

Summer 8-8-2017

# Effects of an Intimate Partner Violence Intervention on Relationship Behaviors with Tests of Moderators: A Multilevel Analysis

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EFFECTS OF AN INTIMATE PARTNER VIOLENCE INTERVENTION ON  
RELATIONSHIP BEHAVIORS WITH TESTS OF MODERATORS: A MULTILEVEL  
ANALYSIS

By

KATHERINE KERR FRANCHOT

B.S., UNIVERSITY OF GEORGIA

A Thesis Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment of the  
Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

30303

**BACKGROUND:** Annually, nearly 7 million women and 5.5 million men experience some form of intimate partner violence, and IPV has serious health impacts. IPV has also been shown to limit the impact of early childhood home visiting interventions. Given the positive impacts of home visiting, reducing IPV in that setting could alleviate the negative impacts of IPV and improve mother and child outcomes as well. The analysis performed here are from data from a randomized trial of an intimate partner violence intervention that was embedded into the Nurse Family Partnership, an evidence-based home visiting program. The intervention focused on identifying severe IPV, and for women without severe IPV, improving relationship choices and skills including communication patterns and conflict resolution. An “under review” paper has found a preventive effect on IPV for the intervention, so the goal of this analysis is to examine how changes in partner and history of IPV moderate the relationship skills outcomes.

**AIMS:** This study aims to fill the gap in knowledge regarding the relationship between a home visiting intervention and relationship skill outcomes in women enrolled in the home visiting program, the Nurse Family Partnership. The purpose of the study is to discover whether the relationship skills differ in participants with stable vs. unstable partnerships and with those who experienced IPV before the start of the study.

**METHODS:** Women were randomized to NFP as usual (n=105) or NFP+, which included NFP plus the IPV intervention (n=133). Participants were surveyed at baseline, and at one and two-year follow-up with 81% retention over 2 years. Standardized assessment tools assessed relationship quality, communication, problem solving, partner support, relationship decision making, and psychological maltreatment. Marginal modeling was conducted to examine whether the intervention accounted for any change in relationship variables and whether the impact is moderated by history of IPV and changes in partnership.

## **RESULTS:**

Multilevel modeling of the seven outcomes variables showed some main effects of time such that conflict resolution improves over time for the intervention group ( $p < 0.05$ ). There is one clinically significant three-way interaction showing reduced relationship danger in the intervention group in women with previous IPV history ( $p < 0.05$ ). However, there were no significant interactions with time and treatment group for the moderator, partnership change.

APPROVAL PAGE

A MULTILEVEL ANALYSIS OF LONGITUDINAL DATA EXAMINING RELATIONSHIP  
FACTORS ASSOCIATED WITH INTIMATE PARTNER VIOLENCE

By

Katherine Kerr Franchot

Approved:

Daniel J. Whitaker, Ph.D

Committee Chair

Matthew J. Hayat, Ph.D

Committee Member

June 2, 2017

Date

## Acknowledgments

First, I would like to thank everyone involved in the An Enhanced Nurse Home-Visitation Program study for allowing me to use their data for this research. I would then like to thank Dr. Daniel Whitaker, my chair and incredible boss, for his endless patience, guidance, and sense of humor during this project. I'd also like to thank my mentor and professor, Dr. Matt. Hayat, for teaching me many valuable lessons in an incredibly kind manner. I sincerely appreciate both of you taking the time to work with me through this thesis.

To my coworkers and friends, thank you for your encouragement, advice, and empathy. To my parents and sister, thank you for your constant support, love, and prayers. To my dog, Stella, thank you for keeping me company on many long work days and nights. And lastly to Sam, thank you for being my partner, and being so understanding and helpful through this process. You truly are the best.

## Author's Statement Page

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Katherine Kerr Franchot

Signature of Author (electronically signed)

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## **Introduction**

### **Prevalence of Intimate Partner Violence**

Intimate Partner Violence (IPV) encompasses any physical, sexual and emotional abuse perpetrated by a significant and intimate partner (WHO, 2010). IPV covers a wide range of levels of abuse and violence including stalking and psychological abuse, such as threats of physical and sexual violence (Spivak, 2014). IPV occurs among women and men, opposite and same-sex relationships, and cohabiting and non-cohabiting partners (Ard, 2011). In the United States, IPV is a serious, yet preventable public health issue. The pervasiveness of IPV stems from the high prevalence, severity and long-term impact interrelated with the issue. The Centers for Disease Control and Prevention (CDC) list intimate partner violence prevention as a top priority in their research agenda within the National Center for Injury Prevention and Control (NCIPC) specifically identifying gaps in the research and prevention plans (Black et al., 2011).

The Division of Violence Prevention within the CDC/NCIPC conducts the National Intimate Partner and Sexual Violence Survey. The most recent survey is from 2011 and estimates prevalence of IPV, stalking victimization, and sexual violence in the United States from a large, nationally representative sample (Krebs et al., 2011). The survey is ongoing and collects national and state level data to ensure the construction of the most current prevention plans (Breiding et al., 2011). The lifetime prevalence of physical and psychological IPV among women is 31.5% and 47.1%, respectively (Breiding, Chen & Black, 2014). These rates may underestimate the true rate because of the sensitivity of the questions. IPV can occur in both heterosexual relationships and same-sex relationships. Even though men experience negative consequences from IPV, women are shown to be disproportionately affected (Black et al., 2011). Most victims do not report IPV to police, family, or friends (Spivak, 2014).

## **Impact**

Intimate partner violence has long-term negative health consequences for the victims (Campbell, 2002). IPV remains a significant predictor of injury in women even with controlling for age, race, health, insurance status, and childhood abuse (Iverson et al., 2013). Effects of IPV can manifest itself in obvious ways such as bruises, cuts, and broken bones, but may also be indicated by overall poor health status, poor quality of life, and high use of health services (Dillon et al., 2013). Health effects also include death, injury, chronic pain, functional disabilities and poor pregnancy outcomes (Dillon et al., 2013).

The effects of IPV can be immediate and direct, long term and direct, and indirect. Direct effects include death and injury. Femicide (murder of women) studies find high rates of IPV prior to the murder (Plichta, 2004). The Federal Bureau of Investigation reported that nearly one-third of female homicide victims are killed by an intimate partner (Catalano et al., 2009, Coker et al., 2000). Studies conducted in the United States found that femicide is a leading cause of pregnancy-associated deaths with 13-24% of all pregnancy-associated deaths caused by femicide (Cheng & Horon, 2010). Results from a meta-analysis demonstrate that abuse before pregnancy and lower education level are the strongest risk factors for predicting IPV during and after pregnancy (James, Brody & Hamilton, 2013). Partner violence is associated with a greater likelihood of unintended pregnancy and worse maternal health behavior (James, Brody & Hamilton, 2013). With substance abuse being highly associated with IPV, women who become pregnant are less likely to cease substance use (Holden et al., 2012). The impact on the baby extends past health issues at birth because children born into violence are at a greater risk for child abuse and maltreatment (Zolotor, 2007). In addition, women assaulted by an intimate partner are more likely to suffer injury than those assaulted by a non-intimate person (Tjaden &

Thoennes, 2000). In 2010, IPV contributed to 1,295 deaths and 10% of the annual total homicides (Spivak et al., 2014).

Another direct effect of intimate partner violence is injury (Arias, 2004). The range of injury is variable. Injuries vary from minor to critical with minor injuries being the most common (Black, 2011). Studies have identified certain types of injuries that abused women are more likely to sustain. These findings can be used to train healthcare providers to identify abused women in a healthcare setting. Many studies conducted to research the health effects of IPV have found that abused women are more likely to report head injuries, loss of consciousness, and concussions (Jackson et al, 2002). There also is a dose-response relationship to the severity and frequency of blows to the head. The more often the occurrence, the more likely a victim is to have a traumatic brain injury, which is associated with many negative long-term impacts (Jackson et al. 2002).

Mental health effects are also associated with IPV and can have a serious and debilitating impact on victims. Depression and post-traumatic stress disorder (PTSD) have a high comorbidity and are the most prevalent mental health diagnoses among those who experience IPV (Campbell, 2002). Longitudinal evidence supports the decrease of depression with decrease of partner violence (Chuang et al., 2012). PTSD in victims of IPV stems from severity of abuse, previous trauma, and partner dominance. PTSD is associated with suicidal tendencies, and abused women are more likely to commit suicide in the United States (Dillon et al., 2012). Substance abuse is a risk factor for IPV, but it is also a mental health effect of IPV. There is comorbidity with these mental health issues, because women experiencing PTSD from partner abuse might abuse a substance in order to cope or mask the negative feelings (Lehavot et al., 2014).

IPV not only affects the victim, and is shown to be strongly related to child maltreatment and poor or negative parenting behaviors. The overlap between partner violence and child maltreatment is well documented and ranges from 40-60% depending on the sample and measurement (Appel & Holden, 1998). Many studies have found a relationship between experiencing IPV and poor parenting practices (e.g. high levels of conflict, use of discipline). A study sampling 3,000 women reported that women who experienced recent IPV also reported using significantly more physically aggressive or neglectful behaviors compared with those who experienced past violence or no violence at all (Kelleher et al., 2008). The researchers examined aggressive behaviors using the CTS-PC, and found that women in an abusive relationship were more likely to engage in aggressive acts toward their child (AOR=6.44, 95% CI=2.93-14.15) (Windham et al., 2004). Yet another study that utilized the CTS-PC to measure psychological aggression and physical assault and found similar outcomes. The association between IPV and child maltreatment exacerbates the impact because it shows the pattern of violence and the need to end the cycle.

Along with the negative impacts to the victims of partner violence and to the children involved, there are also public health and economic effects associated with intimate partner violence. According to the Centers for Disease Control and Prevention, the costs of IPV against women alone exceeded an estimated \$5.8 billion in 1995 (Eisler, 2015). \$4.1 billion of those dollars were spent on direct medical and mental health care services and the other portion is from lost productivity and lost lifetime earnings from victims of IPV homicide (Max et al., 2004). In 2010, the combined costs of IPV including medical, mental health, and lost productivity were estimated at \$8.3 billion (Spivak, 2014). This increase over 15 years adds to the necessity to understand the risk factors of violent behavior and implement primary prevention methods.

According to the National Violence against Women Survey (NVAWS), IPV victims lose a total of nearly 8.0 million days of paid work each year, which is equivalent to 32,000 full-time jobs (Max et al., 2004). Violence and abuse occur on some level in all age groups and all socioeconomic statuses making the impact pervasive and difficult to calculate (Dolezal, McCollum, & Callahan, 2009). The extent of costs for components such as medical services, social services, and criminal justice services are lacking (Shorey, Tirone, & Stuart, 2014). Therefore, the overall costs associated with IPV are likely underestimated in the United States. Cost estimates of IPV are necessary to improve outcomes for this public health issue and to improve violence intervention strategies and programs. Also, the estimate will help shape public policy and society's attitude towards the severity of the issue (Wuest et al., 2015).

### **Risk Factors**

The Social Ecological Model (SEM), is a theory based framework to explain health behaviors by targeting risk factors at varying levels in a society (Ali & Naylor, 2013). There are five hierarchical levels of the SEM: individual, interpersonal, community, organizational, and policy. Every environment has different risk factors and characteristics to explain why an individual or community would engage in a health behavior. This model can help guide the creation and implementation of programs to determine the best way to target risk factors at each level (Krug et al., 2002). For IPV, there are risk factors for perpetrators and victims at each of these levels of the SEM (Stith et al., 2004). It is important to recognize that many studies examining IPV are cross-sectional studies, so the majority of risk factors are more accurately described as associations or predictors (Capaldi, 2012). On the individual level, factors associated with IPV are low self-esteem, low socioeconomic status, substance abuse, delinquent behavior as a youth, low educational achievement, unemployment, isolation, mental health issues

(i.e. depression, borderline personality disorder, etc.), and history of physical or psychological abuse in childhood. (Stith et al., 2004, Whitaker et al., 2009). When examining socioeconomic status, income in particular is a strong predictor for IPV across all major ethnic groups in the United States (Capaldi, 2012). Age is also a risk factor for IPV. IPV occurs to some extent at each age level, but is heavily weighted to a young adult population. According to a meta-analysis examining risk factors, there is a negative association between age and IPV with the likelihood of being involved in a violent relationship decreasing as age increases (Capaldi, 2012). Adults ages 15 to 24 are much more likely to engage in violent behaviors (Stöckl, 2014). According to the National Intimate Partner and Sexual Violence Survey, 71.1% of women and 58.2% of men who experienced IPV were first victimized before the age of 25 years. 23.2% and 14.1% of female and male victims, respectively, report their first intimate violent encounter before the age of 18 years (Breiding et al., 2014).

On the relational or interpersonal level of the SEM, IPV is linked to marital instability, such as divorce and separation, dysfunctional family relationships, financial strain, and dominance or control needs in a relationship (Wong & Mellor, 2014). Within intimate relationships, pregnancy is associated with heightened risk of persistent IPV. IPV is observed in about 3-13% of pregnancies as evidenced by many studies around the world with higher prevalence in lower socioeconomic classes. The prevalence of IPV is estimated to be about 5.3% during pregnancy and increase to 8.7% around the time of pregnancy (Saltzman et al., 2003). Higher rates are found in adolescents and in clinics and healthcare settings that serve predominately poor women. The health of a baby can also affect the risk of IPV. A meta-analysis of eight studies concluded that if a baby is born with health issues, such as low-birth weight, there is a greater likelihood of IPV after birth (Hill et al., 2016). This is a circular issue, because abuse during pregnancy leads to poor

infant outcomes, such as preterm delivery, fetal distress, antepartum hemorrhage, and pre-eclampsia (Zolotor & Runyan, 2006, Pallitto et al., 2013). IPV is also associated with low social capital, a psychological sense of community, neighborhood cohesion and collective efficacy (Bourey, 2015). Social networks are a part of social capital and are characterized by trust, shared reciprocity and community norms (Aldrich & Meyer, 2015). The strength of community and quality of schools and neighborhoods all have an impact on the normalization of IPV and outcomes. There is varying evidence on the impact of relationship level variables on IPV. According to Rothman et al., lower social control and increased disorder within a neighborhood is associated with violence amongst teenagers, but is not associated with violence in adults (Rothman et al., 2011). Another cross-sectional study found that no level of social capital and social cohesion mediated the effect of income level and poverty on IPV perpetration (Caetano, Ramisetty-Mikler, & Harris, 2010). Further research needs to be conducted to determine which relational level characteristics and circumstances can mitigate or exacerbate IPV perpetration in communities.

A secondary data analysis performed using the longitudinal data from the Toledo Adolescent Relationships Study (TARS) used fixed effect models to determine the frequency of IPV across changing and continuing relationships (Johnson et al., 2015). Increases in infidelity and disagreements were positively associated with rates of IPV and persons reporting higher rates of trust and commitment showed lower rates of IPV in their relationships over time (Johnson, et al, 2015). When looking at persistence of IPV, this study showed support for a lower proportion of IPV victimization when there is higher partner turnover and higher rates of IPV for those that persist in a relationship. Cohabitation is also associated with a higher proportion of relationships with IPV (Johnson et. al, 2015, Longmore et al., 2016). A cross-sectional study utilizing telephone survey data of 1,435 mothers living in the United States showed that each 1

point increase in a 4-point social capital index was associated with a 30% reduction in the odds of domestic violence (Zolotor, 2006).

On the organizational and societal levels, policies and programs focused on the prevention of IPV have an impact on rates of IPV (Dahlberg, 2002, Lundgren & Amin, 2015). This level includes broad, societal factors about the normalization of violence in the culture and whether the climate is encouraging or inhibiting of perpetration (Tayton, 2014). Economic, educational, health and social policies on these levels affect individual violence through inequalities between groups, education, access to healthcare, and community support (Heise & Garcia-Moreno, 2002, Dahlberg, 2002).

### **Current Prevention Methods**

The CDC's National Center for Injury Prevention and Control has listed the prevention of intimate partner violence as one of its top priorities. The *Injury Research Agenda* identifies key ways to prevent IPV including developing programs for perpetrators, reversing any normalization of IPV in our society, and increasing the research about how violent behaviors develop (DHHS, 2003). The CDC identifies ways to disrupt the development of violent behaviors by focusing on factors that assist the growth of healthy, respectful relationships and how these qualities can be protective factors against IPV (Breiding et. al, 2014). Training of health professionals to identify IPV and risk factors for violent behaviors is imperative for primary and secondary prevention of IPV. A focus on familial relationships can impact a person's susceptibility to be victimized or likelihood of perpetration (Capaldi & Clark, 1998, Ehrensaft et al., 2003). A stable and nurturing familial environment centering on respectful and open communication has been shown to reduce IPV in children as they approach adulthood (Breiding et. al, 2014).



A 20-year prospective study studying IPV perpetration risk factors from childhood to adulthood, developed prevention implications based on the findings (Ehrensaft et al., 2003). The researchers determined that secondary partner violence prevention programs are useful for children with conduct disorder and those exposed to parental violence (Rizo et al., 2015, Ehrensaft et al., 2003). Children with no history of violence, but a history of child maltreatment could benefit from interventions at a young age to inhibit the progression of a conduct disorder. Prevention programs for children could be implemented within services given to women in battered women's shelters and as a part of mandated services given by family courts in domestic violence cases (Ehrensaft et al., 2003). Most implemented programs target children in later adolescence when they are entering romantic relationships, but the authors encourage programs to start before children reach adolescence. Therefore, children can be educated and targeted before patterns of excessive punishment or violence become entrenched in their relationships and later carried into intimate partnerships (Ehrensaft et al., 2003).

Research suggests that partner violence begins at a young age, and accordingly, most programs targeting primary prevention of IPV focus on middle school and high school aged children. According to the National Center for Injury Prevention and Control within the Centers for Disease Control and Prevention, over 53.8% of female victims and 47.7% of male victims experience IPV before the age of 25 years (Breiding et. al, 2014). Therefore primary prevention efforts are important and should occur at an early age. School-based programs have been implemented across the United States to target the prevention of teen dating violence and subsequently intimate dating violence. Some programs show promise in reducing prevalence of teen dating violence (Whitaker et al, 2013), but the long-term effect into adulthood is difficult to determine (Hickman, Jaycox, & Aronoff, 2004). Secondary and tertiary prevention programs are

also essential in order to prevent recurrence of IPV, especially among victims who disclose their abuse. Eighty four percent of female victims and 60.9% of male victims disclose their abuse to someone in their lives, but only 21% and 5.6%, respectively, account their victimization and abuse to a medical professional who would be mandated to officially report the abuse (Breiding et al, 2014). IPV is linked to poor communication in victims, which translates to a lack of communication with the assigned health care provider. This characteristic can lead to worse outcomes and low reporting (Gutmanis et al., 2007). Reporting needs to increase, so that attention and proper programs can be directed to this need.

In addition to primary prevention interventions offered in schools, other interventions are needed that address IPV in community settings. One setting that serves many women at risk for IPV due to economic circumstances are home visiting programs. In reality, the majority of broadly implemented IPV interventions (e.g., school based) will reach individuals who have and have not experience IPV, and thus must address both primary and secondary intervention. The CDC is working on ways to decrease the barriers that limit disclosure of IPV to people that are in a position to direct victims to programs and other professionals that can help them leave the situation and get the help they need to recover (Breiding et. al, 2014, Todahl et al., 2008).

### **Interventions**

Many intervention strategies have been developed to target IPV that focus on perpetrator, victim, couples, or child-witness interventions (Stover et al, 2009). Because of the nature of IPV and the prevalence of physical and emotional symptoms, public health professionals have designed interventions to fit within primary care services (Harvey, Garcia-Moreno & Butchart, 2007). Because victims may be reluctant to report IPV, implementing interventions within primary care services is an excellent way to reach those that might not come forward on their

own. A primary care professional is more likely to examine and visit the patient for other reasons and, if trained, can detect potential abuse and use communication tools to address the issue directly with a potential victim (Scholle et al., 2003). There are barriers and difficulties to implementation of IPV interventions within primary care settings. A systematic review conducted in the United States found overlapping barriers including lack of provider education regarding IPV, lack of time to screen within appointment, lack of effective interventions, and patient nondisclosure. There were also consistent findings that providers allowed their fear to effect intervening as to not offend the patient (Scholle et al., 2003). Community based interventions outside of the primary care medical setting are proven to be an effective way to reach the most susceptible population to IPV. Unfortunately, targeted interventions designed to prevent or reduce IPV victimization and perpetration are limited (Wathen, 2003).

### **Interventions for IPV in Home Visiting Programs**

Home visiting programs are shown to be an effective tool for young children in preventing child abuse, improving language skills, and reducing low birth weights and improving lives of socially high-risk children who live in disadvantaged families (Peacock, 2013). Increasing evidence shows that utilizing home visiting programs, such as the Nurse Family Partnership (NFP), can be a useful tool for identifying and preventing intimate partner violence (Mejdoubi, 2013). Home visiting programs often target young, disadvantaged mothers, and many begin while the woman is pregnant, thus, addressing a population at high risk for IPV. It is critical to address IPV in this setting, not only to reach vulnerable populations and reduce the impact of IPV on its victims, but because IPV has been shown to eliminate many of the positive effects of the NFP program (Eckenrode, Ganzel, & Henderson, 2000). Another program aiming to prevent and reduce IPV against pregnant and postpartum women and their infants is the

Domestic Violence Enhanced Home Visiting Program (DOVE) (Sharps et al., 2016). DOVE is a brochure based intervention by public health nurses, and it was tested for effectiveness in a randomized control trial in 2016 (Sharps et al., 2016). The women enrolled in the study all experienced perinatal IPV and half were randomized to the intervention DOVE program. There was a significant decrease in IPV from baseline to 1, 3, 6, 12, 18, and 24 months postpartum in the intervention group (all  $p < 0.001$ ) (Sharps et al., 2016). This study reinforces the effectiveness of an in-home intervention when targeting IPV in vulnerable populations. In the current study, an IPV intervention targeting both primary and secondary prevention was implemented with a cohort of pregnant women participating in the NFP.

### **Nurse Family Partnership**

As described, home visiting programs are an effective way of reaching disadvantaged populations that are more susceptible to relationship issues and intimate partner violence. The Nurse Family Partnership (NFP), an evidence-based home visiting program for promoting maternal and child health, presents an excellent opportunity to address IPV both during and after pregnancy (Olds, 2006). NFP is a program designed to assist first-time mothers through pregnancy and until the child has reach two years of age. Families are paired with nurse home visitors and the nurses provide educational support and care to create a healthy, safe environment for the new baby and family (Olds, 2006). NFP targets low-income, young, and disadvantaged first-time mothers. NFP provides regular home visits conducted by community health nurses for those who meet WIC eligibility, or who have a household income at or below 185% of the federal poverty level. NFP promotes healthy behaviors for the mother during and after pregnancy

to increase the likelihood of positive birth outcomes, sensitive and effective parenting, and a positive life course for the mother and child (Olds, 2006).

NFP was chosen as the vehicle for delivering the IPV prevention/intervention for several reasons. First, NFP targets pregnant women who are at increased risk for child maltreatment based on the demographic risk factors of being young, undereducated, and economically-disadvantaged. Research indicates these same demographic characteristics put women at higher risk for IPV victimization (King & Chalk 1998). Not surprisingly, a 15-year follow-up of NFP clients found that 48% reported experiencing IPV in the 12-13 years since they had completed the program (Eckenrode, Ganzel & Henderson, 2000). Second, NFP's has been shown to be made less effective among women when IPV is present (Eckenrode, Ganzel & Henderson, 2006). Therefore, if an intervention to prevent IPV was embedded within NFP and was successful, it would serve the dual purpose of preventing IPV and increasing the effectiveness of the NFP program. The presence of IPV in the home has been noted as a problem for other home visitation programs as well (Duggan et al., 2004).

### **The Current Study**

The current study seeks to examine the impact on relationship outcomes of an IPV intervention that was delivered within the NPF model. The intervention was a multi-component intervention based on existing interventions. The first component was a structured assessment; nurses were taught to screen women for IPV using standardized screening tools. The second component was an intervention for women who screened positive for IPV. For those women, nurses delivered an intervention designed to assess IPV dangerousness and to provide women with resources and referrals for unsafe situations. The final component was a six-session intervention designed to address relationship choices and behaviors than can lead to IPV. The

intervention was based on the Within My Reach curriculum, which focuses on healthy relationships including IPV prevention.

To date, the analyses of the primary outcomes – IPV victimization and perpetration – have been completed and are currently under review. Briefly, those analyses found that the intervention had an impact on some violence outcomes, but only for women who had experienced no violence at baseline (primary prevention sample). Specifically, compared to controls, intervention participants who were not victims at baseline were less likely to be victimized by physical abuse one year later. A similar, but non-significant trend was found at two-year follow-up.

The current research will examine any intervention effects on a variety of relationship constructs the WMR intervention was intended to effect. Those constructs include things like conflict resolution, relationship problem solving, psychological aggression, relationship decision making, and others. This research will examine whether the intervention affected these outcomes, and will examine a couple of important potential moderators. First, we will examine any influence of baseline violence as a potential moderator because baseline violence was found to moderate the finding for IPV (Feder et al, under review). Second, we will examine partnership stability as a potential moderator. Partner stability is key for several reasons. First, relationship variables should naturally be expected to change if partnerships change. Second, there is evidence that IPV perpetration changes with changing partnerships. For example, one study focused on persistence and desistance of physical partner aggression using a nationally representative sample of young adults reporting on their two most recent relationships (Whitaker et al, 2009). Findings indicate that just 29.7% of perpetrators in the initial relationship went on to perpetrate aggression in the subsequent relationship, while 70.3% of perpetrators desisted

(Whitaker et al, 2009). Other studies report similar findings (Giordano et al., 2015, Walker et al., 2013).

In summary, the research questions are as follows:

1. Does the intervention impact relationship skill variables targeted in the intervention relative to control?
2. Does the impact differ by initial violence status?
3. Does the impact differ according to stability of partnerships?

## **Methods and Procedures**

### **Study Design**

This study is a two-arm randomized trial with women being randomized to the intervention or control at the time of referral to the Nurse Family Partnership program. The intervention arm (referred to as NFP+) received the NFP model plus the IPV intervention described below. The control arm received (referred to as NFP) standard NFP. All NFP eligible women were eligible for the study. NFP eligibility criteria are: no current children, currently pregnant but not more than 28 weeks in gestational age, English or Spanish speaking, and WIC-eligible. The investigators recruited participants over a 20 month period and randomized them to each group once they met the eligibility criteria. The study took place in the NFP program in Multnomah County, Oregon. Once the individuals were randomized to each arm, the characteristics and demographics of the NFP+ and NFP groups were compared and found to have no significant differences between the two arms; the study population did not differ from the overall population of women enrolled in the Multnomah County NFP program.

## **Sample**

The sample included 238 women, with 105 assigned the NFP+ group and 133 assigned to the NFP group. All women completed baseline surveys, and 88% and 81% completed one- and two-year follow up surveys, respectively. There were no statistically significant differences between groups in likelihood of retention at one or two year follow up ( $p > 0.05$ ).

Baseline demographics indicate that women had a mean age of 20 years and were approximately 50% Hispanic. Only half of the participants had a high school diploma/GED and 40% had a household annual income of less than \$10,000. Approximately 80% of participants were in a relationship at baseline and 35% reported experiencing some physical violence at baseline, and 31% reported perpetrating physical violence at baseline.

## **Interventions**

### *IPV intervention: NFP+*

The NFP+ intervention included three components to target IPV through both primary and secondary prevention utilizing the empowerment theory (Zimmerman, 2000). Empowerment theory suggests that individuals benefit from engaging in a process by which they obtain information and acquire skills and resources that enable them to make decisions and intentionally influence the direction of their lives. The first component of the intervention involves training the NFP nurses on IPV in general, and training them to use a specific validated assessment for IPV with their clients early in the program and at regular intervals thereafter. The second component is a brochure drive intervention (McFarlane et al., 1992) and targets women who report experiencing significant IPV in their relationship. The third component was adapted from the Within My Reach intervention and was delivered to all women in the NFP+ group regardless



of whether they reported IPV (women reporting severe IPV were given the brochure driven intervention first and the focus was on reducing dangerous IPV). The components are described in more detail here:

1. Structured assessments for IPV: The IPV assessment consisted of three standardized instruments: the Abuse Assessment Screen (McFarlane et al., 1992) (AAS), the Women's Experience with Battering (Smith, Smith, & Earp, 1999) scale (WEB) and the control subscale of the Psychological Maltreatment of Women Inventory (Tolman, 1989) (PMW) The nurse was to immediately deliver the brochure-driven intervention if a client gave either a positive response to any of the AAS items at least two positive responses on the WEB, or a response of "frequently" or "very frequently" to any of the PMWI control items. These measures capture abuse from current and past partners across a range of time frames. NFP+ nurses administered the verbal assessment at designated time points (around the 4<sup>th</sup> visit (but after the baseline survey), at 6 weeks-, 3 months-, and 1 year-postpartum), and as-needed whenever IPV was suspected.
2. Brochure-Driven Intervention: Originally developed by Parker, McFarlane, and colleagues, (McFarlane et al., 1992) this intervention included: a discussion of power and control; administration of the Danger Assessment Scale, (Pinard & Pagani, 2000) the development of a client-driven safety plan, and the provision of national and local resources for IPV.
3. Adaptation of Within My Reach Curriculum: The Within My Reach curriculum (Pearson, Stanley, & Kline, 2005) is a relationship curriculum for individuals delivered in a group setting. This curriculum is based on PREP, an evidenced-based group relationship training program for couples, which has been found to increase relationship satisfaction

and reduce physical aggression (Markman et al., 2004). WMR was modified for use in NFP to fit the nurse-to-client delivery method, with five units that focus on understanding, building, and maintaining healthy relationships. The fifth unit builds on the concepts in the previous 4 units and consists of skills-based activities designed to enhance conflict management, communication, and decision-making skills. This skills-based relationship curriculum was intended to help women better understand IPV and its consequences for them and their children (Pearson, Stanley, & Kline, 2005). The participants are measured on a “sliding vs. deciding” scale to determine their decision making skills and whether they intentionally make a decision or find themselves “sliding” into a relationship or situation. The participants are taught decision-making, conflict management, and communication skills to reduce risk of victimization and perpetration of IPV in their relationships.

### **Assessment Measures**

Women who consented to participate in the study were contacted by a research assistant who scheduled an audio computer-assisted survey at the client’s home or another private location. Clients were given the option of using the audio-computer assistance in completing the interview or of turning off the audio and reading and progressing through the interview on their own. The addition of audio addressed literacy issue by having the survey items read to participants. NFP+ nurses conducted NFP visits before the baseline assessment was completed, but did not implement any of the IPV intervention components until after the baseline assessment had been completed. Two follow-up assessments were conducted at one and two years post baseline. Independent research assistants conducted all assessments to limit participant response

bias that may be caused by the presence of the home visitor. The study protocol was approved by the Institutional Review Boards at the CDC and the Multnomah County Health Department.

## **Measures**

A battery of 22 different measurement tools were given at each survey. Here, I focus only on the measures that are relevant for this thesis.

### Demographics

The demographics survey is a 10-item questionnaire requesting basic participant information, such as age, sex, race/ethnicity, income level, and education level. Education level was an 8-level categorical variable with choices ranging from elementary to post college. The participant is to select the highest level of education that they have completed. Income was 7-level categorical variable ranging from ‘under \$10,000’ to ‘above \$35,000’. The questionnaire asks for the sources of yearly income and the participant can select any that apply from a list including Employment, Social Services, Disability, and Family support you.

### Partners and relationship stability

The Relationship History Measure is a 33-item survey assessing the participant’s relationship history, their partner situation around the time of pregnancy and their current relationship. To measure partnership change and stability, we focused on the questions from this measure targeting partnership status and relationship history. Participants were asked to provide the name of their current romantic partner and to indicate whether this relationship was with the child’s father. Depending on the participant’s answer, there is a skip pattern. If yes, they are asked details of the relationship. If not, then they are asked to provide the name of the target

child's father and the most serious status of that relationship. These questions were asked at each time point, so the partnership change variable is coded based on the names of the current partners as if they change between time points. The partnership change variable is dichotomous and coded as 0 for no partner change (either the participant never had a partner or kept the same partner) and 1 for any partner change at any time point in the study.

### *Relationship Violence at Baseline*

The Relationship History Measure is a 33-item survey assessing the participant's relationship history, their partner situation around the time of pregnancy and their current relationship. The questionnaire continues by asking about partner violence occurrence, such as, "Thinking back on all of your dating relationships, how often has your partner thrown something at you that could hurt, twisted your arm, pushed, shoved, grabbed, or slapped you?" and then, if the participant answers a frequency greater than zero, asking how many partners have done those things to them. This measure is repeated at the Follow-up assessments to determine if there is any change in relationship violence over the course of the study. For the purpose of this analysis, we are focusing on baseline violence, only. Baseline violence is coded as 0 for no violence at baseline and 1 for any violence at baseline.

### *Quality of Marriage Index*

The Quality of Marriage Index (QMI) is a 5-item scale with a 7-point response scale measuring relationship quality. Participants are instructed to answer the questions about their current intimate, romantic relationship. If the participant is not involved in a relationship, then they should answer based on their most recent romantic relationship. The scale includes items

such as, “My relationship with my partner is very stable.” (Norton, 1983). The QMI showed a high degree of internal consistency ( $\alpha=0.92$ ).

#### *Psychological Maltreatment of Women Index*

The Psychological Maltreatment of Women Index (PMWI) is a 7-item scale with a 5-point response scale measuring psychological control. The directions state that the respondent should rate the behaviors occurring in the past 12 months with their current romantic partner or for their most recent relationship. The index includes items such as, “My partner restricted my use of the telephone” and “My partner was jealous or suspicious of my friends.” (Tolman, 1989). The PMWI was internally consistent in this sample ( $\alpha=0.84$ ).

#### *Relationship Danger Assessment*

The Relationship Danger Assessment (RDA) is a 7-item survey using a 3-point response scale. This survey assesses warning signs for the termination of a relationship based on risk factors to determine if the relationship (not the participant) is in danger. The respondent is directed to rate how often they and their romantic partner experience the following things. The scale includes items such as, “When we have a problem to solve, it is like we are on opposite teams” and, “My partner criticizes or belittles my opinions, feelings, or desires.” Higher scores indicate a greater danger of the relationship dissolving. The RDA has a high internal consistency in this sample ( $\alpha=0.87$ ).

#### *Conflict Resolution Scale*

The Conflict Resolution (CR) scale is an 8-item scale using a 5-point response scale measuring conflict in the relationship. The directions state to rank the items according to yours and your partner’s behavior. This scale includes items such as, “We go for days without settling

our differences” (reversed) and, “By the end of an argument, each of us has been given a fair hearing.” Coding of items was such that higher scores indicate more positive conflict resolution. The CR is internally consistent in this sample ( $\alpha=0.29$ ).

#### Communications Pattern Questionnaire-Short Form

The Communications Pattern Questionnaire-Short Form (CPQ) is a 12-item scale using a 9-point scale measuring positive communication (Christensen, 1988). The CPQ is interested in how the respondent and their main romantic partner deal with problems in the relationship. It includes items such as, “I express my feelings to my partner” and, “My partner blames, accuses, and criticizes me,” (reversed). Higher scores indicate more positive, healthy communication patterns. The CPQ has a high internal consistency in this sample ( $\alpha=0.70$ ).

#### Support received from Partner

Support received from the partner was measured with the Partner Support Subscale of the Prenatal Psychosocial Profile (PPPPart). The scale includes 11-item that are responded to on a 6-point scale that measures satisfaction with the support received from a partner (Curry, Burton, & Fields, 1998). Sample questions include “Allows me to talk about things that are very personal and private” and “Tolerates my ups and downs and unusual behaviors”. Higher scores indicate greater perceived support from the partner. The PPPPart has a high internal consistency in this sample ( $\alpha=0.95$ ).

#### Sliding Versus Deciding Scale

Sliding Versus Deciding (SVD) is a key concept from the WMR curriculum. In WMR, participants are taught to take an active role in relationship choices and decisions, or to “decide” rather than “slide” into choices. The SVD scale attempts to measure the extent to which

participants decide rather than slide into relationship choices. The SVD includes 11 items each of which is responded to using a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree). Examples of items on the scale are, “Going out with someone is an important decision that should be given a lot of thought,” and “If I go steady with a guy, I want to know he can make me happy in the long run.” Four of the eleven items are reverse coded and include, “Sometimes I wonder what I’m doing with the kinds of guys I go out with,” and “My relationships seem to just happen instead of me making decisions about them.” (Stanley, Rhoades, & Markman, 2006). Higher scores on SVD indicate a greater tendency to make clear, informed decisions regarding relationship choices. The SVD has a high internal consistency in this sample ( $\alpha=0.69$ ).

### **Statistical Analysis**

Statistical analyses were performed using SAS 9.4. The analyses conducted to determine if the intervention impacted relationship skill variables and, whether partner violence or relationship stability moderated any intervention effect. Before the analyses were conducted, the data were examined to understand the distribution and direction of the data. The univariate procedure outputs the mean, median, quartiles, standard deviations, and the ‘normal’ option adds the test for normality. We discovered that the seven dependent outcomes were not normally distributed. Therefore, to address the lack of normality, we dichotomized each dependent outcome. Marginal models were used with generalized estimating equations to fit a multilevel model that accounted for the multilevel nature of the data.

The primary analyses were conducted with marginal models to account for the longitudinal measurements taken on each subject. Longitudinal data involves measurements of the same variables of a particular subject at multiple time points. It is characterized by two sources of variation: within-subject variation and between-subject variations. The within-subject

observations are generally dependent of each other. Moreover, because subjects may leave the study at any time or they may miss some follow-up observations, longitudinal data are usually incomplete (Barkaoui, 2014). Longitudinal studies present the advantage of allowing researchers to investigate and explain change over time. These data have three time points: baseline, follow-up 1, and follow-up 2 with a one-year interval in between each assessment.

Multilevel modeling (MLM) is useful because it includes all observed data in the analysis even if an observation has missing data at one or more time points. Other statistical methods like ANOVA with Repeated Measures require complete data, and partial data on a subject cannot be included in the analysis. MLM has the flexibility to handle unbalanced data structures assuming that observations are missing at random (MAR). The MLM estimation technique is based on generalized estimating equations, which allow the use of all available observations from each participant, meaning there is no need to exclude subjects with missing values from the analysis or impute missing observations (Wang, Xie, & Fisher, 2011). Compared to traditional methods, MLM have much higher levels of statistical power when applied to the same data (Curran, Obeidat, & Losardo, 2010). MLM accounts for the dependence of observations within groups. MLM provides the possibility to examine the micro-level of individuals and the macro-level of group frameworks simultaneously. Finally, MLM can easily handle time-varying and time-invariant covariates and can accommodate two or more hierarchical levels (Diez-Roux, 2000). MLM functions on multiple levels simultaneously and can be modeled as a two part system. The type of MLM I will be using is the marginal model. The marginal model works with nonlinear data by allowing the mean of a population to depend on a linear predictor through a nonlinear link function. This allows the extension of the general linear model to the generalized linear



models framework. The dataset from the study includes all of the variables of interest for this analysis.

The frequency distribution of demographic variables were examined overall, and by intervention and control groups. Frequency procedures were performed to report the distribution of the dichotomous relationship outcomes.

Three models were fit for each dependent variable to address the research questions. The first model includes time and treatment group as covariates and the interaction between time and treatment condition. Time is also included in the repeated statement. The second model includes baseline violence as a covariate and with a three-way interaction with time and treatment condition. The third model replaced baseline violence with partner change as a covariate and for the three-way interaction with time and treatment condition. The second and third models also include the time variable in the repeated statement

Then, I prepared the data for the marginal model procedure by recording the frequencies and percentages of participants in each category for the seven dependent outcomes. The variables were separated by lower and higher values. Each scale for the dependent outcomes extend from a meaning of low to high. For the QMI, 'low' correlates to low quality of marriage and high with a better reported quality. For the CPQ, 'low' is associated with worse communication and 'high' associated with better communication. The CR, SVD, and PPPPart follow this trend as well with 'low' signifying worse conflict resolution, decision making, and partner support and 'high' with better conflict resolution skills, decisive action, and support from an intimate partner. The PMWI is dichotomously separated into 'Did Not Experience' and 'Did Experience' with anyone indicating never being psychologically maltreated coded as a '0' and any reporting of maltreatment coded as a '1'. The RDA is coded into 'low' and 'high', but 'low' correlates to

lower danger of a relationship falling apart and ‘high’ with a greater likelihood of a relationship collapsing. I first reported frequencies for the first model which includes the three time points and the treatment conditions. The data will be further stratified into those who reported violence at baseline and those who did not report any previous IPV. Baseline violence is one of the two main moderators being tested in the mixed modeling procedure. Last, I incorporated partner change as a moderator, and reported the frequencies and percentages over time by treatment condition, separately for participants with and without stable partnerships.

The seven dependent variables being tested are psychological maltreatment of women (PMWI), quality of marriage (QMI), relationship danger assessment (RDA), partner support (PPPPart), communication patterns (CPQ), sliding vs. deciding in decision making (SVD), and conflict resolution skills (CR). The substantive independent variables for each model include time and treatment group: intervention or control. Time is categorized as the three time points (1, 2, and 3). Treatment group is categorized dichotomously into 0 for control group and 1 for intervention group. The second model includes baseline violence as a covariate and interaction term, with baseline violence coded dichotomously as 0 for no baseline violence and 1 for baseline violence. The third model contains partner stability as a covariate and interaction term with time and treatment group. The partner stability variable is coded into two variables. One variable includes participants who had the same partner at all time points. The second variable measures partner change and includes participants who changed partners over the course of the study period. The variable used for this model is the partner change variable, which is coded dichotomously with 0 as no partner change throughout the study and 1 as any partner change.

Each model was run using Proc Genmod in SAS 9.4 with the use of the Repeated Statement. The seven dependent outcomes were coded into dichotomous variables because they

did not fulfill the normal assumption. The relationship outcomes are analyzed using the marginal model framework. The distribution is binomial and logit is the link function. Odds ratios and confidence intervals were output and examined to determine the associations between the independent variables and outcomes.

Partial model statements that describe the fixed effects part of each model are displayed below (with a corresponding unstructured working correlation matrix specified for each using the Repeated Statement in SAS):

**Model 1:**

$$\log(\rho/1-\rho) = \beta_0 + \beta_{\text{TIME}}X_{\text{TIME}} + \beta_{\text{TREATMENT}}X_{\text{TREATMENT}} + \beta_{\text{TIME}*\text{TREATMENT}}X_{\text{TIME}}X_{\text{TREATMENT}}$$

**Model 2:**

$$\log(\rho/1-\rho) = \beta_0 + \beta_{\text{TIME}}X_{\text{TIME}} + \beta_{\text{Tx}}X_{\text{Tx}} + \beta_{\text{BxVIOLENCE}}X_{\text{BxVIOLENCE}} + \beta_{\text{TIME}*Tx}X_{\text{TIME}}X_{\text{Tx}} + \beta_{\text{Tx}*BxVIOLENCE}X_{\text{Tx}}X_{\text{BxVIOLENCE}} + \beta_{\text{TIME}*BxVIOLENCE}X_{\text{TIME}}X_{\text{BxVIOLENCE}} + \beta_{\text{TIME}*Tx*BxVIOLENCE}X_{\text{TIME}}X_{\text{Tx}}X_{\text{BxVIOLENCE}}$$

**Model 3:**

$$\log(\rho/1-\rho) = \beta_0 + \beta_{\text{TIME}}X_{\text{TIME}} + \beta_{\text{Tx}}X_{\text{Tx}} + \beta_{\text{PARTNERSTAT}}X_{\text{PARTNERSTAT}} + \beta_{\text{TIME}*Tx}X_{\text{TIME}}X_{\text{Tx}} + \beta_{\text{Tx}*PARTNERSTAT}X_{\text{Tx}}X_{\text{PARTNERSTAT}} + \beta_{\text{TIME}*PARTNERSTAT}X_{\text{TIME}}X_{\text{PARTNERSTAT}} + \beta_{\text{TIME}*Tx*PARTNERSTAT}X_{\text{TIME}}X_{\text{Tx}}X_{\text{PARTNERSTAT}}$$

**Results**

***Descriptive Data***

Table 1 shows demographic variables including age, race, education, annual household income, violence at baseline, and partnership change. The average age for women in the control group is 20.7 years and the average age for women in the intervention group is 20.3 years. The highest proportion of Race is Hispanic and then White and then African American. In the NFP

group, 67.3% of women had graduated high school and 84.9% had completed high school in the intervention (NFP+). For post high school education, 32.7% of women in the NFP group and 15.1% of women in the NFP+ group indicated pursuing education past high school. When looking at women who experienced violence before baseline, 58.8% of women in the NFP group indicated yes and 68.9% of women in the control indicated yes. Participants in the NFP group had about half of the subsample with stable partnerships, and half with changing partnerships (49.5% and 50.5%). The majority of the women in the NFP+ group changed partners throughout the study (60.7%) compared to stable partnerships.

Tables 2-4 show the frequencies and percentages for the seven dependent outcomes by treatment and time. The dependent outcomes are separated dichotomously based on their scales. Table 3 shows the frequencies over time with the stratification of participants by whether they reported experiencing IPV at the baseline time point (Yes/No). The number of people are listed in each category and the percentages to easily view the breakdown of participants in the categories and where the majority lie. Table 4 shows the frequencies for the seven dependent variables by treatment and time and then separated by Relationship change status. If someone changed partners at one of the time points in the study, that participant is in the “yes” category and if they maintained the same partner throughout the whole study or never had a partner, then they are in the “no” category.

*Research Question 1: Does the intervention impact relationship skill variables targeted in the intervention relative to control?*

For this research question, it was hypothesized that there will be a significant difference in the relationship outcomes between the intervention group and the control group over time. The main results for the first research question are shown in Table 5. Because the research questions

are focused on understanding differences in treatment outcomes over time, I focus on interactions including Treatment Group and Time. The table displays the parameter estimates and their confidence intervals and p-values. For any significant treatment condition and time interactions, odds ratios and confidence intervals are reported for those outcomes. I used the 'estimate' statement in SAS 9.4 to output the odds ratios for the treatment groups over time pertaining to the relationship outcomes. Across the seven dependent measures, there were no reported significant treatment group by time interactions.

However, there are important within treatment group and time effects that are worth reporting. For the Quality of Marriage Index, there is a significant odds of a lower quality of marriage for the intervention at the end of the study compared to the beginning ( $p < .0001$ ). For the control group, there is a significant odds ratio comparing relationship quality from the midpoint of the study to the beginning and the end of the study to baseline ( $p < 0.02$ ,  $p < 0.0002$ , respectively). Although the lack of an interaction suggests these different rates of change are not statistically different, it is worth noting that the direction of the differences is in the opposite direction of the hypothesis, and favors the control group over the intervention group. Specifically, over time, the decrease in relationship quality is greater for the intervention group compared to control. The proportion of cases with high relationship satisfaction decreases for the intervention group from 64.8% to 54.0% 43.8% at Time 1, 2, and 3 respectively. For the control group, the proportions of high satisfaction reports also decreases, but at a lower rate from 52.5% to 44.7% to 44.0% over the three time points.

#### *Description of Derivation of Parameter Estimates and Odds Ratios*

Here, I describe the derivation of the parameter estimates and their odds ratios for the significant time effects within the control and intervention groups. A contrast was used to look at

the linear combination of estimates to derive the parameter estimates at Time 2 vs. Time 1 and Time 3 vs. Time 1. The model statement for QMI with treatment group and time and their interaction as covariates is:  $\log(\rho/1-\rho) = 0.08 + 0.49X_{TX} - 0.30X_{TIME=2} - 0.30X_{TIME=3} - 0.14X_{TX=1, TIME=2} - 0.54X_{TX=1, TIME=3}$ . The odds ratios for each time point by group are found in Table 5. The regression coefficient from the model statement for the reference time category is 0.08 for the Control and  $0.08 + 0.49(1) = 0.57$  for the Intervention. These values are subtracted from the regression coefficients at the later time points (2, 3) in order to get the parameter estimates. Parameter estimates were exponentiated to calculate odds ratios. For the estimate of an event in the intervention group for time point 2, the equation follows:  $\log(\rho/1-\rho) = 0.08 + 0.49(1)_{TX} - 0.30(1)_{TIME=2} - 0.30(0)_{TIME=3} - 0.14(1)_{TX=1, TIME=2} - 0.54(0)_{TX=1, TIME=3}$ . The end calculation is 0.13 and then taking in the difference of the reference regression coefficient leads to -.44. The odds ratio can be computed by raising e to the power of this value,  $OR=e^{-.44} = .65$ . The odds ratio for the control is derived from the same method of taking a linear combination of the estimates at each time point. The regression coefficient is just the beta estimate, 0.08, for the reference time point (1). The regression coefficient for Time 2 for the control group is calculated from the model statement and equals -.30. This value subtracted by the reference value is -0.38 and the corresponding odds ratio is 0.69.

Therefore the odds of having high relationship satisfaction for the intervention group at Time 2 compared to Time 1 is 0.65 when controlling for other covariates ( $p < 0.05$ ). The odds ratio for the control comparing relationship quality at Time 2 compared to baseline is 0.69 controlling for other covariates ( $p < 0.02$ ). This significant change is found within each group, but it is key to note that the lack of an interaction means that the relatively change between the intervention and control groups is not statistically different. The difference between the two

groups for this time point can be calculated by taking the difference of the estimates from the model statements and exponentiating them to get the odds ratio. For Time 2 vs. Time 1, the calculation would be  $-0.44 - -0.38$ , which equals  $-.82$ . This value exponentiated is an odds ratio of 0.44.

The odds ratio comparing Time 3 to baseline for the intervention group is .43 ( $p < 0.0001$ ) and the odds ratio comparing Time 3 to baseline for the control group is .57 ( $p < 0.0002$ ). The odds of a participant in the intervention group having a high QMI at the end of the study is .43 times more likely than at the beginning of the study. The odds of a participant in the control group having a high QMI at the end of the study is .57 times more likely than at the beginning of the study. Both of these odds ratios are less than one, so the odds of higher QMI decrease over time in reference to an odds ratio of one at baseline. The relative change or group by time interaction is not significant. The odds ratio comparing the two groups is calculated by contrasting the linear combination of estimates ( $-.27$  for the intervention and  $-.22$  for the control) and getting a comparative odds ratio of 0.95. This OR is not significant with a p-value of 0.19.

For the relationship skill, conflict resolution, there is significance for both the control and intervention groups when comparing odds at Time 2 vs. Time 1. This relationship can be seen through the frequencies and percentages found in Table 2. The proportion of women reporting better CR skills increases from 49.2% at Time 1 to 62.4% at Time 2 and then decreases slightly to 57.6% at Time 3. There is an overall increase of 8.4% from baseline to the 2<sup>nd</sup> follow-up time point. There is also an increase in the control group with the proportions increasing from 56.2% at baseline to 65.9% at Time 2 and then decreasing slightly to 63.0%.

#### *Description of Derivation of Parameter Estimates and Odds Ratios*

For this model, the partial model statement of the fixed effects is:  $\log(\rho/1-\rho) = \beta_0 + \beta_{\text{TIME}}X_{\text{TIME}} + \beta_{\text{TX}}X_{\text{TX}} + \beta_{\text{TIME*TX}}X_{\text{TIME}}X_{\text{TX}}$  and with the values plugged in:  $\log(\rho/1-\rho) = 0.25 - 0.29X_{\text{TX}} + 0.40X_{\text{TIME}=2} + 0.28X_{\text{TIME}=3} + 0.18X_{\text{TX}=1, \text{TIME}=2} + 0.13X_{\text{TX}=1, \text{TIME}=3}$ . The parameter estimate at the reference time point for the control is the intercept value, 0.25, and the parameter estimate for the intervention group at the reference time point is  $(0.25 - 0.29(1)) = -.04$ . By contrasting the linear combinations of these values with respect to time points 2 and 3, parameter estimates will be exponentiated to output the odds ratios. For the comparison between Time 2 and the reference time point, Time 1, for the intervention group, the equation is  $\log(\rho/1-\rho) = 0.25 - 0.29(1)_{\text{TX}} + 0.40(1)_{\text{TIME}=2} + 0.28(0)_{\text{TIME}=3} + 0.18(1)_{\text{TX}=1, \text{TIME}=2} + 0.13(0)_{\text{TX}=1, \text{TIME}=3} = 0.54$ . The difference in estimates at Time 2 and Time 1 is 0.58 and this value, exponentiated, is the odds ratio, 1.78.

The odds ratios are only significant from Time 2 vs. Time 1 for the intervention group and control group. The odds ratio from Time 2 compared to baseline for the intervention is 1.78 ( $p < 0.01$ ). The odds ratio for the control is 1.63 and calculated using the same method ( $p < 0.003$ ). The odds of a participant in the intervention group having better CR skills is 1.78 times more likely at the midpoint of the study compared to baseline controlling for other covariates. For the control group, the odds of a participant having higher CR skills at the midpoint of the study is 1.63 times the odds at baseline controlling for other covariates. The relative change or group by time interaction is not significant. The odds ratio comparing the two groups is calculated by contrasting the linear combination of estimates (.54 for the intervention and .65 for the control) and getting a comparative odds ratio of 0.90. This odds ratio is not significant with a p-value of 0.86.



For all women participating in the study, there are significantly higher conflict resolution skills reported across time and treatment condition. However, there is a greater odds of higher CR skills in the intervention group compared to the control. There were no other significant interactions for any of the other dependent relationship skill outcomes.

*Research Question 2: Do any intervention effects differ by initial violence status?*

For this research question, I examined whether initial baseline violence status moderated the treatment effect on relationship outcomes. Each model included Treatment, Time, Baseline violence, and all interactions between the three variables. The primary effect of interest is the three-way interaction. The main results for this research question are displayed in Table 6.

The only relationship outcome with a significant three-way interaction was the Relationship Danger Assessment ( $p < 0.02$ ). The three-way interaction is only significant from Time Point 3 to Time Point 1. For the RDA, higher values indicate a higher risk of the relationship collapsing. The interaction can be visualized in Table 3. The proportion of women with a history of violence in the intervention group with a higher RDA decreases from 65.0% to 51.4% to 46.7%. The proportion of women with a history of violence in the control group with a higher RDA increases from 54.8% at baseline to 65.6% at the end of the study. The -18.3% change from baseline to Time 3 in the intervention group and the +10.8% increase in the control group is the significant interaction with this subsample of women who experienced violence at baseline. Among women with no history of violence, high relationship danger increased over time for the intervention group (35%, 65%, 67% = +22%), whereas it remained relatively stable for the control group (48%, 44%, 51%).

*Description of Derivation of Parameter Estimates and Odds Ratios*

Here, I will explain how the parameter estimates used to calculate the odds ratios for Table 6 were derived. The partial model statement with fixed effects is:  $\log(\rho/1-\rho) = \beta_0 + \beta_{\text{TIME}}X_{\text{TIME}} + \beta_{\text{TX}}X_{\text{TX}} + \beta_{\text{BxViolence}}X_{\text{BxViolence}} + \beta_{\text{TIME*TX}}X_{\text{TIME}}X_{\text{TX}} + \beta_{\text{TX*BxViolence}}X_{\text{TX}}X_{\text{BxViolence}} + \beta_{\text{TIME*BxViolence}}X_{\text{TIME}}X_{\text{BxViolence}} + \beta_{\text{TIME*TX*BxViolence}}X_{\text{TIME}}X_{\text{TX}}X_{\text{BxViolence}}$ . With the values from the RDA model, the model statement is  $\log(\rho/1-\rho) = -0.07 - 0.55X_{\text{TX}} + 0.17X_{\text{TIME=2}} - 0.13X_{\text{TIME=3}} + 0.20X_{\text{TIME=2, TX=1}} + 0.77X_{\text{TIME=3, TX=1}} + 0.26X_{\text{BXVIOLENCE}} + 0.97X_{\text{TX=1, BxViolence=1}} + 0.29X_{\text{TIME=2, BxViolence=1}} + 0.59X_{\text{TIME=3, BxViolence=1}} - 1.23X_{\text{TX=1, TIME=2, BxViolence=1}} - 1.98X_{\text{TX=1, TIME=3, BxViolence=1}}$ . The parameter estimate for an event in the intervention group at the reference time point, Time 1 is  $-0.07 - 0.55(1) + 0.26(1) = -0.36$ . The parameter estimate of an event in the intervention group at Time 3 is  $\log(\rho/1-\rho) = -0.07 - 0.55(1)_{\text{TX}} + 0.17(0)_{\text{TIME=2}} - 0.13(1)_{\text{TIME=3}} + 0.20(0)_{\text{TIME=2, TX=1}} + 0.77(1)_{\text{TIME=3, TX=1}} + 0.26(1)_{\text{BXVIOLENCE}} + 0.97(1)_{\text{TX=1, BxViolence=1}} + 0.29(0)_{\text{TIME=2, BxViolence=1}} + 0.59(1)_{\text{TIME=3, BxViolence=1}} - 1.23(0)_{\text{TX=1, TIME=2, BxViolence=1}} - 1.98(1)_{\text{TX=1, TIME=3, BxViolence=1}}$ . This computes to a parameter estimate of  $-0.14$ . The contrast of linear combinations from Time 3 to Time 1 is equal to  $0.22$  and exponentiated is an odds ratio of  $1.25$ . To compare, I will calculate the odds ratio for the control group with women who have a history of baseline violence from Time 3 to Time 1.

The parameter estimate for an event of higher relationship danger for participants with relationship violence history in the control group at Time 1 is  $-0.07 + 0.26(1) = 0.19$ . The parameter estimate for an event of higher relationship danger for participants with relationship history violence in the control group at Time 3 is  $\log(\rho/1-\rho) = -0.07 - 0.55(0)_{\text{TX}} + 0.17(0)_{\text{TIME=2}} - 0.13(1)_{\text{TIME=3}} + 0.20(0)_{\text{TIME=2, TX=1}} + 0.77(0)_{\text{TIME=3, TX=1}} + 0.26(1)_{\text{BXVIOLENCE}} + 0.97(0)_{\text{TX=1, BxViolence=1}} + 0.29(0)_{\text{TIME=2, BxViolence=1}} + 0.59(1)_{\text{TIME=3, BxViolence=1}} - 1.23(0)_{\text{TX=1, TIME=2, BxViolence=1}} - 1.98(0)_{\text{TX=1, TIME=3, BxViolence=1}}$ , which is  $0.65$ . The contrast from Time 3 to Time 1 is equal to  $0.46$ ,

and this value exponentiated is an odds ratio of 1.58. The odds of reporting higher relationship danger in the control group at the end of the study is 1.58 times the odds of reporting higher RDA at baseline.

The odds ratio comparing the intervention group and the control group from Time 3 vs. Time 1 for women with violence history is calculated by contrasting the linear combination of estimates (.22 for the intervention and .46 for the control) and getting a comparative odds ratio of 0.79. The odds of a participant with IPV history in the intervention group having a higher RDA at the end of the study compared to baseline is 0.79 times the odds of a participant with IPV history in the control group when controlling for other covariates. This value is less than 1, which is the reference. This odds ratio is not statistically significant with a p-value of 0.06.

This shows that women in the intervention group who have IPV history respond better to the intervention in terms of improving the likelihood of relationship dissolution compared to women enrolled in the control group. The parameter estimate for baseline violence is 0.26, which positively adds an increased relationship danger if it is present. Even though baseline violence was not an overall moderator for each of the relationship outcomes, there is evidence to believe that it can inhibit or change an intervention. There were no other significant three-way interactions with any of the other dependent relationship skill outcomes.

*Research Question 3: Does the impact differ according to stability of partnerships?*

For this research question, it is predicted that partnership status throughout the study will moderate the relationship between the treatment condition and outcome variables being tested. To test partnership change as a moderator for this association, interactions were used. Multiple interactions were tested: time and treatment condition, time and partnership change, treatment

condition and partnership change, and the three-way interaction between time, treatment condition and partnership change. The main point of interest is in whether the three-way interaction is significant at the alpha .05 level. The main results for the third model and research question are displayed in Table 7. The added covariate is the partnership change variable that is being tested for moderation in the relationship with time and treatment condition. When probed for an intervention effect, none of the three-way interactions with Time, Treatment, and Partner Stability were significant at the alpha level .05. There were no other notable findings for this model that included partnership change as a covariate to test for moderation.

### **Discussion**

The purpose of this study was to assess the relationship between a home visiting IPV intervention and certain relationship outcomes when examining IPV history and stability of partnerships. These findings provide additional understanding of the impact of home visiting programs for intimate partner violence prevention in at-risk populations. When not considering any potential moderators, there is evidence to support a positive increase in conflict resolution skills. Across all time points, women report higher abilities in conflict resolution within their intimate relationships. This change could be attributed to maturation among the women as they change over the course of two years. These skills are beneficial when diffusing situations and arguments and can deter them from becoming violent. This skill can be viewed as a protective and preventive factor of IPV. This finding is reinforced by other IPV prevention programs that focus on nonviolent conflict resolution as a way to protect against IPV and prevent IPV in younger adolescents and adults. A meta-analysis by Lundgren and Amin, found that the majority of studies prioritized curriculum with conflict resolution skills as a way to teach young adolescents how to handle adversity without resulting to violence (Lundgren & Amin, 2015).

Because IPV typically starts in the teen years when adolescents enter relationships, intervening with programs that teach skills like conflict resolution is crucial to prevent IPV.

Because no significant differences over time were found between groups, there is no support for the hypotheses that the intervention group fared better than the control group in conflict resolution skill improvement. Both treatment groups had significant improvement over time, so the Nurse Family Partnership as usual could be beneficial for teaching nonviolent conflict resolution in this population of women. This finding supports the idea that an additive IPV prevention piece to NFP is not necessary in order to see positive relationship skill outcomes.

The other finding for the first research question was that the intervention group had a lower odds of higher reported quality of marriage over time. Relationship satisfaction decreased over time, but there no differences by intervention arm were found. This change in relationship satisfaction could be attributed to a common dissatisfaction witnessed after the birth of a child (Rosand et al., 2011). Evidence suggests a negative relationship between maternal distress, depression, and anxiety and relationship satisfaction after a baby is born. This change in relationship quality could be due to outside effects not associated with the study.

For the second research question, there was only one significant treatment condition, time, and baseline violence interaction. This was a three-way interaction from time point 3 to time point 1 for the Relationship Danger Assessment. This finding is interesting because it provides support that women with a history of IPV enrolled in the intervention show lower risk of relationship danger at the end of the study as compared to the same subsample in the control group. However, this significant interaction is not seen for the other time points (Time 2 to Time 1).

One explanation is that the small size of the sample does not lend enough power to detect an effect for this interaction between treatment groups. Since not all of the women had a history of IPV before study, the sample is split by initial IPV experience, reducing the number of participants in each cell. For the RDA, the subsamples of women with violence victimization have values less than 30 for the three time points in the intervention and values less than 40 for the three time points in the control group. With the significance appearing in the category with samples of less than 30 and with the p-value being close to 0.05, the likelihood of a power problem is high. The positive parameter estimate of baseline violence history for this model provides support that baseline violence can inhibit the improvement of relationship skills in this population of women.

There are several possible reasons for failing to detect a relationship in the third model that includes partner change as a covariate to test for moderation. One reason is that the coding of the partnership stability variable was not defined correctly. To maintain reasonable sample sizes in each group, participants were considered to have a stable partnership if they either never had a partner or kept the same partner across all time points. Other nuances of partner change patterns were not captured. In addition, the two subpopulations (never had a partner, never changed) may be very different, but we were unable to explore differences due to sample size. For example, a participant in a stable partnership might already possess higher relationship skills like communication and conflict resolution and thus may not show improvement over time.

### *Strengths*

There are many strengths to this study. First, this is a longitudinal data analysis, so temporal ordering of variables is present to indicate a causal relationship between the treatment condition and risk factors and the relationship outcomes. The use of multilevel modeling for

longitudinal data for this analysis is another strength because all of the data was eligible for inclusion. Longitudinal data is susceptible to missing data because of dropout, adverse events, and loss-to-follow-up over time. To be able to include observations with missing time points is a strength in order to maintain the estimated power a priori to the study. In other analytic methods, such as repeated measures ANOVA, the observations are required to be complete at all time points in order to be included in analysis or else the whole observation would have to be thrown out. This study also had an impressive retention rate for the participants over time. At the follow-up one time point, 88% of the women continued to participate in the assessments and study, and 81% were retained at the follow-up two time point. This high retention increases the power of the analysis and allows for a more robust conclusion. Another strength is that this study examines mediating factors from a study and treats them as outcomes. For any significant relationship, there is a possibility that it is a mediating factor between the intervention and IPV outcome. This study is a good start when considering a full mediation analysis.

### *Limitations*

There are several limitations to this study. First, this sample was obtained from a group of first-time, low-income mothers who were enrolled in a home visitation program. A broader sample from the community might provide more generalizable results about the impact of baseline violence and partnership change on relationship outcomes in an intimate partner violence prevention program. This limited sample also provides a lack of variability, which is seen in the distribution of the data for the relationship skill outcomes. When the majority of participants are answering in one direction or the other, the data are likely to be skewed.

Another limitation is how the variable for partnership change was created. Women who kept the same partner or never had a partner were considered to be in the stable partnership

category because there was no change. However, a participant who does not have a partner at any time point can be different from someone who is in a stable relationship and they can have very different responses on the surveys assessing these relationship outcomes of interest.

With the lack of normality, another limitation is the validity of the measures for the main relationship outcomes. The dependent outcomes were skewed and needed to be dichotomized in order to run a marginal model. The question raised is whether the researchers are measuring what they are intending to measure with these surveys and tools. The internal validity of the measures could be impacting the response and leading to a skewed distribution.

Another limitation is that the majority of this data for the study is based off of self-report measures. The challenges with self-report data include response bias due to social desirability. Women might report that they have never been psychologically maltreated or that their relationship has a higher quality than in actuality because they are concerned about a societal response. Self-report data also introduces recall bias. Participants in this study had to remember events up to a year, which they could easily recall incorrectly.

Another challenge with this implementation is the lack of fidelity measures to monitor the intervention. Nurses were initially trained to deliver the intervention, but there is not a set measurement to ensure that fidelity in practice is sound. There were checklists in place and occasional supervision to check in on the nurse home visitors, but the lack of measures is a limitation for this study and future dissemination. Thus, it is possible that the lack of intervention effects found here was due to poor implementation. A last limitation is that these data are from a small sample size. With only 238 women participating, it is difficult to look at response at the different time points and within the subcategories for partner change and violence history because the numbers in each group are so low. Longitudinal data is susceptible to missing values



due to participants missing time points or not responding to each survey, which inhibits the totals for each subcategory. Therefore, the power to detect a difference is limited and can lead to false positives.

### *Future Direction*

With the responses for the relationship outcomes lacking normal distributions, future researchers should examine other survey measures and analytic tools for this population. At this point, there is little literature on how partner stability and partner change influence IPV onset or persistence. This addition introduces a new school of thought when developing IPV prevention programs. There has been research on persistence and desistance of IPV perpetration across partners, but not as much focus on the victim. One aim of this study was to determine if partnership stability or change was associated with better relationship skill outcomes. No significant findings were found, but it would still be interesting to examine whether victims of IPV can learn relationship skills in order to improve their current relationship or end relationships that are abusive. Future research should categorize this variable into more categories and include 'never had a partner' as an option. Multiple categories would require a greater sample size to have enough power. This type of study could include a qualitative factor in order to determine the reasons why a participant changed partners or kept their current partner. Another future research question would be to examine how partner status impacts the outcome of intimate partner violence over time.

This research reinforces the positive impacts of home visiting programs as participants in both treatment arms experienced better relationship skill outcomes for the majority of these outcomes.

**Tables**

*Table 1:  
Demographic Profile of Sample at Baseline (n=238)*

	NFP Average (n=105)	NFP+ Average (n=133)
Age	20.7 (4.705)	20.3 (4.040)
Race		
White, non-Hispanic	38 (36.5%)	32 (24.1%)
African American	11 (10.6%)	15 (11.3%)
Hispanic/Latina*	44 (42.3%)	75 (56.4%)
Asian/Pacific Islander	3 (2.9%)	3 (2.3%)
Native American	1 (1.0%)	2 (1.5%)
Education		
Completed High School*	70 (67.3%)	112 (84.9%)
Some Post-HS Education	34 (32.7%)	20 (15.1%)
Annual Household Income <sup>a</sup>	4.32[1.534]	4.21[1.731]
Baseline Violence		
Yes	42 (41.2%)	41 (31.1%)
No	60 (58.8%)	91 (68.9%)
Partnership Change		
Yes*	46 (50.5%)	41 (39.3%)
No*	45 (49.5%)	71 (60.7%)

*\*significant at the alpha level 0.05 a: income 1=less than or equal to \$3000, 2=3001-6000, 3=6001-9000, 4=9001-12,000, 5=12,001-15,000, 6=15,001-20,000, 7=20,001-30,000, 8=30,001-40,000, 9=over 40,000*

Table 2:

*Frequencies over Time and Treatment Condition for Relationship Outcomes*

Dependent Variables	Time 1	Time 2	Time 3
	Frequency (%)	Frequency (%)	Frequency (%)
<b>PMWI</b>			
<b>NFP</b>			
Did not Experience	27 (25.7%)	29 (30.5%)	20 (23.5%)
Experienced	78 (74.3%)	66 (69.5%)	65 (76.5%)
<b>NFP+</b>			
Low	44 (33.3%)	37 (32.7%)	37 (34.9%)
High	88 (66.7%)	76 (67.3%)	69 (65.1%)
<b>QMI</b>			
<b>NFP</b>			
Low	48 (47.5%)	52 (55.3%)	47 (56.0%)
High	53 (52.5%)	42 (44.7%)	37 (44.0%)
<b>NFP+</b>			
Low	44 (35.2%)	52 (46.0%)	59 (56.2%)
High	81 (64.8%)	61 (54.0%)	46 (43.8%)
<b>RDA</b>			
<b>NFP</b>			
Low	52 (49.5%)	41 (43.2%)	40 (47.1%)
High	53 (50.5%)	54 (56.8%)	45 (52.9%)
<b>NFP+</b>			
Low	74 (56.1%)	61 (54.0%)	54 (50.9%)
High	58 (43.9%)	52 (46.0%)	52 (49.1%)

**CPQ****NFP**

Low	44 (43.6%)	43 (45.7%)	38 (46.9%)
High	57 (56.4%)	51 (54.3%)	43 (53.1%)

**NFP+**

Low	44 (33.6%)	40 (37.0%)	45 (45.0%)
High	87 (66.4%)	68 (63.0%)	55 (55.0%)

**SVD****NFP**

Low	49 (46.7%)	44 (46.3%)	40 (47.1%)
High	56 (53.3%)	51 (53.7%)	45 (52.9%)

**NFP+**

Low	65 (49.6%)	60 (53.6%)	55 (51.9%)
High	66 (50.4%)	52 (46.4%)	51 (48.1%)

**PPPPart****NFP**

Low	40 (46.0%)	41 (55.4%)	35 (53.0%)
High	47 (54.0%)	33 (44.6%)	31 (47.0%)

**NFP+**

Low	46 (42.2%)	39 (42.9%)	42 (48.3%)
High	63 (57.8%)	52 (57.1%)	45 (51.7%)

**CR****NFP**

Low	42 (43.8%)	30 (34.1%)	30 (37.0%)
High	54 (56.2%)	58 (65.9%)	51 (63.0%)

**NFP+**

Low	63 (50.8%)	38 (37.6%)	42 (42.4%)
High	61 (49.2%)	63 (62.4%)	57 (57.6%)

Table 3:

*Frequencies over Time and Treatment Condition for Relationship Outcomes Stratified by Violence History at Baseline*

Dependent Variables	Time 1 Frequency (%)	Time 2 Frequency (%)	Time 3 Frequency (%)
<b>PMWI</b>			
NFP			
Bx Violence=No			
Did Not Experience	17 (28.3%)	21 (36.8%)	16 (31.4%)
Experienced	43 (71.7%)	36 (63.2%)	35 (68.6%)
Bx Violence=Yes			
Low	9 (21.4%)	8 (22.9%)	3 (9.4%)
High	33 (78.6%)	27 (77.1%)	29 (90.6%)
NFP+			
Bx Violence=No			
Low	32 (35.2%)	27 (35.1%)	25 (33.3%)
High	59 (64.8%)	50 (64.9%)	50 (66.7%)
Bx Violence=Yes			
Low	11 (27.5%)	9 (25.7%)	11 (36.7%)
High	29 (72.5%)	26 (74.3%)	19 (63.3%)
<b>QMI</b>			
NFP			
Bx Violence=No			
Low	28 (48.3%)	30 (52.6%)	25 (50.0%)
High	30 (51.7%)	27 (47.4%)	25 (50.0%)
Bx Violence=Yes			
Low	19 (47.5%)	20 (58.8%)	20 (62.5%)

	High	21 (52.5%)	14 (41.2%)	12 (37.5%)
<b>NFP+</b>				
	Bx Violence=No			
	Low	29 (32.9%)	35 (45.5%)	41 (55.4%)
	High	59 (67.1%)	42 (54.5%)	33 (44.6%)
	Bx Violence=Yes			
	Low	15 (41.7%)	17 (48.6%)	18 (60.0%)
	High	21 (58.3%)	18 (51.4%)	12 (40.0%)

**RDA**

**NFP**

	Bx Violence=No			
	Low	31 (51.7%)	43 (55.8%)	37 (49.3%)
	High	29 (48.3%)	34 (44.2%)	38 (50.7%)
	Bx Violence=Yes			
	Low	19 (45.2%)	12 (34.3%)	11 (34.4%)
	High	23 (54.8%)	23 (65.7%)	21 (65.6%)

**NFP+**

	Bx Violence=No			
	Low	59 (64.8%)	27 (35.1%)	25 (33.3%)
	High	32 (35.2%)	50 (64.9%)	50 (66.7%)
	Bx Violence=Yes			
	Low	14 (35.0%)	17 (48.6%)	16 (53.3%)
	High	26 (65.0%)	18 (51.4%)	14 (46.7%)

**CPQ**

**NFP**

	Bx Violence=No			
	Low	23 (39.7%)	26 (46.4%)	20 (41.7%)
	High	35 (60.3%)	30 (53.6%)	28 (58.3%)

	Bx Violence=Yes			
	Low	20 (50.0%)	17 (48.6%)	16 (51.6%)
	High	20 (50.0%)	18 (51.4%)	15 (48.4%)
NFP+				
	Bx Violence=No			
	Low	24 (27.0%)	24 (32.9%)	35 (48.6%)
	High	65 (73.0%)	49 (67.1%)	37 (51.4%)
	Bx Violence=Yes			
	Low	20 (48.8%)	16 (47.1%)	10 (37.0%)
	High	21 (51.2%)	18 (52.9%)	17 (63.0%)
<b>SVD</b>				
NFP				
	Bx Violence=No			
	Low	27 (45.0%)	29 (50.9%)	25 (49.0%)
	High	33 (55.0%)	28 (49.1%)	26 (51.0%)
	Bx Violence=Yes			
	Low	20 (47.6%)	13 (37.1%)	15 (46.9%)
	High	22 (52.4%)	22 (62.9%)	17 (53.1%)
NFP+				
	Bx Violence=No			
	Low	46 (51.7%)	43 (56.6%)	39 (52.0%)
	High	43 (48.3%)	33 (43.4%)	36 (48.0%)
	Bx Violence=Yes			
	Low	19 (46.3%)	17 (48.6%)	16 (53.3%)
	High	22 (53.7%)	18 (51.4%)	14 (46.7%)
<b>PPPPart</b>				
NFP				
	Bx Violence=No			

	Low	19 (37.3%)	25 (54.4%)	30 (38.5%)
	High	32 (62.7%)	21 (45.6%)	48 (61.5%)
	Bx Violence=Yes			
	Low	20 (60.6%)	15 (60.0%)	17 (63.0%)
	High	13 (39.4%)	10 (40.0%)	10 (37.0%)
NFP+				
	Bx Violence=No			
	Low	30 (38.5%)	24 (38.7%)	33 (51.6%)
	High	48 (61.5%)	38 (61.3%)	31 (48.4%)
	Bx Violence=Yes			
	Low	16 (53.3%)	15 (53.6%)	9 (40.9%)
	High	14 (46.7%)	13 (46.4%)	13 (59.1%)
<b>CR</b>				
NFP				
	Bx Violence=No			
	Low	24 (44.4%)	16 (30.8%)	21 (42.0%)
	High	30 (55.6%)	36 (69.2%)	29 (58.0%)
	Bx Violence=Yes			
	Low	16 (41.0%)	13 (39.4%)	9 (31.0%)
	High	23 (59.0%)	20 (60.6%)	20 (69.0%)
NFP+				
	Bx Violence=No			
	Low	46 (54.8%)	29 (42.0%)	27 (38.6%)
	High	38 (45.2%)	40 (58.0%)	43 (61.4%)
	Bx Violence=Yes			
	Low	17 (42.5%)	9 (29.0%)	15 (51.7%)
	High	23 (57.5%)	22 (71.0%)	14 (48.3%)



Table 4:

*Frequencies over Time and Treatment Condition for Relationship Outcomes Stratified by Partnership Status*

Dependent Variables	Time 1 Frequency (%)	Time 2 Frequency (%)	Time 3 Frequency (%)
<b>QMI</b>			
NFP			
Partner Change=No			
Low	19 (43.2%)	19 (43.2%)	19 (48.7%)
High	25 (56.8%)	25 (56.8%)	20 (51.3%)
Partner Change=Yes			
Low	26 (60.5%)	30 (73.2%)	26 (70.3%)
High	17 (39.5%)	11 (26.8%)	11 (29.7%)
NFP+			
Partner Change=No			
Low	22 (32.4%)	25 (41.7%)	27 (48.2%)
High	46 (67.6%)	35 (58.3%)	29 (51.8%)
Partner Change=Yes			
Low	18 (41.9%)	22 (55.0%)	24 (66.7%)
High	25 (58.1%)	18 (45.0%)	12 (33.3%)
<b>PMWI</b>			
NFP			
Partner Change=No			
Did not Experience	12 (26.7%)	16 (36.4%)	7 (17.5%)
Experienced	33 (73.3%)	28 (63.6%)	33 (82.5%)
Partner Change=Yes			
Low	12 (26.1%)	10 (24.4%)	9 (24.3%)

	High	34 (73.9%)	31 (75.6%)	28 (75.7%)
<b>NFP+</b>				
	Partner Change=No			
	Low	22 (31.0%)	21 (35.0%)	18 (31.6%)
	High	49 (69.0%)	39 (65.0%)	39 (68.4%)
	Partner Change=Yes			
	Low	15 (32.6%)	11 (27.5%)	13 (36.1%)
	High	31 (67.4%)	29 (72.5%)	23 (63.9%)

**CPQ**

**NFP**

	Partner Change=No			
	Low	17 (38.6%)	22 (50.0%)	15 (41.7%)
	High	27 (61.4%)	22 (55.0%)	21 (58.3%)
	Partner Change=Yes			
	Low	24 (54.6%)	18 (45.0%)	21 (56.8%)
	High	20 (45.4%)	22 (55.0%)	16 (43.2%)

**NFP+**

	Partner Change=No			
	Low	21 (30.0%)	21 (36.8%)	24 (44.4%)
	High	49 (70.0%)	36 (63.2%)	30 (55.6%)
	Partner Change=Yes			
	Low	15 (33.3%)	14 (36.8%)	16 (45.7%)
	High	30 (66.7%)	24 (63.2%)	19 (54.3%)

**CR**

**NFP**

	Partner Change=No			
	Low	17 (40.5%)	12 (30.0%)	14 (35.0%)
	High	25 (59.5%)	28 (70.0%)	26 (65.0%)

	Partner Change=Yes			
	Low	19 (44.2%)	13 (34.2%)	11 (32.4%)
	High	24 (55.8%)	25 (65.8%)	23 (67.6%)
NFP+				
	Partner Change=No			
	Low	32 (48.5%)	21 (38.2%)	19 (35.9%)
	High	34 (51.5%)	34 (61.8%)	34 (64.1%)
	Partner Change=Yes			
	Low	23 (52.3%)	10 (28.6%)	13 (38.2%)
	High	21 (47.7%)	25 (71.4%)	21 (61.8%)
<b>SVD</b>				
NFP				
	Partner Change=No			
	Low	21 (46.7)	22 (50.0%)	19 (47.5%)
	High	24 (53.3)	22 (50.0%)	21 (52.5%)
	Partner Change=Yes			
	Low	21 (45.7%)	18 (43.9%)	18 (48.7%)
	High	25 (54.3%)	23 (56.1%)	19 (51.3%)
NFP+				
	Partner Change=No			
	Low	37 (52.9%)	34 (56.7%)	29 (50.9%)
	High	33 (47.1%)	26 (43.3%)	28 (49.1%)
	Partner Change=Yes			
	Low	21 (46.7%)	17 (43.6%)	18 (50.0%)
	High	24 (53.3%)	22 (56.4%)	18 (50.0%)
<b>PPPPart</b>				
NFP				
	Partner Change=No			

	Low	17 (44.7%)	22 (61.1%)	18 (54.6%)
	High	21 (55.3%)	14 (38.9%)	15 (45.4%)
	Partner Change=Yes			
	Low	17 (46.0%)	16 (51.6%)	15 (57.7%)
	High	20 (54.0%)	15 (48.4%)	11 (42.3%)
NFP+				
	Partner Change=No			
	Low	26 (42.6%)	22 (44.0%)	26 (54.2%)
	High	35 (57.4%)	28 (56.0%)	22 (45.8%)
	Partner Change=Yes			
	Low	14 (40.0%)	11 (39.3%)	10 (38.5%)
	High	21 (60.0%)	17 (60.7%)	16 (61.5%)
<b>RDA</b>				
NFP				
	Partner Change=No			
	Low	19 (42.2%)	17 (38.6%)	19 (47.5%)
	High	26 (57.8%)	22 (61.4%)	21 (52.5%)
	Partner Change=Yes			
	Low	26 (56.5%)	19 (46.3%)	17 (46.0%)
	High	20 (43.5%)	22 (53.7%)	20 (54.0%)
NFP+				
	Partner Change=No			
	Low	42 (59.2%)	35 (58.3%)	28 (49.1%)
	High	29 (40.8%)	25 (41.8%)	29 (50.9%)
	Partner Change=Yes			
	Low	25 (54.4%)	21 (52.5%)	18 (50.0%)
	High	21 (45.6%)	19 (47.5%)	18 (50.0%)

Table 5:

*Parameter Estimates, Odds Ratios, and Confidence Intervals for Dependent Variables over Time and Treatment Condition*

Dependent Variables	Parameter Estimates	95% Confidence Intervals	Pr >  Z
<b>QMI</b>			
Intercept	0.08	(-0.31, 0.47)	0.69
Tx Condition (REF=Control)	0.49	(-0.04, 1.02)	0.07
Time 2 (REF=1)	-0.30	(-0.73, 0.13)	0.17
Time 3 (REF=1)	-0.30	(-0.72, 0.13)	0.17
Time 2*Tx Condition	-0.14	(-0.75, 0.47)	0.66
Time 3*Tx Condition	-0.54	(-1.14, 0.06)	0.08

*Odds Ratios and Confidence Intervals by Treatment Condition Comparing Change over Time*

Dependent Variable	Odds Ratios	95% Confidence Intervals	Pr >  Z
<b>QMI</b>			
<b>Control</b>			
Time 2 vs. Time 1	0.69	(0.51, 0.94)	0.02*
Time 3 vs. Time 1	0.57	(0.42, 0.77)	0.0002*
<b>Intervention</b>			
Time 2 vs. Time 1	0.65	(0.42, 0.99)	0.05
Time 3 vs. Time 1	0.43	(0.28, 0.66)	<.0001*

*Odds Ratios and Interaction p-value comparing the Treatment Groups*

Intervention vs. Control			P-value (p<0.19)
Time 2 vs. Time 1	0.44		
Time 3 vs. Time 1	0.95		

**PMWI**

Intercept	1.06	(0.62, 1.50)	<.0001*
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Tx Condition (REF=Control)	-0.38	(-0.95, 0.19)	0.19
Time 2 (REF=1)	-0.23	(-0.74, 0.29)	0.39
Time 3 (REF=1)	0.13	(-0.40, 0.66)	0.63
Time 2*Tx Condition	0.30	(-0.36, 0.95)	0.37
Time 3*Tx Condition	-0.20	(-0.93, 0.52)	0.59
<b>CPQ</b>			
Intercept	0.27	(-0.12, 0.67)	0.17
Tx Condition (REF=Control)	0.40	(-0.13, 0.93)	0.14
Time 2 (REF=1)	-0.11	(-0.56, 0.33)	0.62
Time 3 (REF=1)	-0.14	(-0.64, 0.36)	0.58
Time 2*Tx Condition	-0.08	(-0.63, 0.48)	0.79
Time 3*Tx Condition	-0.37	(-1.03, 0.30)	0.28
<b>CR</b>			
Intercept	0.25	(-0.15, 0.65)	0.21
Tx Condition (REF=Control)	-0.29	(-0.82, 0.25)	0.29
Time 2 (REF=1)	0.40	(-0.06, 0.87)	0.09
Time 3 (REF=1)	0.28	(-0.25, 0.82)	0.30
Time 2*Tx Condition	0.18	(-0.46, 0.81)	0.59
Time 3*Tx Condition	0.13	(-0.56, 0.82)	0.71

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*Odds Ratios and Confidence Intervals by Treatment Condition Comparing Change over Time*

Dependent Variables	Odds Ratios	95% Confidence Intervals	Pr >  Z
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**CR**

Control

Time 2 vs. Time 1	1.63	(1.19, 2.24)	0.003*
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Time 3 vs. Time 1	1.41	(0.99, 1.99)	0.05
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Intervention

Time 2 vs. Time 1	1.78	(1.16, 2.75)	0.01*
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Time 3 vs. Time 1	1.51	(0.97, 2.34)	0.07
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*Odds Ratios and Interaction p-value comparing the Treatment Groups*

Intervention vs. Control		P-value (p<0.86)
Time 2 vs. Time 1	0.90	
Time 3 vs. Time 1	0.85	

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**PPPPart**

Intercept	0.13	(-0.28, 0.54)	0.54
Tx Condition (REF=Control)	0.16	(-0.40, 0.72)	0.57
Time 2 (REF=1)	-0.40	(-0.80, -0.004)	0.05*
Time 3 (REF=1)	-0.35	(-0.94, 0.24)	0.25
Time 2*Tx Condition	0.29	(-0.33, 0.90)	0.36
Time 3*Tx Condition	0.07	(-0.70, 0.85)	0.85

**SVD**

Intercept	0.13	(-0.25, 0.52)	0.49
Tx Condition (REF=Control)	-0.11	(-0.63, 0.40)	0.66
Time 2 (REF=1)	0.01	(-0.36, 0.37)	0.98
Time 3 (REF=1)	-0.01	(-0.45, 0.44)	0.97
Time 2*Tx Condition	-0.13	(-0.62, 0.35)	0.59
Time 3*Tx Condition	-0.06	(-0.62, 0.51)	0.85

**RDA**

Intercept	0.02	(-0.31, 0.47)	0.92
Tx Condition (REF=Control)	-0.26	(-0.04, 1.02)	0.33
Time 2 (REF=1)	0.30	(-0.73, 0.13)	0.16
Time 3 (REF=1)	0.11	(-0.72, 0.13)	0.69
Time 2*Tx Condition	-0.22	(-0.75, 0.47)	0.44
Time 3*Tx Condition	0.10	(-1.14, 0.06)	0.78

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*\*significant at the alpha level 0.05*

Table 6:

*Parameter Estimates, Odds Ratios, and Confidence Intervals for Dependent Variables over Time and Treatment Condition, and Violence History at Baseline*

Dependent Variables	Parameter Estimates	95% Confidence Intervals	Pr >  Z
<b>QMI</b>			
Intercept	0.07	(-0.45, 0.58)	0.79
Tx Condition (REF=Control)	0.64	(-0.04, 1.32)	0.06
Time 2 (REF=1)	-0.17	(-0.91, 0.56)	0.64
Time 3 (REF=1)	-0.07	(-0.83, 0.69)	0.86
Time 2*Tx Condition	-0.35	(-1.32, 0.61)	0.47
Time 3*Tx Condition	-0.86	(-1.85, 0.13)	0.09
Bx Violence (REF=No)	0.03	(-0.78, 0.84)	0.94
TxCond*BxViolence	-0.40	(-1.54, 0.73)	0.48
Time 2*Bx Violence	-0.28	(-1.46, 0.90)	0.64
Time 3*Bx Violence	-0.54	(0.62, -1.75)	0.38
Tx*Time2*BxViolence	0.53	(-1.10, 2.16)	0.52
Tx*Time3*BxViolence	0.73	(-0.96, 2.41)	0.40
<b>PMWI</b>			
Intercept	0.93	(0.37, 1.49)	0.001
Tx Condition (REF=Control)	-0.32	(-1.02, 0.39)	0.38
Time 2 (REF=1)	-0.39	(-1.17, 0.39)	0.33
Time 3 (REF=1)	-0.15	(-0.96, 0.67)	0.73
Time 2*Tx Condition	-0.39	(-0.61, 1.40)	0.44
Time 3*Tx Condition	-0.23	(-0.81, 1.27)	0.67
Bx Violence (REF=No)	0.37	(-0.56, 1.30)	0.43
TxCond*BxViolence	-0.01	(-1.25, 1.22)	0.98
Time 2*Bx Violence	0.31	(-1.02, 1.64)	0.65
Time 3*Bx Violence	1.11	(-0.50, 2.73)	0.18



Tx*Time2*BxViolence	-0.22	(-2.02, 1.58)	0.81
Tx*Time3*BxViolence	-1.62	(-3.63, 0.40)	0.12
<b>CPQ</b>			
Intercept	0.42	(-0.11, 0.95)	0.12
Tx Condition (REF=Control)	0.58	(-0.13, 1.28)	0.11
Time 2 (REF=1)	-0.28	(-1.02, 0.47)	0.47
Time 3 (REF=1)	-0.08	(-0.86, 0.70)	0.83
Time 2*Tx Condition	-0.01	(-1.01, 0.99)	0.99
Time 3*Tx Condition	-0.86	(-1.88, 0.16)	0.09
Bx Violence (REF=No)	-0.42	(-1.23, 0.39)	0.31
TxCond*BxViolence	-0.53	(-1.65, 0.59)	0.36
Time 2*Bx Violence	0.33	(-0.84, 1.51)	0.58
Time 3*Bx Violence	0.02	(-1.20, 1.24)	0.98
Tx*Time2*BxViolence	0.02	(-1.61, 1.65)	0.98
Tx*Time3*BxViolence	1.40	(-0.30, 3.11)	0.11
<b>CR</b>			
Intercept	0.22	(-0.31, 0.76)	0.41
Tx Condition (REF=Control)	-0.41	(-1.10, 0.27)	0.24
Time 2 (REF=1)	0.59	(-0.21, 1.38)	0.15
Time 3 (REF=1)	0.10	(-0.68, 0.88)	0.80
Time 2*Tx Condition	-0.08	(-1.10, 0.95)	0.89
Time 3*Tx Condition	0.56	(-0.45, 1.57)	0.28
Bx Violence (REF=No)	0.14	(-0.69, 0.97)	0.74
TxCond*BxViolence	0.35	(-0.77, 1.48)	0.54
Time 2*Bx Violence	-0.52	(-1.76, 0.72)	0.41
Time 3*Bx Violence	0.34	(-0.94, 1.61)	0.61
Tx*Time2*BxViolence	0.60	(-1.15, 2.31)	0.49
Tx*Time3*BxViolence	-1.36	(-3.09, 0.36)	0.12
<b>PPPPart</b>			
Intercept	0.52	(-0.05, 1.09)	0.07

Tx Condition (REF=Control)	-0.05	(-0.78, 0.68)	0.89
Time 2 (REF=1)	-0.70	(-1.5, 0.12)	0.09
Time 3 (REF=1)	-0.42	(-1.27, 0.44)	0.34
Time 2*Tx Condition	0.69	(-0.38, 1.75)	0.21
Time 3*Tx Condition	-0.12	(-1.20, 0.97)	0.83
Bx Violence (REF=No)	-0.95	(-1.85, -0.05)	0.04*
TxCond*BxViolence	0.35	(-0.89, 1.59)	0.58
Time 2*Bx Violence	0.72	(-0.62, 2.06)	0.29
Time 3*Bx Violence	0.32	(-1.04, 1.67)	0.65
Tx*Time2*BxViolence	-0.72	(-2.54, 1.10)	0.44
Tx*Time3*BxViolence	0.72	(-1.16, 2.59)	0.45

### SVD

Intercept	0.20	(-0.31, 0.71)	0.44
Tx Condition (REF=Control)	-0.27	(-0.93, 0.39)	0.42
Time 2 (REF=1)	-0.24	(-0.96, 0.49)	0.53
Time 3 (REF=1)	-0.16	(-0.91, 0.59)	0.67
Time 2*Tx Condition	0.04	(-0.91, 0.99)	0.94
Time 3*Tx Condition	0.15	(-0.82, 1.12)	0.76
Bx Violence (REF=No)	-0.11	(-0.90, 0.69)	0.79
TxCond*BxViolence	0.32	(-0.76, 1.40)	0.56
Time 2*Bx Violence	0.67	(-0.50, 1.83)	0.26
Time 3*Bx Violence	0.19	(-0.99, 1.38)	0.75
Tx*Time2*BxViolence	-0.56	(-2.16, 1.04)	0.49
Tx*Time3*BxViolence	-0.46	(-2.10, 1.18)	0.58

### RDA

Intercept	-0.07	(-0.57, 0.44)	0.80
Tx Condition (REF=Control)	-0.55	(-1.21, 0.12)	0.11
Time 2 (REF=1)	0.17	(-0.55, 0.90)	0.64
Time 3 (REF=1)	-0.13	(-0.88, 0.62)	0.73
Time 2*Tx Condition	0.20	(-0.75, 1.16)	0.67

Time 3*Tx Condition	0.77	(-0.21, 1.74)	0.12
Bx Violence (REF=No)	0.26	(-0.53, 1.05)	0.52
TxCond*BxViolence	0.97	(-0.14, 2.08)	0.09
Time 2*Bx Violence	0.29	(-0.89, 1.46)	0.63
Time 3*Bx Violence	0.59	(-0.62, 1.79)	0.34
Tx*Time2*BxViolence	-1.23	(-2.85, 0.40)	0.14
Tx*Time3*BxViolence	-1.98	(-3.65, -0.31)	0.02*

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Dependent Variables	Parameter Estimates	Odds Ratio	P-value
<b>RDA</b>			<b>0.06</b>
Control (BxViolence=Yes)			
Time 3 vs. Time 1	0.65 (Time 3) 0.19 (Time 1)	1.58	
Intervention (BxViolence=Yes)			
Time 3 vs. Time 1	-0.14 (Time 3) -0.36 (Time 1)	1.25	
Intervention vs. Control (BxViol=Y)			
Time 3 vs. Time 1	0.22 (Intervention) 0.46 (Control)	0.79	

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*\*significant at the alpha level 0.05*

Table 7:

*Parameter Estimates, Odds Ratios, and Confidence Intervals for Dependent Variables over Time and Treatment Condition, and Partnership Status*

Dependent Variables	Parameter Estimates	95% Confidence Intervals	Pr >  Z
<b>QMI</b>			
Intercept	0.27	(-0.32, 0.87)	0.37
Tx Condition (REF=Control)	0.46	(-0.32, 1.25)	0.25
Time 2 (REF=1)	-0.00	(-0.84, 0.84)	1.00
Time 3 (REF=1)	-0.22	(-1.09, 0.64)	0.61
Time 2*Tx Condition	-0.40	(-1.51, 0.71)	0.48
Time 3*Tx Condition	-0.44	(-1.58, 0.69)	0.44
Partner Change (REF=No)	-0.70	(-1.55, 0.15)	0.11
TxCond*PartChange	0.29	(-0.87, 1.45)	0.63
Time 2*PartChange	-0.58	(-1.83, 0.67)	0.36
Time 3*PartChange	-0.21	(-1.49, 1.06)	0.74
Tx*Time2*PartChange	0.45	(-1.23, 2.14)	0.60
Tx*Time3*PartChange	-0.14	(-1.88, 1.59)	0.87
<b>PMWI</b>			
Intercept	1.01	(0.35, 1.67)	0.003*
Tx Condition (REF=Control)	-0.21	(-1.04, 0.62)	0.62
Time 2 (REF=1)	-0.45	(-1.35, 0.45)	0.33
Time 3 (REF=1)	0.54	(-0.51, 1.59)	0.31
Time 2*Tx Condition	0.27	(-0.89, 1.43)	0.65
Time 3*Tx Condition	-0.57	(-1.86, 0.72)	0.39
Partner Change (REF=No)	0.03	(-0.90, 0.96)	0.95
TxCond*PartChange	-0.10	(-1.33, 1.12)	0.87
Time 2*PartChange	0.54	(-0.78, 1.87)	0.42
Time 3*PartChange	-0.45	(-1.89, 1.00)	0.55

Tx*Time2*PartChange	-0.12	(-1.89, 1.66)	0.90
Tx*Time3*PartChange	0.32	(-1.55, 2.19)	0.74
<b>CPQ</b>			
Intercept	0.46	(-0.14, 1.07)	0.14
Tx Condition (REF=Control)	0.38	(-0.41, 1.18)	0.34
Time 2 (REF=1)	-0.46	(-1.31, 0.38)	0.28
Time 3 (REF=1)	-0.13	(-1.02, 0.77)	0.78
Time 2*Tx Condition	0.15	(-0.97, 1.28)	0.79
Time 3*Tx Condition	-0.50	(-1.66, 0.67)	0.40
Partner Change (REF=No)	-0.64	(-1.49, 0.20)	0.14
TxCond*PartChange	0.49	(-0.68, 1.66)	0.41
Time 2*PartChange	0.85	(-0.36, 2.05)	0.17
Time 3*PartChange	0.04	(-1.22, 1.29)	0.95
Tx*Time2*PartChange	-0.69	(-2.37, 0.99)	0.42
Tx*Time3*PartChange	0.07	(-1.65, 1.79)	0.94
<b>CR</b>			
Intercept	0.39	(-0.23, 1.00)	0.22
Tx Condition (REF=Control)	-0.33	(-1.11, 0.46)	0.42
Time 2 (REF=1)	0.46	(-0.45, 1.38)	0.32
Time 3 (REF=1)	0.23	(-0.66, 1.13)	0.61
Time 2*Tx Condition	-0.04	(-1.21, 1.13)	0.95
Time 3*Tx Condition	0.29	(-0.87, 1.45)	0.63
Partner Change (REF=No)	-0.15	(-1.01, 0.71)	0.73
TxCond*PartChange	0.001	(-1.15, 1.15)	0.99
Time 2*PartChange	-0.04	(-1.33, 1.24)	0.95
Time 3*PartChange	0.27	(-1.03, 1.57)	0.68
Tx*Time2*PartChange	0.63	(-1.12, 2.38)	0.48
Tx*Time3*PartChange	-0.22	(-1.97, 1.53)	0.80
<b>PPPPart</b>			
Intercept	0.21	(-0.43, 0.85)	0.52

Tx Condition (REF=Control)	0.09	(-0.73, 0.90)	0.84
Time 2 (REF=1)	-0.66	(-1.59, 0.26)	0.16
Time 3 (REF=1)	-0.39	(-1.33, 0.54)	0.41
Time 2*Tx Condition	0.61	(-0.59, 1.80)	0.32
Time 3*Tx Condition	-0.07	(-1.28, 1.14)	0.91
Partner Change (REF=No)	-0.05	(-0.96, 0.86)	0.92
TxCond*PartChange	0.16	(-1.08, 1.40)	0.80
Time 2*PartChange	0.44	(-0.90, 1.77)	0.52
Time 3*PartChange	-0.08	(-1.46, 1.30)	0.91
Tx*Time2*PartChange	-0.35	(-2.19, 1.49)	0.71
Tx*Time3*PartChange	0.61	(-1.28, 2.50)	0.53

### SVD

Intercept	0.13	(-0.45, 0.72)	0.66
Tx Condition (REF=Control)	-0.25	(-0.99, 0.50)	0.52
Time 2 (REF=1)	-0.13	(-0.97, 0.70)	0.75
Time 3 (REF=1)	-0.03	(-0.89, 0.82)	0.94
Time 2*Tx Condition	-0.02	(-1.10, 1.06)	0.97
Time 3*Tx Condition	0.11	(-0.99, 1.22)	0.84
Partner Change (REF=No)	0.04	(-0.78, 0.87)	0.92
TxCond*PartChange	0.21	(-0.91, 1.32)	0.72
Time 2*PartChange	0.20	(-0.98, 1.39)	0.74
Time 3*PartChange	-0.09	(-1.30, 1.13)	0.89
Tx*Time2*PartChange	0.07	(-1.55, 1.70)	0.93
Tx*Time3*PartChange	-0.13	(-1.78, 1.53)	0.88

### RDA

Intercept	0.31	(-0.28, 0.91)	0.30
Tx Condition (REF=Control)	-0.68	(-1.44, 0.07)	0.08
Time 2 (REF=1)	0.15	(-0.70, 0.99)	0.73
Time 3 (REF=1)	-0.21	(-1.07, 0.64)	0.63
Time 2*Tx Condition	-0.12	(-1.21, 0.98)	0.84

Time 3*Tx Condition	0.62	(-0.49, 1.73)	0.27
Partner Change (REF=No)	-0.58	(-1.41, 0.25)	0.17
TxCond*PartChange	0.77	(-0.35, 1.89)	0.18
Time 2*PartChange	0.26	(-0.94, 1.46)	0.67
Time 3*PartChange	0.64	(-0.58, 1.86)	0.31
Tx*Time2*PartChange	-0.22	(-1.85, 1.41)	0.79
Tx*Time3*PartChange	-0.87	(-2.53, 0.79)	0.30

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