Intimate Partner Violence, Contraceptive Use and Unintended Pregnancy in Peru

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Abstract

In Latin America, a handful of studies have examined the direct association between intimate partner violence and unintended pregnancy—both independently important outcomes. These studies have found significant associations between physical and sexual intimate partner violence and unintended births. However, these studies have limitations: most utilize cross-sectional data, which are limited to measures of intimate partner violence ever or in the past 12 months, and the chronology of events is unclear. Additionally, these studies do not largely take potential contraceptive use mechanisms into account.

Using data from the 2004-2008 Peru Demographic and Health Surveys, I examine intimate partner violence, contraceptive use, and unintended pregnancy with refined chronology. The Peru DHS includes a 5-year contraceptive calendar as well as the timing of onset of physical or sexual intimate partner violence in the current union. I limit the sample to women whose first union began 7-10 years before the interview to establish whether violence has occurred in the past and utilize Multinomial Logistic Regression Models to estimate the effects of prior experience of intimate partner violence on (1) mistimed and unwanted pregnancy, relative to intended pregnancy and on (2) current contraceptive use. I use Competing Risk Regressions to test whether the 'risk' of contraceptive adoption, discontinuation and failure during the calendar period differs by IPV experience.

Results support prior findings on intimate partner violence and unintended pregnancies by demonstrating that significant effects persist even after chronology is established. This study also finds that past experience of intimate partner violence in a union contributes to decreased probability of adoption of traditional contraceptive methods and intended pregnancies. Further, the results add to research which finds that ethnicity is a major factor in contraceptive method choice and use.

Introduction

Intimate partner violence is disturbingly common worldwide, though the percentage of women who have experienced intimate partner violence varies markedly by region and country: between 15% and 75% of women have experienced some combination of physical and sexual intimate partner violence (Hindin, Kishor and Ansara 2008; Garcia-Moreno et al. 2005; Kishor and Johnson 2004; Bott et al. Forthcoming). Beyond being physically and emotionally damaging to women's overall health and wellbeing, intimate partner violence is associated with numerous negative reproductive health outcomes (Moore 1999; Heise, Ellsberg and Gottmoeller 2002; Heise et al. 1994; Campbell et al. 1995). Additionally, a growing number of studies have found both direct and indirect associations between intimate partner violence and unintended pregnancy—another serious negative health outcome.

Research which examines intimate partner violence and unintended pregnancy finds evidence that physical and sexual intimate partner violence is positively associated with unintended pregnancy (Gazmararian et al. 1995; Goodwin et al. 2000; Campbell et al. 1995). Yet, until recently, these studies were largely concentrated in the United States (Pallitto, Campbell and O'Campo 2005). The number of studies which find support for this association in developing country contexts is growing; intimate partner violence has been associated with increased risk of unintended pregnancy, most notably in Colombia (Pallitto and O'Campo 2004; Pallitto and O'Campo 2005; Gomez 2011), India (Stephenson et al. 2008), and Bangladesh (Rahman et al. 2012).

The research linking intimate partner violence and unintended pregnancy is indeed growing, but many of these studies (though there are exceptions) have important limitations. Most utilize cross-sectional data, which are limited to measures of physical and/or sexual intimate partner violence ever or in the past 12 months. Studies examining lifetime intimate partner violence and unintended pregnancies find an association between the two. However, without a date of the onset of abuse, the chronological ordering of abuse and unintended pregnancies are murky at best and the causal ordering is decidedly

unclear. The objective of this study is to add to and clarify findings on intimate partner violence and unintended pregnancy. Specifically, I examine physical and/or sexual intimate partner violence, contraceptive use, and unintended pregnancy in a developing country setting with refined chronology and the inclusion of contraceptive calendars.

Intimate Partner Violence, Unintended Pregnancy and Contraceptive Use

Evidence from past research in the U.S. indicates that intimate partner violence is associated with unintended pregnancy (Gazmararian et al. 1995; Goodwin et al. 2000; Campbell et al. 1995), and a growing body of literature examines the association between intimate partner violence and unintended pregnancy internationally. In Latin America, women who have ever experienced intimate partner violence are more likely to report unintended births (Pallitto and O'Campo 2004; Pallitto and O'Campo 2005; Kishor and Johnson 2004), and recent research finds that sexual violence is associated with unintended pregnancy (Gomez 2011). In a sample of women who had just given birth in Peru, women who had experienced physical and sexual intimate partner violence had over three times the odds of reporting their pregnancy as unintended compared to women who had no history of partner violence (Cripe et al. 2008).

Outside of the most recent U.S. research, most studies exploring the link between intimate partner violence and unintended pregnancy utilize cross-sectional data, which are generally limited in measures of physical and/or sexual intimate partner violence and are unclear in the chronology of events[1] (Gomez 2011; Miller et al. 2010; Cripe et al. 2008; Pallitto, Campbell and O'Campo 2005; Pallitto and O'Campo 2004). These limitations suggest that the relationship between intimate partner violence and unintended pregnancy would best be studied with longitudinal data, which unfortunately is scarce. Stephenson, Koenig, Acharya and Roy (2008) examined the relationship between intimate partner

[1] Research in Nicaragua does find that, in unions with intimate partner violence, 80% of the violence begins within the first four years, and 50% of the violence begins within the first two, so we may assume that violence occurs fairly early within the union (Ellsberg et al. 2000).

violence and unwanted pregnancy in India using a 2002-03 follow-up survey to the country's 1998-99 National Family Health Survey. They were thus able to measure prospective pregnancy intentions, as well as violence occurring within 12 months of the baseline study, and found that the experience of intimate partner violence within the 12 months prior to baseline was associated with increased odds of later unwanted pregnancy (Stephenson et al. 2008). Though these data exclusively deal with unwanted pregnancy (a subset of unintended pregnancy), the results echo the broader international, and specifically Latin American, findings on intimate partner violence and unintended pregnancy internationally using data with refined temporal ordering.

Effects of intimate partner violence on unintended pregnancy could be due to several mechanisms of reproductive control. Hypothesized pathways of reproductive control include a deterring climate of fear, opposition of and restricted access to contraceptives (especially preferred or more effective methods), birth control sabotage, lack of control over sexual decisionmaking, and pregnancy promotion or coercion (Gomez 2011; Black et al. 2010; Moore, Frohwirth and Miller 2010; Stephenson et al. 2008; Cripe et al. 2008; Williams, Larsen and McCloskey 2008; McCarraher, Martin and Bailey 2006; Pallitto, Campbell and O'Campo 2005; Pallitto and O'Campo 2004; Campbell et al. 1995). Most of these mechanisms directly involve contraceptive use patterns, making it the most important and of the most interest.

Theoretically, unintended pregnancies are the outcome sexual exposure, the desire to postpone or avoid having more children entirely and either contraceptive non-use (unmet need or discontinuation) or failure. In reality, however, the relationship is not perfect; even though around 50% of unintended births are reported to be from contraceptive failures (Black et al. 2010), a sizable percentage of births due to contraceptive discontinuation for reasons other than wanting to become pregnant are retrospectively reported as wanted births (Curtis, Evens and Sambisa 2011). Nevertheless, contraceptive discontinuation for reasons other than to become pregnant is significantly associated with

both mistimed and unwanted pregnancies (Barden-O'Fallon, Speizer and White 2008). Additionally, other behaviors, such as frequent changes in contraceptive method, may also place women at increased risk of unplanned pregnancies (Schrieber et al. 2011).

Obviously, contraceptive use patterns are vital factors in unintended pregnancy. Emerging research directly, and usually separately, examines intimate partner violence and contraceptive use adoption, current use, and discontinuation. Intimate partner violence is associated with a reduced likelihood of modern method adoption in India (Stephenson et al. 2008; Stephenson, Koenig and Ahmed 2006), and decreased probability of current contraceptive use in the U.S. (Fantasia et al. 2012).

However, these associations do not always hold; other studies have found associations between partner violence and *increased* likelihood of ever using contraceptives and even subsequent contraceptive use (Fanslow et al. 2008; Alio et al. 2009; Chan and Martin 2009; Dalal, Andrews and Dawad 2012; Okenwa, Lawoko and Jansson 2011). In a study of six Sub-Saharan African countries, women who had ever experienced partner violence were more likely to use contraceptives and the likelihood increased with exposure to more than one type of violence (Alio et al. 2009).

Evidence also suggests that, as hypothesized, intimate partner violence influences women's control over contraceptive use. In U.S. studies, women who have experienced IPV were more likely to report difficulty using birth control and to have had unprotected sex because of partner's unwillingness to use contraceptives or his desire for her to become pregnant (Gee et al. 2009), and women who had experienced intimate partner violence were less likely to use their preferred method of contraception (Williams, Larsen and McCloskey 2008).

Further, the effects of intimate partner violence can interfere with continued contraceptive use over time. In a small sample of Bolivian women, women were more likely to discontinue the contraceptive pill if they had experienced any partner violence related to their pill usage (McCarraher, Martin and Bailey 2006). Newer studies are also beginning to take the chronicity and pattern of violence

into account. In a study of medical records from family planning clinic in the US, women who have experienced both long-term and recent partner violence in the US were more likely to change contraceptive methods. Additionally, women with long-term experience of violence were more likely to use contraceptives covertly, and even without recent experiences of violence, were still at increased risk for method switching and pregnancy (Fantasia et al. 2012).

Clearly, intimate partner violence and contraceptive use dynamics are complicated. As further evidence of this, a recent US study suggests that physical and sexual violence may affect contraceptive use differently; physical violence in the last 12 months was positively associated with contraceptive use at the time of the survey, while sexual violence produced marginally significant negative effects (Chan and Martin 2009). Similarly, women's experience of physical IPV was positively associated with contraceptive use in Bangladesh, with almost twice the likelihood of using contraceptives, while the effects of sexual IPV were not significant (Dalal, Andrews and Dawad 2012). Similar results were reported in Nigeria, where physical IPV, but not sexual or emotional IPV, was associated with modern contraceptive use (Okenwa, Lawoko and Jansson 2011).

In sum, research generally finds associations between IPV and contraceptive use adoption, and IPV and current method (whether positive or negative), but the dynamics widely vary. Such potential variation in the relationship between IPV and contraceptive use further legitimizes this study in Peru.

Intimate Partner Violence, Contraceptive Use and Unintended Pregnancy in Peru

Though there is considerable variation between countries, when examined as a region, IPV prevalence is comparatively high in Latin America; in Peru, specifically, almost 40% of women will experience some form of physical or sexual violence perpetrated by an intimate partner at some point in their life (Bott et al. Forthcoming; WHO 2005).

Rates of unintended pregnancy, and specifically unwanted pregnancies, are also high in the region. The percentage of unwanted births (out of all births) ranges from 21% of births in Paraguay to nearly 60% in Bolivia (Casterline and Mendoza 2010). Historically, Peru has been recognized as a setting with high levels of unintended pregnancy (Adetunji 1998; Blanc 1982), and recent estimates indicate that approximately 40% of births in Peru are unwanted (Casterline and Mendoza 2010).

Correspondingly, in past years contraceptive use patterns in Peru have been characterized by high levels of traditional method use and contraceptive failures. In the early 1990s, Kost (1993) reported that 29% of Peruvian women who began using a contraceptive method would discontinue use (for reasons other than to become pregnant) within one year and that frequent method switches were common. More recently, the percentage of married women using modern contraceptives has reached 51%, though roughly a quarter of married still utilize traditional methods (PRB 2008).

If contraceptive failures in Peru could be avoided completely, the extremely high rates of unintended pregnancy in the country would fall by up to 24 percentage points (Bradley et al. 2011). These high failure rates are likely due, in part, to the high levels of traditional contraceptive use in Peru. However, the literature on reproductive control intimates that birth control sabotage and dissuasion from modern method use may be contributing factors.

This Study

I conceptualize contraceptive use as a central mechanism by which IPV affects unintended pregnancies and study the following aspects: first, with refined measures of chronology and inclusion of the timing of onset of violence, does the past experience of intimate partner violence in the union affect whether women report mistimed or unwanted births? If violence is associated with unintended pregnacy, what part do contraceptive use patterns play-- does the adoption of contraceptives (and type of contraceptive method) differ by past experience of violence? Are women with past experience of intimate partner violence more likely to discontinue contraceptive methods or experience contraceptive

failures? Are they more likely to switch methods? Is the past experience of partner violence associated with switches to less effective methods? Finally, I examine the effect of intimate partner violence in the past on current contraceptive use (both modern and traditional methods) as an overall study of the effects of intimate partner violence on contraceptive use.

Method

Data

I use data from the 2004-2008 Peru Continuous Demographic and Health Survey (DHS). The Peru DHS is a nationally-representative sample of women of reproductive age. Women age 15-49 provide information on the wantedness of recent births as well as a month-by-month account of contraceptive use, pregnancies and births for the five years prior to the survey. Of the 41,648 women surveyed, one woman per household is selected to complete the violence module in private (30,452 women). The DHS violence module collects data on violence perpetrated by current or last partners. Women are asked whether they have ever experienced acts of physical or sexual partner violence in their current or last union and, if so, when the first instance of violence occurred relative to the beginning of the union. By utilizing this measure of the timing of onset of intimate partner violence together with data from the contraceptive calendar-- where the respondent reports pregnancies, births and contraceptive by month over a period of five years-- I am able to refine the temporal order of violence relative to births (and associated retrospective reports of wantedness with each birth) and episodes of contraceptive use or non-use which occurred during the calendar period.

Outcome: Unintended Pregnancy

Measures of unintended pregnancy are gathered for all births in the past five years. For each birth, women are asked whether, at the time of conception, they wanted to get pregnant, wanted to wait to

get pregnant, or did not want any more children. Births which resulted from pregnancies where the woman wanted to wait to get pregnant are classified as *mistimed births*, while births from pregnancies which occurred even though the woman did not want any more children are considered *unwanted*. *Unintended births* include both mistimed and unwanted births.

Outcome: Contraceptive Use

The contraceptive calendar includes monthly measures of contraceptive use, pregnancies and occurrences of births as well as reasons for any contraceptive discontinuation. We classify contraceptive methods as modern or traditional, and contraceptive discontinuation as either due to contraceptive failure, method switch, or contraceptive non-use.

Modern methods include the pill, condoms, implants, vasectomy and female sterilization, IUD, injectables, the patch, the ring, diaphragms, sponges, and spermicide. *Traditional methods* include lactational amenorrhea, fertility-awareness based methods (i.e. the rhythm method and others), and withdrawal.

I divide *contraceptive discontinuation* transitions into contraceptive failure, method switch, or transition to non-use. *Contraceptive failures* are reports of pregnancy due to method failure. In cases of contraceptive *method switches*, I compare the *method efficacy* and classify whether the method switch was to a less effective method, a method of similar effectiveness or a more effective method. I do this by categorizing contraceptive methods into four groups of efficacy following Trussell's (2009) reports of the percentages experiencing an unintended pregnancy within the first year of typical or perfect use. The least effective group (group 1) includes withdrawal and spermicide, followed by more effective methods (group 2) like male and female condoms, diaphragms, the sponge and fertility-awareness based methods, then (group 3) injectables, lactational amenorrhea, pills, the patch, and the ring, and the most effective methods (group 4): implants, vasectomy, female sterilization, and IUDs. Respondents

may also transition to *contraceptive non-use*, which occurs when they no longer report using a contraceptive method.

Predictor: Physical/Sexual IPV

The measure of intimate partner violence indicates whether the respondent has experienced any of the following physical or sexual acts of violence, including whether her partner has ever: "A) Pushed, shaken or thrown something at you? B) Slapped you or twisted your arm? C) Hit you with his fist or with something that could harm you? D) Kicked or dragged you? E) Attempted to strangle or burn you? F) Attacked you with a knife, gun or other weapon? H) Used physical force to make you have sexual relations when you did not want to? I) Forced you to perform sexual acts that you did not approve of?" A woman was classified as ever having experienced physical and/or sexual abuse if she answered affirmatively to any of these statements.

This measure of violence is then combined with the timing of the onset of violence. Women who experienced any form of physical and/or sexual violence (as listed above) were asked when the first instance of physical or sexual violence in relation to their union formation: "How much time after your union began did these things (violence) begin?" Reponses to this question are in year increments. As a conservative estimate, I did not classify violence as occurring until the end of the year. For example, if the respondent reported that violence occurred within the two years of the union, I did not code the violence as occurring until 24 months after the beginning of the union. In cases where the respondent reported violence occurring before the official beginning of the union, I coded the onset of violence as the same month as the beginning of the union. Once the time of the first experience of violence is established, I then code physical and/or sexual violence relative to the overall contraceptive calendar, as (1) no IPV, (2) the IPV began before the beginning of the contraceptive calendar data, or (3) the IPV began during the contraceptive calendar time period. When utilizing measures of violence with regard

to births or episodes of contraceptive use or non-use, physical and/or sexual violence is classified as (1) no experience of IPV, (2) occurrence of IPV prior to start of episode (or 9 months before a birth), or (3) IPV occurrence during or after episode (includes violence which may have began during pregnancy).

Controls

Control variables include the respondent's ethnicity (whether an indigenous language is spoken in the home), age (20-24, 25-29, 30-34, 35-39, 40-49), years of education, area of residence (urban or rural), economic status (quintiles of the DHS wealth index), and, in episode and birth data, the number of living children at the start of the episode or at the beginning of pregnancy. I control for the effects of each of these variables because of potential relationships, referenced in prior literature, with unintended pregnancy, contraceptive use, and intimate partner violence.

Sample

I limit the sample to women who were selected for the violence module, completed a contraceptive calendar, and were in their first union and whose first union began between 7 and 10 years prior to the survey. There are several rationales for this selection. First, questions about intimate partner violence are only asked of ever-partnered women. I limit the unions to first unions because the union start date is only known for first unions, and questions about intimate partner violence only refer to violence in the current or most recent union. Further, the question in the data about the onset of violence refers to the current union. Another rationale for the selection of women whose unions began 7-10 years prior to the survey is that it allows some time for violence to occur before the start of the contraceptive calendar data. There are 3,612 first union women whose unions began between 7 and 10 years ago and who completed both the violence module and contraceptive calendar.

Analytic Strategy

After calculating descriptive statistics for the sample of 3,612 women, I use a series of models to examine intimate partner violence, unintended pregnancy, and contraceptive use. I utilize multinomial logistic regression and competing risk regressions with survival data. I create four different subsamples from the 3,612 first union women who completed both the violence module and contraceptive calendar for these calculations: (1) a data file of all births in the five years prior to the survey, (2) a data file of episodes of contraceptive non-use, (3) a data file of episodes of contraceptive use, and (4) a data file of individuals (women).

First, using multinomial logistic regression analyses, I estimate the effects of intimate partner violence on mistimed and unwanted pregnancy, relative to intended pregnancy. These regressions are estimated using all births in the five years prior to the survey. The data include wantedness information for each birth. I examine the association between mistimed or unwanted births (relative to intended births) and intimate partner violence experience (1) before the pregnancy and (2) during or sometime after the pregnancy.

Next, I focus on the relationship between intimate partner violence and contraceptive use. Using a regression model for survival with competing risks, I test the association between intimate partner violence and (1) adoption of contraceptive methods, and (2) discontinuation of contraceptive methods. Competing risk regression allows for several competing events, or failures, and estimates the cause-specific hazards. In essence, competing risk regressions estimate the effects of explanatory variables on the risk of each failure taking into account the possibility of experiencing a different type of failure (Fine and Gray 1999; Cleves et al. 2010). Episodes that do not end in a 'failure,' or transition, are censored.

I condition the models examining contraceptive adoption and discontinuation on fertility preferences; contraceptive adoption and discontinuation among women who do not want any more

children is an entirely different matter than adoption and discontinuation among women who wish to space births or want to get pregnant. In these analyses I utilize episodes where women have already reached their ideal number of children (and are thus assumed to have not wanted any more children) at the start of the episode. The models focusing on contraceptive adoption are based on episodes of contraceptive non-use and compare the effects of intimate partner violence on the risk of transitioning into traditional contraceptive use, modern contraceptive use, an intended pregnancy, mistimed pregnancy or unwanted pregnancy, all relative to the competing risks. The models examining contraceptive discontinuation utilize episodes of contraceptive use and estimate the relative risks of contraceptive discontinuation, failure, and method switches.

Finally, to examine whether past experience of intimate partner violence affects current use of contraceptives for women who do not desire more children, I estimate models of intimate partner violence on current contraceptive use (traditional vs. modern vs. no method) with multinomial logistic regression models.

All of the models were estimated using Stata 12. I adjust for the survey design and sample weights using the *svy* command. Statistical tests adjust for clustering by woman (i.e. multiple births or multiple episodes).

Results

Of the 3,612 first union women included in the sample, I report summary statistics for 3,602 (10 women did not know if they had experienced intimate partner violence and were excluded from the analyses) (see Table 1). Over 38% of these women have experienced intimate partner violence in the union, and almost 23% reported that the first instance of violence occurred before the contraceptive calendar began. The remaining 15% (women who had experienced violence in the union) reported the onset of intimate partner violence during the calendar period (within roughly five years prior to the survey). As a

function of the selection of women in first-order unions 7-10 years old, the majority of the women in the sample are young; approximately half of the women are younger than 30 years. At the time of the survey, almost 70% of the sample used some form of contraceptives, with almost half of the sample utilizing modern methods of contraceptives. When I compared women's ideal number of children (recorded at the time of the survey) with the number of children women actually had at the start of the contraceptive calendar, over 70% of the sample still wanted more children, but, by the end of the contraceptive calendar, that percentage fell to 45%. At the time of the survey, about 72% of the sample had fewer than three children. Less than 3% of the sample had not received any education, and over 66% completed secondary school. Most of the sample spoke Spanish (Castellano) in the home, and only 10% of respondents reported speaking an indigenous language in the home.

(Table 1 about here)

The births file contains all of the births during the calendar period, which began about five years prior to the survey. Birth wantedness information was present for 2,810 births during this time (see Table 1). The onset of intimate partner violence in the relationship occurred prior to pregnancy for 27% of the births, and during or after the pregnancy for an additional 8%. Over half of the births were retrospectively classified as unintended births by their mothers. The percentage of untended births was equally split between mistimed (26%) and unwanted (25%). Over half of the births were first or second order births.

Table 2 shows the results from the multinomial logistic regression model of birth wantedness (mistimed or unwanted compared to intended).[2] In the bivariate model (Model 1), the experience of intimate partner violence prior to the pregnancy was significantly associated with higher risk of mistimed and unwanted births, whereas the experience of violence during the pregnancy or at some future time was marginally associated with mistimed pregnancy and was not significantly associated with unwanted pregnancy. With the addition of control variables (age, area of residence, education,

[2] Full table for all models available in Appendix (Table A1).

wealth, and the number of living children at the time of the pregnancy) in Model 2, I find that the experience of partner violence prior to pregnancy was still strongly associated with increased risk of mistimed and unwanted pregnancies. Indeed, women who experience partner violence prior to pregnancy have 1.8 times the relative risk of having an unwanted birth ($p<0.001$). The first experience of violence during or after pregnancy was associated with mistimed, but not unwanted, pregnancy. Ethnicity was also a risk factor for unwanted pregnancy; indigenous women have 57% higher risk of unwanted pregnancy than the non-indigenous.

(Table 2 about here)

The competing risk regressions modeling adoption of contraceptives utilize a subsample of data containing episodes of contraceptive non-use in which the woman had already reached (or exceeded) her ideal number of children. The onset of intimate partner violence in the union occurred prior to 34% of the episodes, and the first experiences of violence occurred during or after an additional 7% of the episodes (see Table 1). Overall, close to 21% of the episodes are censored, meaning that women did not transition to any of the outcomes before the end of the contraceptive calendar. Roughly 57% of the episodes transitioned to some kind of contraceptive method, and almost 14% of episodes transitioned to an unintended pregnancy (mistimed or unwanted) (see Table 3).

Table 3 presents the results from the contraceptive adoption competing risk regressions.[3] Relative to competing outcomes, intimate partner violence prior to the episode had a prohibitive effect on the uptake of traditional contraceptive methods and a slightly increased, and marginally significant, incidence of modern method adoption. The effect of prior violence on modern method adoption disappeared once the effects of age, residence, ethnicity, wealth, education and number of living children added to the model (Model 2). Past experience of intimate partner violence was associated with a reduced incidence of intended pregnancy, but not with increased incidence of mistimed or unwanted pregnancy. A first experience with partner violence during or after the episode is associated

[3] Table A2 in the Appendix details the full results from these models.

with an increase the incidence of mistimed pregnancy though. In addition, speaking an indigenous language in the home significantly increased the incidence of transitions to traditional method use (adoption), and decreased modern method adoption.

(Table 3 about here)

For the competing risks regressions on contraceptive discontinuation and method switch, the subsample included episodes of contraceptive use and episodes selected on whether no more children were wanted at the start of the episode. Summary statistics for this subsample are displayed in Table 1. Similar to the other episode subsample, roughly 36% of the episodes are preceded by an instance of intimate partner violence, and violence began during or after another 9% of the episodes. The contraceptives utilized in most of the episodes were modern methods, and traditional methods were the primary method used in only 33% of the episodes. A substantial percentage of the episodes were censored (38%) at the end of the contraceptive calendar, and a similarly large percentage of contraceptive episodes ended with method switches. Smaller proportions of the contraceptive episodes ended due to method failure (10%) or discontinuation (18%) (see Table 4).

In the competing risks regression on contraceptive use discontinuation[4], the onset of intimate partner violence prior to the start of the episode was only associated with increased incidence of method switching (to methods of similar effectiveness). Net of other effects in the models, the use of modern contraceptives significantly decreased the incidence of pregnancy from method failure, and compared to traditional contraceptive use, was a strong force behind method switches and contraceptive discontinuation. Ethnicity is also of note in these models. Though the effects of speaking an indigenous language in the home were only marginally significant, they were predictive of method failure (increased incidence) and method switches (reduced incidence of all types of switches).

(Table 4 about here)

[4] Table A3 in the Appendix contains the full results from these models.

Table 5 contains the results of multinomial logistic regressions modeling current (at the time of the survey) contraceptive use for women in the sample who already had reached or exceeded their ideal number of children, or approximately 55% of the women in the original sample (see Table 1).[5] The onset of partner violence during the calendar period (within the five years prior to the survey) was associated with increased relative risks of modern contraceptive use at the time of the survey in zero-order models (Model 1), but the effects disappeared once models controlled for other potentially confounding factors (Model 2). Past intimate partner violence was not significantly associated with contraceptive use at the time of the survey. The models also found that speaking an indigenous language in the home was positively and significantly associated with traditional method use compared to non-use; indigenous women had close to twice the relative risk of traditional contraceptive use.

(Table 5 about here)

Discussion

This study used calendar data and a measure of the onset of violence to test the relationship between intimate partner violence, the adoption, use of, and discontinuation of contraceptives and unintended pregnancy in Peru with clearer chronology. The findings demonstrate that partner violence is indeed an important force behind unintended pregnancy. Even net of potentially confounding demographic and socioeconomic factors, the influence of past experience of intimate partner violence still influenced reports of mistimed and unwanted pregnancy. Though these findings are not surprising, they are important, as they use refined chronology to substantiate findings from prior research in Latin America.

The results regarding contraceptive use are less clear. In the competing risk regressions, past intimate partner violence was not associated with modern method adoption (relative to the other potential outcomes), but was associated with a reduced incidence of traditional method uptake. Further, women with past experiences of partner violence were less likely to have intended pregnancies.

[5] Table A4 in the Appendix details the full results from these models.

Interestingly, current or later onset of partner violence was strongly associated with mistimed pregnancy. Mistimed and unwanted pregnancies are affected differently by risk factors (D'Angelo 2004), but this may also be an artifact of a sample of women in fairly young unions who haven't met their fertility ideals yet.

Contraceptive discontinuation and method failure does not appear to be driven by past experiences of intimate partner violence as expected, though past intimate partner violence does increase the incidence of method switch. This suggests that, instead of contraceptive failure or discontinuation (potentially from lack of access), the mechanism by which intimate partner violence could be operating is through frequent method switches, which also works to increase women's risk of unplanned pregnancy (Schrieber et al. 2011). This finding is less unusual when considering that recent U.S. research has also found that women with intimate partner violence in their past are at increased risk for method switching and pregnancy (Fantasia et al. 2012).

In the most straightforward analysis, intimate partner violence was not associated with current contraceptive method use among women who had already reached or exceeded their ideal number of children. Given that prior research has found both positive and negative effects of intimate partner violence on contraceptive use, this lack of association should not be particularly shocking, particularly with the overall effects of violence found on contraceptive adoption (reduced incidence of traditional use, and no significant association with modern contraceptive use).

One of the standout factors in these analyses was ethnicity. Indigenous women were at higher risks of unwanted pregnancies, and were more likely to use traditional methods and experience method failure. Further, they were much less likely to adopt modern methods and make any method switches. Essentially, indigenous women were more likely to use, stick with, and experience method failure from traditional contraceptive methods. These results are in line with findings from other studies in the Andean region, which have found that indigenous women are less likely to use modern contraceptive

methods (Terborgh et al. 1995), and have higher rates of traditional method contraceptive method use and unwanted pregnancy (Mendoza and Heaton 2008; McNamee 2009). The findings from this study may provide evidence as to why rates of unwanted pregnancy are so high in Peru.

Potential limitations of this study include the possible underreporting of both and intimate partner violence and unintended pregnancy. The data for this study rely on measures of retrospective reports of birth wantedness, which produce lower estimates of the number of unintended births. Stephenson and colleagues (2008) have found that, methodologically, prospective measures of pregnancy intention allow for better modeling of the effects of violence on unintended pregnancy. Prospective measures can only be used with longitudinal data. While the calendar data used in this study is an improvement over cross-sectional data, it is not the longitudinal data ideal.

Another potential limitation is the measure of the onset of intimate partner violence, which is not reported as a specific date, but rather in years relative to the start of the union. And, of course, the accuracy of this measure also depends on the recall of the respondent. I am also unable to separate effects of physical and sexual violence since the data does not specify the type of violence act first perpetrated. Moreover, I am not able into include measures of the pattern of violence throughout the union due to a lack of information about the frequency, severity and chronicity over time.

Conclusion

This study contributes to existing literature on intimate partner violence, contraceptive use, and unintended pregnancy by parsing out the chronology of intimate partner violence, contraceptive use, and births. Given the scarcity of longitudinal data in Latin American countries, this study takes an important methodological step forward from research conducted with traditional cross-sectional data. Results support prior findings on intimate partner violence and unintended pregnancies by demonstrating that significant effects persist once chronology is established.

This study also finds that past experience of intimate partner violence in a union contributes to decreased incidence of traditional contraceptive use adoption and intended pregnancies. Further, the results from this study support findings which find that ethnicity is a major factor in contraceptive method choice, adoption, and use.

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Tables

Table 1. Summary statistics of sample: Women in first unions which began 7-10 years before survey

	Women %	Births %	Episodes non-use %	Episodes of method use %
Experience of intimate partner violence	*at survey*	*at birth*	*at episode*	*at episode*
No IPV	61.44	64.50	58.17	53.86
IPV before	22.88	27.25	34.30	36.99
IPV during/after	15.68	8.25	7.53	9.15
Number of living children	*at survey*	*at birth*	*at episode*	*at episode*
0 - 1 children	29.23	57.10	8.63	11.14
2 children	42.32	30.71	51.82	55.00
3 children	20.02	9.41	27.60	23.94
4+ children	8.44	2.77	11.94	9.33
Age				
20-24	9.75	13.58	10.30	9.87
25-29	41.20	45.69	46.32	43.32
30-34	30.86	27.45	27.96	32.53
35-39	11.21	9.79	10.96	10.66
40-49	6.98	3.50	4.45	3.61
Educational attainment				
None	2.67	3.80	4.17	2.32
Primary	29.88	38.24	39.54	30.36
Secondary	40.87	39.26	39.96	45.19
Higher	26.58	18.70	16.32	22.14
Language spoken in home				
Castellano	88.99	15.20	81.62	89.36
Indigenous	10.77	84.77	18.34	10.64
Other	0.24	0.03	0.04	0.00
Contraceptive method	*at survey*			*at episode*
None	29.94			
Traditional	22.36			33.30
Modern	47.69			66.70
Want more children at calendar start				
No	29.20			
Yes	70.80			
Want more children at survey				
No	55.20			
Yes	44.80			
Wantedness of birth				
Intended		48.06		
Mistimed		26.56		
Unwanted		25.39		
Number of births	3,602	2,810	2,484	3,910

Table 2. Relative risk ratios from multinomial logistic regression comparing risks of mistimed and unwanted pregnancy to intended pregnancy: Analysis of births in the contraceptive calendar

	Model 1		Model 2	
	Mistimed	Unwanted	Mistimed	Unwanted
IPV before pregnancy	1.341**	1.603***	1.411**	1.769***
IPV during or after pregnancy	1.450*	0.857	1.835***	1.676*
Constant	0.559***	0.506***	0.619*	0.751
N	2810		2807	
Log likelihood	-2981		-2608	

Model 1: No controls

Model 2: Controls (Indigenous, Area of residence, Education, Age, Wealth Quintiles, Number of living children at time of pregnancy)

Robust z-statistics in parentheses

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

Table 3. Subhazard ratios from competing risk regression for survival data: Comparing incidence of contraceptive adoption to pregnancy among episodes of contraceptive non-use for episodes in which women did not want more children

	Traditional Method Use	Modern Method Use	Intended Pregnancy	Mistimed Pregnancy	Unwanted Pregnancy
			Model 1		
IPV before start of episode	0.717**	1.159*	0.726*	0.988	1.035
IPV during or after episode	0.629*	1.261	0.997	2.326**	1.017
			Model 2		
IPV before start of episode	0.748**	1.022	0.701*	1.072	1.125
IPV during or after episode	0.748	1.001	0.804	2.463**	1.290
Number of failures	541	859	205	115	259
Number censored	504				
Number of observations	2484				

Model 1: No controls
Model 2: Controls (Indigenous, Area of residence, Education, Age, Wealth Quintiles, Number of living children at time of pregnancy)

Robust z-statistics in parentheses

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

Table 4. Subhazard ratios from competing risk regression for survival data: Comparing incidence of contraceptive discontinuation among episodes of contraceptive use where women did not want more children

	Method Failure	Method Switch: Less Effective	Method Switch: Similar Efficacy	Method Switch: More Effective	To Non-Use
			Model 1		
IPV before start of episode	0.942	0.935	1.702**	0.880	1.122
IPV during or after episode	0.901	1.253	1.268	1.244	1.233
			Model 2		
IPV before start of episode	1.183	0.873	1.598*	0.929	1.090
IPV during or after episode	1.267	1.034	1.134	1.359	1.123
Modern method use (episode)	0.151***	2.223***	3.067***	0.203***	2.066***
Number of failures	395	433	493	358	712
Number censored	1519				
Number of observations	3910				

Model 1: No controls
Model 2: Controls (Indigenous, Area of residence, Education, Age, Wealth Quintiles, Number of living children at time of pregnancy)

Robust z-statistics in parentheses

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

Table 5. Relative risk ratios from multinomial logistic regression comparing risks of traditional and modern contraceptive use to no method use: Analysis of contraceptive use at time of survey for women who do not want more children

	Traditional	Modern	Traditional	Modern
IPV before calendar period	0.856	1.005	0.778	0.855
IPV during calendar period	1.315	1.899**	1.153	1.394
Constant	0.916	1.887***	0.830	1.216
N	2025	2025	2024	2024

Model 1: No controls
Model 2: Controls (Indigenous, Area of residence, Education, Age, Wealth Quintiles, Number of living children at survey)

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

Appendix

Table A1. Relative risk ratios from multinomial logistic regression comparing risks of mistimed and unwanted pregnancy to intended pregnancy: Analysis of births in the five years prior to survey

	Mistimed	Unwanted	Mistimed	Unwanted	Mistimed	Unwanted
IPV before pregnancy	1.341**	1.603***	1.416**	1.825***	1.411**	1.769***
	(0.145)	(0.177)	(0.151)	(0.198)	(0.152)	(0.212)
IPV during or after pregnancy	1.450*	0.857	1.737**	1.202	1.835***	1.676*
	(0.255)	(0.171)	(0.301)	(0.251)	(0.320)	(0.376)
Indigenous			1.148	1.576***	1.141	1.622**
			(0.159)	(0.212)	(0.160)	(0.241)
Urban residence			1.146	1.281	1.164	1.346
			(0.157)	(0.188)	(0.161)	(0.218)
Educational attainment (years)			0.986	0.932***	1.005	0.992
			(0.015)	(0.014)	(0.015)	(0.017)
Age 20-24			1.433**	1.051	1.628***	1.647**
			(0.188)	(0.151)	(0.217)	(0.261)
Age 30-34			0.908	1.166	0.853	0.900
			(0.107)	(0.143)	(0.102)	(0.123)
Age 35-39			0.690*	1.403	0.629*	0.952
			(0.128)	(0.246)	(0.118)	(0.187)
Age 40-49			0.623	1.772	0.557	1.111
			(0.222)	(0.521)	(0.201)	(0.368)
Lowest wealth quintile			1.675**	2.082***	1.397	1.154
			(0.290)	(0.376)	(0.248)	(0.231)
Mid-low wealth quintile			1.569**	1.788***	1.508**	1.538*
			(0.232)	(0.281)	(0.225)	(0.267)
Mid-high wealth quintile			0.794	0.626*	0.801	0.654*
			(0.125)	(0.115)	(0.128)	(0.132)
Highest wealth quintile			0.581**	0.619*	0.583**	0.653
			(0.118)	(0.139)	(0.120)	(0.160)
Number of living children at time of pregnancy: 0-1					0.534***	0.131***
					(0.0586)	(0.0165)
Number of living children at time of pregnancy: 3					1.665*	2.889***
					(0.349)	(0.542)
Number of living children at time of pregnancy: 4 or more					1.239	3.627***
					(0.479)	(1.139)
Constant	0.559***	0.506***	0.476***	0.470***	0.619*	0.751
	(0.0331)	(0.0326)	(0.0928)	(0.0961)	(0.129)	(0.175)
N	2810	2810	2807	2807	2807	2807
Log likelihood	-2981	-2981	-2848	-2848	-2608	-2608

Robust z-statistics in parentheses; *** p<0.001, ** p<0.01, * p<0.05

Table A2. Subhazard ratios from competing risk regression for survival data: Comparing incidence of contraceptive adoption to pregnancy among episodes of contraceptive non-use in which no more children were wanted

	Traditional Contraceptive Use		Modern Contraceptive Use		Intended Pregnancy		Mistimed Pregnancy		Unwanted Pregnancy	
IPV before start of episode	0.717**	0.748**	1.159*	1.022	0.726*	0.701*	0.988	1.072	1.035	1.125
	(0.075)	(0.078)	(0.086)	(0.077)	(0.116)	(0.117)	(0.216)	(0.234)	(0.137)	(0.151)
IPV during or after episode	0.629*	0.748	1.261	1.001	0.997	0.804	2.326**	2.463**	1.017	1.290
	(0.014)	(0.171)	(0.184)	(0.157)	(0.310)	(0.265)	(0.686)	(0.742)	(0.270)	(0.347)
Indigenous		1.662***		0.672***		0.809		0.787		0.903
		(0.196)		(0.073)		(0.167)		(0.202)		(0.147)
Urban residence		0.976		1.132		0.859		0.777		1.263
		(0.128)		(0.110)		(0.191)		(0.255)		(0.246)
Educational attainment (years)		1.007		1.058***		0.922***		0.978		0.967
		(0.015)		(0.012)		(0.021)		(0.031)		(0.020)
Age 20-24		0.828		1.348*		0.719		1.008		0.929
		(0.134)		(0.162)		(0.175)		(0.293)		(0.178)
Age 30-34		1.105		0.781**		1.249		1.057		0.962
		(0.124)		(0.070)		(0.212)		(0.261)		(0.154)
Age 35-39		1.122		0.655**		0.834		0.864		1.303
		(0.179)		(0.084)		(0.248)		(0.384)		(0.291)
Age 40-49		1.027		0.407**		1.136		0.344		1.126
		(0.240)		(0.105)		(0.457)		(0.350)		(0.417)
Lowest wealth quintile		0.862		0.669**		1.402		2.015		1.930**
		(0.147)		(0.086)		(0.416)		(0.829)		(0.459)
Mid-low wealth quintile		1.091		0.803*		1.175		1.392		1.322
		(0.161)		(0.086)		(0.293)		(0.507)		(0.270)
Mid-high wealth quintile		0.974		0.941		1.403		1.076		0.518*
		(0.168)		(0.113)		(0.327)		(0.385)		(0.148)
Highest wealth quintile		0.781		1.203		1.166		0.28		0.270**
		(0.175)		(0.173)		(0.412)		(0.213)		(0.130)
Number of living children at start of episode: 0-1		0.691		0.349***		4.010***		1.842*		1.066
		(0.150)		(0.061)		(0.655)		(0.464)		(0.254)
Number of living children at start of episode: 3		1.359**		1.135		0.315***		0.555**		0.848
		(0.132)		(0.087)		(0.068)		(0.120)		(0.125)
Number of living children at start of episode: 4 or more		1.415*		1.067		0.251***		0.221**		0.722
		(0.193)		(0.131)		(0.086)		(0.119)		(0.136)
Number of failures	541		859		205		115		259	
Number censored	504									
Number of observations	2484									

Robust z-statistics in parentheses

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

Table A3. Subhazard ratios from competing risk regression for survival data: Comparing incidence of contraceptive discontinuation among episodes of contraceptive use for women who did not want more children

	Model 1					Model 2				
	Method Failure	Method Switch: Less Effective	Method Switch: Similar Effectiveness	Method Switch: More Effective	To Non-Use	Method Failure	Method Switch: Less Effective	Method Switch: Similar Effectiveness	Method Switch: More Effective	To Non-Use
IPV before start of episode	0.942	0.935	1.702**	0.880	1.122	1.183	0.873	1.598*	0.929	1.090
	(0.107)	(0.100)	(0.313)	(0.108)	(0.104)	(0.127)	(0.98)	(0.320)	(0.115)	(0.104)
IPV during or after episode	0.901	1.253	1.268	1.244	1.233	1.267	1.034	1.134	1.359	1.123
	(0.183)	(0.197)	(0.342)	(0.223)	(0.174)	(0.260)	(0.166)	(0.305)	(0.265)	(0.169)
Modern method use (episode)						0.151***	2.223***	3.067***	0.203***	2.066***
						(0.018)	(0.300)	(0.473)	(0.026)	(0.212)
Indigenous						1.357*	0.631*	0.589*	0.614*	0.868
						(0.186)	(0.139)	(0.121)	(0.123)	(0.127)
Urban residence						1.227	1.111	0.822	0.877*	1.022
						(0.174)	(0.162)	(0.289)	(0.138)	(0.123)
Educational attainment (years)						0.968	1.012	1.004	1.046	0.979
						(0.016)	(0.018)	(0.026)	(0.021)	(0.013)
Age 20-24						1.099	1.001	1.254	0.841	1.068
						(0.181)	(0.168)	(0.244)	(0.152)	(0.173)
Age 30-34						1.163	1.363*	1.073	0.801	0.815
						(0.139)	(0.170)	(0.232)	(0.121)	(0.087)
Age 35-39						0.940	1.099	0.409***	0.635*	0.891
						(0.193)	(0.198)	(0.101)	(0.134)	(0.142)
Age 40-49						0.743	1.289	0.356**	0.829	1.004
						(0.230)	(0.401)	(0.141)	(0.268)	(0.214)
Lowest wealth quintile						1.511*	1.027	1.047	0.945	1.248
						(0.282)	(0.234)	(0.322)	(0.237)	(0.200)
Mid-low wealth quintile						1.223	1.022	1.074	0.766	1.119
						(0.195)	(0.155)	(0.261)	(0.135)	(0.145)
Mid-high wealth quintile						0.768	1.091	1.280	1.152	1.002
						(0.149)	(0.163)	(0.367)	(0.190)	(0.145)
Highest wealth quintile						1.081	1.201	0.632	1.141	0.862
						(0.240)	(0.201)	(0.191)	(0.235)	(0.155)
Number of living children at start of episode: 0-1						1.329	0.822	0.833	0.851	1.670***
						(0.219)	(0.148)	(0.154)	(0.228)	(0.204)
Number of living children at start of episode: 3						0.981	0.866	0.796	0.969	0.875
						(0.122)	(0.103)	(0.128)	(0.132)	(0.095)
Number of living children at start of episode: 4 or more						0.947	0.796	0.804	1.412	0.826
						(0.162)	(0.145)	(0.161)	(0.275)	(0.136)

Number of failures	395	433	493	358	712	395	433	493	358	712
Number censored	1519									
Number of observations	3911									

Model 1: No controls
Model 2: Controls (Indigenous, Area of residence, Education, Age, Wealth Quintiles, Number of living children at time of pregnancy)

Robust z-statistics in parentheses

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

Table A4. Relative risk ratios from multinomial logistic regression comparing risks of traditional and modern contraceptive use to no method use: Analysis of contraceptive use at time of survey with episodes where no more children are wanted

	Traditional	Modern	Traditional	Modern	Traditional	Modern
IPV before calendar period	0.856	1.005	0.776	0.866	0.778	0.855
	(0.168)	(0.180)	(0.157)	(0.166)	(0.158)	(0.160)
IPV during calendar period	1.315	1.899**	1.171	1.462	1.153	1.394
	(0.352)	(0.442)	(0.298)	(0.345)	(0.314)	(0.320)
Indigenous			1.999**	0.709	2.081**	0.687
			(0.447)	(0.147)	(0.464)	(0.143)
Urban residence			1.608	1.462	1.545	1.519
			(0.436)	(0.357)	(0.439)	(0.375)
Educational attainment (years)			1.069*	1.051*	1.026	1.074**
			(0.0287)	(0.0260)	(0.0288)	(0.0270)
Age 20-24			1.208	1.676*	1.311	1.577
			(0.350)	(0.390)	(0.376)	(0.372)
Age 30-34			1.159	0.706*	1.014	0.803
			(0.224)	(0.122)	(0.210)	(0.135)
Age 35-39			1.046	0.553*	0.921	0.653
			(0.277)	(0.145)	(0.259)	(0.164)
Age 40-49			0.660	0.286**	0.704	0.309**
			(0.256)	(0.116)	(0.284)	(0.122)
Lowest wealth quintile			0.426**	0.742	0.569	0.687
			(0.134)	(0.212)	(0.193)	(0.200)
Mid-low wealth quintile			0.776	0.908	0.898	0.876
			(0.213)	(0.227)	(0.266)	(0.221)
Mid-high wealth quintile			0.707	0.977	0.709	0.919
			(0.196)	(0.267)	(0.209)	(0.247)
Highest wealth quintile			0.633	1.112	0.459	1.078
			(0.228)	(0.344)	(0.183)	(0.336)
Number of living children at time of pregnancy: 0-1					0.499	0.787
					(0.186)	(0.260)
Number of living children at time of pregnancy: 3					0.909	0.976
					(0.194)	(0.180)
Number of living children at time of pregnancy: 4 or more					0.651	0.874
					(0.156)	(0.189)
Constant	0.916	1.887***	0.732	1.168	0.830	1.216
	(0.0973)	(0.181)	(0.271)	(0.372)	(0.314)	(0.402)
N	2025	2025	2024	2024	2024	2024

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