Exposure to Nearby Homicides and Young Women’s Reproductive Lives During the Transition to Adulthood

Abigail Weitzman
Department of Sociology and Population Research Center, University of Texas

Jennifer Barber
Department of Sociology and Kinsey Institute, Indiana University

Justin Heinze
School of Public Health, University of Michigan

Yasamin Kusunoki
School of Nursing and Population Studies Center, University of Michigan

Marc Zimmerman
School of Public Health, University of Michigan

Please direct all correspondence to:
Abigail Weitzman
Department of Sociology
University of Texas Austin
aweitzman@utexas.edu
(512) 475-8526

Acknowledgements: This article was made possible with funding from three grants from the National Institute for Child Health and Human Development (R03HD096118, PI Weitzman; and R01HD050329 and R01HD050329-S1, PI Barber); with two population center grants from the National Institute for Child Health and Human Development to the Population Research Center at the University of Texas at Austin (P2CHD042849) and the Population Studies Center at the University of Michigan (R24HD041028); with a training grant (T32AG000221) from the National Institute for Aging administered through the Population Studies Center at the University of Michigan, where Abigail Weitzman was a postdoctoral fellow; and with support from the Russell Sage Foundation, where Abigail Weitzman participated in the Visiting Scholars Program. The authors are indebted to Julia Behrman, Monica Caudillo, Greg Duncan, Jacob Faber, Peter Rich, and Patrick Sharkey for their insightful comments on this study’s conceptual design and findings. They are also grateful to Galo Falchettore and Michelle Eilers for their assistance with this research.

Keywords: Homicides, Neighborhood Violence, Early Pregnancy, Reproductive Health, Health Disparities
Abstract

Neighborhood violence and early pregnancy are both major components of social stratification yet sociologists rarely examine relationships between the two. We assess the effects of nearby homicides on the risk of pregnancy and on pregnancy-related behavioral and psychosocial indicators among women aged 18 to 22 years. Specifically, we exploit spatiotemporal variation in homicides occurring amidst a weekly panel survey in Flint, Michigan and compare the same women’s reproductive outcomes when a homicide did and did not occur within a quarter-mile of their homes that week. Women’s probability of conceiving a pregnancy was more than double in weeks when a nearby homicide occurred, relative to when one had not. This substantial increase in pregnancy risk was driven by a similarly substantial decrease in contraceptive use, especially among women using short-acting hormonal methods. Contraceptive changes, however, were not accompanied by changes in feelings about pregnancy or contraception, nor were they accompanied by changes in contraceptive access or forgetfulness. Rather, in weeks when nearby homicides occurred, women were less likely to use contraception “just because,” suggesting a marked decline in their reproductive vigilance. When they culminate in pregnancy, the immediate consequences of nearby homicides can have lifelong ramifications for young adults.
Social scientists have long been interested in the collateral consequences of violence, both for those who are victims of it and for those who witness it. A rich body of research documents the multidimensional consequences of primary and secondary violence exposures (Buka et al. 2001), including their effects on mental and physical health (Heinz et al. 2018; Hsieh et al. 2017; Mendelson, Turner and Tandon 2010; Mitchell et al. 2010), cognitive development and schooling (Jordan, Combs and Smith 2014; Mathews, Dempsey and Overstreet 2009), substance use (Roehler et al. 2018), progression of intimate relationships (Kuhl, Warner and Warner 2015; Kuhl, Warner and Wilczak 2012; Warner, Warner and Kuhl 2017), and sexual and reproductive behavior and outcomes (Barber et al. 2018; Brady and Donenberg 2006; Harding 2009), among others (for reviews, see Margolin and Gordis (2000) and Sharkey (2018)). More recently, scholars have begun to recognize that even diffuse exposure via violence occurring within a person’s neighborhood or surrounding community can have developmental consequences (Sharkey 2018). For instance, studies show that homicides and other violent crimes occurring near to children’s homes affect their sleep quality, attention span, and impulse control (Heissel et al. 2018; Sharkey et al. 2012); as well as their school performance and likelihood of school drop-out (Caudillo and Torche 2014; Sharkey 2010; Sharkey et al. 2014).

Although it is now clear that nebulous exposures to nearby homicides are consequential to child and adolescent development, scholars continue to know little about the implications of homicide exposure for young adults. Given the density of important experiences and decisions occurring during the transition to adulthood (Arnett 2014; Johnson 2002; Lareau and Weininger 2008)—a key stage of the life course during which individuals’ social and economic trajectories begin to solidify (Fomby and Bosick 2013; Johnson and Reynolds 2013; Lee 2014)—nearby homicide exposure coinciding with this transition may have an outsized effect on the subsequent unfolding of women’s adult lives. In light of this possibility, we ask what the consequences of nearby
homicides are for young women’s reproductive health, including their risk of pregnancy during the transition to adulthood.

At any age, pregnancy is a highly consequential outcome that can alter the course of a person’s life. When carried to term, pregnancies affect women’s time use, identity, relationship dynamics and stability, economic trajectory, and longer-term health and wellbeing (Budig and England 2001; Budig and Hodges 2010; Correll, Benard and Paik 2007; Edin and Lein 1997; Evenson and Simon 2005; Killewald and Bearak 2014; Sanchez and Thomson 1997).¹ Thus, for many, pregnancy marks a fundamental turning point (Rumbaut 2005). As such, women’s ability to control whether and when they become pregnant (or not) is a critical issue of reproductive justice and gender stratification (Luna and Luker 2013; Russo and Steinberg 2012). Among young women, however, especially those between the ages of 18 and 24, the majority of pregnancies are undesired (Finer and Zolna 2016), suggesting that many are unable to fully control reproductive processes and outcomes during the transition to adulthood. This is especially the case for Black women, whose pregnancies are twice as likely to be undesired as white women’s (Finer and Zolna 2016).

Examining the reproductive repercussions of nearby homicides for young women is complicated by the fact that socioeconomically disadvantaged Black women are not only more likely than others to become pregnant during the transition to adulthood (Center for Disease Control 2019; Penman-Aguilar et al. 2013), but are also disproportionately exposed to nearby homicides (Ferrandino 2017; Sharkey 2018). These realities make it difficult to isolate the effects of homicide exposure from systematic differences in women’s likelihood of being exposed. The gold standard is to compare outcomes among the same individuals before and after a homicide has occurred near to...
their residence (Sharkey 2018). Doing so, however, requires intensive longitudinal panel data collected at relatively short intervals. To that end, we take advantage of spatiotemporal variation in homicides occurring during a weekly panel survey in Flint, MI, a city with one of the highest per capita murder rates in the United States (Adams 2017). Combining administrative police records on the date and location of homicides with georeferenced longitudinal survey data from the Relationship Dynamics and Social Life (RDSL) study, we estimate models with person fixed effects that compare the same woman’s reproductive outcomes in weeks when a nearby homicide did and did not occur within a quarter-mile of her home. This quasi-experimental approach offers us the distinct advantage of accounting for women’s predetermined vulnerability to homicide exposure, fixed demographic characteristics, and earlier life circumstances that may have contributed to their likelihood of becoming pregnant during the transition to adulthood.

Our investigation into how nearby homicides reverberate throughout young women’s reproductive lives makes four contributions to existing scholarship. First, we demonstrate how homicides occurring near young women’s homes affect their reproductive processes and outcomes. Whereas past scholarship investigating the relationship between violence exposure and pregnancy has emphasized the effects of personal violence victimization (Barber et al. 2018; Harding 2009), we elucidate that exposure to violence within the broader surrounding environment can have substantial reproductive repercussions as well. Second, our findings focus on a pivotal period of the life course—the transition to adulthood. By focusing on young adults rather than on children and adolescents, who have received greater attention in the literature, we broaden the scope of knowledge about the implications of homicide exposure. Third, we not only estimate the effects of nearby homicides on young women’s reproductive ideation and behavior, but also on pregnancy itself. Given the potentially lifelong implications of pregnancy, our findings concretely illustrate the “long reach” of violence (Sharkey 2018). Fourth, our analysis of the reproductive consequences of
nearby homicide exposure expands current understandings of the distal determinants of fertility. As we show, nearby homicides immediately increase young women's probability of becoming pregnant by disrupting their use of short-acting contraceptive methods without concomitantly increasing their desire for pregnancy. Rather than conceiving of socially disadvantaged young women as less personally efficacious at preventing pregnancy (England 2016; England et al. 2016), our findings highlight how structural disadvantages, in this case residing in a violent neighborhood, can directly interfere with young women’s ability to contracept consistently.

BACKGROUND

Many studies have examined the relationship between violence and fertility. The majority of existing research, however, focuses on the implications of violence victimization, especially intimate partner violence (IPV) victimization (see Grace and Anderson (2018) and Pallitto, Campbell and O’Campo (2005) for reviews) or on the consequences of protracted, large-scale violent events like war or civil conflict (for reviews, see Abu-Musa et al. (2008) and McGinn (2000)). Only a handful of studies explore the reproductive consequences of exposure to neighborhood violence (Harding 2009; Haynie et al. 2009; Uscher-Pines and Nelson 2010). Moreover, the few studies exploring links between neighborhood violence and pregnancy have been limited to data sources that are either cross-sectional (Uscher-Pines and Nelson 2010) or collected at wide intervals, such as the National Longitudinal Study of Adolescent and Adult Health (Add Health) (Harding 2009; Haynie et al. 2009). Reliance on cross-sectional data leaves open the possibility of confounding (Dietz 2002), while analyses of longitudinal data that are collected infrequently (at intervals of approximately six years in the Add Health) leave unanswered critical questions about the immediate behavioral and psychosocial mechanisms linking neighborhood violence to pregnancy.
Addressing these lacunae, we examine how nearby homicides shape young women’s risk of pregnancy in their immediate aftermath, including assessments of potential behavioral and psychosocial changes that could explain changes in pregnancy risk. Our approach elucidates the pathways by which neighborhood homicides affect young women’s pregnancy risk while overcoming the endogeneity of homicide exposure, i.e. systematic variation in who is exposed to homicides. In the United States, Black youth are disproportionately exposed to neighborhood homicides relative to white youth (Sharkey 2010; Sharkey 2018; Sheats et al. 2018), reflecting a combination of enduring residential racial segregation (Faber 2020) and the fact that homicide rates are approximately twelve times higher among Black adolescents and young adults than among their white counterparts (Sheats et al. 2018).

At the state level, homicide rates are highly correlated with teen birth rates ($r = .74$) (Pickett, Mookherjee and Wilkinson 2005). Yet, this strong correlation does not necessarily imply that homicide exposure affects young women’s likelihood of becoming pregnant at a young age. First, residing in a more violent state does not mean that women are invariably exposed to homicides in their immediate environment, especially given the concentration of homicides in poor, racially segregated neighborhoods. Second, even a high correlation between neighborhood homicide rates and early pregnancy rates could simply reflect that both disproportionately occur among racial minorities and socially disadvantaged populations. Nevertheless, there are a number of plausible explanations as to how nearby homicide exposure might alter a young woman’s sexual and contraceptive behaviors and ultimately impact her probability of becoming pregnant in the weeks following. We discuss these possibilities below.

*Nearby Homicides and Pregnancy-Related Behaviors*
The vast majority of pregnancies are conceived through penile-vaginal sexual intercourse,\(^2\) which for the sake of parsimony we refer to as sex. In order for sex to result in pregnancy, a couple must not be using effective contraception, or in rare cases, experience a contraceptive failure. Thus, behaviorally, nearby homicides are most likely to affect women’s risk of pregnancy through their sexual activity and contraceptive use. More specifically, if nearby homicide exposure increases the probability and/or frequency of sexual activity in a given week, then it could increase the risk of pregnancy. Likewise, if nearby homicides decrease contraceptive use or efficacy, then they will increase the risk of pregnancy.

The most effective forms of contraception are referred to as long-acting reversible contraceptives (LARCs) (Mansour, Inki and Gemzell-Danielsson 2010). These include intra-uterine devices (IUDs) and subdermal implants, which prevent pregnancy with failure rates <1%. Initiating or removing LARCs requires the assistance of medical personnel, but while in use, they require no effort on the part of the user for up to ten years (in the case of IUDs) or three years (in the case of implants) (Hatcher et al. 2011). Given these features, nearby homicides are unlikely to disrupt LARC use. However, owing in part to the long racialized history of forced sterilization, contraceptive experimentation, and resulting medical distrust in the United States (Kluchin 2009; Prather et al. 2018; Roberts 1997), Black women—who are the most likely to be exposed to nearby homicides—tend to be more skeptical of LARCs and, correspondingly, tend to prefer contraceptive methods that they can more easily control and discontinue at will (Dehlendorf et al. 2010; Jackson et al. 2016).

\(^2\) Pregnancy can also be achieved through assisted reproductive technologies, but >99% occur through penile-vaginal intercourse Faddy, Malcolm J, Matthew D Gosden, and Roger G Gosden. 2018. "A demographic projection of the contribution of assisted reproductive technologies to world population growth." Reproductive biomedicine online 36(4):455-58. Trans-gender men with female reproductive organs can also become pregnant. The RDSL sampled women only, as identified in state driver’s license records. Although it became possible to change gender on a driver’s license in Michigan in 2019, it was not possible during the RDSL study period; thus, the RDSL included only cisgender women. Other research using this dataset has analyzed sexual minority women’s sexual and contraceptive behaviors (Ela & Budnick Demography paper), but RDSL did not directly assess gender minority status and no women reported being a gender minority in the weekly surveys’ “anything else you want to tell us?” open-ended question.
An alternative effective pregnancy prevention strategy is to use hormonal short-acting contraceptives (SACs). SACs, which include injections, vaginal rings, transdermal patches, and birth control pills, are >99% effective when used correctly (Hatcher et al. 2011). However, because SACs require regular user effort, as ‘typically’ used, they are only about 90% effective (Trussell 2011). Therefore, their use is more susceptible to homicide-related interruptions. For instance, injection users must visit a healthcare provider every twelve weeks to receive the shot. Likewise, ring and patch users must regularly visit a pharmacy to refill their prescription. Nearby homicides could impede the use of these methods by temporarily preventing women from accessing healthcare providers and pharmacies. Moreover, because birth control pills require consistent user effort on a daily basis, they may be especially susceptible to homicide-related disruptions. For instance, if nearby homicides reduce young women’s attention span or increases their impulsivity, as they do children’s (Sharkey et al. 2012), then being exposed to nearby homicides may result in a temporary lapse in pill use.

Mixed gender couples can also prevent pregnancy with the use of barrier methods like condoms. However, when condoms are the primary contraceptive method, they must be used every time the couple has sex to prevent pregnancy. Moreover, because condoms are utilized at the time of intercourse, they must be on-hand at the time sex occurs and they must be deployed in the heat of the moment. Thus, as with SACs, nearby homicides may decrease condom use if they prevent women or their partners from accessing condoms or temporarily increase impulsivity or otherwise decrease follow-through on previously made plans to prevent pregnancy.

In sum, nearby homicides may increase a young woman’s probability of becoming pregnant by increasing the probability or frequency of sexual intercourse. Even in the absence of such a change, nearby homicides may increase her risk of pregnancy by reducing her probability or consistency of contraceptive use, particularly of methods that require sustained, deliberate effort,
such as birth control pills and condoms—two of the most common contraceptive methods during the transition to adulthood (Guttmacher Institute 2014; Kusunoki and Barber 2020).

Nearby Homicides and Pregnancy-Related Psychosocial Processes

Interdisciplinary scholarship points to a number of psychosocial processes by which nearby homicides may affect young women’s reproductive behaviors, including motivational, cognitive, structural, and interpersonal processes. First, when people are reminded of their own mortality, they tend to seek comfort in emotional intimacy and bonding, a response referred to as proximity seeking. One way people cultivate this intimacy is through family formation and family investments (Vail et al. 2012). For example, in the years following the 1995 Oklahoma City bombing, fertility rates increased in Oklahoma County (Rodgers 2005), while divorce rates decreased (Nakonezny, Reddick and Rodgers 2004). Likewise, divorce rates declined in New York City and across other major metropolitan areas following the September 11th terrorist attack on the World Trade Center in 2001 (Cross Hansel, Nakonezny and Rodgers 2011). Experimental studies in psychology indicate that these terrorist events heightened fertility and improved marital stability because people prioritize their intrinsic life goals, like strengthening their interpersonal relationships, over their extrinsic life goals, like getting ahead in their career, when they are reminded of death (Lykins et al. 2007; Vail et al. 2012). Extended to the case of homicide exposures, these studies suggest that if homicides provoke thoughts of death among nearby residents, then these thoughts may increase some people’s desire to conceive a pregnancy. If so, then nearby homicides may correspondingly increase sexual activity and decrease contraceptive use.

Relatedly, being reminded of death leads some people to crave physical intimacy and interpersonal touch (Goldenberg et al. 2000; Koole, Tjew A Sin and Schneider 2014; Silveira et al. 2013), which stimulates the production of oxytocin (Bick and Dozier 2010; Borrow and Cameron
2012), a hormone associated with emotional attachment and reduced anxiety (Bakermans-Kranenburg and van IJzendoorn 2017; Koole, Tjew A Sin and Schneider 2014). Thus, thoughts of death, induced by nearby homicides, may also increase desire for sex, which oftentimes leads to increased sexual activity (Weitzman 2020). Given that condoms are sometimes viewed as an impediment to physical intimacy (Sobo 1993; Tavory and Swidler 2009), increased desire for sex may also decrease condom use (Weitzman 2020).

Second is increased fatalism, which may reduce desire to use contraception. Correlational studies suggest that neighborhood violence erodes adolescent and adult mental health. That is, adolescents who are exposed to neighborhood violence report a greater degree of depression, hopelessness, and general lack of purpose than adolescents who are not (DuRant et al. 1995; Mendelson, Turner and Tandon 2010). Although depression may reduce sexual frequency (Atlantis and Sullivan 2012), both depressive responses and increased fatalism could yield a more fatalistic outlook toward pregnancy, less desire to use contraception, and/or lower rates of contraceptive use, all of which increase the probability of pregnancy (Hall et al. 2014).

Third are temporary cognitive impairments, which may affect a person’s ability to translate her pregnancy prevention desires and plans into corresponding decisions about sex and contraceptive use. For instance, among young children, neighborhood homicides temporarily increase impulsivity, for approximately one week (Sharkey et al. 2012). If neighborhood homicide exposure has an analogous effect on young adults’ impulsivity, then it may decrease contraceptive use during sexual activity. Moreover, impulsive decision-making may further be exacerbated by substance use, including the frequency of drinking and incidence of binge drinking, which are positively associated with neighborhood violence (Fagan, Wright and Pinchevsky 2014; Fagan, Wright and Pinchevsky 2015; Pinchevsky, Wright and Fagan 2013). Because alcohol use decreases inhibition and impairs judgment, it may further decrease contraceptive use (Rashad and Kaestner
Beyond impulsivity, neighborhood homicides also temporarily reduce attention span and cognitive performance among young children (McCoy, Raver and Sharkey 2015; Sharkey 2010; Sharkey et al. 2012). If such cognitive impairments include increased forgetfulness among young adults, as psychological research on stress responses indicates they might (Rickenbach et al. 2014), then nearby homicides may increase the chances that a young woman forgets to take her birth control pills.

A fourth possibility is that nearby homicides heighten women’s obstacles to healthcare services and thus impede their contraceptive access. That is, sociological and criminological studies suggests that neighborhood violence disrupts people’s daily routines by impinging on their perceived safety (Guo et al. 2018; Johnson et al. 2009) and by increasing police presence in the neighborhood (Legewie and Fagan 2019; Sharkey 2018; Taylor, Koper and Woods 2011). Both of these responses to violence may in turn motivate people to stay home (Legewie and Fagan 2019; Tung et al. 2019; Weir, Etelson and Brand 2006) and thus create temporary obstacles to accessing healthcare providers, pharmacies, and by extension, contraception.

Finally, a fifth possibility is that nearby homicides impede contraceptive use by eliciting or exacerbating intimate partner violence (IPV) (Eisman et al. 2018). At least two studies report that young men who believe their neighborhood is characterized by violent activity or who believe that fighting is needed for survival in their neighborhood are more likely to perpetrate physical or sexual IPV than men who do not (Reed et al. 2009; Reed et al. 2011). Given that alcohol consumption is highly correlated with IPV (Reyes et al. 2012; Thulin et al. 2020), this association may be partially explained by alcohol use. Either way, because IPV increases pregnancy rates through sexual and reproductive coercion, whereby men force women to have sex or prevent them from using contraception, relationship violence in response to neighborhood homicides could also manifest in increased intercourse and decreased contraceptive use (Barber et al. 2018; Kusunoki et al. 2018).
Past scholarship therefore highlights that nearby homicides may affect young women’s reproductive behaviors for motivational reasons—leading to changes in their desires for pregnancy, sex, and/or contraception. At the same time, it also underscores that being exposed to nearby homicides may elicit temporary cognitive responses—impulsivity and forgetfulness—that could affect their sex and contraceptive use even if their motivation to avoid pregnancy remains unchanged. Beyond these possibilities, extant scholarship indicates that women may face more structural and interpersonal obstacles to contracepting in the aftermath of nearby homicides.

DATA AND METHODS

Data

We take advantage of weekly information on young women’s pregnancy status and associated reproductive behaviors made available through the Relationship Dynamics and Social Life (RDSL) study (Barber, Kusunoki and Gatny 2016). The RDSL were collected among a population-representative sample of 1,003 women who were aged 18 to 19 years old and residing in Genesee County, Michigan at baseline. Participants were randomly selected from the Michigan Department of State Driver’s License and Personal Identification Card database between 2008 and 2009, with a response rate of 84% (94% of those successfully located).

Figure 1 illustrates how RDSL study participation unfolded over time. RDSL data collection began with a comprehensive in-person baseline survey. This survey included a range of questions pertaining to respondents’ demographic and family background and reproductive attitudes and desires. At the close of baseline, respondents were invited to participate in weekly follow-ups, which consisted of 5-minute surveys completed online or over the phone every week for up to 2.5 years. These brief surveys asked respondents about their pregnancy status and pregnancy-related behaviors.

---

3 Women who were temporarily residing outside the county for school or work were also included.
and desires. Every four weeks they also asked respondents to update their address, enabling us to track their geographic location over time. In addition, every twelve weeks, surveys repeated questions about reproductive attitudes and updated women’s educational and employment status. A randomized experiment conducted in conjunction with the RDSL found little evidence of panel conditioning bias, suggesting that continued participation did not affect young women’s reproductive behaviors or outlook (Barber et al. 2016b).\(^4\) Seventy-eight percent of respondents completed weekly surveys for at least 1.5 years; 63% completed them for 2.5 years, with a median time of 7 days between surveys (Barber et al. 2016a).\(^5\) Item-specific missing data from the weekly surveys were rare (3%)(Barber et al. 2016a) and seemingly missing at random: women almost never missed multiple responses within the same weekly survey and missing responses did not cluster within the same women across weeks.

[Figure 1]

Given that our administrative data on homicides are limited to Flint and that crime rates tend to be highest in urban areas (Glaeser and Sacerdote 1999), we restrict all analyses to weeks in which women’s residential address was located in Flint, Michigan. Additionally, because of our focus on pregnancy and its antecedents, we restrict our sample to weeks during which women were at risk of becoming pregnant, meaning that they were not pregnant or were assumed to be in their first week of pregnancy only (as described below). This yields a final sample of 12,162 weekly surveys from 334 women. A description of these women is provided in Table 1. Appendix A correspondingly describes how demographic variables are defined.

[Table 1]

---

\(^4\) Women who only answered the baseline survey and one weekly survey a year later exhibited similar attitudes, behaviors, and outcomes to women who answered the baseline survey and completed these shorter surveys on a weekly basis.

\(^5\) Attrition rates differed, however, by race and education at baseline. African American respondents and respondents who had never attended college completed an average of 11 and 12 fewer weekly surveys, respectively, than did white respondents and respondents who had at least some college education (Barber et al. 2016).
Measures

Homicide exposure. Information on the date and street location of homicides occurring in Flint between 2008 and 2012 come from the Flint Police Department (FPD). Each homicide was recorded by a Flint police officer. Approximately half of all homicides occurred in northwestern Flint, while another quarter occurred in northeastern Flint. The remaining quarter occurred across southern parts of the city.

Using geocodes, we integrate spatiotemporal information on homicides and respondents’ time-varying residence to create a dichotomous indicator of whether a homicide occurred within a quarter-mile of a respondent’s home in the seven days prior to each survey. We focus on this short window of time because prior research suggests that nearby homicides’ cognitive consequences begin to diminish by the second week post-exposure, at least among children (Sharkey 2010).

We define nearby homicide exposures as those occurring within a quarter-mile radius of respondents’ homes for both theoretical and empirical reasons. From a theoretical perspective, the closer a homicide is to a woman’s home, the more likely she is to know about it and be affected by it. From an empirical perspective, it would be ideal to estimate the effects of homicide exposure at even shorter radii; however, we lack the statistical power to do so. Thus, if the effects of homicides are more pronounced when they are closer to women’s homes, then our estimates should be understated. Eighty-five respondents (25%) were exposed to homicides within a quarter-mile of their home in a total of 109 weeks (1%, Tables 1 and 2). Sixty-one of these women were exposed once, while twenty-eight were exposed more than once (up to five times).

Consistent with existing research, homicide exposure varied with women’s racial and class background: 30% of African American respondents were exposed to a homicide within a quarter mile of their residence during the study period while only 13% of non-African American respondents were similarly exposed (p<.001, Figure 2a). Likewise, 27% of women whose mothers
did not graduate college were exposed to a nearby homicide compared with 15% of women whose mothers graduated college (p<.1, Figure 2a).

[Figure 2]

Pregnancy. Each week respondents were asked, “Do you think there might be a chance that you are pregnant right now?” Affirmative answers were followed with the question: “Has a pregnancy test indicated that you are pregnant?” When a respondent again reported “yes” she was asked to provide her due date. Respondents who did not yet know the due date were re-asked this question in subsequent surveys until they provided an answer. We use this information to create a right-censored indicator of pregnancy by identifying the weekly interview that occurred 38 weeks prior to the due date. This week is coded (1) for “pregnant.” All other weeks are coded (0). In total, 82 women in our sample (25%) reported 98 pregnancies during the study period. Because respondents were asked about their pregnancy status in each weekly interview, only pregnancies that started and ended between two journals could have been missed. Pregnancies began in 3% of the weeks when a nearby homicide occurred (bivariate analysis not shown).

In some ways, the demographic distribution of pregnancies is similar to that of homicide exposure. Women whose mothers did not graduate college were more than twice as likely to become pregnant during the RDSL than were women whose mothers graduated college (31% versus 15%, p<.05, Figure 2b). Women who were receiving public assistance at baseline were also nearly 50% more likely to become pregnant than were women who were not (34% versus 24%, p<.05, Figure 2b).

Behavioral indicators. In weeks when women reported having any type of partner they were asked “….did you have sexual intercourse with [partner]? By sexual intercourse, we mean when a man puts his penis into a woman’s vagina.” And “….did you have sexual intercourse with anyone
other than [partner]?” We combine responses to these two questions to ascertain sexual activity for each week. Women had sex in 31% of weeks (Table 2).6

Irrespective of sexual activity, each week respondents were asked “Did you use or do anything that can help people avoid becoming pregnant, even if you did not use it to keep from getting pregnant yourself?” When a woman answered “yes” she was asked a series of follow-up questions about hormonal methods, including IUDs, implants, injectables, vaginal rings (e.g. NuvaRing), transdermal patches, and oral birth control pills. In addition, when women reported having sex, they were asked a second set of questions about coital-specific contraceptive methods, including condoms, diaphragms, and spermicide. Based on responses to these questions, we create an indicator of any contraceptive use each week, defined as (1) when a woman reported using at least one of these hormonal or coital methods and (0) when she did not. Women used any form of contraception in 61% of the weeks they had sex (Table 2).

We also create a series of more nuanced contraceptive indicators based on the amount and type of effort they require. First are LARCs, which require the least frequent effort—once every three to ten years. LARC use is defined (1) in weeks when women used IUDs or implants and (0) in weeks when they did not. Women used LARCs in 4% of sexually active weeks (Table 2). Second is a dichotomous indicator of hormonal SACs, which require more frequent user effort, at intervals from once a day to once every twelve weeks. SAC use is coded (1) in weeks when women used birth control pills, transdermal patches, vaginal rings, or injectables, and (0) in weeks when they did not. Women used SACs in 29% of weeks they had sex (Table 2). Because pill use requires user effort every day, whereas other SACs require user effort once a month to once every three months (approximately), we create two additional SAC indicators—one for birth control pills; the other for use of the patch, ring, or shot. Both are defined (1) in weeks when women used that method and (0)

6 The RDSL did not collect information on the frequency of intercourse each week.
in weeks when they did not. Women used birth control pills and other SACs in 21% and 8% of sexually active weeks, respectively (Table 2).

Beyond these hormonal methods, we also examine condom use. Condom use is defined (1) when women used condoms that week (male or female) and (0) when they did not. Women used condoms in 39% of the weeks they had sex (Table 2).\footnote{Spermicide and diaphragm use are not analyzed because they were exceptionally rare (observed in <2% of sexually active weeks combined). As a robustness check, we group these methods with condoms into an indicator of coital method use. The results remain nearly identical to those presented below (available upon request).}

*Psychosocial indicators.* In addition to young women’s reproductive behaviors, we examine two sets of psychosocial indicators. The first are motivational, pertaining to how much women wanted to get pregnant, have sex, and use contraception. Desire for pregnancy was assessed weekly by asking respondents how much they “want to get pregnant in the next month.” Desire for sex and desire for contraception were assessed every twelve weeks by asking respondents how much they “want to have sex” and how much they “want to use contraception” “in the next year” (Figure 1). All three measures ranged between (0) “not at all” and (5) “extremely.” Women’s desire for pregnancy was typically low—.34—and their desire to use contraception was correspondingly high—4.16—in an average week (Table 2). Their desire to have sex was moderate, with an average of 2.33 (Table 2).

The second set of psychosocial indicators we explore are respondents’ reasons for not using contraception in weeks when they had sex but did not contracept. We explore these reasons so as to provide a window into homicide-related cognitive, structural, and interpersonal impediments. When women had sex without using contraception, they were asked to select all of the following explanations that applied: “forgot,” “did not have method available,” “not happy with method,” “partner did not want to use a method,” “not trying to avoid pregnancy,” and “other.” When women selected “other” they were asked to write-in an alternative reason. Where possible, we
combined write-in responses with preexisting categories (for instance, if a woman wrote in *why* she could not access contraception that week we coded her as not having contraception available).

Write-in responses also illuminated the existence of an additional category: “just because.” Thirty-three percent of write-in responses included phrases like “just because,” “just didn’t,” or “no reason.” Based on write-in responses and the structured response categories provided, we assess four dichotomous indicators of contraceptive non-use reasoning that prior scholarship indicates may be related to homicide exposure: “just because,” which captures impulsivity; “forgot to use,” which conveys forgetfulness; “did not have contraception,” which conveys access issues; and “partner did not want to use contraception,” which captures partner interference. Each of these four indicators is coded (1) when a woman did not use contraception and offered this explanation for why she did not and (0) otherwise.

**Controls.** To account for any secular time trends that may affect all women in our sample, we include categorical indicators for the month and year of each weekly survey, as well as interactions between them. In models where we estimate the probability of pregnancy, we additionally include a discrete measure of the cumulative number of months a woman has been at risk of pregnancy (since the start of her study participation or the end of her most recent pregnancy during the study).

Because of concerns about collider bias (Cole et al. 2009; Elwert and Winship 2014), in which homicide exposure could simultaneously affect multiple facets of a woman’s life in ways that might distort the estimated effect of homicides, we do not adjust for time-varying characteristics of women, such as their educational attainment or relationship status.

[Table 2]

**Analytic Approach**

Our analysis proceeds in three parts. To begin, we assess the effects of recent nearby homicides—those occurring within a quarter-mile of a woman’s residence in the prior seven days—
on her probability of becoming pregnant in a given week. To ensure the robustness of our results, we model this relationship in four different ways. The first model uses a linear specification with person fixed-effects. This approach is ideal for addressing the issue of endogeneity because it compares the same women to themselves in weeks when a nearby homicide did and did not occur, thereby accounting for all time-invariant factors that may simultaneously affect a woman’s likelihood of being exposed to nearby homicides and her probability of becoming pregnant during the transition to adulthood. Using a linear rather than a logistic specification with fixed-effects enables us to retain women who never varied on the outcome (Gomila et al. 2020; Rodríguez and Goldman 1995), or in other words, who never became pregnant during the RDSL. In the second model, we employ a linear specification with random effects. Random effects models are more commonly used to predict right-censored events like pregnancy (Barber et al. 2018; Miller, Barber and Gatny 2013) because they simultaneously derive estimates from within-woman changes across weeks and from between-women differences in a given week. A remaining concern with this approach, however, is that linear models perform best when predicting outcomes with a probability between .2 and .8 (von Hippel 2015), and may therefore perform poorly when estimating a rare event like pregnancy. Thus, in the third model, we predict pregnancy using a logistic regression with random effects. Finally, because random effects regressions assume that unobserved heterogeneity among women is uncorrelated with their homicide exposure, we estimate a fourth model using logistic regression without random effects to predict pregnancy, which relaxes this assumption.

Following our analysis of pregnancy, our second step is to explore the effects of nearby homicides on young women’s pregnancy-related behaviors. As with our initial model of pregnancy,

---

8 For instance, 252 women (75%) never became pregnant during the study period. These women and their weeks would be omitted from a logistic regression with person fixed-effects even though, arguably, homicide exposure had no effect on their likelihood of becoming pregnant if it never induced a change in their pregnancy status. The exclusion of these women and their weeks could thus upwardly bias fixed-effects estimates, leading us to overstate the effects of homicide exposure.
we estimate all pregnancy-related behaviors using linear regression with person fixed-effects so as to address the issue of endogeneity while still retaining women whose behavior never wavered. Here, we begin by estimating the effects of nearby homicides on women’s probability of having sex in a given week. Then, focusing on weeks when women specifically had sex and were thus at risk of becoming pregnant, we estimate their probabilities of using any contraception, LARCs, SACs, and condoms (separately). Together, these models provide a birds-eye view of the behavioral mechanisms by which homicides most likely affect young women’s pregnancy risk.

Providing greater depth of understanding into how nearby homicides affect young women’s contraceptive use, we assess the extent to which they disrupt the use of contraceptive methods requiring repeat effort. To do so, we estimate models predicting shot, ring, or patch use, which require effort at intervals of one to three months; birth control pill use, which requires user effort daily; and condom use, which requires user effort at intercourse. To determine if nearby homicides specifically disrupt ongoing use of these methods, we estimate linear fixed effects models and restrict the sample to weeks in which women used that same method within the preceding four weeks. Modeled in this way, a negative effect of homicides on birth control pill use, for example, indicates that homicide exposure reduces the use of pills among women who were specifically using pills at or just before exposure occurred.

Finally, after assessing the effects of nearby homicides on pregnancy-related behaviors, our third step is to assess their effects on pregnancy-related psychosocial indicators. Here, we use linear regressions with fixed effects to first predict desire for pregnancy, desire to have sex, and desire to use contraception (separately). Then we use linear probability models with fixed effects to predict contraceptive non-use scenarios: didn’t use contraception “just because”; forgot to use
contraception; didn’t have access to contraception; and partner didn’t want to use contraception that week.\footnote{9}

For all multivariable analyses, we report whether coefficients are significant up to the .05 level, based on two-tailed tests of statistical significance. To ensure the robustness of our results, we re-estimate all models including controls for women’s time-varying educational, employment, and welfare receipt status, relationship status, parity, and census tract (Appendix B); and further re-estimate all linear probability models excluding observations with an infeasible predicted probability $<0$ or $>1$ (Horrace and Oaxaca 2006) (Appendix C). In addition, we assess the sensitivity of our results to widening the radius of homicide exposure to a half-mile surrounding respondents’ residence and explore potential lagged effects of nearby homicides. We discuss the results of these complementary analyses following the presentation of our main results.

**RESULTS**

*The Implications of Nearby Homicides for Young Women’s Immediate Probability of Pregnancy Conception*

We begin our analysis by examining the effects of recent nearby homicides on young women’s probability of becoming pregnant in a given week. The results, presented in Table 3, indicate that regardless of how we model pregnancy, homicides occurring within a quarter-mile of a young woman’s home have a significant, positive effect on her probability of pregnancy. When modeled linearly, homicides occurring within a quarter-mile of a young woman’s home are estimated to increase her probability of becoming pregnant by 2 percentage points, regardless of whether the model is estimated with fixed or random effects. When modeled nonlinearly, using logistic

\footnote{9 Weeks when women used contraception are included in the reference category of these variables. This is because our fixed effects models compare women to themselves across weeks. If we restricted the analysis to weeks when women did not use contraception, then estimates would not convey an effect of homicides on actually forgetting (and consequently not using) contraception, for example.}
regression, homicides occurring within a quarter-mile of a young woman’s home are estimated to increase her odds of becoming pregnant by 52% and 33% when including and excluding random effects, respectively.

Looking across models in Table 3 thus indicates that nearby homicides have a strong effect on women’s likelihood of becoming pregnant in a given week. Moreover, the significant effect of homicide exposure in the first model, which is estimated with person fixed-effects, implies that this effect is not simply attributable to differences between women who were and were not exposed to homicides, but rather, is attributable to meaningful changes in the same woman’s risk of becoming pregnant over time, between weeks when she was and was not exposed to a homicide within a quarter-mile of her home.

[Table 3]

The Implications of Nearby Homicides for Young Women’s Pregnancy-Related Behaviors

Having demonstrated a significant effect of nearby homicide exposure on young women’s likelihood of conceiving a pregnancy, we next turn our attention to potential behavioral explanations. This behavioral analysis compares the sexual activity and contraceptive use of the same women in weeks when they were and were not exposed to nearby homicides, implicitly accounting for all time-invariant differences between women that may be associated with their probability of homicide exposure and with their sexual and reproductive behaviors during the transition to adulthood.

The results of our behavioral analysis, presented in Table 4, indicate that homicides have no detectable effect on women’s probability of having sex that week. When women have sex, however, their probability of using any form of contraception is 24 percentage points lower during the week a nearby homicide occurred relative to in other weeks. In other words, when they are exposed to
nearby homicides, young women’s probability of using any contraception declines by more than a third from the average week.

When disaggregated by method type, we observe no significant effect of nearby homicide exposure on women’s probability of using LARCs in a given week. This is not surprising given that LARCs require user effort at a minimum interval of every three years. SACs, on the other hand, which require user effort much more frequently, are sensitive to homicide exposure: In weeks when a young woman is exposed to a homicide near to her home, her probability of using SACs is 13 percentage points lower than in other weeks. Coital methods, which must be implemented at the time of sex, do not significantly differ between weeks when women were and were not exposed to nearby homicides.

[Table 4]

Table 5 presents the results of models exploring the effects of homicide exposure on contraceptive methods that require user effort at intervals of three months or less, or user effort at sex, which we interpret in terms of contraceptive disruptions, and restrict the sample to weeks in which women recently used one of these methods. The results of the first model in Table 5 suggest no effect of nearby homicides on shots, rings, or patches—methods necessitating user effort once a month or less frequently. The results of the second model, on the other hand, indicate that nearby homicides decrease the probability of birth control pill use by 36 percentage points among women who used the pill during the preceding month (four weeks). Pill use, which requires daily user effort, is thus clearly susceptible to homicide-related disruptions. Finally, the results of the last model indicate that nearby homicides do not disrupt the use of coital methods among recent coital method users.

Taken together, the results in Tables 4 and 5 yield three clear takeaways. First, exposure to nearby homicides does not affect a young woman’s probability of having sex in a given week, but if
she has sex that week, it dramatically reduces her probability of using contraception. Second, the
effects of nearby homicides are most pronounced on young women’s use of SACs—methods that
are more demanding in terms of user effort but that are also much more commonly used than
LARCs. Third, nearby homicides reduce young women’s use of SACs particularly by disrupting their
ongoing use of birth control pills, which are by far the most prevalent type of SAC used.

[Table 5]

The Pregnancy-Related Psychosocial Implications of Nearby Homicide Exposure

The third step in our analysis is to investigate the effects of nearby homicides on pregnancy-
related psychosocial indicators, thus providing a window into why homicides lead to behavioral
changes. The results, presented in Table 6, indicate that homicides occurring within a quarter-mile of
a young woman’s home have no significant effect on her (typically low) desire for pregnancy the
following week. Nor do they significantly alter women’s (typically strong) desire to use
contraception. On the other hand, women’s desire for sex increases by .87 points, or 15% on a scale
of 0 to 5, the week after a nearby homicide occurs relative to in other weeks.

In weeks when young women have sex, nearby homicides increase their probability of not using contraception “just because” by 6 percentage points, suggesting that homicides increase
impulsive decisions about contraception. Nearby homicides do not, however, increase women’s
probability of forgetting to use contraception. Nor do they impede women’s access to contraception
or heighten partner’s resistance to it in ways that ultimately lead to contraceptive non-use (Table 6).

On the whole, the results in Table 6 highlight that nearby homicides affect young women’s
desire for sex and impulsivity about their contraceptive use in the short-run. These results are
consistent with existing research on homicide exposures’ neurological and cognitive consequences
(Sharkey 2010; Silveira et al. 2013) and suggest that such consequences manifest in the reproductive
lives of young women during the transition to adulthood.
SUPPLEMENTARY RESULTS

Sensitivity Analyses

To ensure the robustness of our results, we subject this analysis to a series of sensitivity tests. First, we re-estimate all models controlling for respondents’ dynamic characteristics, including their current educational attainment, employment status, receipt of public assistance, relationship status, parity, and census tract. In our preferred models, we do not include these controls because of the possibility of collider bias (Cole et al. 2009; Elwert and Winship 2014), which could distort the estimated effects of homicide exposure. Nevertheless, results remain highly similar in magnitude, direction, and significance when models are adjusted for respondents’ time-varying demographic characteristics (Appendix B).

Second, because the primary drawback of linear probability models is that they can yield infeasible estimated probabilities <0 or >1, we re-estimate all models of dichotomous outcomes omitting observations with an infeasible predicted probability. The results again remain highly similar to those of our focal analyses above (Appendix C), with only one substantive difference—the estimated effect of nearby homicides on LARC usage becomes slightly larger and statistically significant when excluding weeks with infeasible predicted probabilities.

Spatial and Temporal Dimensions of Nearby Homicides’ Reproductive Consequences

Thus far, we have defined nearby homicides as those occurring within a quarter-mile of women's homes and focused our attention on their immediate consequences in the subsequent week. These analytic decisions were guided by prior studies, which indicate that the effects of homicides attenuate with greater geographic distance and as time elapses (Sharkey 2010; Sharkey et al. 2012). To explore whether the reproductive repercussions of nearby homicides similarly dissipate
at greater spatial and temporal distances, we re-estimate all models twice. In the first set of models, we re-define homicide exposure as homicides occurring within a half-mile of a woman’s home in the prior week. Consistent with prior research, we find that homicides’ effects on young women’s reproductive lives attenuate at more distant radii (Appendix D).

In the second set of models, we explore temporal dimensions of homicides’ effects by including indicators of nearby homicides—within a quarter-mile of a woman’s home—8 to 14, 15 to 21, and 22 to 28 days prior. Also consistent with past research, the results suggest that most effects of nearby homicides diminish quickly over time (Appendix E). Only homicides’ estimated effect on women’s probability of using any contraception remains statistically significant 8 to 14 days later and the magnitude of this point estimate is approximately half of what it is within 7 days of nearby homicides. Moreover, 15 to 21 days after a young woman is exposed to a homicide, her probability of using SACs is 11 points greater and her probability of forgetting to use contraception is 7 points smaller than in other weeks. Taken in conjunction with homicide exposures’ effects the first week following, these effects three weeks later suggest that immediate lapses in contraceptive use brought on by homicides may subsequently motivate young women to become more concerted in their contraceptive use. If so, however, then this lagged effect is also short-lived: by the fourth week after a nearby homicide (21 to 28 days later) no significant effects of nearby homicides are detected on any outcome.

DISCUSSION AND CONCLUSION

Summary of Results

We sought to elucidate whether and how nearby homicides increase young women’s risk of becoming pregnant during the transition to adulthood. To do so, we leveraged uniquely intensive panel data on young women’s reproductive lives and spatiotemporal variation in women’s exposure
to homicides occurring within a quarter-mile of their homes coinciding with the collection of these data. As we demonstrated, being exposed to a nearby homicide increases a young woman’s probability of becoming pregnant nearly three-fold compared to in other weeks. The magnitude of this estimate indicates that, in the aggregate, homicides have a non-negligible effect on young adult pregnancy rates.

To better understand what, behaviorally, could explain this phenomenon, we investigated how being exposed to nearby homicides changes young women’s reproductive behaviors. Although a homicide occurring near to a young woman’s home has no significant effect on her sexual activity, when young women have sex, nearby homicides dramatically decrease their likelihood of using any contraception that week. Homicides therefore increase young women’s pregnancy risk primarily by reducing their contraceptive use.

Nevertheless, homicides affect some contraceptive methods, namely SACs, more than others. This is because, unlike LARCs, SACs require sustained user effort, which makes them more susceptible to homicide-related disruptions. The capacity for nearby homicides to disrupt ongoing SAC use is epitomized by their negative effects on birth control pills—a daily method—among recent users of the pill. Although condoms, too, require frequent user effort, our behavioral results indicated that nearby homicides do not significantly affect their use. This may be because women’s motivations for using condoms differ from their motivations for using hormonal methods (Higgins et al. 2008; Weitzman, Barber and Kusunoki 2019); because condom use is already more sporadic (Mullinax et al. 2017); and/or because condoms require the participation of male partners who could have been affected differently by nearby homicides.

In an effort to clarify why nearby homicides diminish women’s contraceptive use, we explored a range of potential psychosocial explanations, including motivational, cognitive, structural, and interpersonal explanations. Overall, the results of our psychosocial analysis underscored that
young women desire sex more strongly and are more likely to forego contraception “just because” in weeks when they are exposed to a nearby homicide than in weeks when they are not. Nearby homicides do not induce analogous changes in how much young women want to become pregnant or want to use contraception; nor do they impede women’s contraceptive access or heighten partners’ reluctance to use contraception.

On the whole, our conclusions were robust to alternative specifications. Like studies of developmental outcomes among children and adolescents, our supplemental analysis of spatial and temporal variation in homicides’ effects confirmed that homicides’ reproductive repercussions among young women are attenuated at greater geographic distances and diminish quickly with time.

Limitations

The conclusions drawn from this study should be taken in the context of several limitations. The first is that our study analyzed a sample of young adult women in Flint, Michigan. This geographic restriction prevents us from generalizing about the effects of homicide exposure in other cities or nationwide. Nevertheless, previous comparisons of the RDSL to women of comparable age in nationally representative samples indicate that demographically, attitudinally, and behaviorally, women in the RDSL are highly similar to young women elsewhere in the United States (Clark 2018; Ela and Budnick 2017). Moreover, the demographic distributions of homicide exposures and pregnancies observed in our sample mimic what are observed in other cities and nationwide (Center for Disease Control 2019; Penman-Aguilar et al. 2013; Sharkey 2018)

Second, because our sample was limited to young adult women, we could not make inferences about the reproductive repercussions of nearby homicides for older or younger women, or for men. Considering that sexual frequency and modes of contraceptive use vary with age (Daniels and Abma; Ueda et al. 2020), further research is needed to understand the full extent to
which neighborhood homicides influence fertility, reproductive health, and family life across the life course.

A third limitation pertains to measurement error, particularly with respect to sex, condom use, and pregnancy. Regarding the former, we analyzed information about whether women had sex each week; however, we lacked information about the number of times they had sex that week. Considering the positive effect of homicides on desire for sex and on pregnancy, it is possible that homicides increase sexual frequency among those who have sex—a possibility we were unfortunately unable to assess. Relatedly, qualitative research suggests that even when couples use condoms, they often use them incorrectly or take them off partway through sex (Higgins et al. 2014). It is therefore possible that homicide exposure impedes effective condom use, especially if it leads to more impulsive decision-making. Regarding the measurement of pregnancy, previous research finds that prenatal stress increases the risk of miscarriage (Hamoudi and Nobles 2014). If neighborhood homicides not only increase the risk of becoming pregnant but also the likelihood of losing that pregnancy at a very early stage—before the pregnancy is even recognized—then the magnitude of our estimated effects of homicides on pregnancy should be understated.

Fourth, because our sample is small, we face an increased risk of Type II error, especially when it comes to estimating differences in the demographic distribution of homicide exposure. Our small sample size, and especially small number of Asian and Hispanic women, combined with the uneven racial distribution of homicide exposure, further prevents us from investigating homicides’ potentially heterogeneous effects across race. Given well documented racial differences in young women’s reproductive attitudes and behaviors, it is plausible that homicides differentially impact women from different racial backgrounds. Also given our small sample size, and the fact that homicide exposure is a relatively infrequent occurrence, we further face a heightened risk of Type S
and M errors (mischaracterizing the sign and magnitude of homicides’ effects) (Gelman and Carlin 2014).

The Disruptive Capacity and “Long-Reach” of Neighborhood Violence

This study broadens the scope of what is understood about homicide exposure in two key ways: by highlighting a distinct set of outcomes resulting from this exposure—pregnancy and its behavioral and psychosocial antecedents—and by shifting attention to homicides’ consequences for young adults. Young adulthood is distinct from earlier stages of the life course because it is marked by greater independence and a higher density of consequential decisions that affect one’s future, including decisions about family formation, higher education, and career directions (Arnett 2007; Schwartz 2016).

A key finding from past scholarship is that exposure to homicides at a young age has temporary cognitive effects, including increased impulsivity and decreased attention span (Sharkey et al. 2012). In childhood, these effects have detrimental implications for school performance and achievement (Caudillo and Torche 2014; Sharkey 2010; Sharkey et al. 2014). During the transition to adulthood, the stakes are different—a point we emphasized through our exploration of how homicide exposures reverberate in young women’s reproductive lives. The fact that nearby homicides disrupt women’s ongoing birth control pill use and lead them to forego contraception “just because” epitomizes how even a temporary uptick in impulsivity can have important long-term implications at this stage.

The constellation of cognitive sequelae following homicide exposure may have other meaningful consequences for young adults as well, which we were unable to explore. One of these is drug and alcohol use. Numerous correlational studies document a positive association between neighborhood violence and substance use (Fagan, Wright and Pinchevsky 2014; Fagan, Wright and
Pinchevsky 2015; Pinchevsky, Wright and Fagan 2013). Our findings suggest that, among young adults this association may be attributable to an effect of homicide exposure on neurocognitive processes that result in increased risk-taking. However, greater causal research is needed to affirm this possibility and to better understand the nature of this relationship. Other important realms of young adults’ lives that may be impacted by nearby homicide exposures include employment and education. Indeed, among children, homicide exposure is associated with school drop-out (Caudillo and Torche 2014). If nearby homicides heighten a young adult’s cognitive load and impulsivity, then exposure to nearby homicides likely impinges on their job and school performance, with notable implications for their income, financial instability, and overall economic trajectories.

Considering that the sequencing of events matters to how one’s life progresses (Elder Jr 1998), nearby homicides occurring amidst early adulthood may have a rippling effect on the subsequent unfolding of young adults’ lives. This ripple effect is made clear by nearby homicides’ positive effects on a young woman’s probability of becoming pregnant—a pivotal life event that, when carried to term, has long-lasting implications for her earnings, health, and relationship trajectories (Budig and England 2001; Budig and Hodges 2010; Correll, Benard and Paik 2007; Edin and Lein 1997). In this way, our findings concretely illustrate the “long reach” of exposure to nearby violence.

Moreover, given that pregnancies carried to term result in the birth of a new generation, our findings exemplify how this long reach can extend from one generation to the next. Because the most socially disadvantaged populations are both disproportionately exposed to violence and stuck in place (Sharkey 2013), children conceived in the aftermath of nearby homicides are likely to grow up in violent neighborhoods themselves and to therefore be socially and cognitively impacted by neighborhood violence as well. Children born to young mothers also experience more family instability and are more likely to grow up poor than are children born to comparatively older
mothers (McCarthy and Menken 1979; Moore et al. 1993; Musick and Michelmore 2018). In these ways, homicide exposures’ multifaceted effects may become compounded across generations.

Exposure to Violent Environments as a Distal Determinant of Pregnancy

Our findings also contribute to ongoing sociological and demographic debates about the relationship between violence and fertility. Scholars increasingly recognize that being the victim of interpersonal violence, especially intimate partner violence, increases women’s risk of pregnancy (Barber et al. 2018; Behrman and Weitzman 2016), as does residing in a place characterized by diffuse conflict or war (Abu-Musa et al. 2008; McGinn 2000). Yet, until now, little attention has been paid to the role of more localized environmental violence occurring in close proximity to one’s home, leaving open important questions about whether, how and why such violence contributes to pregnancy risk.

As we showed, nearby homicides are a distal determinant of fertility because they disrupt women’s contraceptive use, particularly of short-acting methods. At the same time, however, nearby homicides do not immediately alter young women’s typically low desire to become pregnant or typically high desire to use contraception. Thus, in the short term, nearby homicides impede fertility regulation by undermining women’s attempts at pregnancy prevention and, more specifically, their efficacy at using hormonal methods requiring sustained user effort.

Considering that SACs are among the most prevalent contraceptive methods for young adults (Guttmacher Institute 2014; Kusunoki and Barber 2020), the non-trivial effects of homicide exposure on their use have substantial population-level implications. Moreover, the long, racialized history of forced sterilization and hormonal experimentation in the United States has left many Black women skeptical of LARCs (Gomez, Fuentes and Allina 2014; Kluchin 2009; Prather et al. 2018; Roberts 1997), which are more difficult to discontinue than SACs (Hatcher et al. 2011). Public
health practitioners and clinicians aiming to reduce unwanted pregnancies—which also disproportionately occur among Black and socially disadvantaged women—should therefore ensure that LARC methods, as well as those methods that require user effort at intervals of one month or less, like vaginal rings and patches, are offered to these women. In the face of neighborhood violence, these methods improve women’s control over their fertility more than other SACs, like birth control pills. Although clinician bias toward encouraging LARC use among Black and socially disadvantaged women (Higgins et al. 2016 in AJPH) has led to a recent backlash against encouraging these methods amidst worries about coercion and the imposition of a “planning paradigm” on women who do not want to plan (Aiken et al. 2016; Rocca and Harper 2012), the most recent research suggests that young Black and white women are similarly motivated to avoid or delay pregnancy in the near-term (Barber et al. 2021). Thus, alongside careful attention to women’s own preferences for contraceptive method choice, one key way in which clinicians can help young women achieve their reproductive goals in the face of community violence is to support the use of LARC methods (or longer acting SACs), which are more resistant to threats and thus leave women better positioned to actualize their reproductive desires and plans.

Our findings align with the reproductive justice paradigm, which recognizes that people’s ability to control the timing of their fertility is not simply a matter of their healthcare access, but also a matter of the broader social structural conditions in which they live. These conditions, which enable or impede a person’s ability to manifest and achieve her reproductive goals, are notably stratified by race and class (Luna and Luker 2013). Considering that neighborhood violence is one of the conditions interrupting women’s ability to contracept consistently, ultimately increasing her probability of pregnancy without increasing her desire for it, community violence prevention is a vital component of achieving reproductive justice.
Figure 1. Timeline of RDSL Study

Timing of Each Measure:

<table>
<thead>
<tr>
<th>Baseline only</th>
<th>Every week</th>
<th>Every four weeks</th>
<th>Every twelve weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td>Pregnancy status</td>
<td>Current address</td>
<td>Desire for sex</td>
</tr>
<tr>
<td>Maternal education</td>
<td>Sex</td>
<td>Desire for contraception</td>
<td>Educational enrollment</td>
</tr>
<tr>
<td>Maternal age at 1st birth</td>
<td>Contraceptive use</td>
<td>Desire for pregnancy</td>
<td>Employment status</td>
</tr>
<tr>
<td>Childhood family structure</td>
<td>Reason for not using contraception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood public assistance</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Baseline survey
Initiation of weekly journals
Address updated at 4-week intervals
Quarterly supplements, repeated at 12-week intervals

J1, J2, J3, J4, J12, J130
Figure 2. Distributions of Homicide Exposure and Pregnancy, by Demographic Background

a. Homicide exposure

![Bar chart showing distributions of homicide exposure by demographic background.

Legend:
- Race
  - African American
  - White and others
- Maternal ed+
  - Mother did not graduate college
  - Mother graduated college
- Teen mom
- Two-parent home
- Child: Welfare
- Baseline: Welfare

b. Pregnancy

![Bar chart showing distributions of pregnancy by demographic background.

Legend:
- Race
- Maternal ed*
- Teen mom
- Two-parent home
- Child: Welfare
- Baseline: Welfare

Note: N=334 women. Distributional differences were determined with chi-square tests. +p<.1, *p<.05, **p<.01, *** p<.001 (two-tailed tests).
<table>
<thead>
<tr>
<th>Table 1: Descriptive Characterization of Respondents in Analytic Sample (N=334)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homicide Exposure</strong></td>
</tr>
<tr>
<td>Ever exposed to a homicide &lt;=.25 miles of her home</td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
</tr>
<tr>
<td>Became pregnant during study</td>
</tr>
<tr>
<td><strong>Fixed demographic characteristics</strong></td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>African American</td>
</tr>
<tr>
<td>White or other</td>
</tr>
<tr>
<td>Maternal education</td>
</tr>
<tr>
<td>Mother did not attend college</td>
</tr>
<tr>
<td>Mother attended college</td>
</tr>
<tr>
<td>Maternal age at first birth</td>
</tr>
<tr>
<td>&lt;20 years at first birth</td>
</tr>
<tr>
<td>&gt;=20 years at first birth</td>
</tr>
<tr>
<td>Childhood family structure</td>
</tr>
<tr>
<td>Did not grow up in a two-parent home</td>
</tr>
<tr>
<td>Grew up in a two-parent home</td>
</tr>
<tr>
<td>Childhood welfare</td>
</tr>
<tr>
<td>Received public assistance as a child</td>
</tr>
<tr>
<td>Did not receive public assistance as a child</td>
</tr>
<tr>
<td>Current welfare receipt</td>
</tr>
<tr>
<td>Received public assistance at baseline</td>
</tr>
<tr>
<td>Did not receive public assistance at baseline</td>
</tr>
</tbody>
</table>
Table 2. Descriptive Characterization of Weeks in Analytic Sample (N=12,162)

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homicide exposure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed to a homicide &lt;=.25 miles from her home in last week</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Became pregnant</td>
<td>.008</td>
<td></td>
</tr>
<tr>
<td><strong>Behavioral indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had sex</td>
<td>.31</td>
<td></td>
</tr>
<tr>
<td>If had sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used any contraception</td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>Used long-acting reversible contraception</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Used hormonal short-acting contraception</td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td>Used shot, ring, or patch</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td>Used birth control pills</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>Used condoms</td>
<td>.39</td>
<td></td>
</tr>
<tr>
<td><strong>Psychosocial indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desire for sex (0-5)</td>
<td>2.33</td>
<td>1.75</td>
</tr>
<tr>
<td>Desire to use contraception (0-5)</td>
<td>4.16</td>
<td>1.45</td>
</tr>
<tr>
<td>Desire for pregnancy (0-5)</td>
<td>.34</td>
<td>1.10</td>
</tr>
<tr>
<td>If had sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t use contraception “just because”</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Forgot to use contraception</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Couldn’t access contraception</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Partner didn’t want to use contraception</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td><strong>Time-varying demographic characteristics (supplemental)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;H.S.</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>Graduated H.S., not enrolled</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>Enrolled in 2-year college or vocational school</td>
<td>.39</td>
<td></td>
</tr>
<tr>
<td>Enrolled in 4-year college</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>.58</td>
<td></td>
</tr>
<tr>
<td>&lt;30 hours per week</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>&gt;=30 hours per week</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Receiving public assistance</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Parity (0-3)</td>
<td>.29</td>
<td>.54</td>
</tr>
<tr>
<td>Relationship status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>.47</td>
<td></td>
</tr>
<tr>
<td>Casual</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Special</td>
<td>.38</td>
<td></td>
</tr>
<tr>
<td>Engaged</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>.04</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Estimated Effects of Homicide Exposure on Probability of Pregnancy Conception

<table>
<thead>
<tr>
<th></th>
<th>Linear, FE</th>
<th>Linear, RE</th>
<th>Logistic, RE</th>
<th>Logistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed to homicide in last week</td>
<td>.02**</td>
<td>.02*</td>
<td>1.52*</td>
<td>1.33*</td>
</tr>
<tr>
<td></td>
<td>(.01)</td>
<td>(.01)</td>
<td>(.74)</td>
<td>(.61)</td>
</tr>
<tr>
<td>Constant</td>
<td>.40</td>
<td>.32***</td>
<td>6.14</td>
<td>-.34</td>
</tr>
<tr>
<td></td>
<td>(.53)</td>
<td>(.10)</td>
<td>(6.62)</td>
<td>(3.26)</td>
</tr>
<tr>
<td>Observations (weeks)</td>
<td>12,162</td>
<td>12,162</td>
<td>9,661</td>
<td>9,661</td>
</tr>
<tr>
<td>Respondents</td>
<td>334</td>
<td>334</td>
<td>325</td>
<td>325</td>
</tr>
</tbody>
</table>

Note: All models control for age, month and year dummies, month-by-year interaction terms, and months at risk of pregnancy and its squared term. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).
**Table 4.** Estimated Effects of Homicide Exposure on Sex and Contraceptive Use, from Linear Models with Person Fixed-Effects

<table>
<thead>
<tr>
<th>Had sex</th>
<th>Used any contraception</th>
<th>Used LARCs</th>
<th>Used SACs</th>
<th>Used condoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed to homicide in last week</td>
<td>-0.03</td>
<td>-0.24***</td>
<td>-0.02</td>
<td>-0.13*</td>
</tr>
<tr>
<td>Constant</td>
<td>2.33</td>
<td>-1.92</td>
<td>-4.06*</td>
<td>-2.31</td>
</tr>
<tr>
<td>Observations (weeks)</td>
<td>12,131</td>
<td>3,716</td>
<td>3,716</td>
<td>3,716</td>
</tr>
<tr>
<td>Respondents</td>
<td>334</td>
<td>263</td>
<td>263</td>
<td>263</td>
</tr>
</tbody>
</table>

*Note: All models include controls for age, month and year dummies, and month-by-year interaction terms. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).*
### Table 5. Estimated Effects of Homicide Exposure on Contraceptive Use Among Women Who Recently Used that Contraceptive Method, from Linear Probability Models with Person Fixed-Effects

<table>
<thead>
<tr>
<th></th>
<th>Used shot, ring, or patch</th>
<th>Used pills</th>
<th>Used condoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed to homicide in last week</td>
<td>-0.33 (.23)</td>
<td>-0.36* (.14)</td>
<td>-0.01 (.15)</td>
</tr>
<tr>
<td>Constant</td>
<td>8.72 (17.07)</td>
<td>5.27 (9.22)</td>
<td>3.09 (7.70)</td>
</tr>
<tr>
<td>Observations (weeks)</td>
<td>395</td>
<td>1,007</td>
<td>1,696</td>
</tr>
<tr>
<td>Respondents</td>
<td>83</td>
<td>109</td>
<td>186</td>
</tr>
</tbody>
</table>

In preceding four weeks:

|                         | Used shot, ring, or patch | Used pills | Used condoms |

*Note: All models are limited to weeks when women had sex and include controls for age, month and year dummies, and month-by-year interaction terms. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).*
Table 6. Estimated Effects of Homicide Exposure on Pregnancy-Related Psychosocial Indicators, from Linear Models with Person Fixed-Effects

<table>
<thead>
<tr>
<th></th>
<th>Desire for pregnancy</th>
<th>Desire for sex</th>
<th>Desire for contraception</th>
<th>Didn’t use contraception “just because”</th>
<th>Forgot to use contraception</th>
<th>Couldn’t access contraception</th>
<th>Partner didn’t want to use contraception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed to homicide in last week</td>
<td>.04 (.07)</td>
<td>.87* (.34)</td>
<td>.05 (.36)</td>
<td>.06* (.03)</td>
<td>.03 (.03)</td>
<td>.06 (.05)</td>
<td>.02 (.03)</td>
</tr>
<tr>
<td>Constant</td>
<td>7.43+ (4.51)</td>
<td>-11.91 (31.25)</td>
<td>28.23 (33.31)</td>
<td>-1.58 (1.83)</td>
<td>.34 (2.33)</td>
<td>-4.11 (3.35)</td>
<td>-.17 (1.89)</td>
</tr>
<tr>
<td>Observations (weeks)</td>
<td>12,162</td>
<td>905</td>
<td>902</td>
<td>3,716</td>
<td>3,716</td>
<td>3,716</td>
<td>3,716</td>
</tr>
<tr>
<td>Respondents</td>
<td>334</td>
<td>265</td>
<td>265</td>
<td>263</td>
<td>263</td>
<td>263</td>
<td>263</td>
</tr>
</tbody>
</table>

Note: Desire for pregnancy was assessed weekly, while desire for sex and contraception were assessed every twelve weeks, leading to different numbers of observations across these models. All models control for age, month and year dummies, and month-by-year interaction terms. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).
Appendix A. Description of Demographic Characteristics

**Time-Invariant:** All time-invariant characteristics were assessed once at baseline.

*Race* is defined as (1) African American and (0) otherwise. Ninety-seven percent of respondents either identified as African American or white. The remaining three percent are combined with whites in the reference category.

*Maternal education* is categorized as (1) when a woman’s mother graduated college and (0) when her mother either did not complete or did not attend college.

*Maternal age at first birth* is based on whether a young woman’s mother was (1) \(<=19\) years of age or (0) \(>=20\) years at first birth.

*Childhood family structure* reflects whether a young woman (1) grew up in a two-parent household, including any combination of biological, adoptive, and step-parents, or (0) did not.

*Childhood welfare* is determined by whether a young woman reported that, as a child, her household (1) received any type of public welfare, or (0) did not.

**Time-Variant:** Education, employment, and welfare receipt were assessed at baseline and then again every twelve weeks; parity and relationship status were assessed at baseline and then every following week; census tract was updated every four weeks alongside respondents’ residential address.

*Education* is divided into four categories based on respondents’ current level of educational achievement: <high school (dropped out or still enrolled); graduated high school and not enrolled in post-secondary; enrolled in or graduated from a 2-year community college or vocational school; or enrolled in or graduated from a 4-year college.

*Employment* is categorized based on respondents’ current hourly employment, defined as non-employed; employed <30 hours a week (e.g. part-time); and employed \(>=30\) hours a week (full-time).

*Welfare* is defined as whether a woman is (1) currently receiving any type of public assistance or (2) not.

*Parity* is based on a woman’s total number of live births as of a given week. This number is taken from baseline and then updated every time a woman reported a new birth.

*Relationship status* is categorized as married; engaged; special (“a special romantic relationship’’); casual (a relationship that is not “special romantic” but that involved “physical or emotional contact, such as kissing, dating, spending time together, sex, or other activities with a partner’’); and none.

*Census tract* is defined as the 2010 census tract in which respondents’ resided in a given week.
Appendix B. Comparison of Coefficients on Homicide Exposure with and without Adjusting for Time-Varying Demographic Characteristics

Note: Comparison models are estimated identically to in Tables 3, 4, and 6, except that those estimated with demographic controls adjust for the time-varying characteristics listed at the bottom of Table 1 and further adjust for census tract.
Appendix C. Comparison of Coefficients on Homicide Exposure with and without Weekly Observations with Predicted Probabilities <0 or >1

Note: Comparison models are estimated identically to in Tables 3, 4, and 6 but exclude weekly observations in which the predicted probability of a given outcome is <0 or >1.
Appendix D. Comparison of Coefficients on Homicide Exposure ≤.25 and ≤.5 Miles of Respondents’ Homes

Note: Comparison models are estimated identically to in Tables 3, 4, and 6 but replace the indicator of recent homicide exposure with one that defines exposure as ≤.5 miles of respondents’ homes.
**Appendix E. Estimated Effects of Homicide Exposures One to Four Weeks Prior**

<table>
<thead>
<tr>
<th></th>
<th>Pregnancy</th>
<th>Pregnancy-related behaviors</th>
<th>Pregnancy-related psychosocial outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pregnant</td>
<td>Had sex</td>
<td>Desired for pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed to homicide</td>
<td>.02**</td>
<td>-.03</td>
<td>-.23***</td>
</tr>
<tr>
<td>last 7 days</td>
<td>(.01)</td>
<td>(.03)</td>
<td>(.07)</td>
</tr>
<tr>
<td>Exposed to homicide</td>
<td>-.01</td>
<td>.02</td>
<td>-.12*</td>
</tr>
<tr>
<td>last 8-14 days ago</td>
<td>(.01)</td>
<td>(.03)</td>
<td>(.07)</td>
</tr>
<tr>
<td>Exposed to homicide</td>
<td>.00</td>
<td>-.02</td>
<td>.10</td>
</tr>
<tr>
<td>last 15-21 days ago</td>
<td>(.01)</td>
<td>(.03)</td>
<td>(.07)</td>
</tr>
<tr>
<td>Exposed to homicide</td>
<td>-.01</td>
<td>.03</td>
<td>.16*</td>
</tr>
<tr>
<td>last 22-28 days ago</td>
<td>(.01)</td>
<td>(.04)</td>
<td>(.07)</td>
</tr>
<tr>
<td>Constant</td>
<td>.41</td>
<td>2.31</td>
<td>-.219</td>
</tr>
<tr>
<td></td>
<td>(.53)</td>
<td>(2.12)</td>
<td>(4.80)</td>
</tr>
<tr>
<td>Observations (weeks)</td>
<td>12,162</td>
<td>12,131</td>
<td>3,716</td>
</tr>
<tr>
<td>Respondents</td>
<td>334</td>
<td>334</td>
<td>263</td>
</tr>
</tbody>
</table>

*Note: All models control for age, month and year dummies, and month-by-year interaction terms. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).*
References


Aiken, Abigail RA, Sonya Borrero, Lisa S Callegari, and Christine Dehlendorf. 2016. "Rethinking the pregnancy planning paradigm: unintended conceptions or unrepresentative concepts?" Perspectives on sexual and reproductive health 48(3):147.


Barber, Jennifer, Yasamin Kusunoki, and Heather Gatny. 2016. "Relationship Dynamics and Social Life (RDSL) Study [Genesee County, Michigan]." Ann Arbor, MI: Inter-university Consortium for Political and Social Research.


