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How Nearby Homicides Affect Young Women's Pregnancy Desires: Evidence From a Quasi-Experiment

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Abstract

Leveraging spatiotemporal variation in homicides that occurred during a 2.5-year weekly panel survey of 387 women ages 18–22 in Flint, Michigan, we investigate how young women's desires to become pregnant and to avoid pregnancy evolve in response to local homicides during the transition to adulthood. To address the endogeneity of exposure, we explore how the same woman's pregnancy desires (1) differed, on average, across weeks before and after the first homicide occurred within a quarter mile of her home; (2) evolved in the aftermath of this initial homicide exposure; and (3) changed in response to additional nearby homicides. One-fifth (22%) of women were exposed to a nearby homicide at least once during the study, and one-third of these women were exposed multiple times. Overall, the effects of nearby homicides were gradual: although *average* desires to become pregnant and to avoid pregnancy differed after initial exposure, these differences emerged approximately three to five months post-exposure. Repeated exposure to nearby homicides had nonlinear effects on how much women wanted to become pregnant and how much they wanted to avoid pregnancy. Together, our analyses provide a new explanation for why some young women—especially those who are socially disadvantaged—desire pregnancy at an early age.

Keywords

Neighborhood homicides; Pregnancy desires; Mortality; Fertility; Transition to adulthood

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⁵When this happens, it can introduce bias (Horrace and Oaxaca 2006). To ensure that such cases do not bias our results, we reestimate our linear probability models, omitting observations with predicted values of less than 0 or more than 1 (Horrace and Oaxaca 2006). The results remain highly similar to those we present here with respect to magnitude, direction, and significance, confirming that such cases do not bias our conclusions.

Introduction

The relationship between mortality and fertility is a central concern to demographers. At a macro level, a large body of literature highlights that when mortality levels decline (or incline), fertility levels soon follow suit (Haines 1998; Mason 1997; Rosenzweig and Schultz 1983). At a more micro level, women's fertility tends to vary as a function of child mortality, including both the death of their own children and the death of children within their social network and community (Aksan 2014; Lindstrom and Kiros 2007; Sandberg 2006). Likewise, women's fertility is often positively responsive to large community mortality shocks, such as natural disasters, war, genocide, and terrorist attacks (Agadjanian and Prata 2002; Cohan and Cole 2002; Davis 2017; Finlay 2009; Heuveline and Poch 2007; Nobles et al. 2015; Rodgers 2005).

Demographers have proposed numerous theories to explain the typically positive relationship between mortality and fertility. The vast majority of these theoretical perspectives assume that exposure to fatalities affects women's fertility desires, including how many children they want to have and when they want to have them (Trinitapoli and Yeatman 2018). For instance, some have argued that fertility serves as a way to rebuild one's community in the aftermath of widespread loss (Nobles et al. 2015). Others have posited that the trauma of mortality exposure leads people to seek comfort in the family-building process (Nakonezny et al. 2004; Rodgers 2005). Likewise, psychologists have theorized that just thinking about mortality can result in concerns about one's legacy and that these concerns, in turn, heighten the desire to biologically reproduce (Fritsche et al. 2007; Lifton 1996; Zhou et al. 2008).

Despite pervasive evidence that exposure to community deaths affects women's fertility, and despite many compelling arguments about the social psychology underlying this process, few studies have been able to capture how women's fertility desires *evolve* in the aftermath of community mortality (for an exception, see Trinitapoli and Yeatman 2018). The lack of information about this process is especially concerning in the case of violence- and disaster-related mortalities, which may affect not only women's fertility desires but also other factors related to pregnancy and childbearing. At least one study has found that a high-fatality disaster decreased women's contraceptive access and correspondingly increased *unwanted* pregnancy rates (Behrman and Weitzman 2016), and several others have found that disasters and terrorist attacks have decreased overall fertility rates, at least for select populations (Berrebi and Ostwald 2014; Seltzer and Nobles 2017). Likewise, past studies have suggested that prenatal exposure to violence and disasters can increase the risk of miscarriage by inducing stress (Torche 2011; Torche and Kleinhaus 2011). Thus, inferring about changes in pregnancy desire based on changes in pregnancy and fertility rates may lead demographers to mischaracterize the nature and magnitude of this relationship.

Moreover, no research to date has assessed how women's fertility desires change in response to local homicides. Although homicide rates are declining (Sharkey and Friedson 2019), homicide remains one of the leading causes of death in the United States, accounting for 14,123 deaths in 2018 (Federal Bureau of Investigation 2019; Kochanek et al. 2019). For

adolescents and young adults (ages 15–24), it is the third leading cause of death (Kochanek et al. 2019). Notably, homicides disproportionately occur in poor, predominantly Black and Hispanic urban communities (Sharkey 2018; Sharkey and Friedson 2019; Zimmerman and Messner 2013). African American and Hispanic women and women from socially disadvantaged backgrounds, who did not complete school, grew up poor, with a young mother, and/or with less-educated parents, are also the most likely to say that they want to get pregnant in their teens or early 20s (Cowley and Farley 2001; Weitzman et al. 2017). Thus, the same populations that are the most likely to be exposed to neighborhood homicides are also the most likely to desire pregnancy at young ages.

In this study, we examine the effects of nearby homicides on young women's pregnancy desires during the transition to adulthood. Although several studies have examined the effects of neighborhood characteristics on early pregnancy risk (Brahmbhatt et al. 2014; Crane 1991; Harding 2003, 2009; Hogan and Kitagawa 1985), none have explored the influence of homicides specifically locally or examined how young women's pregnancy *desires* vary in response to them. To assess the effects of nearby homicides, we leverage weekly panel data from Flint, Michigan—a city with one of the highest murder rates in the United States (Adams 2017)—collected as part of the Relationship Dynamics and Social Life (RDSL) study. These intensive panel data allow us to estimate models with person fixed effects that compare the same women with themselves before and after a homicide has occurred within a quarter mile of their home. In essence, these models hold constant all stable characteristics of young women that simultaneously increase their risk of exposure to a nearby homicide and affect their desire for pregnancy during young adulthood. Further, frequent, repeated observations from the same women enable us to simultaneously investigate short- and longer-term effects of nearby homicides, as well as the cumulative effects of multiple homicide exposures. These multidimensional analyses, taken together, draw attention to a previously overlooked source of mortality exposure and its effect on pregnancy desires at a critical juncture of the life course.

Background

The Implications of Homicide Exposures for Fertility Desires

Pregnancy desires—including whether, how much, and when women want to get pregnant—are among the strongest predictors of reproductive behavior and subsequent pregnancy, even net of a wide host of demographic, social environmental, and relationship characteristics (Bongaarts 1992; Hayford and Agadjanian 2019; Miller et al. 2013; Thomson 1997; Weitzman 2020). In the United States, young adult women's risk of pregnancy increases incrementally alongside their desire to get pregnant in the next month and correspondingly decreases incrementally alongside their desire to avoid pregnancy that month (Miller et al. 2013). In fact, their risk of pregnancy is considerably higher if they do not simultaneously possess absolutely no desire for pregnancy and the strongest desire to avoid it (Miller et al. 2013). Thus, in addition to *wanting* a pregnancy, feeling indifferent or ambivalent about pregnancy also increases women's risk of becoming pregnant (Miller et al. 2013; Miller et al. 2016).

Demographic and psychological research points to a variety of potential processes by which nearby homicides may affect pregnancy desires. Most of these explanations predict that women's desire for pregnancy will increase in the aftermath of homicides. Some, however, suggest the opposite, whereas others point to the possibility that nearby homicides may lead to conflicting feelings about pregnancy. The first is *proximity seeking*, or the search for comfort through intimacy and human connection when reminded of one's own mortality. One way to establish this sense of human bonding is through family formation and family investments (Vail et al. 2012). For instance, Oklahoma County saw an increase in fertility rates and a decrease in divorce rates in the years following the 1995 Oklahoma City bombing (Nakonezny et al. 2004; Rodgers 2005). Similar decreases in divorce were observed in New York City and other large metropolitan areas following the terrorist attack on the World Trade Center on September 11, 2001 (Cross Hansel et al. 2011). Evidence from psychological experiments suggests that being reminded of death inspires people to place greater emphasis on strengthening interpersonal relationships (Lykins et al. 2007; Vail et al. 2012). Correspondingly, neurocognitive studies suggest that for some people, thinking about death leads to a craving for interpersonal touch and physical intimacy (Goldenberg et al. 2000; Koole et al. 2014; Silveira et al. 2013). Applied to the case of homicide exposure, these studies indicate that thoughts of death—arguably brought on by nearby homicides—may lead women to want to get pregnant as a way to cultivate new interpersonal connections and sources of love, bonding, and affection.

Fertility desires may also increase after nearby homicides if women feel compelled to rebuild their community by repopulating it. For instance, evidence from around the globe suggests that fertility rates often increase in impacted areas following devastating natural disasters, such as tsunamis, earthquakes, and hurricanes (Cohan and Cole 2002; Davis 2017; Finlay 2009; Nobles et al. 2015). One interpretation of this pattern is that individuals' underlying fertility ideals change in response to community loss, particularly when women's fertility increases in response to the disaster or the death of community members independently of the deaths of their own children (Finlay 2009; Nobles et al. 2015). Because nearby homicides are a type of community fatality and are often geographically clustered within the same neighborhoods (Morenoff et al. 2001), they may similarly motivate women to become pregnant in an effort to rebuild their community.

Women may also view childbearing as a symbolic pathway to immortality—a way to ensure that their legacy will live on after they have died (Fritsche et al. 2007; Lifton 1996; Zhou et al. 2008). If nearby homicides lead women to become concerned about their own mortality (Cozzolino 2006), and if women are concerned about their legacy, then nearby homicides should result in increased desire for pregnancy, particularly among young women, most of whom are still childless.

Moreover, as with other mortality-relevant experiences (Carstensen et al. 1999), nearby homicides may lead women to expect a shortened life span. This shortened time horizon, in turn, may not only shift women's life goals but also lead them to want to pursue these goals at a faster pace (Vail et al. 2012). If women's (potentially new) life goals include motherhood, then the perception of reduced time may lead young women to want to become pregnant soon after a nearby homicide has occurred.

On the other hand, because nearby homicides lead women to fear for their and their children's safety (Johnson et al. 2009; Jones et al. 2005), they may diminish pregnancy desire. That is, because nearby homicides are close to home and thus symbolic of violence within one's immediate surroundings (Sharkey 2018), and because the geographic clustering of homicides means that most women who are ever exposed to homicide are likely exposed more than once, women who are exposed to nearby homicides may worry that they will not survive long enough to raise their children or may worry that their children may die at young ages. These concerns may lead women to want to avoid pregnancy.

Moreover, neighborhood violence is positively associated with depression and fatalism (DuRant et al. 1995; Mendelson et al. 2010). If being exposed to a nearby homicide decreases a woman's confidence that she can control her future or diminishes the cognitive energy she has available to do so, then she may become indifferent about pregnancy (i.e., neither strongly wanting it nor strongly wanting to avoid it), feeling that she is not in control of pivotal life outcomes. Indeed, studies from developing country contexts—where child and adult mortality rates are high—suggest that being exposed to the deaths of children and other community members increases the likelihood that women refrain from stating a specific number of ideal children and instead provide nonnumeric, fatalistic responses, such as “it's up to God” (Frye and Bachan 2017; Hayford and Agadjanian 2011).

The Measurement and Malleability of Fertility Desires

Despite the theoretical import of the question of how nearby homicides affect women's pregnancy desires in the United States, we know of no studies that have addressed it. The dearth of knowledge on this topic reflects four long-standing obstacles to accurately measuring these desires and isolating the effects of nearby homicides on them. First, if women's memory of their preconception feelings about a pregnancy is influenced by subsequent experiences (Koenig et al. 2006; Williams et al. 1999), retrospective accounts will not accurately reflect whether and how mortality exposures affect fertility desires (Smith-Greenaway and Sennott 2016). For example, a woman who did not want her pregnancy before it was conceived may misremember it as desired if exposure to homicide subsequently affects her feelings about pregnancy and childbearing. Understanding whether and how homicide exposure induces a change thus requires frequent prospective measurement of pregnancy desire.

Second, when women revise their pregnancy desires, they may change how they feel not only about becoming pregnant but also about avoiding pregnancy. Cognitive research indicates that individuals simultaneously process positive and negative information through separate channels (Cacioppo and Berntson 1999). Indeed, recent advances in the measurement of pregnancy desires and intentions highlight this complexity, with multiple studies finding that at least some women report inconsistent positive and negative attitudes or desires and incongruent intentions and feelings about pregnancy (Aiken et al. 2015; Brückner et al. 2004; Higgins et al. 2012; Miller et al. 2013; Miller et al. 2016). Given this complexity, fully understanding the potential effects of homicide exposure—including effects on pregnancy indifference—requires information on both positive and negative feelings toward pregnancy.

Third, women's responses to homicides and other mortality exposures may or may not be gradual. Studies on the flexibility of fertility desires support the notion that women strategically adapt whether and when they want to have (additional) children in response to changes in their mortality climate (Trinitapoli and Yeatman 2018). However, because most longitudinal surveys interview women infrequently, at intervals between six months and five years apart, previous research has been unable to distinguish between short- and longer-term effects of mortality exposures of any kind. On the one hand, women's desire for pregnancy may change shortly after a nearby homicide, perhaps because being exposed to someone else's death serves as a "wake-up call"; on the other hand, such changes may occur more slowly, after women have had time to ruminate (Vail et al. 2012). Relatedly, because of the typically long duration between longitudinal follow-ups, past scholarship has been unable to investigate whether women continually revise their desires in response to each additional homicide (or other mortality exposure).

Fourth, women may adapt their fertility desires in response to not only mortality exposures but also to other changes in their social circumstances. In Malawi, for instance, women revise their desired number and timing of children after becoming married or widowed (Yeatman et al. 2013), in response to economic changes within their household (Sennott and Yeatman 2012), and in light of existential uncertainties relating to health, sickness, and life expectancy (Trinitapoli and Yeatman 2018). In the United States, how much young women want to get pregnant varies over time as a function of changes in their educational status and relationship seriousness (Barber et al. 2019; Weitzman et al. 2017) and as a function of their partners' pregnancy desires (Miller et al. 2017). Considering that homicides may prompt multiple changes in women's lives and that women's pregnancy desires may be responsive to these other changes as well, cross-sectional data sources are ill-equipped to isolate the direct effects of homicide exposures.

To overcome these obstacles, we leverage weekly information provided by the RDSL, including information about how much women wanted to get pregnant and how much they wanted to avoid pregnancy. These data uniquely enable us to model how nearby homicides affect women's pregnancy desires by allowing us to determine the correct temporal ordering of events while also recognizing the complexity of these desires. At the same time, repeated weekly interviews collected over an extended period allow us to track homicides' short- and longer-term effects, as well as their cumulative effects, and to isolate these effects from homicide exposure's many confounders.

Data and Methods

Sample

We draw on data from the Relationship Dynamics and Social Life (RDSL) study, a novel data set consisting of weekly observations from a population-representative sample of 1,003 young adult women from Genesee County, Michigan (Barber et al. 2016). Participants were randomly selected from the Michigan Department of State Driver's License and Personal Identification Card database. To be eligible, women had to be 18 to 19 years old and residing in Genesee County at the time of recruitment (2008 and 2009). Although this sample is geographically restricted, the RDSL mimics national averages with respect

to young women's birth rates, marriage rates, residential arrangements, high school and postsecondary school enrollment, and employment (Clark 2018; Ela and Budnick 2017). The primary demographic distinction of the RDSL is racial/ethnic: African American women are about twice as represented, while Hispanic women are about half as represented as in nationally representative samples (Clark 2018).

RDSL participation began with an in-person baseline survey that included a wide spectrum of questions about respondents' demographic background and childhood. After the baseline survey, respondents were invited to participate in the weekly follow-up component of the study, which involved completing five-minute surveys online or by phone weekly for the following 2.5 years. In each weekly survey, respondents updated their pregnancy desires and status. Every four weeks, they also updated their residential address, thus enabling us to identify respondents' geographic location over time. Participation in weekly surveys was high: 78% of women who completed the baseline survey completed weekly surveys for at least 1.5 years, and 63% completed weekly surveys for the entire 2.5 years (Barber et al. 2016).¹ A randomized experiment conducted in coordination with the RDSL found little evidence that completing weekly surveys affected women's behavior or outlook (Barber et al. 2012).

Because of our focus on nearby homicides and because homicides are concentrated in urban areas (Glaeser and Sacerdote 1999), we restrict our analytic sample to weeks in which women resided in or within half a mile of Flint, Michigan—a city located in the middle of Genesee County, with a population density of 2,957 people per square mile (U.S. Bureau of Labor Statistics 2019). Further, given our interest in pregnancy desires, we limit the sample to weeks in which women were not or did not believe they were pregnant. Our final analytic sample includes 14,715 weeks from 387 women who were aged 18 to 22 during the study period.

Measures

Homicide Exposure—Information on the date and street location of all homicides occurring during the RDSL study period comes from information reported by the Flint Police Department. These homicides were unevenly spatially distributed, with approximately one-half occurring in northwestern Flint and another one-quarter occurring in northeastern Flint. The remaining one-quarter of homicides occurred in the southern part of the city.

We integrate spatiotemporal information on homicides with respondents' time-varying residence using geocodes to create an indicator of whether a homicide occurred within a quarter mile of each respondent's residence during the prior seven days. Our focus on homicides within a quarter-mile radius is both empirically and theoretically driven. Empirically, we lack the statistical power to explore the effects of homicides at shorter geographic distances. Theoretically, we assume that the closer a woman lives to a homicide, the more likely she is to know about and be impacted by it.²

¹We include each woman's full set of eligible weeks, up to 2.5 years, because homicide exposure was rare, and limiting the sample to weeks in the first 1.5 years or less reduces our statistical power.

Identifying nearby homicides that occurred within seven days of each weekly survey enables us to determine whether women were *ever* exposed to a homicide within a quarter mile of their home and, if so, when their first exposure occurred and their cumulative number of exposures over time. Eighty-five respondents (22%) were exposed to a homicide within a quarter mile of their home at least once during their study participation (Table 1).

To examine the effects of initial homicide exposure, we create a dichotomous indicator defined as 1 in all weeks following a woman's first exposure to homicide during the study period and 0 in all weeks prior to it. To assess the cumulative effects of repeated exposure, we create a time-varying measure of the number of weeks a respondent had been exposed to a homicide (within a quarter mile of her home). Among respondents who were exposed to a homicide during the study period, 67% were exposed in one week only, 20% were exposed in two weeks, and the remaining 13% were exposed in a total of three to seven weeks (Figure 1). Because so few women were exposed more than twice and the effects of repeated exposure may not be linear, we operationalize cumulative exposure as four ordered categories: not exposed in any previous week, exposed once, exposed twice, and exposed three or more times.

Pregnancy Desire—Desires for and to avoid pregnancy were assessed every week with two questions: “How much do you want to get pregnant in the next month?” and “How much do you want to avoid getting pregnant in the next month?” Possible responses ranged from “not at all” (0) to “extremely” (5). Forty-nine percent of respondents ever had any desire *for* pregnancy (a response between 1 and 5; univariate analysis not shown). Similarly, 48% of respondents ever had anything less than the most extreme desire to *avoid* it (a response between 0 and 4; univariate analysis not shown). However, weekly desires *for* pregnancy and less than extreme desires to *avoid* pregnancy were infrequent, with the former and latter occurring in just 10% and 12% of weeks, respectively (Table 2).

Because earlier research suggests that young women's risk of pregnancy rises dramatically when they do not possess an absolute lack of desire for pregnancy and the strongest desire to avoid it (Miller et al. 2013), we explore continuous as well as dichotomized versions of these desires, and additionally explore a combined measure conveying indifference. First, based on the original RDSL questions, we create two measures of desire to become pregnant. The first is an interval measure of desire *for* pregnancy ranging between 0 and 5, thus capturing incremental differences week to week. The second is a dichotomous measure, with 1 indicating any desire to get pregnant in a given week (a response between 1 and 5) and 0 indicating none (a response of 0). As a sensitivity test, we also create an interval-level measure of pronatalism by subtracting how much a respondent wanted to avoid pregnancy from how much she wanted to get pregnant (ranging from -5 to 5, with higher values

²As a robustness check, we reestimate our models defining exposure as homicides that occurred within a half mile of a respondent's residence. One hundred eighty-three respondents (47%) were ever exposed to a homicide within a half mile of their home in a total of 446 weeks. Most significant estimates of the effects of homicides on desires for and to avoid pregnancy are attenuated when defining exposure this way (Table A3, online appendix). However, the estimated effect of homicides on pregnancy indifference becomes statistically significant when exposure is expanded to a half-mile radius. It may therefore be the case that homicides have a significant effect on pregnancy indifference, but the rarity of this state combined with the rarity of exposure to homicides within a quarter mile limits our ability to observe this relationship in our main analysis.

indicating greater overall pronatalism). The results lead to conclusions that are substantively similar to those of our other measures (Table A1, online appendix).

Following, we create two measures of antinatal desires. The first ranges from 0 to 5, with greater values conveying incrementally greater desire to *avoid* pregnancy in a given week. The second is a dichotomous measure coded as 1 for the strongest desire to avoid pregnancy (a response of 5) and as 0 for anything less than the strongest desire to avoid it (a response between 0 and 4). Considering that in most weeks, women reported no desire for pregnancy and the strongest desire to avoid it, as a supplement, we also explore the sensitivity of our results to defining antinatalism as when women have absolutely no desire for pregnancy (a score of 0) and the most extreme desire to avoid it (a score of 5). The results are robust to conceptualizing antinatal desires in this polarized way (Table A1, online appendix).

Finally, combining information about desires to become pregnant and to avoid pregnancy, we create an indicator of indifference. This indicator is coded 1 for low desire both to become pregnant and to avoid pregnancy (responses to both questions were between 0 and 2), and 0 otherwise. Respondents had indifferent pregnancy desires in 2% of weeks only (Table 2).

Analytic Approach

The first step of our investigation is to illuminate demographic differences in young women's likelihood of ever being exposed to a nearby homicide during the RDSL study using bivariate analyses. Because past research indicates that the same women who are most likely to be exposed to homicides are also the most likely to desire pregnancy at an early age, we further conduct bivariate analyses that assess how women who were ever exposed to a nearby homicide differ from those who were not in whether they *ever* desired pregnancy, possessed less than the strongest desire to avoid it, or were indifferent during the RDSL study; their maximum desire for and minimum desire to avoid pregnancy during the study period; and their pregnancy desires at baseline.

As a second step, we fit a series of regressions with person fixed effects that estimate the effects of homicide exposure on pregnancy desires.³ This fixed-effects strategy accounts for alltime-invariant characteristics of a woman that are associated with her predisposition to homicide exposure and her pregnancy desires during the transition to adulthood (Gelman and Hill 2007)—for example, her race, socioeconomic position, childhood family background, and homicide exposures occurring earlier in the life course. Because of our interest in the progression of women's pregnancy desires after homicide exposure, we do not adjust for time-varying covariates that could have been shaped by initial homicide exposure. Doing so would risk collider bias, whereby homicides and shifting pregnancy desires affect other mutable traits of women, such as their relationship status or parity, in ways that could distort the estimated effect of homicides (Cole et al. 2009; Elwert and Winship 2014). We do, however, include controls for age (in exact years), dummy indicators of month and year

³Because person fixed-effects estimates are based on within-person variation, individuals who were *never* exposed to homicide, and thus who never vary on the key predictor, do not contribute information to the estimated effect of homicide exposure. However, they do contribute information to other parameter estimates (on which they vary).

of each weekly survey, and month-by-year interactions. These controls account for secular trends that may affect fluctuations in women's pregnancy desires and exposure to nearby homicides over time. In addition, we control for whether a respondent had previously been exposed to a police-involved fatality within a half mile of her home in any prior week because these fatalities may bear a similar influence on pregnancy desires but were not classified as homicides by the Flint Police Department.⁴

All models are estimated using a linear specification with person fixed effects. One drawback of this approach is that it assumes an equal latent distance between ordinal categories—an assumption that is violated by the fact that in 90% of weeks, women had the lowest (i.e., no) desire for pregnancy and the most extreme desire to avoid it (Table 2). In light of this unequal distribution, we also estimate models predicting dichotomous indicators of any (vs. no) desire for pregnancy and having the strongest (vs. anything less than the strongest) desire to avoid it. In this case, an important shortcoming of the linear approach is that predicted values can fall outside the range of 0 to 1.5. Despite these drawbacks, we opt for a linear specification because it retains women who never varied on the outcome variable. For example, 52% of women had the strongest possible desire to avoid pregnancy every week during the study period (univariate analysis not shown). None of these women (nor any of their weekly interviews) would be included in multinomial models with fixed effects estimating overall desire to avoid pregnancy, nor would they be included in logistic regression models with fixed effects estimating the strongest desire to avoid pregnancy.

Using our person fixed-effects strategy, we first assess the average effects of homicide exposure. These models compare women's average pregnancy desires in all weeks *after* their initial exposure to a nearby homicide during the RDSL study to their average pregnancy desires in all weeks *before* this exposure. Here, we use our indicator of whether a woman has been exposed to a nearby homicide in any prior week to predict her overall level of desire for pregnancy (0–5); whether she has any desire for it (0/1); her overall level of desire to avoid pregnancy (0–5); whether she has the strongest desire to avoid it (0/1); and whether she is indifferent toward becoming pregnant in the next month (simultaneously possessing low desire to get pregnant and low desire to avoid it, 0/1).

We then conduct a more nuanced exploration of how young women's pregnancy desires evolve in response to homicide exposure over the course of approximately one year. To do so, we reestimate our models of any desire for pregnancy and the strongest desire to avoid it, restricting the sample to weeks when a woman had not been exposed to a nearby homicide or had been exposed either 10, 11–20, 21–30, 31–40, or 41–50 weeks prior.⁶ For example, when examining how a woman's likelihood of desiring pregnancy differed 21–30 weeks after a nearby homicide compared with before she was exposed, we include all weeks prior to her first exposure and only the 21st to the 30th week following it. We then plot the results

⁴We derive information about the date and location of police-involved fatalities from the Fatal Encounters data set (www.fatalevents.org). Five respondents were exposed to a police-involved fatality within a half mile of their home during the RDSL study. Combined, 122 of their weeks were characterized as having been previously exposed to a police-involved fatality. Pregnancy desires did not significantly differ before and after exposure to police-involved fatalities (results not shown in tables but available upon request).

⁶As a sensitivity test, we also examine the evolution of pregnancy desires following nearby homicides at 8- and 12-week increments. The results yield patterns similar to those we present here (available upon request).

of these models in sequential order to visually convey the evolution of young women's pregnancy desire following homicide exposure. To rule out the possibility that other factors may drive the estimated effect of homicides in the long term, we conduct a placebo test in which we estimate the effects of faraway homicides—homicides for which we have no theoretical reason to believe should be of relevance to women's pregnancy desires at any point in time. These models estimate the difference in women's pregnancy desires before and 10, 11–20, 21–30, 31–40, and 41–50 weeks after their first exposure to a homicide occurring between 1 and 1.25 miles from their home.

Finally, our last set of analyses examines the cumulative effects of nearby homicides (occurring 0.25 miles from a woman's home). In these models, the sample includes all weeks, and the key predictor is a categorical indicator of the total number of previous weeks a woman has been exposed to a nearby homicide. Using this cumulative measure and our linear fixed-effects approach, we again predict all five outcomes. Given the small number of weeks that women had been exposed twice and more than twice (Table 1), the results of these models should be interpreted with caution.

Results

Which Young Women Are Most Likely to be Exposed to a Nearby Homicide?

Figure 2 conveys the prevalence of homicide exposure during the RDSL across race, socioeconomic status, and childhood conditions. Twenty-eight percent of African American women were exposed to a homicide at least once, whereas only 10% of non-African Americans were exposed ($p < .001$). Similarly, 24% of women who did not grow up in a two-parent home were exposed to a homicide, compared with 16% of women who grew up with two parents ($p < .10$). No significant differences in exposure rates are detected by maternal age at first birth, maternal education, or public assistance receipt at baseline.

African American women and women who grew up in single-headed households were thus overrepresented in the subsample of respondents who were exposed to nearby homicides during the RDSL study (Table 3). This subsample of exposed women was also 45% more likely to desire pregnancy at least once (64% vs. 44%), 58% more likely to ever possess anything less than the strongest desire to avoid it (68% vs. 43%), and 50% more likely to ever be indifferent about getting pregnant (33% vs. 22%) while participating in the RDSL (Table 3). Likewise, women who were ever exposed to a nearby homicide were 53% more likely to ever report having the *strongest* desire for pregnancy (32% vs. 21%; Figure 3, panel a) and 80% more likely to ever have absolutely *no* desire to avoid it (45% vs. 25%; Figure 3, panel b). Nevertheless, women who were ever exposed and those who were never exposed to nearby homicides did not significantly differ in any of their baseline pregnancy desires at the start of the study (Table 3). This juxtaposition provides our first indication that homicide exposure may contribute to the *evolution* of pregnancy desire during the transition to adulthood.

How Do Young Women's Desires for Pregnancy Evolve in Response to Nearby Homicides?

Table 4 presents the results of regression models estimated with person fixed effects exploring how young women's pregnancy desires differed before and after they were first exposed to a homicide within a quarter mile of their home. The table shows that women's overall level of desire for pregnancy was an estimated .05 points higher in weeks after they were exposed to a nearby homicide than in weeks prior to this initial exposure, and their probability of having any desire for pregnancy was 2 percentage points greater. Similarly, a woman's average level of desire to avoid pregnancy was an estimated .05 points lower after she was exposed to a nearby homicide than before she was exposed, and her probability of having the strongest desire to avoid pregnancy was 2 percentage points smaller. Despite their decrease in desire to avoid pregnancy, women were no more or less likely to exhibit pregnancy indifference in weeks after they were exposed to a homicide than in weeks before (Table 4). Thus, in the aftermath of nearby homicides, women's desires for and to avoid pregnancy—but not their indifference toward it—significantly differed on *average* from their desires pre-exposure.

Figure 4 investigates when and how these shifts toward pronatalism emerged in the year following homicide exposure. The results of models comparing women's probability of desiring pregnancy in the pre-exposure period to their probability of desiring pregnancy at five points in the post-exposure period are presented on the top left; the results of analogous models predicting differences in their probability of having the strongest desire to avoid pregnancy are presented on the top right. (Corresponding coefficients, provided in table format, are presented in Table A2 in the online appendix.) Overall, the results indicate that women's probability of desiring pregnancy increased gradually in the aftermath of homicide exposure. In the first 10 weeks after a homicide occurred near her home, the average woman's probability of desiring pregnancy was similar in magnitude and not significantly different from her probability of desiring pregnancy prior to this homicide. However, 11–20 weeks after a homicide occurred, her probability of desiring pregnancy was 3.7 percentage points more than before it ($p < .01$). At 21–30 weeks, this difference was slightly smaller—at 1.9 percentage points—and not statistically significant; but at 31–40 weeks, it was again 3.2 percentage points greater than before she was ever exposed to a homicide ($p < .05$); and at 41–50 weeks, almost a year later, the difference in her probability of desiring pregnancy was 7.2 percentage points greater than before it ($p < .001$). The evolution of a woman's probability of having the strongest desire to avoid pregnancy was similar: at 10 weeks post-homicide, it was not statistically different from in the pre-homicide period. At 11–20 weeks post-homicide, it was 2.5 percentage points lower than in the pre-homicide period ($p < .10$), where it leveled off until 41–50 weeks post-exposure, at which point it became 6.5 percentage points lower than in the pre-homicide period ($p < .001$). Overall, point estimates for both outcomes suggest that pregnancy desires may change nonlinearly over time in response to nearby homicides. Because their confidence intervals are overlapping and the number of exposed weeks is small, however, we are unable to draw firm conclusions about this nonlinearity.

The bottom panel of Figure 4 presents the results of our placebo test in which we assess the effects of more distant homicides (occurring 1–1.25 miles from a woman's home) over

the course of approximately one year. The results of this test indicate that the effects of faraway homicides were close to 0 and not statistically significant at every time point in which they were assessed, with one exception: at 41–50 weeks after a faraway homicide, a woman’s probability of desiring pregnancy was 2.2 percentage points *lower* than in the weeks prior to this distant homicide ($p < .10$). These results thus lend further credibility to our conclusion that nearby homicides have positive, longer-term effects on young women’s desires for pregnancy and that these effects are not driven by an overall upward trend during the transition to adulthood.

Considering that women’s average desires to become pregnant and to avoid pregnancy evolve in response to nearby homicides over time, a related possibility is that women’s pregnancy desires continue to change in response to repeated homicide exposures. This is examined in Table 5, with the caveat that women had previously been exposed to two and more than two nearby homicides in a small number of weeks, and thus these estimates should be interpreted with greater caution. Here we see that the effects of being exposed to a homicide once look similar in magnitude to the effects of having ever been exposed. This finding reassuringly suggests that repeat exposure does not drive our estimated average pre-post differences. Although we find that being exposed to two homicides rarely has a significant effect, these null effects also rarely significantly differ from the estimated effect of being exposed once. In contrast, being exposed three or more times has large significant effects on pregnancy desires, including multiple effects that are significantly larger in magnitude than being exposed once. Compared with before a woman was ever exposed to a nearby homicide, when she was exposed three or more times, her level of pregnancy desire was .20 points higher, and her probability of having any desire for pregnancy was 3 percentage points higher. Like wise, her level of desire to avoid pregnancy was .26 points lower after being exposed three or more times than before she was ever exposed to a nearby homicide, and her probability of having the strongest desire to avoid pregnancy was 5 percentage points lower. Together, these results indicate that repeated exposure to nearby homicides may have nonlinear effects. Most notably, women experience a greater jump in desire for pregnancy and a great fall in desire to avoid it after being exposed to three or more homicides than after being exposed to just one.

Discussion

This study highlights the role that nearby homicides play in the development of young women’s desires for pregnancy during the transition to adulthood—a pivotal period of the life course during which women’s social, economic, and familial trajectories begin to take shape. As a whole, the results offer three clear takeaways. First, the effects of nearby homicides on young women’s pregnancy desires are generally pronatal, prompting an increase in wanting pregnancy and a decrease in wanting to avoid pregnancy. Second, with respect to temporality, young women’s pregnancy desires are not different in the first 10 weeks immediately following exposure to homicide than they were in the weeks before it, but their desires do significantly differ starting around 11–20 weeks after exposure. This suggests that in the long run, women more gradually adapt their desires in response to homicides. Third, even more than this longer-term effect of being exposed to a single

homicide, exposure to three or more homicides may further increase how much young women want to get pregnant and further decrease how much they want to avoid pregnancy.

These findings align with earlier studies documenting a positive relationship between community mortalities and subsequent fertility, which has led many demographers to conjecture that mortality exposure increases women's desires for pregnancy and/or ideal family size (Aksan 2014; Haines 1998; Nobles et al. 2015; Sandberg 2006). We show that in the case of homicide exposures, desire for pregnancy does not immediately emerge but rather grows over a longer period. Although a handful of studies have found that community mortality-related events, such as disasters and terrorist attacks, can increase the rate of *unwanted* pregnancy or decrease pregnancy rates altogether (Behrman and Weitzman 2016; Berrebi and Ostwald 2014; Seltzer and Nobles 2017), and although other studies have found higher rates of fatalism and depression among residents of violent neighborhoods (DuRant et al. 1995; Mendelson et al. 2010), being exposed to a nearby homicide during RDSL study participation increased both the strength of young women's desires to *become* pregnant and decreased the strength of their desires to *avoid* pregnancy. In other words, nearby homicides had a consistently pronatal effect without inducing higher rates of pregnancy indifference.

Our findings build on recent research highlighting that women's childbearing desires are dynamic and flexible (Hayford 2009; Trinitapoli and Yeatman 2018). Like studies finding that women's ideal number of children and desire for pregnancy vary alongside their age, relationship status, and economic conditions (Barber et al. 2019; Hayford 2009; Sennott and Yeatman 2012; Trinitapoli and Yeatman 2018; Weitzman et al. 2017), we show that women's desire for a pregnancy in the very near term varies over time as a function of nearby homicides. However, whereas several studies suggest that women are willing to postpone pregnancy when they anticipate adverse childrearing conditions and/or outcomes (Marteletto et al. 2017; Trinitapoli and Yeatman 2018), our findings suggest that young women's desires to conceive a pregnancy grow stronger in the face of nearby community homicides. This juxtaposition suggests that homicide exposure may affect women's fertility desires differently than other social circumstances, perhaps because it invokes thoughts of mortality. Such an interpretation is bolstered by research from Malawi indicating that women prefer to accelerate their childbearing when they anticipate a different mortality threat— HIV/AIDS (Trinitapoli and Yeatman 2018)—and by psychological experiments in the United States that suggest that when reminded of their own mortality, some people crave physical touch and prioritize the cultivation of interpersonal relationships over other goals (Koole et al. 2014; Vail et al. 2012).

Our findings further expand the scope of scholarship on the consequences of violent environments. In particular, they heed the call to take a more expansive view of how violent environments affect individuals' lives by focusing on an area that has previously received little attention in the community violence literature (Sharkey 2018). Scholars have previously reported that exposure to community violence, including homicide, affects young people's cognitive skills, ability to achieve in school, and behavioral self-control (Burdick-Will et al. 2011; Caudillo and Torche 2014; Sharkey 2018; Sharkey et al. 2014; Sharkey et al. 2012), which may interfere with their ability to implement important life course

goals. Our findings indicate that violence within one's immediate environment can affect the development of important life goals themselves—in this case, the desire to become pregnant.

This study comes with several caveats, however. The first pertains to the data on homicides. Our measure of exposure indicates that a homicide *occurred* within a quarter mile of a woman's home, but it does not guarantee that that woman *knew* of the homicide. This may partially explain why homicide exposure does not have an effect on pregnancy desire in the short-term: some women may have learned of nearby homicides only after several weeks or months had passed. Likewise, it remains possible that respondents were exposed to and knew of other deaths besides nearby homicides (and police-involved fatalities, which we control for) during the RDSL study. If homicides spatiotemporally corresponded with these other deaths, such as drug overdoses, then not controlling for exposure to them may lead us to overstate the effects of homicides. On the other hand, if women were nontrivially exposed to other deaths but these deaths did not spatiotemporally correspond with homicides, then our models may have underestimated the effects of homicides on pregnancy desires.

A second set of caveats pertains to the analytic sample, which includes only young women in Flint, Michigan. As such, we cannot generalize about the effects of nearby homicides on pregnancy desires of men or of younger or older women. We also cannot generalize about the effects of nearby homicides on pregnancy desire elsewhere in the United States. However, the demographic pattern of homicide exposure that we observe in Flint is consistent with patterns documented elsewhere in the United States (Sharkey 2018), and the RDSL is demographically similar to nationally representative samples of women of the same age (Clark 2018; Ela and Budnick 2017). Because our sample is small, we additionally face an increased risk of Type II error (falsely failing to reject the null hypothesis) and of Type M error (overstating the magnitude of effects) (Gelman and Carlin 2014), especially when it comes to estimating differences in the demographic distribution of homicide exposure and the cumulative effects of repeated exposure.

Homicide is the third leading cause of death among young people in the United States. Our findings indicate that after a homicide occurs near a young woman's home, she becomes increasingly likely to want a pregnancy and, on the flip side, decreasingly likely to want to avoid one. Given that homicides tend to be geographically clustered within the same neighborhoods and that the most disadvantaged individuals are often *stuck in place* (Sharkey 2013), some young women will be exposed to multiple nearby homicides during adolescence and early adulthood. Our findings further suggest that these women will experience nonlinear jumps in their desire for pregnancy with repeated exposure. These findings open up critical new questions about the role that neighborhood homicides play in the socioeconomic and racial stratification of early pregnancy rates and in determining young adults' early-life goals.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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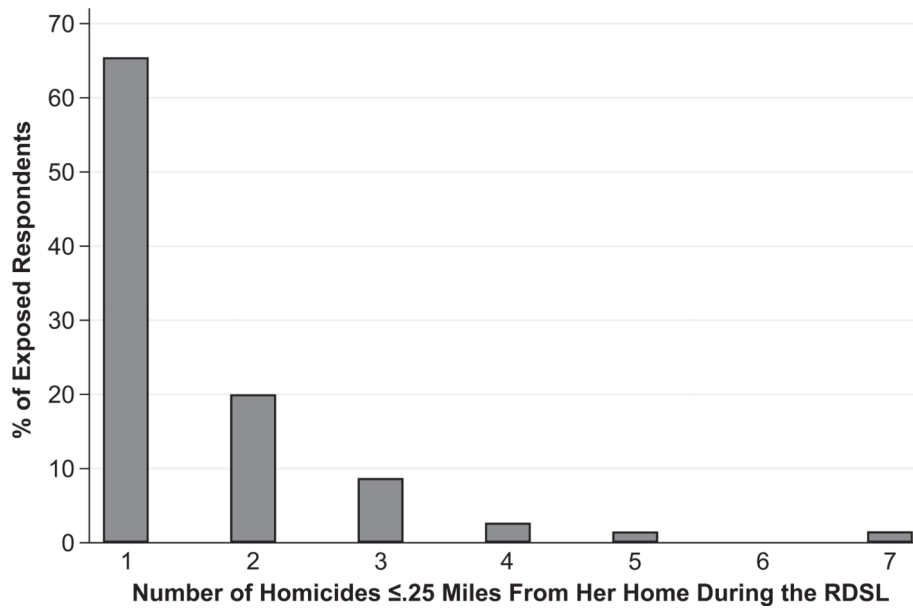


Fig. 1. Frequency of homicide exposures during the RDSL study among women who were ever exposed within a quarter mile of their home. $N=85$ respondents.

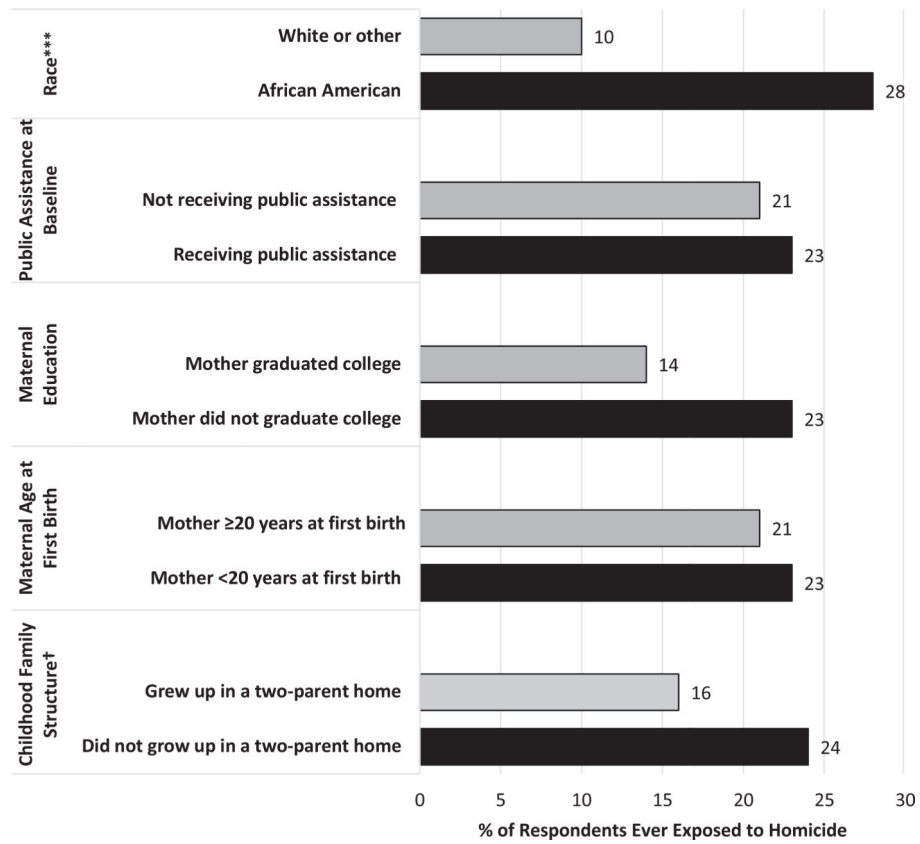


Fig. 2. Percentage of women exposed to homicide within a quarter mile of their home during the RDSL study, by demographic background. $N=387$ women. Distributional differences were determined with chi-square tests. † $p<.10$; *** $p<.001$

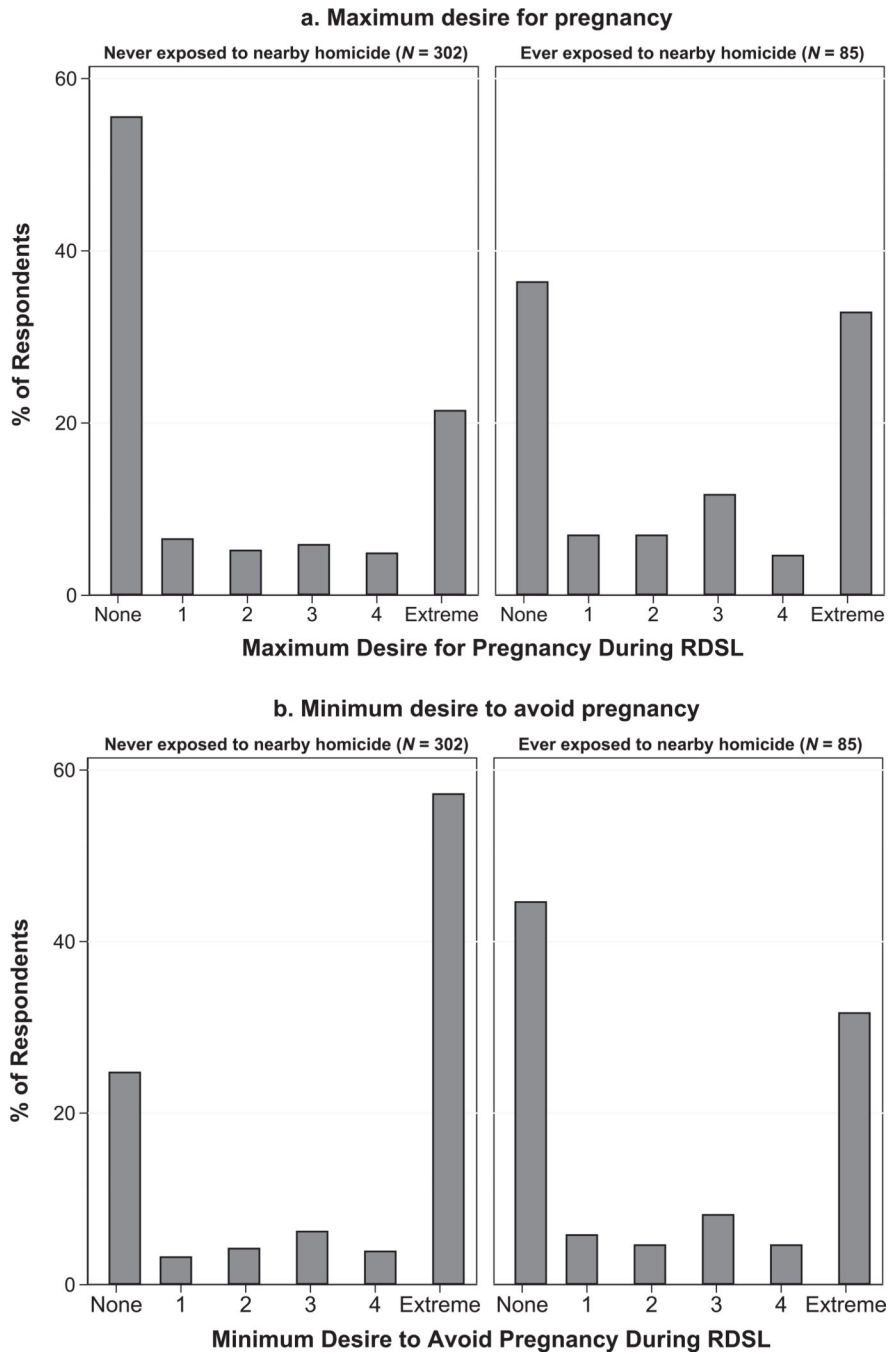


Fig. 3. Maximum desire for pregnancy and minimum desire to avoid it among women who were and those who were not ever exposed to a homicide within a quarter mile of their home during the RDSL Study. Distributional differences are statistically significant ($p < .05$ in panel a; $p < .01$ in panel b).

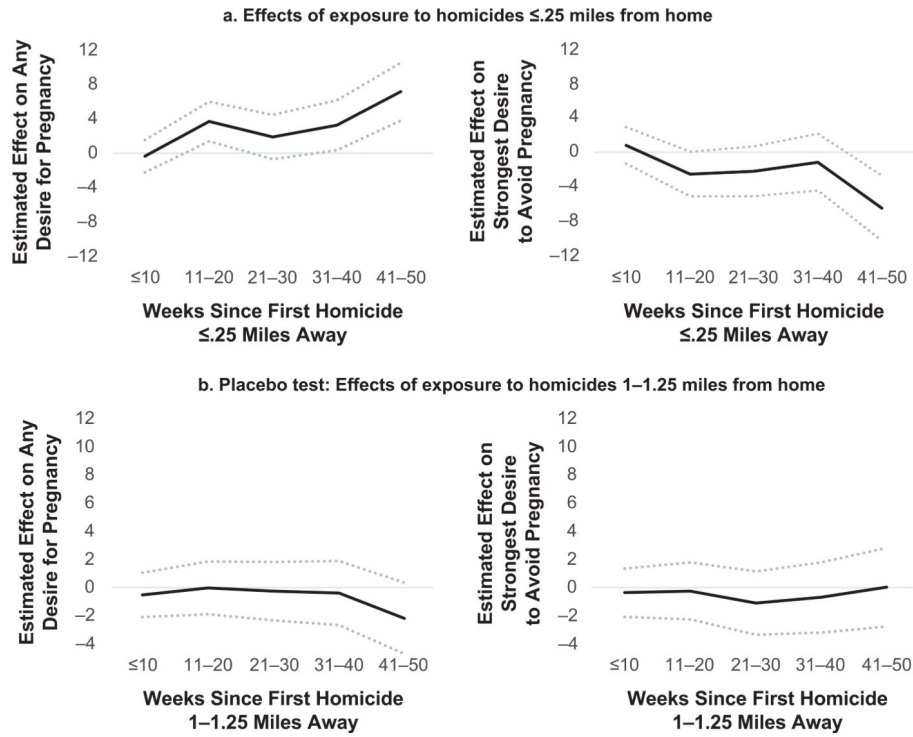


Fig. 4. Estimated effects of homicides on pregnancy desires, by weeks since initial exposure. In panel a, from left to right, $N=12,608$; $N=12,394$; $N=12,288$; $N=12,192$; and $N=12,123$ weeks. In panel b, from left to right, $N=8,170$; $N=7,648$; $N=7,489$; $N=7,356$; and $N=7,210$ weeks. All models are estimated using a linear specification with fixed effects and adjusting for a time-varying measure of age, dummy variables for month and year, and month-by-year interaction terms. Dotted lines represent 95% confidence intervals.

Table 1

Frequency of homicide exposure within a quarter mile of home

	<i>N</i>	% of Sample
Respondents (N= 387)		
Ever exposed during study	85	22
Weeks (N = 14,715)		
Exposed to homicide this week	113	0.77
Exposed to one or more homicides in any previous week	2,841	19
Previously exposed to:		
One homicide	2,034	14
Two homicides	532	4
Three or more homicides	275	2

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Table 2Descriptive statistics of pregnancy desires ($N= 14,715$ weeks across 387 women)

	Mean	SD
Desire for Pregnancy in Next Month (0–5)	0.34	1.09
Any Desire for Pregnancy in Next Month (0,1)	0.10	
Desire to Avoid Pregnancy in Next Month (0–5)	4.65	1.06
Strongest Desire to Avoid Pregnancy in Next Month (0,1)	0.88	
Indifferent (low desire for pregnancy, low desire to avoid) (0,1)	0.02	

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Table 3

Descriptive statistics of respondents who were and those were not exposed to a homicide within a quarter mile of their home during the RDSL Study: Percentages or means

	Never Exposed to a Homicide Within a Quarter Mile of Home (<i>N</i> = 302)	Exposed to a Homicide Within a Quarter Mile of Home at Least Once (<i>N</i> = 85)	Sig.
Sociodemographic Background (%)			
African American	60	84	***
Receiving public assistance at baseline	48	45	
Mother graduated college	16	9	
Mother <20 years old at first birth	50	54	
Grew up in a two-parent household	33	24	[†]
Pregnancy Desire (%)			
During the RDSL study period			
Ever had any desire for pregnancy	44	64	**
Ever less than strongest desire to avoid pregnancy	43	68	***
Ever indifferent	22	33	*
At baseline (means)			
Desire for pregnancy	0.32 (1.00)	0.41 (1.23)	
Any desire for pregnancy	12	13	
Desire to avoid pregnancy	4.68 (1.04)	4.49 (1.41)	
Strongest desire to avoid pregnancy	88	86	
Indifferent	2	5	

Note: Standard deviations are shown in parentheses.

[†]
p < .10

*
p < .05

**
p < .01

p < .001 (two-tailed tests)

Table 4

Average effects of homicide exposure within a quarter mile on pregnancy desire, estimated from linear models with fixed effects

	Desire to Become Pregnant		Desire to Avoid Pregnancy		Conflicting Desires
	Desire for Pregnancy (0/5)	Any Desire for Pregnancy (0/1)	Desire to Avoid Pregnancy (0–5)	Strongest Desire to Avoid Pregnancy (0/1)	Indifferent (0/1)
Ever Exposed in Any Prior Week	0.05 [*]	0.02 ^{**}	-0.05 [†]	-0.02 ^{**}	-0.00
	(0.03)	(0.01)	(0.03)	(0.01)	(0.00)
Constant	7.15 [†]	1.71	0.54	-0.95	-0.16
	(3.85)	(1.12)	(4.28)	(1.23)	(0.68)

Notes: In all models, $N = 14,715$ weeks from 387 women. All models adjust for time-varying age and previous exposure to police-involved fatalities during the RDSL study. Models further include month and year dummy variables and their interactions. Standard errors are shown in parentheses.

[†]
 $p < .10$

^{*}
 $p < .05$

^{**}
 $p < .01$ (two-tailed tests).

Table 5

Cumulative effects of homicide exposure within a quarter mile on pregnancy desire, estimated from linear models with fixed effects

	Desire to Become Pregnant		Desire to Avoid Pregnancy		Conflicting Desires
	Desire for Pregnancy (0/5)	Any Desire for Pregnancy (0/1)	Desire to Avoid Pregnancy (0-5)	Strongest Desire to Avoid Pregnancy (0/1)	Indifferent (0/1)
Previously Exposed Once	0.06 [*] (0.03)	0.02 ^{**} (0.01)	-0.04 (0.03)	-0.02 [*] (0.01)	-0.01 (0.00)
Previously Exposed Twice	-0.05 (0.05)	0.02 (0.01)	-0.01 (0.05)	-0.03 [†] (0.02)	0.01 (0.01)
Previously Exposed Three or More Times	0.20 ^{**} (0.06)	0.03 [†] (0.02)	-0.26 ^{***} (0.07)	-0.05 [*] (0.02)	0.02 [†] (0.01)
Constant	7.20 [†] (3.85)	1.71 (1.12)	0.42 (4.28)	-0.97 (1.23)	-0.14 (0.68)
Post-estimation Tests of Equality					
Exposed once vs. twice	*				†
Exposed once vs. three or more times	*		**		*
Exposed twice vs. three or more times	***		***		

Notes: In all models, $N = 14,715$ weeks from 387 women. All models adjust for time-varying age and previous exposure to police-involved fatalities during the RDSL study. Models further include month and year dummy variables and their interactions. Standard errors are shown in parentheses.

[†] $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$ (two-tailed tests)