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Scars from a Previous Epidemic among White and Black Women: Social Proximity to Zika and Fertility Intentions During the Covid-19 Pandemic

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Abstract

The Covid-19 pandemic has led to rises in morbidity and mortality, but its demographic consequences may not end there. Since the pandemic began, the public has experienced tremendous uncertainty and worry about SARS-CoV-2 infection, especially because scientific understanding of a novel disease takes time to develop and disseminate. During periods of extreme uncertainty and worry, people may revise their fertility intentions, drawing on their prior experiences during prior epidemics. To investigate this possibility, we examine whether women's social proximity to Zika during the Zika epidemic predict their fertility intentions during the Covid-19 pandemic. We apply Structural Equation Models on unique microdata from women in Brazil, the country most affected by Zika, to understand whether a novel infectious disease outbreak left lasting imprints that shape fertility intentions during a subsequent novel infectious disease outbreak, the Covid-19 pandemic, and whether these scarring effects operate differently by race. Results demonstrate a scarring effect such that a woman's social proximity to Zika directly predicts fertility intentions three years later, in response to the Covid-19 pandemic, regardless of whether a woman herself had or suspected that she had Zika. Findings also show that Zika social proximity is associated with increased perceived risk of Covid-19 infection and worry about pregnancy and fetal complications from Covid-19. We also show that white and non-white women have scarred differently from the Zika epidemic. Broadly, our findings speak to the transformative consequences of novel infectious disease outbreaks that go beyond mortality and health.

Significance Statement → The Covid-19 pandemic has led to rises in morbidity and mortality, but its demographic implications may extend to fertility. The transformative consequences of novel infectious disease outbreaks may be conditioned by individuals' social networks, and may also transcend a single epidemic. We collected sizeable representative data on fertility intentions during the early months of the pandemic and created the Zika social proximity index, which measures the reach of a novel infectious disease outbreak by accounting for confirmed and suspected infections in one's social network. We show that an epidemic produces scarring effects on fertility intentions that manifest during a successive outbreak and are variegated by race, contributing to understanding that the impacts of emerging epidemics go beyond confirmed cases and deaths.

Main Text

Introduction

The Covid-19 pandemic has led to a rise in morbidity and mortality, but its demographic consequences may not end there. Since the pandemic began, the public has experienced tremendous uncertainty and worry about SARS-CoV-2 infection, especially because scientific understanding of a *novel* disease takes time to develop. During such periods of uncertainty and worry, people may revise their fertility intentions (i.e. whether and when to have (more) children), with potential implications for both individuals and societies. In this environment, people's prior experiences, particularly prior epidemics, may shape their intentions. To investigate this possibility, we examine whether women's experiences during the Zika epidemic predict their fertility intentions during the Covid-19 pandemic. We hypothesize a scarring effect, such that women who experienced social proximity to Zika are more likely to intend to postpone or forgo pregnancy because of the Covid-19 pandemic.

To examine whether social proximity to disease in one novel infectious disease outbreak has scarring effects on fertility intentions in a subsequent outbreak of a successive novel infectious disease, as well as differential effects across racial groups, we turn to Brazil, which was the epicenter of the 2015-2017 Zika virus (ZIKV) epidemic. Three years later, Brazil was again an epicenter of another novel infectious disease outbreak, with among the highest case counts of Covid-19 in the world (as of May 2021)¹. As a result, Brazilian women of childbearing ages are navigating fertility in the context of successive novel infectious disease outbreaks characterized

by high levels of uncertainty and worry and that will likely exacerbate the country's pervasive racial inequities.

Although ZIKV and SARS-CoV-2 are distinct in their modes of transmission and symptomology, both viruses transmit novel infectious diseases that reached epidemic proportions and generated high levels of individual and societal uncertainty and worry. Navigating fertility intentions during the Zika epidemic became especially fraught for women once scientists established that the ZIKV can cause serious birth defects including microcephaly and other types of congenital Zika syndrome (CZS)^{2,3}. Although scientific knowledge on the health impacts of Covid-19 on pregnant women and birth outcomes is still emerging, pregnant women are at higher risk of developing severe illness from Covid-19⁴, and there is evidence of increases in stillbirth and preterm birth during the pandemic⁵. While the devastating social and economic impacts of the Covid-19 pandemic are still unfolding, women in places affected by the Zika epidemic are again managing fertility intentions in contexts of high uncertainty and worry, this time coupled with heightened social and economic instability.

Given this context, our study examines three central research questions: Is social proximity to Zika during the ZIKV epidemic associated with intentions to postpone or forgo pregnancy due to the Covid-19 pandemic? Is this association mediated by perceived risk of contracting Covid-19 and worry about pregnancy and fetal complications due to Covid-19? Does this association differ between white and non-white women?

To examine these questions, we use unique microdata from 3,996 Brazilian women in Pernambuco, the state hardest hit by the Zika epidemic and that presented the steepest declines in births during the epidemic⁶⁻⁸. We first test whether a woman's social proximity to Zika matters for fertility intentions during the Covid-19 pandemic, specifically whether she intends to postpone or forgo a pregnancy due to the pandemic. We argue that regardless of whether a woman herself contracted Zika, social proximity to people with *confirmed* or *suspected* Zika infection during the epidemic can leave social-psychological imprints that shape her fertility intentions in a subsequent novel infectious disease outbreak also characterized by high levels of uncertainty and worry.

We further argue that individual manifestations of worry regarding infection—which we operationalize as perceived risk of contracting Covid-19 and worry regarding pregnancy and fetal complications due to Covid-19—are important social-psychological mechanisms that drive the association between social proximity to Zika and fertility intentions during the pandemic. Using structural equation models, we examine whether women's social proximity to Zika is associated with perceived risk of Covid-19 infection and worry about pregnancy and fetal complications from Covid-19, and with decisions to postpone or forgo pregnancy because of the pandemic.

Finally, we test whether the scarring effects of social proximity to Zika on fertility intentions during the Covid-19 pandemic differ for white and non-white women, whose lived experiences differ in profound ways due to Brazil's pervasive racial inequalities. As a result, non-white women and white women might "scar" differently due to different experiences during the Zika epidemic, leading to different perceptions of the risks of Covid-19 and of pregnancy during the pandemic and different intentions about whether and when to have (more) children.

Fertility intentions amid public health crises

Intentions about whether and when to have (more) children are dynamic and sensitive to macro-level changes⁹⁻¹³, such as large-scale novel infectious disease outbreaks. Fertility intentions are important because they can be key predictors of fertility behavior, which in turn determines fertility rates. Furthermore, regardless of whether they translate into behavior and rates, fertility intentions reflect social and health inequities as well as differences in women's autonomy over their reproductive lives.

Public health crises can operate through various mechanisms to (re)shape fertility intentions. For example, the potential for a higher burden of care brought on by the health consequences of the disease may influence women to intend to have fewer children, particularly if resources are constrained. Indeed, the prospective burden of caring for a child with CZS may have been a motivation to reduce childbearing during the Zika epidemic, driving down birth rates^{8,14}. In addition, novel infectious disease outbreaks often create a severe demand on health

systems that can reduce available resources for other essential care such as pre-natal care, a factor that might also influence women to intend to postpone or forego childbearing.

On the other hand, in times of significant societal uncertainty and risk, women might intend to have (more) children if they view childbearing as a mechanism to reduce personal uncertainty¹⁵. Amid crises associated with high mortality, a desire to replace lost children can also lead to a desire for more children¹⁶ and as a strategy to deal with the uncertainty regarding child survival¹⁷.

Social proximity to novel infectious diseases, risk perceptions, and fertility intentions

While there are studies on fertility responses to economic crises¹⁸, natural disasters¹⁶, and wars^{19,20}, there is not much on how fertility *intentions* shift in response to epidemics. The few exceptions focus on how diagnosis of an infectious disease shapes fertility preferences^{21,22} or operationalize risk or proximity* to disease by calculating rates of confirmed cases of the disease or another measure of exposure at an aggregate level of geography such as the municipality, state, or region^{14,23,24}. To the best of our knowledge, no research has considered how fertility intentions shift across more than one disease outbreak and in response to experiences with the disease within one's social network.

We define social proximity to disease on a more granular level—as the number of people that an individual personally knows that has had a confirmed *or* suspected case of Zika or a confirmed case of microcephaly. We argue that this level of detail about confirmed *and* suspected cases in an individual's social network is important because it can shape social-psychological mechanisms such as perceptions of and worry about the risk and consequences of the disease, which in turn might shape how individuals make decisions during back-to-back outbreaks. The link between social proximity and such social-psychological mechanisms is especially important to consider during an outbreak of a *novel* infectious disease, when people might perceive a previously unknown disease as an abstract threat until they know someone who has been personally affected by it, and the risk of the disease then becomes a more concrete reality.

Given that Brazil is a highly racially stratified society, the ways in which social proximity to disease in one public health crisis impact fertility intentions during another outbreak may operate differently across racial groups. Non-white communities were disproportionately impacted by the Zika epidemic relative to whites²⁵ and are again bearing the disproportionate burden of Covid-19 health and socioeconomic consequences²⁶. The conditions that made non-white communities more vulnerable to disease during these public health crises stem from a legacy of structural racism that pervades nearly all aspects of life, from education and employment to housing and health²⁷. The lived experiences of non-white, and particularly Black women both prior and during these epidemics^{28,29} likely structure their risk of contracting Covid-19, their worry about it, and, in turn, their fertility intentions.

Results

Data for our analysis comes from a random digit-dialing telephone survey conducted in Pernambuco, Brazil from May to October 2021. This approach generated a representative sample of women ages 18 to 34. Table 1 provides descriptive statistics for all variables in the analysis and for the items in the Zika social proximity index. About three-fourths of the respondents know at least one person who had a suspected or confirmed case of Zika during the epidemic, reflecting the high prevalence of Zika in Pernambuco.

Figure 1, which shows the results from the structural equation models for the full sample, indicates that women with greater social proximity to Zika during the ZIKV epidemic are more likely to postpone or forego pregnancy during the current Covid-19 pandemic ($b = 0.10$, $OR = 1.11$, $p < .05$), suggesting a scarring effect of this previous epidemic. Women of childbearing ages who had greater social proximity to Zika during the Zika epidemic were also more likely to perceive a higher risk of infection of Covid-19 ($b = 0.08$, $p < .01$). Furthermore, women who perceive a greater risk of

*Whereas previous studies often use the term “exposure” to disease, we use the term “social proximity” to make it clear that we are referring to the people an individual knows who has had a confirmed *or* suspected case of Zika and not to an individual's pathogenic exposure to Zika.

Covid-19 infection were more likely to report that they were worried about pregnancy and fetal complications due to Covid-19 ($b = 0.03$, $p < .001$). Women who reported being worried about pregnancy and fetal complications due to Covid-19 were also more likely to postpone or forgo pregnancy during the pandemic ($b = 0.44$, $OR = 1.55$, $p < .05$).

In addition to these direct paths, we also find that perceived risk of contracting Covid-19 and worry about pregnancy and fetal complications during the pandemic mediate the association between social proximity to Zika and childbearing intentions. Greater social proximity to Zika during the ZIKV epidemic is associated with a higher perceived probability of infection and a higher likelihood of worry about adverse fetus and pregnancy effects during the Covid-19 pandemic ($b = 0.003$, $p < .05$). This indirect association extended to childbearing intentions, such that social proximity to Zika during the ZIKV epidemic predicts childbearing intentions during the Covid-19 pandemic through the perceived probability of infection with Covid-19 and concern about pregnancy and fetal complications due to Covid-19 ($b = 0.01$, $p = .059$).

Table 2 summarizes the direct, indirect, and total paths for the full sample with additional analyses. To better understand the nature of the association between social proximity to Zika and fertility intentions during the Covid-19 pandemic, we disaggregated fertility intentions into foregoing versus postponing childbearing. These results suggest that the total association between social proximity to Zika and childbearing intentions during the Covid-19 pandemic is stronger for foregoing pregnancy altogether ($b = 0.14$, $p < .05$) than for postponing ($b = 0.10$, $p = .08$).

Table 2 shows analogous results, but separately for white and non-white respondents and separately for respondents who intend to postpone versus forego childbearing. Social proximity to Zika during the ZIKV epidemic has a strong association with white respondents' intentions to postpone childbearing during the Covid-19 pandemic ($b = 0.291$, $p < 0.01$) but not with their intentions to forgo childbearing (non-statistically significant). The opposite pattern exists for non-white women—social proximity to Zika is statistically significantly associated with intentions to foregoing childbearing altogether ($b = 0.155$, $p < 0.05$), but not with intentions to postpone childbearing (non-statistically significant). Parity or desired fertility do not explain these differences. Further results show that the operating mechanisms driving the indirect paths between social proximity to Zika during the ZIKV epidemic and fertility intentions during the Covid-19 pandemic also differ for white vis-a-vis non-white women.

Additional sensitivity analyses by age and SES levels are shown in Table A1 in the Appendix. Social proximity to Zika is a strong predictor of fertility intentions among younger women of childbearing ages, but not for older women of childbearing ages, likely because the latter has a smaller fecund window. The direct path is strong and driven mostly by intentions to forego fertility ($b = 0.146$, $p < 0.05$). The models disaggregated by SES follow the overall trend of the race groups in that women with high SES intend to postpone childbearing. We estimate further sensitivity analyses to ensure that the Zika social proximity index is not also capturing Covid-19 social proximity. The correlation between the Zika social proximity index and an analogous Covid-19 social proximity index is only 0.22. Additional models in which we control for a Covid-19 social proximity index show substantively similar results to those presented here.

Discussion

With the Covid-19 pandemic occurring only three years after the Zika epidemic ended, women of childbearing age in places affected by the ZIKV are now navigating fertility during back-to-back novel infectious disease outbreaks characterized by high levels of uncertainty and fear. Our study used unique microdata from Brazil, the country most affected by the Zika epidemic, to understand whether this novel infectious disease outbreak left lasting imprints that shape fertility intentions during a subsequent novel infectious disease outbreak, the Covid-19 pandemic, and whether these associations operate differently by race.

Our results demonstrate a scarring effect of one novel infectious disease outbreak to another such that a woman's social proximity to Zika during the ZIKV epidemic directly predicts fertility intentions three years later, during the Covid-19 pandemic. A woman's social proximity to Zika during the ZIKV epidemic was associated with increased perceived risk of Covid-19 infection and worry about pregnancy and fetal complications from Covid-19, which in turn were associated

with intentions to postpone or forgo pregnancy because of the Covid-19 pandemic. The direct effect of social proximity to Zika operates through foregoing pregnancy among non-white women, while it operates through postponing pregnancy among white women. These findings remain despite controls for parity and ideal family size.

Broadly, our findings speak to the transformative consequences of novel infectious disease outbreaks that go beyond mortality and health. Our results have important general implications for understanding the scarring effects of novel infectious disease epidemics and the importance of social proximity to a novel infectious disease, and specific implications for understanding overall and racially patterned individual- and population-level consequences of successive outbreaks for women's childbearing intentions and potentially, for fertility rates. We discuss each of these implications in turn.

First, our findings provide strong evidence of a scarring effect across outbreaks. More than three years since the Zika epidemic ended, women who had greater social proximity to Zika during the epidemic perceived a greater risk of infection with Covid-19, were more likely to be worried about birth complications from Covid-19, and ultimately were more likely to intend to avoid getting pregnant due to Covid-19. Had the Covid-19 pandemic not occurred or had it occurred many years after the Zika epidemic, the impacts of the Zika epidemic might have begun to fade given that Brazil has not faced a recurrence of a Zika outbreak since the end of the epidemic. However, the Covid-19 pandemic appears to have triggered a similar sense of worry and uncertainty that women of childbearing age lived with during the Zika epidemic. This finding highlights that the social-psychological effects of epidemics can spill over from one novel infectious disease outbreak to another. With scientists predicting an "era of pandemics" and a rise in novel infectious diseases³⁰ the occurrence of consecutive outbreaks may increase, with transformative impacts on how individuals navigate major life decisions such as childbearing.

Second, our results show that social proximity to Zika is an important predictor of how women perceive risk during a subsequent public health crisis. Whereas prior studies often capture social proximity or exposure to a disease at a macro level and over a single outbreak, our measure drills down to the more proximate level of women's social networks. We argue that personally knowing people who have had Zika makes women perceive the risks of novel infectious diseases as more real rather than as an abstract and distant threat that they hear about in the news. Our results show that social proximity to Zika—whether confirmed or suspected—matters in concrete ways for how women perceive infection risks, worry about pregnancy and fetal complications, and fertility intentions during the Covid-19 pandemic. Our study suggests that collecting data about social proximity to infectious diseases across multiple outbreaks and social networks could be central for understanding how individuals perceive public health risks and how they might modify their intentions, and ultimately their behaviors as a result.

Third, our findings point to potential individual-level effects for women's childbearing experiences. Even in the absence of a public health crisis, childbearing intentions are often wrapped in at least some worry due to the risks inherent in pregnancy, childbirth, and childrearing. Social proximity to Zika during the epidemic is associated with a heightened likelihood of pregnancy worries during the Covid-19 pandemic. These compounding worries about pregnancy and fetal complications during consecutive novel infectious disease outbreaks could translate into higher levels of stress during pregnancy and adverse mental health outcomes, which can also be associated with deleterious pregnancy and birth outcomes similar to the ones found regarding shocks³¹.

Fourth, at the population level, our results point to the potential consequences of the Covid-19 pandemic on fertility behavior. As demographers document fertility rates during and post-pandemic, with some evidence pointing to a decline in live births in Brazil and elsewhere³² our ability to distinguish between intentions to postpone versus intentions to forgo pregnancy can provide insight into whether observed changes in fertility rates during and following the Covid-19 pandemic may represent tempo or quantum effects. That the association between social proximity to Zika and foregoing pregnancy during the pandemic is stronger than that of postponing pregnancy points to a potential quantum effect in fertility rates if most women are able to fulfill their childbearing intentions. That said, fertility intentions are dynamic and may change in the

period following the pandemic. For example, the documented declines during the ZIKV epidemic^{7,8,14,33} suggest women's ability to adjust their fertility intentions and behavior during a period of intense uncertainty and worry. These back-to-back public health crises involving novel infectious diseases are likely to impact fertility in significant ways.

Fifth, our findings show that white and non-white women have scarred differently from the Zika epidemic. Social proximity to Zika translates into intentions to postpone childbearing among white women and into intentions to forgo among non-white women. That white women react by intending to postpone suggests that white women might perceive the public health crisis as a temporary barrier to childbearing, whereas non-white women might view it as a more permanent barrier. Fertility already takes place in highly contentious and uncertain circumstances among non-white women—unintended fertility is high among non-white women, who also face serious barriers to contraception³⁴, and institutional discrimination²⁸ including regarding reproductive health³⁵. In a context of back-to-back novel infectious disease outbreaks, non-white women might perceive the combined weight of these barriers as leaving them with little option but to intend to forgo future childbearing.

The Covid-19 pandemic has reshaped our world in profound and unequal ways. Drawing evidence from a prior novel infectious disease outbreak, our study showed that the Zika epidemic has left scars that influence childbearing intentions years later and along racial lines. The long-lasting effect of the Covid-19 pandemic will depend on whether these intentions become reality, but they may leave lasting scars that impact behaviors for years to come.

Materials and Methods

Between May-October 2020, the DeCodE Project conducted a 25-minute phone interview with 3,996 women ages 18-34 in the state of Pernambuco, Brazil. We used a random digit-dialing technique with a dual frame design[†]. Data and study materials are available from the authors. The research was approved by the IRB at the University of Texas at Austin and the Brazilian National Commission for Research Ethics (Comissão Nacional de Ética em Pesquisa). Interviewers conducted verbal consent by reading a script approved by IRB. Surveys conducted by Brazil's Census Bureau ³⁶ show that 94% and 88% of women in this age group own a cell phone in the metropolitan region of Recife, and Pernambuco state, respectively. Surveys weights were applied to adjust for unequal selection probabilities, to integrate the samples from both frames, and for nonresponse and coverage adjustments.

Measures

The outcome is change in fertility intentions due to the COVID-19 pandemic, measured separately for respondents who report they want a(nother) child in the future (postponing pregnancy because of the pandemic) versus do not want a(nother) child (foregoing pregnancy because of the pandemic). If respondents reported that they changed their intentions but still intended a pregnancy within the next six months, we did not consider this a change in intentions.

[†] We used a dual frame sample design to selected a sample through a list-assisted random-digit dialing (RDD) procedure. We matched the cell phone census database to the available 1,000 banks dedicated to cell phones in target area code 81, as informed by the telecommunication authority in Brazil, and stratified them into three strata based on i) region (Recife metropolitan area vs. not) based on the location of the plurality of the listed phones, and ii) stratum 3: if the 1,000-bank did not have any listed cell phone number. The sample was allocated proportionately to the number of 1,000-banks from each stratum. Within strata 1 and 2, the 1,000-banks were selected with probabilities proportionate to the number of listed cell phones, and within stratum 3 they were selected at random. All cell phone numbers were sampled from the selected 1,000 banks for a total of approximately 3,000,000 cell phone numbers in the sample. At least three attempts were made to complete an interview at every sampled cell phone number, with all interviews recorded with time and date. Interviews were conducted remotely in interviewers' households due to the Covid-19 pandemic and recorded for supervision and quality purposes.

The social proximity index summarizes whether the respondent herself, family and household members, and/or their children and partners had a suspected or confirmed Zika infection, the overall number of people they know with a suspected or confirmed case, and whether they know any child with microcephaly. Indices constructed using items in Table 1 through sum scores, principal components and factor analysis are highly correlated ($r = .96-.99$). Simple sum score of binary indicators showed the strongest association with Zika exposure correlates such as household water shortage. A high level of social proximity to Zika is unrelated to education (mean difference = .02, $p = .60$) or income ($r = .004$, $p = .79$). Covid-19 risk perception is a self-assessment of the likelihood of infection measured through a 5-point scale coded as a dichotomous variable. Worry about pregnancy and fetal complications because of Covid-19 is a 5-point scale coded as a dichotomous variable. Additional covariates included in the models are age, race, education, income, living with partner, living in the metropolitan state capital area, has at least one child, and wants a(nother) child.

Methodology

To test for direct and indirect associations (i.e., mediation) between social proximity to Zika and fertility intentions, we conducted path models in Mplus version 8.2. We used maximum likelihood robust estimation to account for the dichotomous nature of the outcome variable. We employed full information maximum likelihood to handle missing values ³⁷.

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Figure 1

Path Model Predicting Change in Childbearing Intentions (N = 3,892)

Note: Dashed lines indicate non-significant paths. AIC = 81852.62, BIC = 84210.35. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 1. Descriptive Statistics (N = 3,892)

	<i>M/%</i>	<i>SD</i>	<i>Range</i>
Zika proximity index	1.96	1.40	0 – 5
Perceived likelihood of contracting Covid-19	3.51	1.47	1 – 5
Worried/extremely worried pregnancy-fetal Covid-19 complications	83.5%		
Intends to postpone or forgo because of pandemic	21.6%		
Does not want another child	34.8%		
Has a child	48.6%		
Age 18 – 26	41.0%		
Race (non-white)	70.4%		
Completed high school or less	52.8%		
Lives in metro Recife	85.8%		
Income category (1 - 7)	4.22	1.72	1 - 7
Married or lives with partner	47.0%		
Zika proximity items			
Knows at least one person who had Zika (confirmed or suspected)	74.0%		
Someone in R's household or family had suspected or confirmed case	42.0%		
Knows at least five people who had Zika	36.1%		
Knows any children with microcephaly	25.1%		
Suspected or confirmed case	19.0%		

Source: DeCodE data. Non-pregnant women.

Table 2. Direct, Indirect, and Total Paths from Zika Proximity to Postponing or Forgoing Pregnancy due to the COVID-19 Pandemic.

	Direct path		Indirect path		Total path	
	Est.	<i>p</i>	Est.	<i>p</i>	Est.	<i>p</i>
Full sample (<i>N</i> = 3,892)	0.098	.030	0.010	.059	0.108	.017
Postpone (<i>n</i> = 2,290)	0.093	.104	0.010	.174	0.102	.076
Forgo (<i>n</i> = 1,602)	0.14	.053	0.009	.348	0.149	.038
Non-white (<i>n</i> = 2,737)	0.062	.233	0.011	.093	0.074	.161
Postpone (<i>n</i> = 1,557)	0.030	.419	0.008	.471	0.035	.600
Forgo (<i>n</i> = 904)	0.155	.067	0.018	.284	0.173	.036
White (<i>n</i> = 1,150)	0.193	.023	0.077	.472	0.200	.019
Postpone (<i>n</i> = 748)	0.291	.005	0.001	.954	0.292	.006
Forgo (<i>n</i> = 316)	-0.024	.879	0.013	.564	-0.011	.945

Source: DeCodE data. Non-pregnant women. *Note:* Direct path reports the path from Zika proximity to postponing/forgoing fertility. Indirect path reports the mediated path from Zika proximity to postponing/forgoing through perceived probability of Covid-19 infection and worry about pregnancy-fetal complications due to Covid-19. Full sample reports models for postponing/foregoing childbearing combined (analogous to Figure 1). Postpone vs. forego reports models separately for each fertility intention.