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The impact of lockdowns during the COVID-19 pandemic on fertility intentions*

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Abstract

Lockdown edicts during the COVID-19 pandemic have led to concerns about consequences for childbirth plans and decisions. Robust empirical research to either refute or confirm these concerns, however, is lacking. To evaluate the causal impact of lockdowns on fertility, we exploited a large sample of Australians (aged 18 to 45) from a nationally representative household panel survey and leveraged variation from a unique natural experiment that occurred in Australia in 2020: a lockdown imposed in the state of Victoria, but not elsewhere in Australia. Difference-in-differences models were estimated comparing changes in fertility intentions of persons who resided in Victoria during lockdown, or within four weeks of the lockdown being lifted, and those living elsewhere in Australia. Results revealed a significantly larger decline in reported intentions of having another child among women who lived through the protracted lockdown. The average effect was small, with fertility intentions estimated to fall by between 2.8% and 4.3% of the pre-pandemic mean. This negative effect was, however, more pronounced among those aged over 35 years, the less educated, and those employed on fixed-term contracts. Impacts on men's fertility intentions were generally negligible, but with a notable exception being Indigenous Australians.

JEL classification: J13, J18

Keywords: Australia, COVID-19, lockdown, fertility intentions, social inequality, HILDA Survey

Introduction

The COVID-19 pandemic has affected nearly every aspect of human life. There are the obvious health impacts, reflected in more than 400 million persons infected and around 6 million deaths world-wide over the first two years following the initial outbreak. However, the impact of the pandemic extends well beyond mortality and morbidity, with a large body of research documenting impacts on, among other things, mental health (Robinson et al., 2022), physical exercise (Stockwell et al., 2021), body weight (Bakaloudi et al., 2021), educational achievement (König and Frey, 2022), employment and job security (Adams-Prassl et al., 2020; Forsythe et al., 2020; OECD, 2020), income and poverty (Cantó et al., 2021; Crossley et al., 2021), loneliness (Bu et al., 2020; Dahlberg, 2021), and domestic violence (Piquero et al., 2021). Another outcome that may have been affected by the pandemic is fertility (Aassve et al., 2020; Ullah et al., 2020), with findings from survey-based research reporting evidence that many fertile people delayed or ceased trying to have children because of the pandemic (Emery and Koops, 2022; Kahn et al., 2021; Lin et al., 2021; Lindberg et al., 2020, 2021; Luppi et al., 2020; Micelli et al., 2020; Naya et al., 2021; Zhu et al., 2020). That said, most of these studies involved small convenience samples, and all employed cross-sectional designs where respondents were asked how fertility plans had changed because of the pandemic. Responses may thus be affected both by recall bias and priming. There is also evidence of an acceleration in the long-term decline in fertility rates in high-income countries beginning late 2020, though such patterns did not apply to all countries and the decline was only statistically significant in a minority (Aassve et al., 2021).

A complication in existing research is that much of the documented impacts may not be the result of the virus per se, but of measures introduced by governments to contain the spread of the virus and to limit its effect on population health. Among the suite of policies implemented, most contentious has been the use of lockdowns – compulsory business closures, stay-at-home orders and other interventions designed to restrict population movements (Haug et al., 2020). Despite this, their use has been widespread: According to one source, stay-at-home requirements had been adopted in just over 80% of countries at some point during 2020, and workplace closure policies in around 95% (Hale et al., 2021).

While the channels through which the pandemic might influence fertility are numerous and varied (Voicu and Bădoi, 2021), the role of social distancing, and especially lockdown-type measures, looms large. Lockdowns placed constraints on people's social and intimate lives, with marriages postponed and couples not living together having fewer opportunities to meet and plan for the future. Likely even more important is how couples coped with and responded to the many stressors associated with lockdowns, and the pandemic more generally (Pietromonaco and Overall, 2021). Increased economic uncertainty (and especially job loss), school closures and reduced access to child care (both formal and informal), for example, are all factors that would have placed families under greater strain and potentially adversely affected couple functioning. For some families, and especially those with young children, lockdowns increased the amount of household labor and care work, with typically more of the burden falling on the women in those families (Carlson et al., 2021; Craig and Churchill, 2021; Sevilla and Smith, 2020). Working in the other direction, lockdowns, and more specifically stay-at-home orders, by leading couples to spend more time together, could have strengthened relationships (Neff et al., 2021).

Despite these arguments, there is little empirical evidence disentangling changes in fertility intentions due to the imposition of lockdowns from other channels associated with the pandemic. Indeed, the closest we could identify was a study where the outcome was not a measure of births or fertility intentions, but of Google searches for words related to fertility (and other demographic variables) (Berger et al., 2021). This study, however, is notable for its quasi-experimental design, which, by exploiting cross-country and (in the case of the USA) cross-state differences in the timing of lockdowns, was able to derive estimates of the impact of lockdown that could be defended as causal.

Our study also involves a quasi-experimental design, but where the outcome is a more direct indicator of fertility plans – the expected likelihood of having another child. We exploit household panel survey data collected in Australia in the second half of 2020 when residents of one state of Australia – Victoria – were subject to a highly restrictive lockdown involving curfews and compulsory stay-at-home orders for all but essential workers. We estimate difference-in-differences (DiD) models to test whether and how much the lockdown changed fertility intentions. A feature of our experimental setting is that there was a very low incidence of COVID-19 infection in Australia during 2020. The nexus between the introduction of lockdowns and very high community rates of COVID-19 cases was therefore weaker in Australia than in most other countries, and thus we can be more confident that our estimates reflect the impact of lockdowns rather than some other channel, such as the health effects of the virus.

We also test whether the impact of lockdown on fertility varies with selected individual characteristics. As already discussed, it is generally believed that women, and especially mothers, bore much of the increased care burden associated with lockdown and thus impacts on fertility plans might differ between men and women and, among women, between mothers and the childless. Slightly differently, we also examine whether impacts vary with household income, education, employment status, age, race, and immigrant status, given the economic hardship associated with lockdowns are often thought to have had greater impacts on the most economically vulnerable (e.g., Crossley et al., 2021; Perry et al., 2021).

The Quasi-Experimental Setting

In Australia, the pandemic was met with both international border closures, with arrivals largely restricted to returning Australians who were required to enter an official quarantine facility or hotel upon arrival, and a nationwide lockdown commencing late March 2020, which involved the closure of all non-essential businesses and advice to work from home where possible. Reflecting the success of both the lockdown and border closures in suppressing the spread of the virus, the national lockdown was lifted in early May. Primary responsibility for policies intended to contain the virus was then largely left to the different state and territory governments, thus providing the potential for the type of exogenous variation needed for a quasi-experimental approach. Such variation emerged when, in late June 2020, Melbourne, the largest city in Victoria, became the epicentre of a local outbreak that saw an increase in the number of COVID-19 cases. This prompted the Victorian State Government to impose a range of lockdown measures, including business closures, stay-at-home orders, remote schooling, and evening curfews. In Greater Melbourne, these commenced on 9 July and remained in place until 27 October, making it the second longest continuous lockdown in the world (111 days). In regional Victoria, these restrictions commenced on 4 August and were lifted on 17 September. Meanwhile, rates of community transmission of COVID-19 in other parts of Australia remained extremely low. Indeed, even in Victoria the rate of infection was very low by international standards – fewer than 17,000 cases were reported during the lockdown period (out of a population of around 6.7 million).

Data

The data used come from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a longitudinal study following members of a nationally representative sample of Australian households on an annual basis since 2001 (Watson and Wooden, 2021). Critical to our study, data collection is concentrated each year in the period August to November, and thus overlaps closely with the timing of the Victorian lockdown.

Response rates are high, especially the annual re-interview rate, which over the period covered by this study averaged 95.2%. Thus, whereas non-response means the sample does not precisely match the wider Australian population, differences are mostly small. The exception here is recent immigrant arrivals. The nature of the panel design means that without constant refreshment samples (and one was added in 2011) the study cannot adequately represent migrants entering Australia after the panel commenced.

While the HILDA Survey commenced in 2001, for this analysis we restricted our pre-treatment period to the years since 2012, thus after the refreshment sample was added. Given our focus on fertility, the sample was then further restricted to persons aged 18 to 45. This provided an initial sample comprising 75,800 observations from 14,429 individuals.

Our main outcome variable, fertility intentions, comes from an interviewer administered question that reads: ‘How likely are you to have a child / more children in the future?’ Responses are provided on an 11-point scale where only the end points are labelled (0 = very unlikely, 10 = very likely). Following other analyses of these data (Atalay et al. 2021; Bassford and Fisher, 2020), we treat fertility intentions as a continuous variable. While this question is administered in every year of the survey, differences in the sequencing and filtering of questions in survey years when additional questions about fertility behaviors were collected – 2015 and 2019 – means the fertility intentions data from those years are not strictly comparable with that collected in other years. We thus restricted our analysis to observations collected in 2012, 2013, 2014, 2016, 2017, 2018 and 2020. Again, this is in line with the approach adopted in earlier studies of the HILDA Survey fertility intentions data. After removing cases with missing data on the outcome variable and with a zero-population weight (mostly persons who had moved into non-private dwellings), the final sample for analysis comprised a maximum of 57,184 observations from 13,798 persons. A detailed step-by-step summary of the sample selection process is provided in Figure 1.

We used two analytical samples. In the first sample, our treatment group is respondents living in Victoria and interviewed during the time of the second lockdown in 2020 (July 9 to October 27 in Melbourne and August 4 to September 16 in regional Victoria). This provided 56,967 observations from 13,756 unique individuals. In the second sample the treatment group is identified using the lockdown end dates extended by 4 weeks (July 9 to November 24 in Melbourne and August 4 to October 14 in regional Victoria). This provided a slightly larger sample (57,066 person-year observations). In both samples, respondents living in Victoria who were interviewed after the treatment period ended were removed. This group represents approximately 10% of all Victorians interviewed in survey year 2020 when the treatment period is defined using exact lockdown dates, and 6% when the treatment period is extended by four weeks.

Methodology

We used quasi-experimental DiD models to estimate the impact of lockdown on fertility intentions. The general approach is very similar to that used in an earlier study using these same data, but where the outcome of interest was a measure of mental health (Butterworth et al., 2022).

We compared changes in fertility intentions of those in the treatment group (Victorians interviewed during lockdown, or within 4 weeks of the lockdown being lifted) with those in the control group (persons living in the rest of Australia). Specifically, we estimated the following equation:

$$FI_{i,t} = \beta_0 + \beta_1(Victoria_i \times lockdown) + \beta_2 Year_t + \mu_i + \delta_s + \varepsilon_{i,t} \qquad (1)$$

where $FI_{i,t}$ denotes the fertility intentions of individual i in year t, and $Victoria_i \times lockdown$ equals 1 if respondent i lived in Victoria during the treatment period, and 0 if otherwise. We exploited the longitudinal nature of the data and used person-specific fixed effects (μ_i) to control for all time-invariant factors (both observed and unobserved). $Year_t$ represents year fixed effects, with 2012 used as the base category. The DiD estimation in equation (1) also includes state fixed effects (δ_s). The standard errors were robust and clustered at the state level. Our model used probability weights to ensure the samples were representative of the population in each year.

The coefficient of interest, β_1, summarizes the effects of lockdown on fertility intentions under the assumption that fertility intentions in Victoria and rest of Australia would have followed the same trend in the absence of lockdown. This parallel trends assumption is central to the DiD research design. As a test of the validity of this assumption, we estimated an event-study specification in which the single treatment indicator of equation (1) was replaced by a set of year dummies (γ_τ) interacted with the treatment state indicator:

$$FI_{i,t} = \alpha_0 + \sum_{\tau=2012}^{2020} Victoria_i \times \gamma_\tau + \mu_i + \delta_s + \gamma_t + \varepsilon_{i,t} \qquad (2)$$

Additionally, we provide support for the causal interpretation of our result in different ways. First, we checked whether our results were robust to the inclusion of time-varying controls. Second, we added state-specific time trends to control for potential bias stemming from time-varying variables measured at the state level. Last, we conducted a placebo test to assess the validity of our analysis. More specifically, we removed Victorian observations from the analysis and made residents of New South Wales (Australia's most populous state) the treatment group. Since Victoria was the only state that imposed extended lockdowns during the second half of 2020, we should not find any systematic differences across states in the change in fertility intentions in 2020.

The model in equation (1) was also used to test for heterogeneity in the effects of lockdown on fertility intentions.

Summary statistics for the variables used in our analysis are provided in three tables provided in an (online) Appendix. Table S1 provides means and standard deviations for all variables disaggregated by gender. Table S2 compares mean fertility intentions of treatment and control groups during the pre-COVID period. This table reveals that mean fertility intentions of the control group during the pre-COVID period were much higher than for the control group (5.236 in Victoria vs. 4.826 in the rest of Australia), and is a key reason for the inclusion of individual fixed effects in equation (1). Comparable statistics for the treatment period (2020) are reported in Table S3.

Results

Table 1 reports the DiD estimates for the effect of lockdown on fertility intentions, with columns 1 to 3 using the exact treatment dates and columns 4 to 6 using the slightly wider treatment window (plus 4 weeks). All DiD models performed well, explaining a little over three quarters of the variation in fertility intentions ($R^2 = 0.76$ to 0.78).

The first three columns indicate that, all else equal, fertility intentions declined among Victorian women in 2020 ($b = -0.143$, $p < 0.1$), but not among Victorian men. This gender difference in lockdown effects was statistically significant ($F = 85.93$). The estimated impact on women translates to a reduction in fertility intentions of 2.8% of the pre-lockdown mean. A slightly larger negative impact was observed when we allowed for a longer treatment window (columns 4-6, Table 1). This negative impact was only significant among women, with the estimated coefficient of -0.219 ($p < 0.05$) equivalent to a 4.3% reduction in fertility intentions. Lengthening the treatment window further (by up to 12 weeks) produced estimates (but not reported here) that were little different from these.

We also draw attention to the point estimates on the year dummies. These all take negative values and become progressively larger with time, which is to be expected given the decline in fertility rates in Australia over this period (ABS, 2021). More importantly, there is no evidence here of any acceleration in this decline, with the magnitude of decline between 2018 and 2020 being no larger than in any of the three preceding two-year periods.

As previously, a critical assumption underpinning our identification strategy is that differences in the outcome between Victoria and the rest of Australia are not associated with differential trends in the absence of the lockdown, an assumption that we test by estimating an event-study specification. Figure 2 depicts the results of this specification separately for men and women. The reference period here is 2018. As can be seen, for both men and women the pre-COVID period coefficients (and 95% confidence intervals) all hover around zero, providing support for the parallel trends assumption and adding credibility to our claim that trends in fertility intentions would have continued to be the same in Victoria and the control states in the absence of the lockdown.

We next examined whether the effect of lockdowns on fertility intentions varied across different socio-economic groups. Parameter estimates from a series of separate DiD models are plotted in Figure 3 where the treatment period is defined as the date of lockdown plus 4 weeks, and thus will typically be at the upper end (in absolute terms) of the range of possible estimates.

As can be seen, estimated impacts do vary with socio-economic demographics, and it is women where this variation is most pronounced. Most obviously, older women (36 to 45 years) were more affected (b = -0.447, $p < 0.01$) than younger women (the negative coefficients for the two younger age groups were both small and statistically insignificant). There is also a slightly larger impact on mothers (b = -0.387, $p < 0.01$) than the childless (b = -0.162, $p < 0.1$), but the difference between these two coefficients was not statistically significant.

The pattern of results also provides some tentative evidence that it is women in more disadvantaged and economically vulnerable groups whose fertility plans were most likely to have been disrupted by lockdown. Most obviously, the negative impacts were largest for women with the lowest levels of education (that is, those who did not complete high school) (b = -0.899, $p < 0.01$). There were also larger negative impacts for both Indigenous women (b = -0.449, p = ns) and migrant women from non-English speaking countries (b = -1.295, $p < 0.01$). Only the latter, however, was significantly different from the smaller coefficient for non-indigenous Australian-born women ($b = -0.162$, $p < 0.1$). On the other hand, the negative impact for women living in the lowest income households (i.e., the bottom household income quartile) ($b = -0.398$, $p < 0.01$) was little different from those in the second and third quartiles ($b = -0.223$, p = ns; $b = -0.426$, p = ns, respectively).

There is also an unexpected finding with respect to employment status. Given widespread evidence that both unemployment and more insecure, time-limited forms of employment are associated with lower fertility rates (Alderotti et al., 2021), we expected to find negative lockdown effects to also be most pronounced among the unemployed and workers employed on fixed-term and casual contracts.[1] While a relatively large negative impact was found for women employed on fixed-term contracts ($b = -1.135$, $p < 0.05$), the estimated impact on the unemployed was close to zero ($b = -0.198$, p = ns) while the impact on casual workers was actually positive ($b = 0.636$, $p < 0.01$). A possible explanation for the latter finding lies in the secondary earner status of female casual employees in most households (71%, which compares with 46% among women employed in non-casual jobs). Job and income insecurity likely matter far less where workers are responsible for a relatively small proportion of household income, and thus fertility decisions of the women in those households will also be less impacted.

Among men, effect sizes are obviously much smaller and mostly insignificant. Nevertheless, there is a very large negative impact for Indigenous men ($b = -1.519$, $p <$

[1] Among OECD countries, Australia is distinctive for its relatively high casual employment share, which, over the period since 2000, has averaged around one in every five workers (Laß and Wooden, 2020). Fixed-term employment contracts are less common, but nevertheless, according to HILDA Survey data, applied to about 9% of all employed persons by 2019.

0.01). Very differently, and in contrast to women, low educated and unemployed men both experienced a heightened desire to have children ($b = 0.265$, $p < 0.05$; $b = 0.655$, $p < 0.05$ respectively).

Finally, we conducted a range of sensitivity checks to test whether our estimates are robust (reported in Table 2). We focus on the results using the date of lockdown plus 4 weeks (panel B in Table 1), but our results are qualitatively similar when using the exact lockdown date (panel A). We also restricted our attention to women given the lack of significance of any treatment effect for men. First, we checked whether our results were robust to the inclusion of time-varying controls. As shown in column 1 of Table 2, inclusion of these controls made almost no difference to the estimated impact ($b = -0.215$, $p < 0.05$ vs $b = -0.219$, $p < 0.05$). Second, in column 2, we added state-specific time trends to control for potential bias stemming from time-varying variables measured at the state level. Again, this had very little impact on our coefficient estimates. Finally, we conducted a placebo test, making New South Wales the treatment group (and dropping Victorian observations), to assess the validity of our analysis. As shown in column 3, the coefficient of interest is, as hypothesized, not statistically significant.

Discussion

Around the world, lockdowns have been a commonly used tool in the battle against the COVID-19 pandemic. Their effects on fertility, however, remain insufficiently understood. We used a natural experiment that emerged in Australia during the second half of 2020 to quantify whether and how much lockdowns changed fertility intentions. Our findings indicate that the Victorian lockdown caused a dampening effect on women's fertility intentions when averaged across the population aged 18 to 45. We found an average effect for women ranging between -0.143 and -0.219, which is modest in size, and some might even say small. This effect varied across women of different ages, and was larger for the less educated, immigrants from non-English speaking countries, and those employed on fixed-term contracts. There was, however, no evidence that effects were most pronounced for those living in low-income households. Results further indicated no acceleration in the downward trend in fertility intentions in 2020, implying that the negative impact of the pandemic on fertility intentions was entirely the result of lockdowns.

Most importantly, our results suggest that COVID-19 and the associated policy responses have had a much smaller effect on women's fertility intentions than suggested by other surveys conducted in other countries. Previous research, however, has relied on cross-section surveys, mostly involving small non-probability samples, providing us reasons to believe that the results obtained may not provide an accurate reflection of the magnitude of decline in fertility intentions in wider populations.

Whether the small declines in fertility intentions reported here will result in actual declines in future birth rates remains an open question. If women delay having children during periods of lockdowns but compensate with more births at later ages as jobs become available and economies start to recover from the social and economic disruptions of the pandemic, total fertility rates over the longer-term may be little affected. This scenario would seem to be especially likely in the Australian context given the adverse economic impact of the pandemic was concentrated in a relatively short period (the second quarter of 2020) and employment levels had reached record highs by the end of 2021. Alternatively, if some women not only delay childbearing but forgo parenthood due to perceived income and employment uncertainties or biological factors, then even small declines in the fertility intentions could accelerate the ongoing decline in fertility rates.

Our study is not without limitations. First, the outcome in this study is fertility intentions which, while predictive of, is not the same as actual births. Tracking births of women before and after the pandemic would more accurately reflect the true consequences of the pandemic and its associated lockdowns on fertility. Second, although we used methods to correct for both non-random sample attrition and non-random response, this re-weighting approach is not sufficient to address the under-representation of immigrants arriving in Australia after 2011. If recent immigrants were more likely to be employed in industries that were hit hardest by the pandemic and business closures, then our results may have underestimated the true impact of lockdowns on fertility intentions. Third, although imposed lockdowns in many parts of the worlds share many common factors, our results may be specific to Australia, suggesting the need for future research in other countries to test whether our results can be replicated in other settings with other data.

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Figure 1. Sample selection process.

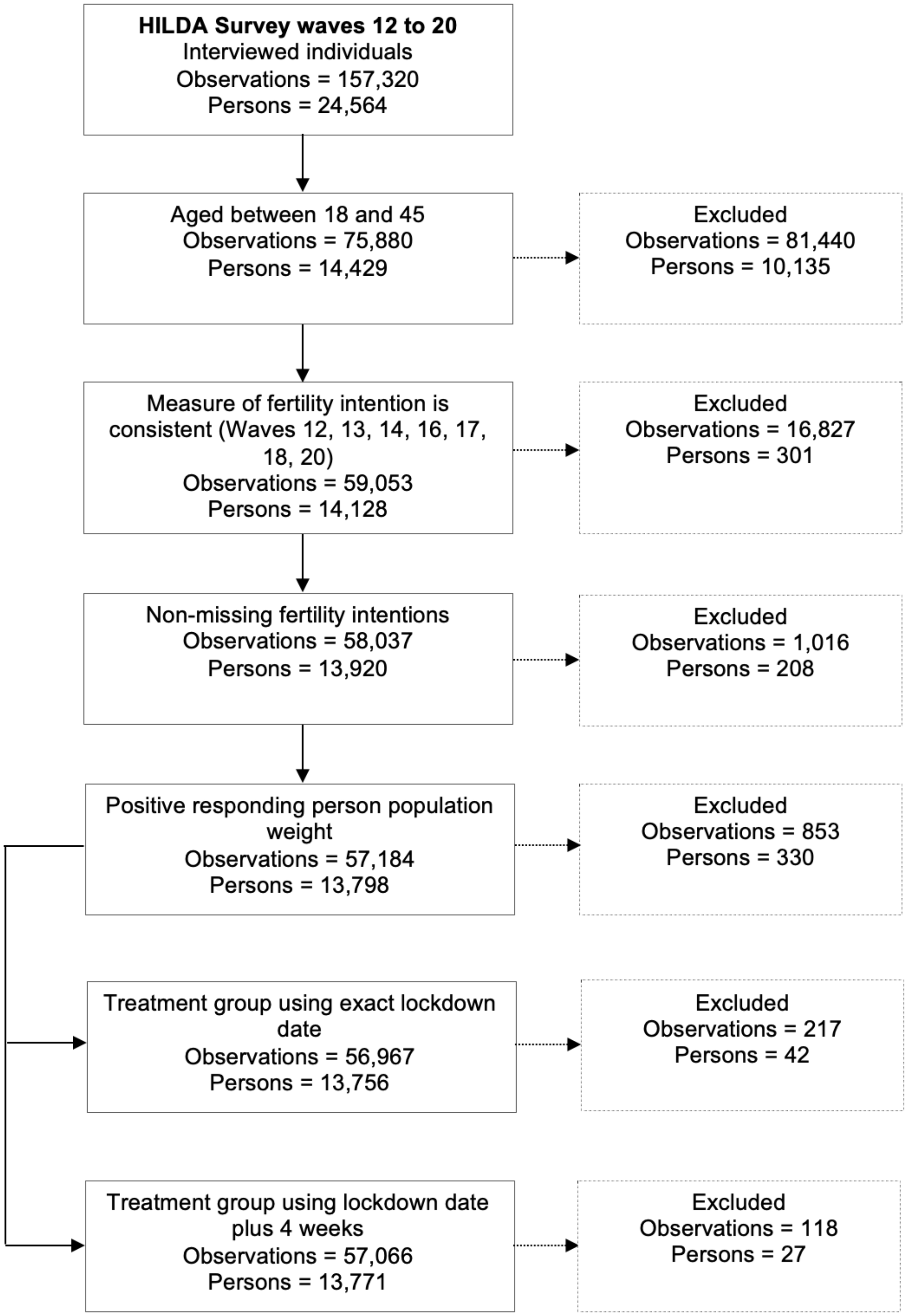
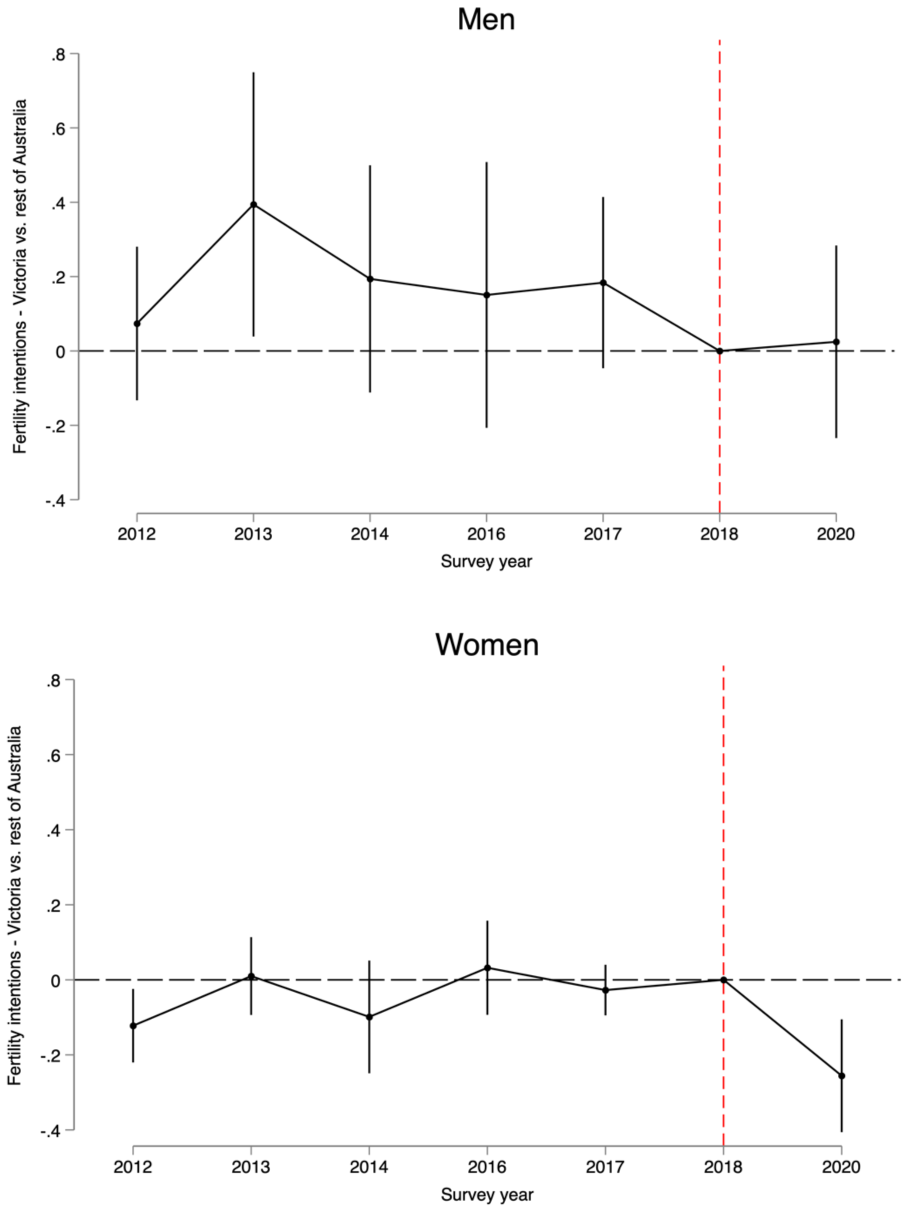
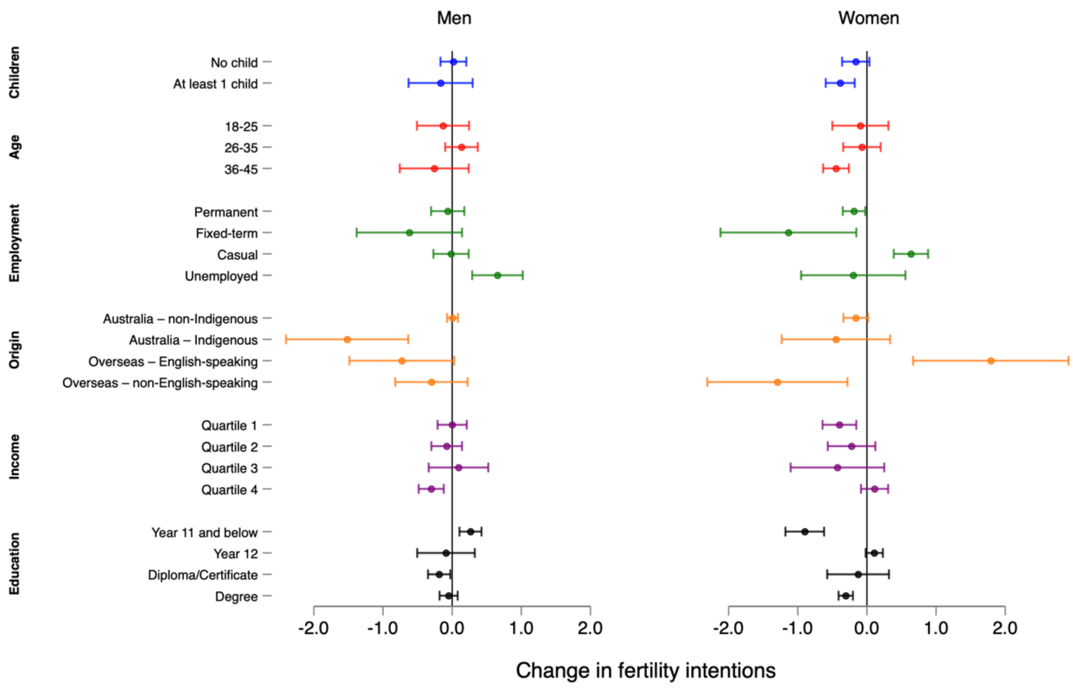


Figure 2. Event-study of Victoria's lockdown effect – test of parallel trends assumption.



Notes: Reported are estimates and their 95% confidence intervals from separate DiD regressions of fertility intentions where the treatment group indicator (Victoria) is interacted with year fixed effects (the reference period is 2018). The graph shows differences between fertility intentions in Victoria and elsewhere in Australia relative to 2018, both before and during the 2020 lockdown. All analyses are weighted, adjusting for both complex survey design and non-response. Robust standard errors (clustered at the state level) are used for confidence interval calculation. The treatment group was identified using lockdown dates plus 4 weeks.

Figure 3. Estimated lockdown effect on fertility intentions by selected socio-demographic characteristics.



Notes: Reported are treatment effect estimates and their 95% confidence intervals for men and women. Each estimate comes from a separate DiD regression of fertility intentions on a treatment group indicator and state, and year and person-specific fixed effects. All analyses are weighted, adjusting for both complex survey design and non-response. Robust standard errors (clustered at the state level) are used for confidence interval calculation. The treatment group was identified using lockdown dates plus 4 weeks.

Table 1. Effect of Victoria's lockdown on fertility intentions.

	Panel A Exact lockdown dates			Panel B Lockdown + 4 weeks		
	Persons (1)	Men (2)	Women (3)	Persons (4)	Men (5)	Women (6)
Lockdown effect	-0.090	-0.032	-0.143*	-0.155**	-0.087	-0.219**
	(0.050)	(0.048)	(0.069)	(0.051)	(0.048)	(0.069)
Year fixed effects (baseline = 2012)						
2013	-0.302**	-0.306*	-0.298***	-0.302**	-0.306*	-0.298***
	(0.091)	(0.144)	(0.051)	(0.092)	(0.144)	(0.051)
2014	-0.652***	-0.605***	-0.698***	-0.651***	-0.604***	-0.698***
	(0.038)	(0.082)	(0.033)	(0.038)	(0.082)	(0.033)
2016	-1.265***	-1.203***	-1.324***	-1.265***	-1.203***	-1.325***
	(0.054)	(0.104)	(0.054)	(0.053)	(0.104)	(0.053)
2017	-1.625***	-1.519***	-1.726***	-1.624***	-1.518***	-1.727***
	(0.038)	(0.068)	(0.037)	(0.039)	(0.069)	(0.037)
2018	-1.912***	-1.774***	-2.047***	-1.914***	-1.775***	-2.049***
	(0.036)	(0.068)	(0.040)	(0.036)	(0.068)	(0.040)
2020	-2.475***	-2.272***	-2.669***	-2.476***	-2.273***	-2.672***
	(0.080)	(0.102)	(0.066)	(0.080)	(0.102)	(0.065)
Equality test (*F*-statistic)		85.93***			117.18***	
Pre-COVID mean – treatment	5.236	5.418	5.057	5.236	5.418	5.057
Pre-COVID mean – control	4.826	5.067	4.583	4.826	5.067	4.583
R-squared	0.770	0.761	0.777	0.769	0.761	0.776
Observations	56,967	27,498	29,469	57,066	27,546	29,520

Notes: Robust standard errors (clustered at the state level) in parentheses. All regressions also include state and person-specific fixed effects, and are weighted, adjusting for both complex survey design and non-response. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 2. Robustness checks (women sample).

	Adding individual controls	Allowing for state-specific time trend	Placebo test: NSW as the treatment
	(1)	(2)	(3)
Panel A: Exact lockdown dates			
Lockdown effect	-0.151**	-0.127***	-0.115
	(0.051)	(0.004)	(0.068)
R-squared	0.791	0.777	0.777
Observations	29,429	29,469	21,572
Panel B: Lockdown + 4 weeks			
Lockdown effect	-0.215***	-0.201***	-0.105
	(0.049)	(0.007)	(0.068)
R-squared	0.790	0.776	0.777
Observations	29,479	29,520	21,699
Pre-COVID mean – treatment	5.058	5.057	5.047
Pre-COVID mean – control	4.583	4.583	4.232

Notes: Robust standard errors (clustered at the state level) in parentheses. All analyses are weighted, adjusting for both complex survey design and non-response, and include state, year and person-specific fixed effects. In column (1), individual controls are included for age group, education, marital status, employment type, having children, long-term health conditions, equivalized real household income (log), and a non-positive income indicator. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table S1. Variable definitions.

		Men		Women	
Variable	Definition	Mean	SD	Mean	SD
Outcome variable					
Fertility intentions	Score on 0 to 10 scale indicating how strongly respondents feel about having a(nother) child in the future	5.155	3.826	4.688	4.027
Control variables					
Age					
18-25	Equals 1 if aged 18 to 25 years	0.285	0.451	0.277	0.448
26-35	Equals 1 if aged 26 to 35 years	0.370	0.483	0.381	0.486
36-45	Equals 1 if aged 36 to 45 years	0.345	0.475	0.342	0.474
Children					
No child	Equals 1 if respondent has no children	0.606	0.489	0.502	0.500
At least 1 child	Equals 1 if respondent has at least one child	0.394	0.489	0.498	0.500
Employment					
Permanent	Equals 1 if employed on a permanent or ongoing basis	0.507	0.500	0.420	0.494
Fixed-term	Equals 1 if employed on a fixed-term contract	0.072	0.258	0.079	0.269
Casual	Equals 1 if employed on a casual basis	0.151	0.358	0.174	0.379
Unemployed	Equals 1 if not employed during the last seven days but actively seeking and currently available for work	0.056	0.231	0.045	0.207
Origin					
Australia – non-Indigenous	Equals 1 if born in Australia (non-Indigenous)	0.689	0.463	0.666	0.472
Australia – Indigenous	Equals 1 if born in Australia (Indigenous)	0.032	0.175	0.032	0.176
Overseas – English-speaking	Equals 1 if born overseas in one of the main English-speaking countries (UK, Ireland, Canada, USA, New Zealand and Republic of South Africa)	0.080	0.271	0.084	0.278
Overseas – non-English-speaking	Equals 1 if born overseas in a country other than one of the main English-speaking countries	0.199	0.399	0.217	0.412
Income					
Quartile 1 (poorest)	Equals 1 if equivalized real disposable household income in first quartile	0.211	0.408	0.211	0.408
Quartile 2	Equals 1 if equivalized real disposable household income in second quartile	0.237	0.425	0.241	0.428
Quartile 3	Equals 1 if equivalized real disposable household income in third quartile	0.263	0.440	0.264	0.441
Quartile 4 (richest)	Equals 1 if equivalized real disposable household income in fourth quartile	0.290	0.454	0.284	0.451

Table S1 (cont'd).

		Men		Women	
Variable	Definition	Mean	SD	Mean	SD
Education					
Year 11 and below	Equals 1 if highest educational attainment is Year 11 or lower	0.139	0.346	0.116	0.320
Year 12	Equals 1 if highest educational qualification is completing high school (i.e., Year 12)	0.250	0.433	0.229	0.420
Diploma/Certificate	Equals 1 if highest educational qualification is a diploma or Level III or IV certificate	0.321	0.467	0.284	0.451
Degree	Equals 1 if highest educational qualification is Bachelor's degree or higher-level qualification	0.290	0.454	0.371	0.483

Table S2. Sample characteristics and mean fertility intentions of treatment and control groups: pre-COVID period (2012-2018).

Sample characteristic	Sample size (N)	Fertility intentions – pre-COVID period (and 95% CIs)	
		Treatment	Control
Total	49,317	5.236 (5.169-5.303)	4.826 (4.785-4.867)
Gender			
Men	23,843	5.418 (5.323-5.512)	5.067 (5.010-5.124)
Women	25,474	5.057 (4.962-5.152)	4.583 (4.525-4.641)
Age			
18-25	14,965	7.479 (7.399-7.559)	7.095 (7.041-7.149)
26-35	18,597	6.219 (6.119-6.319)	5.904 (5.842-5.966)
36-45	15,755	2.107 (2.009-2.204)	1.855 (1.800-1.911)
Children			
No child	26,147	6.543 (6.468-6.617)	6.091 (6.04-6.142)
At least 1 child	23,162	3.454 (3.350-3.559)	3.313 (3.256-3.37)
Employment			
Permanent	22,915	5.162 (5.063-5.261)	4.736 (4.675-4.797)
Fixed-term	3,722	6.040 (5.824-6.256)	5.308 (5.160-5.455)
Casual	7,834	6.403 (6.251-6.555)	5.787 (5.692-5.883)
Unemployed	2,779	5.216 (4.937-5.494)	5.316 (5.159-5.473)
Origin			
Australia – non-Indigenous	39,597	5.331 (5.258-5.404)	4.736 (4.690-4.781)
Australia – Indigenous	2,073	5.077 (4.642-5.512)	4.310 (4.133-4.486)
Overseas – English-speaking	2,788	4.136 (3.813-4.460)	4.371 (4.205-4.537)
Overseas – non-English-speaking	4,812	5.172 (4.958-5.387)	5.397 (5.265-5.529)
Income			
Quartile 1 (poorest)	6,149	5.090 (4.913-5.267)	4.658 (4.548-4.768)
Quartile 2	11,876	4.567 (4.426-4.707)	4.546 (4.464-4.627)
Quartile 3	16,318	5.020 (4.903-5.137)	4.576 (4.504-4.647)
Quartile 4 (richest)	14,974	5.953 (5.835-6.072)	5.304 (5.230-5.377)
Education			
Year 11 and below	7,614	4.958 (4.770-5.147)	4.037 (3.939-4.135)
Year 12	11,461	5.986 (5.856-6.117)	5.874 (5.796-5.951)
Diploma/Certificate	16,119	4.859 (4.738-4.980)	4.099 (4.028-4.171)
Degree	14,123	5.135 (5.015-5.255)	5.076 (4.998-5.154)

Note: Sample means are estimated with survey weights that adjust for both complex survey design and non-response.

Table S3. Sample characteristics and mean fertility intentions of treatment and control groups: COVID period (2020).

Sample characteristic	Sample size (N)	Fertility intentions – COVID period (and 95% CIs)	
		Treatment	Control
Total	7,749	5.001 (4.83-5.172)	4.804 (4.704-4.904)
Gender			
Men	3,703	5.316 (5.073-5.558)	5.081 (4.941-5.221)
Women	4,046	4.685 (4.445-4.926)	4.537 (4.395-4.679)
Age			
18-25	2,020	7.390 (7.161-7.620)	7.056 (6.910-7.203)
26-35	3,267	6.021 (5.776-6.267)	5.635 (5.490-5.781)
36-45	2,462	2.035 (1.795-2.275)	2.118 (1.974-2.262)
Children			
No child	4,081	6.426 (6.231-6.621)	6.089 (5.966-6.212)
At least 1 child	3,667	3.081 (2.829-3.332)	3.213 (3.071-3.354)
Employment			
Permanent	3,909	5.046 (4.804-5.289)	4.736 (4.593-4.879)
Fixed-term	466	5.336 (4.653-6.018)	5.472 (5.062-5.882)
Casual	1,054	6.063 (5.584-6.541)	5.733 (5.483-5.982)
Unemployed	462	6.370 (5.709-7.030)	4.647 (4.278-5.016)
Origin			
Australia – non-Indigenous	6,382	5.321 (5.140-5.502)	4.932 (4.822-5.042)
Australia – Indigenous	336	3.918 (2.556-5.281)	4.295 (3.835-4.754)
Overseas – English-speaking	361	3.626 (2.755-4.496)	4.179 (3.720-4.638)
Overseas – non-English-speaking	659	3.922 (3.384-4.599)	4.713 (4.365-5.062)
Income			
Quartile 1 (poorest)	573	4.701 (4.086-5.315)	4.491 (4.150-4.832)
Quartile 2	1,213	4.511 (4.068-4.954)	4.274 (4.034-4.514)
Quartile 3	2,466	4.379 (4.066-4.693)	4.564 (4.387-4.741)
Quartile 4 (richest)	3,497	5.459 (5.215-5.704)	5.148 (4.996-5.300)
Education			
Year 11 and below	947	4.717 (4.131-5.304)	4.364 (4.090-4.639)
Year 12	1,790	6.047 (5.725-6.369)	5.747 (5.553-5.941)
Diploma/Certificate	2,493	4.465 (4.151-4.779)	4.150 (3.972-4.328)
Degree	2,519	4.825 (4.541-5.109)	4.815 (4.636-4.995)

Note: Sample means are estimated with survey weights that adjust for both complex survey design and non-response.

HIGHLIGHTS

- We use a natural experiment to quantify the impact of lockdown on fertility decisions.
- Protracted lockdown had a negative impact on women's fertility plans.
- The average effect was small: fertility intentions fell by between 2.8% and 4.3%.
- Effect were more pronounced among older women and the less educated.
- Impacts on men's fertility intentions were generally negligible.

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