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ARTICLE

PERSPECTIVES on Sexual and Reproductive Health

"The future is unstable": Exploring changing fertility intentions in the United Kingdom during the COVID-19 pandemic

Alyce Raybould[1] | Monika Mynarska[2] | Rebecca Sear[3]

[1]Centre for Longitudinal Studies, University College London, London, UK

[2]Institute of Psychology, Cardinal Stefan Wyszyński University in Warsaw, Warsaw, Poland

[3]Population Health, London School of Hygiene and Tropical Medicine, London, UK

Correspondence
Alyce Raybould, Centre for Longitudinal Studies, University College London, 55–59 Gordon Square, London WC1H 0NU, UK.
Email: a.raybould@ucl.ac.uk

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Abstract

Objective: To understand whether reproductive decision-making among United Kingdom (UK) respondents had changed in light of the COVID-19 pandemic and, if so, why COVID-19 had led them to change their intentions.

Methods: We conducted a cross-sectional online survey in January 2021. We asked survey participants if their fertility intentions had changed and to rate how aspects of their life had changed during COVID-19. We also included an open-ended question and asked participants to explain in their own words how COVID-19 had influenced their reproductive decision-making. We used descriptive and regression analyses to explore the quantitative data and thematically analyzed written responses.

Results: Nine percent ($n = 70$) of our 789 UK respondents reported a change in fertility intention after the start of the pandemic. Changes in both pro-natal and anti-natal directions made the overall change in intentions small: there was a 2% increase across the sample in not intending a child between the two time points. Only increased financial insecurity was predictive of changing intentions. Responses to the open-ended question ($n = 103$) listed health concerns, indirect costs of the pandemic, and changing work-life priorities as reasons for changing their intentions.

Conclusion: While studies conducted at the beginning of the pandemic found that fertility intentions became more anti-natal, we found little overall change in fertility intentions in January 2021. Our findings of small pro-natal and anti-natal changes in fertility intentions align with emerging UK birth rate data for 2021, which show minimal change in the total fertility rate in response to the pandemic.

KEYWORDS
demography, Europe, fertility/infertility, pregnancy intention, qualitative research methods

INTRODUCTION

In high-income countries like the United Kingdom (UK), demographers had widely predicted a "baby bust" in 2020 as a result of the COVID-19 pandemic.[1–3] They had predicted that COVID-19 would both directly (via infection causing health implications and self-isolation) and indirectly (via increased economic and health uncertainty) negatively impact the likelihood that people would have children. Further, historical evidence of exogenous shocks such as world wars, economic recessions, and other pandemics like Spanish flu, have typically had depressing effects on fertility via these mechanisms.[4,5] However, there are also possible "positive" mechanisms, meaning COVID-19 could directly and indirectly increase fertility. For example, increased frequency of sex due to social isolation,[1,6] decreased access

to contraception and abortion services,[3] rethinking of priorities in favor of family,[7] and unintentional saving among wealthier families could make childbearing more feasible.[6]

Studies conducted in Europe and the United States (US) in 2020 suggested that COVID-19 had a more negative than positive impact on fertility desires, intentions, and behavior.[8,9] Luppi and colleagues, who conducted a study between March 27th and April 7th 2020,[9] estimated between 38% and 58% of their sample from Germany, the UK, France, and Spain had postponed their intention for children, and 17%–29% had foregone their intention altogether. Similarly, Lindberg and colleagues found that 34% of women in their US analysis conducted between April 30th and May 6th 2020, had postponed or foregone their intentions for children, with the biggest change among women with no children, Black women, women who were not heterosexual, and women living on lower incomes.[8] However, they also found that 17% of their sample wanted to have children sooner than they originally planned in response to the pandemic, suggesting that the pandemic might have had diverse influences on both fertility intentions and behaviors.

Psychosocial theories of reproductive decision-making outline that fertility intentions and desires are the predecessors to behavior in contemporary high-income societies and thus can be used as a predictor of future childbearing.[10] Specifically, these theories outline that a general desire for children (how many children one would like to have in the absence of any obstacles) are translated into more realistic intentions (a plan to act in the short-term, accounting for what is feasible under various constraints) which result in action to achieve or avoid a pregnancy.[11] Asking about intentions for children in the near future, as these studies have, should therefore be indicative of how COVID-19 will influence fertility and reproductive behavior in the coming years. Furthermore, asking about fertility intentions and their determinants might also give us better insights into people's decision-making under such unique circumstances.

Like Lindberg and colleagues and Luppi and colleagues, we explore whether there were changes to reproductive decision-making among UK citizens about a year after the start of the COVID-19 pandemic using an online questionnaire fielded in January 2021, including both men and women between 18 and 49 with different numbers of children. We compare our findings to those from the earlier 2020 studies at the start of the pandemic to examine whether the influence of the pandemic on fertility intentions changed over time. We also asked respondents to elaborate in their own words why their decision-making had changed or not. Our design allowed for an open exploration of respondents' conscious deliberation regarding their fertility.

Context: Fertility and COVID-19 in the UK

During the last decades of the 20th century and the first decade of the 21st century, the total fertility rate (TFR) in the UK had been fluctuating around 1.8, with a steady decline observed since 2008. Thus, the backdrop for examining changing fertility intentions in the COVID-19 era in the UK is one of slowly declining fertility over the last decade or so. In 2019, right before the onset of the pandemic, the UK reported a TFR of 1.63.[12] Furthermore, the fertility rate in the UK comprises a relatively large distribution of parities relative to other European contexts, with high proportions of individuals with no children and individuals with three or more children.[13] The trend of declining fertility has been predominantly driven by fewer births among younger age groups[14] and increased postponement of first and second births.[15]

Regarding the trajectory of the COVID-19 outbreak in the UK, the trends were initially similar to the rest of Europe: a first wave in March 2020, resulting in a strict lockdown until the end of June 2020. At that point, the UK had the highest cumulative excess mortality rate in Europe.[16] Following a tentative easing of some lockdown restrictions (allowing outdoor gatherings and reopening non-essential shops), case numbers slowly increased again between September–November 2020 followed by a large surge in December and January 2021 as a result of the new Alpha variant. Excess mortality was 7% above the five-year average by early 2021, although the UK no longer had the highest comparative excess mortality rate in Europe.[16] The UK then entered another strict lockdown, lasting until the end of March 2021. The UK began their vaccine roll-out at the end of December 2020 for health sector workers, the elderly, and the most clinically vulnerable. The UK government gradually expanded the vaccine program such that all those over 18 had been offered a first vaccine by July 2021.

In terms of the socio-economic consequences of the pandemic, gross domestic product declined by 10% in 2020 which was the steepest drop on record in the UK since 1948.[17] Around 1 million people were made redundant between April 2020 and June 2021,[18] but the government minimized this through an extensive furlough scheme for 1.6 million people. Generally, mental health, well-being and individual financial precarity were all negatively affected by COVID-19, but the effects were more pronounced for younger and more socio-economically disadvantaged groups.[19]

The context within which we conducted this survey in January 2021 was therefore during the Alpha wave with a high number of hospitalizations and deaths and a strict lockdown, but at the start of the vaccine roll-out and a foreseeable end in sight to lockdowns as the first line of defense against COVID-19.

METHODS

Data collection

We fielded an online survey of UK-based respondents between January 19th and January 25th 2021. We sourced participants from *Prolific*, a database in which prospective respondents sign up voluntarily and provide demographic information. The researcher selects characteristics and *Prolific* advertises the study to eligible respondents and keeps the survey open until the quota(s) set by the researcher is met.

Each respondent has a verified unique participant ID, which limits the chance of the same individual taking the survey multiple times.

We requested distribution of our survey to *Prolific* participants who were UK citizens, aged 18–49 (inclusive), and were neither pregnant nor had a pregnant partner (if they had one) at the time of the survey. We piloted our survey with 11 initial respondents. We did not design our sample to be representative of the UK population or of *Prolific* respondents. Rather we aimed to include samples of individuals with different family sizes to allow us to detect differences between these groups; 200 individuals with no children, 200 individuals with one child, 200 individuals with two children, and 100 individuals with three or more children for a total sample of 700. During data collection, an error with the pregnancy eligibility criteria meant that the original sample with no children entirely consisted of women. We then collected an additional sample of 80 men with no children.

We paid all participants a prorated incentive of £7.50 an hour (USD 9.20/hour) for participating in the survey (regardless of the quality of their response) and the survey took 7 minutes to complete on average. The project received ethical approval from The London School of Hygiene and Tropical Medicine Ethics Committee.

Data analysis

The questionnaire covered whether intentions for children had changed compared to before the pandemic and the potential reasons for changing intentions. We first asked respondents whether they had intended to have any children in the next three years prior to the pandemic in March 2020, to which they could say yes, no or they were uncertain at that time. We chose a three-year time interval to be consistent with standardized definitions of short-term fertility intentions.[20] We then asked participants whether that intention had now changed (in January 2021), and if so, in what way. The response options captured absolute change (a move to intending or not intending), becoming more uncertain, and changes in when participants wanted to have a child (instrument available on request). We use this data to report descriptive statistics on changes reported.

Following these questions in our survey, we then collected a few indicators of potential mechanisms for changing fertility intentions: whether financial security, mental well-being and relationship with loved ones had improved or worsened in comparison to March 2020, and whether concerns over loved ones' health and burdens of domestic responsibilities had increased or decreased. We asked respondents to rate these things on a scale of −3 (being a significant decline) to 3 (being a significant improvement), with 0 being no change. We performed bivariate and multivariate multinomial regressions to explore whether these variables were related to: (1) a positive change in intentions bringing childbearing forward; (2) a move towards uncertainty; (3) no change in intentions (reference category); or (4) a negative change in intentions meaning childbearing is postponed or foregone. We added sex, age group, and number of children as controls to the multivariate model, given the predictive value of these variables for determining fertility intentions in the existing literature. We have reported *p*-values to give an indication of associations and trends in the data. They should not be used to interpret likelihood of observing these effects in the target population (UK population aged 15–49) given the non-representative nature of the sample.

In the second part of our results, we present our qualitative findings. We included a voluntary question where respondents could explain in their own words whether and how COVID-19 had affected their childbearing plans. We performed a bottom-up text analysis of responses deriving categories of reasons from the data.[21] AR did this by classifying quotes into "reason" topic areas (such as health, financial issues, etc.). We then examined quotes within groups to identify any additional topics and repeated this process until we had categorized all content. We present unaltered quotes in the results section to showcase these reason categories.

RESULTS

Participant characteristics

The final sample consisted of 276 individuals reporting no children, 194 with one, 212 with two, and 107 with three or more children. One hundred and three respondents answered the open-ended question we use in the qualitative analysis. The total number in each group varies from the quota target for two reasons. Firstly, some participants were allocated into a different group as the number of children they reported in the questionnaire and the number listed on their *Prolific* screening information differed, perhaps because our definition of children extended beyond only biological children. Following examination of the data, we also removed two respondents from the sample because they failed all three attention checks included to establish data quality. These checks asked respondents to enter a given answer (e.g., please select "no" from the list of options below) so that any individuals clicking through without reading the questions could be identified.

We present the demographic characteristics of the respondents in Table 1 for both the quantitative and qualitative parts of this study. Overall, the sample is skewed towards female participants and those with a high level of educational attainment. As participants on the database are 55% women, 45% men, we assumed a roughly equal gender balance would be achieved so we did not set any quota for gender. However, between different family size sub-samples, the sample was consistently skewed towards women (between 62% and 79% women). This may be because the topic of the survey was of particular interest to women, but also because men's response rates to online web surveys is consistently lower than women's in the UK.[22]

Quantitative findings

We first asked respondents whether they were intending to have a child in the next 3 years in March 2020 prior to the outbreak. The majority ($n = 559$, 70%) said they were not intending a child in

TABLE 1 Demographic characteristics and distribution of changing intentions among the respondents in the quantitative ($N = 789$) and qualitative ($N = 103$) samples of citizens of the United Kingdom.

	Frequency of quantitative sample ($N = 789$) *n* (% to nearest whole number)	Frequency of qualitative sub-sample ($N = 103$) *n* (% to nearest whole number)
Sex		
Male	240 (30%)	26 (25%)
Female	546 (69%)	77 (75%)
Prefer not to say	3 (<1%)	–
Number of children		
0	276 (35%)	30 (29%)
1	194 (25%)	27 (26%)
2	212 (27%)	38 (37%)
3	75 (10%)	7 (7%)
4+	32 (5%)	1 (1%)
Age group		
18–25	142 (18%)	7 (78%)
25–29	107 (14%)	18 (18%)
30–34	162 (21%)	26 (25%)
35–39	146 (19%)	28 (27%)
40–44	138 (18%)	17 (17%)
45–49	94 (12%)	7 (7%)
Partnership status		
Married/civil partnership	329 (42%)	41 (40%)
Cohabiting, not married	203 (26%)	41 (40%)
In a relationship, not cohabiting	99 (13%)	11 (11%)
None	158 (20%)	10 (10%)
If in a relationship, whether couple are same sex ($n = 631$)		
No	582 (92%)	87 (94%)
Yes	49 (8%)	6 (7%)
Highest educational attainment		
No GCSEs or equivalent	1 (<1%)	–
GCSEs or equivalent	90 (12%)	11 (11%)
A-levels or equivalent	178 (23%)	19 (19%)
Vocational qualification	70 (9%)	11 (11%)
Bachelor's degree or equivalent	121 (16%)	20 (19%)
Postgraduate degree	329 (42%)	42 (41%)
Employment status		
Permanent employment	466 (60%)	68 (66%)
Fixed-term employment	45 (6%)	10 (10%)
Self-employment	69 (9%)	7 (7%)
Unemployed	57 (7%)	4 (4%)
Student	91 (12%)	5 (5%)
Retired	1 (<1%)	–
Caring for home or family	58 (7%)	9 (9%)
Other/"Part time"	2 (<1%)	–
Household size		
1	45 (6%)	4 (4%)
2	169 (22%)	25 (24%)
3	219 (28%)	29 (28%)
4	233 (30%)	34 (33%)
5+	123 (16%)	11 (11%)
Whether intentions changed		
Yes	70 (9.0%)	35 (34%)
No	719 (91%)	68 (66%)

the next 3 years, 119 (15%) said they were, and 115 (15%) said they were uncertain at that time. We then asked respondents whether their answer had changed since the onset of the pandemic. Only 70 respondents (9%) declared their intentions for children in the next 3 years had changed. Overall, we observed a minor increase in the number not intending a child (from 70% to 72% overall), a minor decrease in the number intending to have a child (from 15% to 13%), and an even smaller decrease in the number who were uncertain (from 15% to 14%).

Among those who had intended to have a child in the next 3 years, we found that if they had changed their intention, it was more likely that they had postponed it beyond the three-year window ($n = 21$, 18% of the group, Figure 1). One person said they had forgone their intention for a child altogether. Of those that did not intend a child previously (the majority of the sample), we observed very minimal change towards becoming more uncertain ($n = 4$, 1%) or now intending to have a child ($n = 15$, 3%) in the next 3 years (Figure 1). Of those that were uncertain prior to COVID-19, we observed some change to both intending ($n = 11$, 9%) and not intending ($n = 6$, 5%).

Table 2 shows the distribution of the regression explanatory variables regarding how COVID-19 affected aspects of people's lives. Overall, most respondents did not see large changes to financial security, their relationship to loved ones or household burdens. Mental well-being and concerns about health tended to worsen since the start of COVID-19.

Given the minimal variation in changing intentions, and thus small sample sizes for these groups, it is not surprising that we then found nearly no significant statistical associations between how intentions

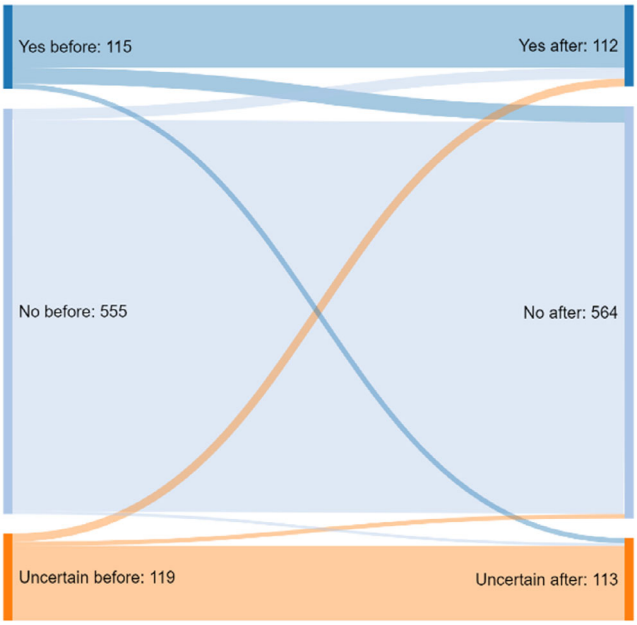

FIGURE 1 Changes in intentions among those who (1) Intended a child prior to the pandemic, (2) did not intend a child prior to the pandemic and (3) those who were unsure what they intended prior to the pandemic. Numbers are sample sizes.

changed (no change, positive change, negative change, and change towards uncertainty), changing COVID-related factors (health concerns, contact with loved ones, household burden, financial concerns, and mental well-being) or demographic characteristics (sex, age, and number of children) in the bivariate and multivariate multinomial regressions (Table 3 reports the multivariate findings). The only factor we found to be significant (in both the bivariate and multivariate models) was that relative to those who did not change their intentions, those that had become more uncertain in their intentions were more likely to have financial concerns. These results did not change when we introduced additional demographic characteristics (age, sex, and number of children) to the model. When we changed the outcome of the model to intentions in January 2021, rather than change in intentions, none of the COVID-related variables were significantly predictive of intentions (data not shown).

Qualitative findings

We received 103 written responses to the question "*If the COVID-19 pandemic has made you change your intentions related to childbearing, please explain how and why?*" This is more than the 70 who answered that their intentions had changed in light of COVID-19. Although not our intention, 68 of the 719 who had no change also offered some explanation for why this was. We received a reasonable response rate among those whose intentions had changed ($n = 35$, 50%), with the majority with a negative change or change to uncertainty (19 of 28, 68% and 6 of 11, 55% respectively) explaining their answer. Fewer who reported a positive change responded (10 of 31, 32%). We identified four "reason categories" among the responses: (1) health concerns, (2) indirect costs of the pandemic, (3) work-life priorities and (4) poor perceived state of society.

TABLE 2 Reported changes to respondents' lives rated from −3 (considerably worsened) to 3 (considerably improved) for items 1–3, and −3 (considerably decreased) to 3 (considerably increased) for items 4 and 5.

	Mean	Standard error
1. Financial security	−0.2	0.06
2. Mental well-being	−0.84	0.05
3. Relationship to close ones	0.2	0.05
4. Concerns about health	1.16	0.06
5. Household burdens	0.44	0.05

Reason category 1: Health concerns ($n = 21$)

The first theme we identified related generally to health concerns. All of those who listed health related reasons for changing their intentions were women, ranging in age between 24 and 40, and included an equal mix of those with and without children. Three women wrote they had changed their intentions because of concerns about being ill with COVID-19 while pregnant. For example, a 33-year-old woman with one child who no longer intended to have additional children expressed, "I was unwell with 'influenza A' Feb 2020, whilst 7 months pregnant. I would not want to experience this again whether it was the flu or COVID etc." These reactions appear to be linked to both personal health fears and concerns about the impact of COVID-19 on fetal development. A 30-year-old with no children who shifted from intending to postponing having a child wrote, "I wouldn't want to be pregnant during the pandemic, or to risk harming my unborn baby if I caught COVID-19 during pregnancy." Other participants wrote about the indirect effects of the pandemic on child development due to the overall lack of support, resources, and stimulation. A 29-year-old with no children who previously intended to have a child but became uncertain explained, "Services such as stay and play, social stimulation for children are closed and I feel this could impact a child's development."

Separately to mothers' and babies' health, women raised concerns about the COVID-19 vaccine and pregnancy, which was just beginning to be rolled out at the time of the survey. At that time, the messaging from UK government and health professionals on vaccines during pregnancy was not consistent, with the first vaccine taking longer to be approved than in other countries like the US. Specifically, women participants mentioned that they feared the vaccine could harm the fetus and/or impact women's fecundity. As explained by a 32-year-old woman with no children: "Due to the vaccine questioning female's fertility I have been questioning my intentions of becoming a mother in future much more." However, the vaccine appeared to bring childbearing forward for some but delay it, or make it more uncertain, for others. This is quite different from the personal health

TABLE 3 Multinomial regression (coefficients) between COVID-19 related changes (to finances, mental well-being, health, household burdens and relationships), demographic characteristics (sex, age and number of children) and changing fertility intentions (negative change, change to being uncertain or positive change) between March 2020 and January 2021 ($N = 789$).

	Negative change ($n = 28$)	Change to being uncertain ($n = 11$)	No change ($n = 719$)	Positive change ($n = 31$)
Financial security (discrete)	−0.052	−0.586***	*Reference group*	−0.097
Mental well-being (discrete)	0.154	−0.023		0.157
Relationship to close ones (discrete)	−0.069	−0.096		0.017
Concerns about health (discrete)	0.044	−0.102		−0.171
Household burdens (discrete)	0.118	0.367		0.26
Sex (Ref: Male)				
Female	−0.204	15.346		−0.274
Prefer not to say	−17.121	−1.266		−17.277
Age group (Ref: under 25)				
25–29	0.85	17.459		0.497
30–34	1.108	16.236		0.059
35–39	0.33	16.979		−0.06
40–44	0.067	0.634		−0.562
45 and over	−16.266	0.602		−1.5
Number of children (discrete)	0.09	−0.221		−0.012
Constant	−3.631***	−35.81		−2.7***

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.005$.

concerns which consistently had a negative or postponing effect on intentions.

The most common health-related worry given by respondents ($n = 11$) was related to access to health services. Some commented on not wanting to go to appointments or give birth alone:

> We got pregnant with our second just before the outbreak with a first terrible pregnancy. I hoped for better then being pregnant in a pandemic with all the uncertainty, it was horrible having no support at appointments and worrying more about your health. I wouldn't wish to go through all that again. (Woman, 24, 2 children, no longer intending)

Others commented on not wanting to add extra strain to the health services during the pandemic. For example, a 30-year-old woman with no children wrote, "I feel the NHS [National Health Service] has so much pressure currently I wouldn't want to be a burden." Indeed, access to health services consistently had a "delaying effect" on intentions among those who stated this reason.

Reason category 2: Indirect costs of the pandemic ($n = 14$)

The second theme we identified related to indirect costs of the pandemic, including changing financial security and lifestyles (social isolation, lack of support, and changing responsibilities). Most of the participants who fell into this category identified as men and all were over 30 with one or more children. Eight participants, nearly all of whom had two children, listed how financial complications because of the pandemic, including job loss, furlough, and financial strain resulted in postponed intentions and increased uncertainty about childbearing. As a 36-year-old man with two children who shifted to wanting to postpone having another child wrote, "Financial security is a big factor. We are having some cutbacks this year so [having another child is] subject to what happens with employment." Seven participants, all with one child, wrote that parenting struggles had intensified because of the pandemic, as parents lost access to support from friends, family, and services. A 32-year-old woman with one child who remained uncertain wrote, "Working from home and also trying to look after a toddler whose nursery has closed has been an absolute nightmare and affected my mental health very badly, so the thought of doing the same but with more than one child is terrifying." Finally, across demographic groups participants mentioned that the pandemic complicated the ability of individuals to meet a partner, which also shaped fertility intentions.

Reason category 3: Work-life priorities ($n = 10$)

The third general theme we observed from the responses was related to the pandemic altering respondents' work-life priorities. For two women in their twenties with no children, the COVID-19 pandemic left them feeling "robbed" of career and social opportunities, making them want to put off parenthood to make up for this lost time. As one

21-year-old explained, "[Because of] COVID-19 [I've] almost lost a year of my life. I have lost career and social options. So it is making me want to have a child when I am even older than I wanted it before." For two other women over 30, they decided against having more children because the pandemic made them appreciative of their current life with their children. As a 31-year-old woman with one child wrote, "[The COVID-19 pandemic has] made me realise more than ever I do not ever want another child. Spending all this extra time with my daughter and it being just us have been a beautiful thing, I wouldn't wish anyone else to come in between that."

In contrast, there were six men and women (all aged 30 or older) who found that the lockdown adjusted their priorities in favor of childbearing. This sentiment was usually related to the idea that children add meaning and importance to life and COVID-19 had affirmed this sentiment. As a 37-year old woman with one child who shifted from being uncertain to intending to have an additional child wrote, "It has made me more aware that time with family is precious and I should have more children if I want them sooner rather than later."

Reason category 4: Poor perception of the state of society ($n = 12$)

The final group of comments focused on the bleak state of society and the ensuing uncertainty. This theme was particularly prevalent among men and women under 30 (typically without children) and those over 40. These were particularly emotive responses, often involving strong feelings or rhetorical questions and an intensified commitment to not intending to have (additional) children. As a 19-year-old woman with no children who had continued to have no intention of having children wrote, "Why would I want to bring an innocent life into this world when things like COVID can break out so easily?" Another participant, a 31-year-old woman with one child who shifted to having no intention of having additional children wrote, "The Government have been total scum to expecting mothers and their partners. Absolutely inhumane." Unlike the other themes, respondents also often tied this theme into other contextual trends (particularly climate change and fears about overpopulation). A 21-year old woman with no children who initially had no intention but is now uncertain reported, "Also it is making me not want to bring up a child in this world because of so many bad things happening to our world e.g. climate change, increase in population. And COVID-19 tips it off." Similarly, a 26-year old woman with one child explained she was now uncertain whether she still intended to have another child because, "The future is unstable I fell more now than ever."

DISCUSSION

We used an online participant panel to assess changes to reproductive intentions in light of COVID-19 in the United Kingdom. The panel allowed us to rapidly collect this data within 2 days across a broad range of demographic groups, who would otherwise have been much harder to reach in such a timely manner during the pandemic. The quantitative findings overall did not point to large changes in childbearing intentions in this UK sample, with only 9% reporting any kind of change to their intentions relative to before the onset of the pandemic. The largest change observed among those who had changed their intentions was from intending to have a child prior to the pandemic to no longer intending a child in the next 3 years (either postponing or foregoing altogether). This is particularly stark when compared to earlier studies from 2020 which found considerably larger decreases (between 30% and 60%) in planned childbearing.[8,9]

Comparison of findings to previous research

One potential reason for this difference is that the other studies comprise data collected in March–May 2020 which was much earlier in the pandemic. As we conducted our survey when the UK vaccination campaign was already underway, and an end to pandemic was more conceivable, evaluations of future childbearing plans would have been made under a more certain context than the earlier studies. As a result, respondents may have become more optimistic in their childbearing plans than during the initial shock at the beginning of 2020. A follow-up 2021 survey in the US by Lindberg and colleagues[23] may lend support to this explanation: only 22% of those surveyed in 2021 said the COVID-19 pandemic had made them change their intentions for children, compared to the 41% finding of the previous year.[23] However, fewer changes in intentions in this study may also be due to recall bias. Specifically, respondents may have struggled to recall their intentions at the start of the pandemic and may have been influenced by thinking about their current, more positive plans for children. Recall bias may also explain the lack of associations between retrospectively reported impacts of COVID-19 and fertility intentions. For example, the experience of financial precarity (the only significant indicator) may be more salient and better recalled than the other changes. It should be noted that both this study and the other earlier studies all used cross-sectional designs, rather than a longitudinal design to track changing intentions more accurately without recall bias. Future studies could harness existing panel studies to understand better the effect of external shocks like the pandemic on fertility intentions over time.

Another reason for potential differences between our studies and others on this topic could be related to the sample composition. The 2020 studies used large samples (over 1000 people) with geographical quotas to ensure a level of national representativeness.[8,9] We only used family size quotas, meaning the representativeness and generalizability of our findings to the general UK population may be limited. Limitations of using online panel surveys may also have played a role in why our study's findings differ to the earlier studies. *Prolific's* respondents are more likely to be younger than the general population, women, and more highly educated. Our sample was skewed to a higher proportion of women and individuals with a postgraduate education. A more educated sample may have meant that the respondents were buffered against some of the worst effects of the

pandemic by potentially having more stable jobs and income, perhaps explaining the minimal associations found in this paper. Other potential biases may also have arisen through the nature of the data collection, such as rapid responder bias (i.e., those who were online were able to respond first in the "first-come, first-served" system) and that the survey was not appealing to some groups because of the topic, incentive or length. However, we tried to mitigate these factors by running the surveys between 4 and 7 pm when respondents were less likely to be at work, having a comparable level of payment to other *Prolific* surveys, and having a relatively short questionnaire length (7 min).

Lastly, differences between our study and others may have been generated by differences in question wording. A Polish study (conducted in December 2020) asked similar questions to this study and also found limited changes in intentions.[24] Sixteen percent declared they had postponed their intentions for children and 3% said they had foregone their intention for a(nother) child. Both this study and the Polish study used a three-year time frame for respondents to think about their intentions. The next 3 years is a reasonably large time window and thus any intention to postpone within the three-year window (e.g., postponing a birth to within the next 1 or 2 years) would not be detected. The study by Luppi and colleagues used a one-year time frame of reference which would detect more of a tempo change in response to the pandemic and the study by Lindberg and colleagues asked generally about whether the respondent's plans had changed and whether they now intended a child sooner or later than before.

Understanding reasons for changing intentions

It is noteworthy that our quantitative analysis only yielded one significant association: between worsening financial security during the pandemic and the likelihood of being more uncertain about intending to have children. This could point to a lack of importance for these factors in determining reproductive decision-making during the pandemic but the sample size of those who changed their intentions may also have been too small to detect any statistical differences. Even though we found smaller changes in the quantitative part of this study relative to other surveys, the qualitative findings highlighted considerable contemplation by individuals about how the pandemic influenced their childbearing decision-making, whether this be resulting in changing or more stable intentions. Indeed, 68 of 103 participants explained why COVID-19 had led them to *not* change their intentions. This finding highlights the value of qualitative exploration, as the quantitative analysis was not able to reveal the importance of COVID-19 for reproductive decision-making among both those who did and did not change their intentions.

Previous studies have suggested several mechanisms for behavioral change which we identified in our study, such as lack of opportunity to meet partners,[6] concerns about health risks and difficulty accessing health services without support,[6,8] limited help with childcare, and economic uncertainty.[1,6,8] Furthermore, our findings fit well with those that are emerging from other Global North contexts. For example, Malicka and colleagues[24] found financial strains to be a common reason for postponing or foregoing fertility intentions, alongside concerns about health and access to health services in their Polish sample. Lindberg and colleagues[23] similarly found financial strain to be the most common reason for decreased intention and that a re-evaluation of work-life priorities in favor of childbearing was most common for increased intention.

However, we did not find some of the themes hypothesized and identified by other studies. For example, some authors thought factors like reduced access to contraception or abortion services, less time alone because of intergenerational residences, difficulties finding a new home and postponed marriages would decrease fertility intentions.[6] On the other hand, it could be that couples who move in together may have more opportunities for sex and thus increase their intentions.[6] Potentially these reasons were less conscious for our respondents or they were simply less important. For example, evidence suggests that access to abortion services in the UK was not as significantly impacted by the COVID-19 pandemic as first feared.[25] However, it is also notable that no participants mentioned that the pandemic had resulted in financial savings which might make having (more) children more viable. Indeed, nearly a quarter of US respondents said they had positively changed their fertility intentions for this reason.[23] The socio-economic composition of the sample, both with a high proportion of educated individuals who may have already had sufficient savings to allow them to fulfill fertility intentions, and potentially a high proportion without stable income given that *Prolific* is a paid for service, may explain why we did not find this in the study.

The health-related reasons category was the largest group of responses we identified, but it consisted of many different sub-reasons (e.g., concerns about being a burden to health system, concerns about the vaccine). The single most common reason we found in our sample related to a perceived poor state of society, which we categorized into one group. This reason has not been given much attention in the existing literature on COVID-19 and fertility intentions. This may be because of a particular focus on the shorter term "shocks" of COVID-19 by studies conducted earlier in the pandemic.[8,9] The follow-up US study by Lindberg and colleagues also found that the top reason given by respondents for decreased fertility intentions was "It did not seem like a good time to bring kids into the world," which shares a similar sentiment.[23] Malicka and colleagues also identified a general sense of insecurity and uncertainty as a key reason given by their Polish respondents for changing their intentions.[24] The salience of the state of society for our respondents may be more indicative of a continuation of fertility trends observed prior to COVID-19 than a shorter-term shock: that increased uncertainty in many areas of life is having substantial long-term impacts on childbearing in high-income countries.[26,27] The phrasing of the responses under this theme in our study ("COVID-19 tops it off") is potentially indicative of this, as does the fact that people who gave these responses tended not to be intending a(nother) child at all both in March 2020 and January 2021. It is therefore perhaps not surprising that 2021 TFR estimates for the UK devolved nations have shown that while there was an initial early shock leading to a low in January

2021, there was a quick rebound to previous fertility levels in February and March 2021.[28] Overall, in 2021, there was even a minor increase in the TFR of England, Wales, and Scotland relative to 2020.[29,30] Arguably, the small changes in intentions found in this study and the diversity of both positive and negative mechanisms identified which would lead to a small net effect on fertility can help explain the overall limited impact of COVID on fertility in the UK.

Differences in reasons between demographic groups

While participants across all demographic groups commonly identified the poor state of society as the reason for their intentions, there were some demographic trends across the other reason categories. Financial concerns tended to be raised mostly by men, for example, whereas issues relating to attending hospital appointments without support and the COVID-19 vaccine were only raised by women. Overall, the number of concerns raised by women in response to this open question provides some support to previous findings that the pandemic has had more detrimental effects for women.[31–34] However, we found no evidence of a difference in effect on changing fertility intentions by sex in our regression models, and women were also over-represented in our sample.

Aside from gender, we also found some variation in responses by age and parenthood status. Among the second reason category, we found that those reporting financial concerns were all over 30 and parents. Further all those who listed struggles with childrearing only had one child, whereas those who listed financial struggles nearly all had 2 children. Whilst being careful not to overinterpret these descriptive trends, it does appear that changes in circumstances during COVID-19 differed between demographic groups and had a subsequent impact on reproductive decision-making.

CONCLUSION

In conclusion, this study complements and builds upon existing work exploring the link between COVID-19 and reproductive decision-making using a large UK sample. We highlight several important mechanisms that can explain changes (or lack of changes) in childbearing intention, derived from respondents' own words. Overall, our findings point to a small net effect on fertility intention due to COVID-19: we observed that most respondents did not change their fertility intentions and that among those that did, changes in both pro- and anti-natal directions are likely to cancel each other out. This is in line with 2021 TFR data for the UK, which showed minimal change relative to previous years. Furthermore, we highlight that trends in UK fertility are more likely to be driven by general anxieties and uncertainties, rather than the specific crisis of COVID-19 alone. Our results demonstrate that only collecting information on intentions at the start of crisis scenarios may miss a tempering of those intentions once initial shocks subside. These results should therefore pave the way for inspiring further causal analysis into the effects of both COVID-19 and growing sources of uncertainty for reproductive decision-making and outcomes.

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AUTHOR BIOGRAPHIES

Dr. Alyce Raybould is a Research Fellow and Survey Manager at the Centre for Longitudinal Studies, University College London.

Dr. Monika Mynarska is an Associate Professor at the Institute of Psychology, Cardinal Stefan Wyszyński University in Warsaw.

Prof. Rebecca Sear is a Professor of Population Health in the Population Studies Group at the London School of Hygiene and Tropical Medicine.

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