LGBTQ+ Women and Mental Health during the COVID-19 Pandemic

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Abstract

We analyze whether the pandemic and its containment policies affected the mental health of women differently by their sexual orientation and gender identity. Using a sample of 26 European Union countries, we find that LGBTQ+ women were 8 to 11 percentage points more likely than heterosexual, cisgender women to report anxiety, worries about mental well-being, and depression during the pandemic. We uncover a notable interaction between LGBTQ+ status and household composition, by which the presence of children below the age of 15 reduces the probability of anxiety for LGBTQ+ women. Causal mediation analysis shows that the presence of children partially mediates the link between LGBTQ+ and anxiety, explaining 10% of the total effect. LGBTQ+ women are unconditionally associated with a higher prevalence of worries about mental well-being and depression. Containment policies also mattered: LGBTQ+ women were more likely than heterosexual, cisgender women to have detrimental mental health effects from workplace and office closures.

Keywords: *LGBTQ+ women, mental health, COVID-19 pandemic, EU countries, causal mediation analysis*

JEL Codes: *I14; I18; J16*

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1 Introduction

Mental health disparities align with social systems such as sexism, heterosexism, and gender binarism, which privilege men, heterosexual, and cisgender people (Krieger, 2019; Parenteau et al., 2022). LGBTQ+ people, compared to cisgender[1] heterosexual (cishet) people, are exposed to minority stress derived from different forms of discrimination (Meyer, 1995; B. Aksoy et al., 2023; Badgett et al., 2024). LGBTQ+ people's mental health is also at risk of psychological distress derived from gender dysphoria and/or gender incongruence (Campbell et al., 2024; Bränström et al., 2024). In some countries, LGBTQ+ individuals lack access to formal medical care and risk experiencing inappropriate care or neglect from family members who have not accepted their sexual orientation or gender identity. Even if they have formal healthcare, LGBTQ+ individuals may still face discriminatory treatment from medical providers. These problems contribute to poor health outcomes: LGBTQ+ people experience higher rates of depression, anxiety, PTSD, suicidality, HIV/AIDS, and substance abuse compared with heterosexual and cisgender people. Poor health affects not only the well-being of LGBT individuals but also has repercussions for reduced work productivity, lower labor force participation, greater public health costs, and even reduced macroeconomic growth (Layard, 2013, 2017; Bubonya et al., 2017; Li & Sunder, 2024).

While the pandemic wreaked havoc on the mental health of the general population (Brodeur et al., 2021; Altindag et al., 2022), women's mental health, on average, appears to have been more severely affected by the pandemic than that of men (Zamarro & Prados, 2021; Cheng et al., 2021; Huebener et al., 2021; Etheridge & Spantig, 2022). Moreover, women themselves experienced heterogenous effects depending on socioeconomic status and other demographic characteristics. For instance, in the U.S., mothers of young children experienced higher levels of psychological distress, anxiety and depression than women without children in the early stages of the pandemic (Zamarro & Prados, 2021). In the U.K., greater time spent on childcare or homeschooling was associated with worse mental health during the pandemic, a link that was stronger for mothers than fathers (Cheng et al., 2021). Yet this finding is not universal, as De Pedraza et al. (2020) found no evidence in a sample of 25 countries that the presence of children in the household affected anxiety levels during the pandemic.

[1] Cisgender refers to individuals whose gender identity is aligned with the sex they were assigned at birth, while for transgender people, their gender identity does not match the sex they were assigned at birth. We use this terminology for the ease of the presentation of the results, and we acknowledge the possibility of including individuals who do not identify as cisgender heterosexual nor LGBTQ+ in the cishet category.

Gender binary differences in mental health outcomes during the pandemic have received some attention in the economic literature, but the mental health consequences of the pandemic for lesbian, gay, bisexual, transgender and other queer people remain understudied. Public health studies suggest that sexual and gender minority women experienced more negative mental health effects from the pandemic and its lockdown policies than cishet women (e.g. Kim et al. (2024)). However, less is known about the channels through which these disparities occurred.

We bridge this gap by analyzing whether and how lesbian, gay, bisexual, trans, non-binary, intersex or queer (LGBTQ+) women suffered more negative mental health effects compared to cishet women during the COVID-19 pandemic. We consider first the extent to which pandemic had heterogeneous effects on mental health among women according to their sexual orientation and gender identity. Subsequently, we explore whether the presence of children in the household affects the relationship between mental health and sexual and gender minority status. Finally, we check whether the containment policies affected LGBTQ+ women more compared to cishet women, and if so, whether the presence of children mattered in that link.

This study uses a unique dataset of 25,700 women from 26 European Union (EU) countries, collected from the survey *Women in Times of COVID-19* (European Parliament, 2022), with extensive information on mental health during the pandemic.[2] All respondents defined themselves as "female," and further, they were asked whether they identify as being LGBTQ+. We leverage this information by analyzing whether and how LGBTQ+ women relative to cishet women experienced more negative mental health effects as a consequence of i) the pandemic and ii) its containment policies. To the best of our knowledge, this is the first study to use this survey to analyze mental health disparities between LGBTQ+ and cishet women. We use probit and ordered probit models that control for individual-level and country-level factors associated with mental health, measured as anxiety, worries about mental well-being and depression. We find that LGBTQ+ women are substantially more likely to report anxiety, worry about their mental well-being, and suffer from depression following the onset of the pandemic compared to cishet women.

Our study also uses the potential-outcome framework of causal mediation analysis (Baron & Kenny, 1986; Imai et al., 2011) to study the mechanisms behind the more adverse mental health effects of the pandemic for LGBTQ+ women, focusing on the presence of children in the household

[2]The European Parliament launched this survey targeting exclusively women (only filling the survey for people who assert to identify as "female"), and therefore, we are not considering here the mental health of people who identify as "male."

as a mediator. Motherhood has been associated with a deterioration of mental health, as it is found to increase illness diagnoses and antidepressant prescriptions in Austria and Sweden (Ahammer et al., 2023), Switzerland (Bearth, 2024) and Germany (Dehos et al., 2024). Against this backdrop, sexual and gender minority women are less likely to have children (Black et al., 2007, 2013; Badgett et al., 2021), which can be due to preferences, social constraints and discrimination. Our estimates fail to associate living with children with a significant role in mental health symptoms. Nonetheless, we find a significant mediating role of living with children in the LGBTQ+ status' effect. Our causal mediation analysis suggests that the presence of children below the age of 15 in the household works as a mediator in the link between LGBTQ+ and experiencing anxiety, explaining about 10% of the total effect of being LGBTQ+ in reporting anxiety during the pandemic.

The last part of our study examines disparities in the mental health effect of COVID-19 containment policies between LGBTQ+ women and cishet women. Lockdowns and containment policies were crucial to stem the expansion of the COVID-19 deaths and cases, but they also unleashed economic and health distress. We find that LGBTQ+ women had more severe mental health impacts from workplace and office closures policies. Other types of containment policies, such as lockdown and curfew measures, limitations on the number of people to see, and travel restrictions, did not generate substantially different outcomes between LGBTQ+ women and cishet women. The effects of school and daycare center closures were more nuanced.

The paper adds to two growing strands in the economics literature, namely the economics of mental health and LGBTQ+ economics First, we provide an *intersectional* approach to the uneven mental health effects of the pandemic for women by sexual orientation and gender identity. Our analysis builds on the approach employed in Zamarro & Prados (2021) and De Pedraza et al. (2020) by expanding the focus toward gaps among women by sexual and gender minority status and the interaction with the presence of children in the household. Second, we add to LGBTQ+ economics literature (B. Aksoy et al., 2023; Mann, 2023; Badgett et al., 2024) by applying a causal mediation analysis to uncover the actual mechanisms behind the link between LGBTQ+ status and mental health among women through the mediating role of children in the household. This quantitative technique has become more common in empirical economics as a tool for better understanding the mechanisms or pathways through which a causal relationship occurs (Heckman & Pinto, 2015; Carpena & Zia, 2020; Celli, 2022).

2 Data

We use data from the Flash Eurobarometer survey *Women in Times of COVID-19* (European Parliament).[3] The sample comprises 25,700 women from the 26 EU countries.[4] The survey was conducted between 25 January and 3 February 2022 in an internationally representative sample of women ages 15 years and above. The *Women in Times of COVID-19* Flash Eurobarometer is the first European Parliament survey that includes a question on sexual orientation and/or gender identity.[5] All individuals in the database selected "female"" to describe how they think about themselves, and those who did not describe themselves as "female" did not take the survey. A total of 1,066 individuals responded yes to the question *"Do you identify as any of the following? Lesbian, gay, bisexual, trans, non-binary, intersex or queer (yes/no)"*, representing 4.15% of the sample. This percentage is similar to estimates in previous, comparable research (Valfort, 2017; C. G. Aksoy et al., 2018; Badgett et al., 2021). Yet we cannot rule out the possibility of disclosure bias in our dataset, which can ultimately bias the reporting of mental health symptoms and other confounders (Carpenter, 2005; Badgett et al., 2024; Ham et al., 2024).[6] The share of LGBTQ+ women varies across countries: Romania has the lowest share (1.07%), while Ireland shows the highest percentage of LGBTQ+ women (9.04%) (see Figure A1 in Appendix).

Figure 1 reports the percentage of cishet and LGBTQ+ women who suffered from anxiety, reported worries about mental well-being, or suffered from depression.[7] On average, 37% of cishet

[3]The Flash Eurobarometer started to be conducted the European Commission, launched in the late eighties. They are small-scale surveys conducted in all EU member states at times, scoping certain countries or topics as a function of specific themes. The typical sample size is 500-1000 respondents per country and interviews are usually conducted by phone in the respective national language.

[4]Data for the 27 EU countries is provided in the Flash Eurobarometer. However, we were unable to include data from the Czech Republic related to our country-level metric on acceptance of LGBTQ+ people. Therefore, we decided to drop that country. Baseline models, that do not include GAI as a metric of country-level acceptance of LGBTQ+ people, on the sample of the 27 EU countries, including Czech Republic, yield the same results provided in the paper.

[5]The European Parliament launched a Flash Eurobarometer in the aftermath of the 2008's Great Recession, conducted in 2013 (Women and Gender Inequalities in the Context of the Crisis - FL371). In that previous Flash Eurobarometer individuals were not asked about their sexual orientation/gender identity, nor their mental health.

[6]Ham et al. (2024) use an experiment in Bogotá (Colombia) and find that household surveys underestimate the size of the LGBT population by around 11 to 18 percentage points, which also varies by sex at birth, age groups, educational attainment and marital status.

[7]While the questionnaire included other mental health impacts or symptoms, we focused on these three key symptoms as they can be easily compared with previous research. Nonetheless, we complement our analysis using an indicator of reporting any of the suggested symptoms. See Figure SM1 in Supplementary Materials.

women reported anxiety, 21% reported worries about mental well-being, and 22% reported depression. The corresponding means for LGBTQ+ women are 53% (anxiety), 42% (worries about mental well-being), and 44% (depression). Hence LGBTQ+ women were more likely to report adverse mental health conditions than cishet women during the pandemic. We identify cross-country heterogeneity in the disparity of the mental health impacts of the pandemic in LGBTQ+ women and cishet women. Nonetheless, with the exception of anxiety in Italy, Bulgaria, Cyprus, and Croatia, LGBTQ+ women report higher rates of all three indicators (anxiety, worries about mental well-being and depression) across the 26 EU countries in the sample (see Figure A2 in Appendix).

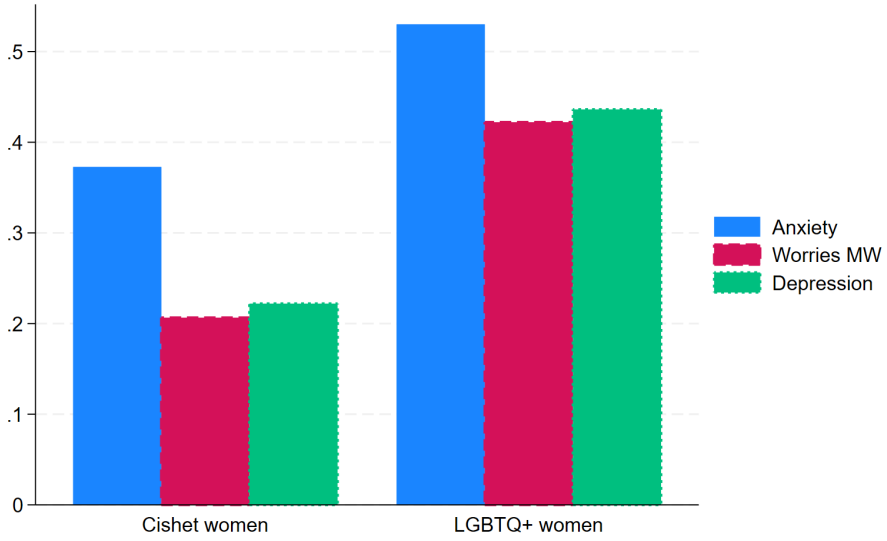


Figure 1: Prevalence of Anxiety, Worries about Mental Well-being, and Depression, by LGBTQ+ Status

Containment policies also appeared to have more adverse effects on the mental health of LGBTQ+ women compared to cishet women. In the survey, respondents assigned a value on a 1-5 Likert-type scale to the mental health impact of i) Workplace and office closures, ii) School and childcare closures, iii) Lockdown and curfew measures, iv) Limitations in the number of people you can meet, and v) Travel restrictions. Table 1 shows differences in the impacts of containment policies from cishet and LGBTQ+ women. On average, LGBTQ+ women were less likely to report minor mental health impacts and more likely to report major mental health impacts than cishet women. On average, 24% of cishet women versus 18% of LGBTQ+ women reported minor mental health effects from workplace and office closures. But, on average, 15% of cishet women and 19% of LGBTQ+ women

reported major effects from workplace and office closures. We show a similar pattern in the mental health effects of the other containment policies.

Table 1: Mental Health Impact of Containment Policies, by LGBTQ+ Status

	WP and Office closure		School/Childcare		Lockdown and Curfew		People to see limit		Travel limit	
	Cishet	LGBTQ+	Cishet	LGBTQ+	Cishet	LGBTQ+	Cishet	LGBTQ+	Cishet	LGBTQ+
Minor (1)	0.24	0.18	0.26	0.20	0.19	0.10	0.21	0.17	0.24	0.20
2	0.13	0.12	0.11	0.10	0.15	0.13	0.16	0.14	0.14	0.15
3	0.17	0.19	0.13	0.13	0.21	0.23	0.22	0.23	0.18	0.21
4	0.14	0.21	0.13	0.16	0.20	0.26	0.20	0.24	0.17	0.20
Major (5)	0.15	0.19	0.14	0.19	0.20	0.26	0.17	0.18	0.17	0.19

3 Econometric analysis

We first use probit and ordered probit models to estimate the following regression equation:

$$Y_{ic} = \beta_0 + \beta_1 LGBTQ^{+}_{ic} + \gamma X'_{ic} + \alpha Z'_c + \delta_c + e_{ic} \quad (1)$$

For the set of mental health effects, Y_{ic} is a dummy variable that takes the value of one when the individual i reports the symptom being analyzed (anxiety, worries about mental well-being, or depression). We use probit models to compute three different models, one for each symptom. For the effects of the containment policies, the dependent variable is a 1-5 Likert-type scale, where the value of 1 reflects a minor impact and a value of 5 reflects a major impact. We employ ordered probit models for the 5 types of containment policies.

Our focal independent variable is $LGBTQ+_{ic}$ for individual i in country c, taking the value of one if the individual identifies as LGBTQ+, zero otherwise. A set of individual-level characteristics are grouped in the vector X_{ic}. These variables include age, being married or cohabiting, educational attainment (with dummies for secondary education, upper secondary education and higher education), labor market status (home maker, working the labor market, unemployed, student, retired), geographical area (rural, middle-sized or urban area), and being a non-national. These controls are usually employed in related literature (Blanchflower, 2021; Zamarro & Prados, 2021; Bau et al., 2022; Rienzo, 2024). Table A1 in Appendix shows the mean values of the controls for the whole sample, and for cishet women and LGBTQ+ women separately: on average, LGBTQ+ women are younger,

are less likely to be married/cohabit, and show lower levels of educational attainment and higher unemployment rates than their cishet counterparts. These disparities are commonly found in the LGBTQ+ economics literature (Badgett et al., 2024; Tampellini, 2024).

We include the presence of children below the age of 15 as a key independent variable. While previous research (Zamarro & Prados, 2021; Cheng et al., 2021) has used the variable "being a mother" to uncover the gap between women with and without children, our measure encompasses a more diverse and $LGBTQ^{+}$-inclusive operationalization of childcare responsibilities and family structures. Having children in the household might imply care responsibilities even though there is no biological nor legal tie with the children. In an international context of EU countries, individuals face varying levels of LGBTQ+ acceptance and legal LGBTQ+ equality, thus we acknowledge the different possibilities for LGBTQ+ women to access reproductive healthcare, to give birth to, and/or adopt children in different countries. We also conduct robustness checks using a dummy variable for being a parent of young children.

The vector Z_c includes two country-level controls: severity of the pandemic, and level of acceptance of LGBTQ+ individuals. We use the log of the cumulative count of COVID deaths per country population in the week of the survey, collected from European Centre for Disease Prevention and Control (ECDC). The results are robust to the use of cases instead of deaths, and other measures of the incidence of the pandemic. We also control for potential confounders of mental health derived from the tolerance to LGBTQ+ people in country c. We use the Global Acceptance Index (GAI) from the Williams Institute School of Law (University of California Los Angeles, UCLA). The GAI is computed using advanced computational methods that analyze survey data from different countries and locations to produce a single score. Controlling for the acceptance of LGBTQ+ is critical in a model of mental health, as mental health problems are associated with low levels of acceptance or tolerance (Francis & Mialon, 2010; Mann, 2023; Badgett et al., 2024). By including GAI, we aim to control structural stigma in societal attitudes, laws, and policies (Bränström et al., 2024)

Both the incidence of the pandemic and country-level acceptance of the LGBTQ+ community vary considerably across countries: Eastern European countries show a higher cumulative count of COVID-19 deaths and a lower LGBTQ+ tolerance. Scandinavian countries, to the contrary, show higher LGBTQ+ acceptances and lower severity of the pandemic. Bulgaria was the country more severely hit by the pandemic, with the highest death count, and Denmark the lowest death count. Based on the GAI metric, the Netherlands is the most LGBTQ+ tolerant country, followed by Sweden and Spain, whereas Romania, Bulgaria and Lithuania are the least tolerant countries. Figures A3

and A4 (Appendix) depict the incidence of the pandemic and GAI levels for each country. Finally, we include country fixed effects and clustered standard errors at the country level in all our regressions.

Before proceeding with our analysis, we first consider the extent to which our focal independent variable affects the response rate of mental health questions in the survey, as done in related literature (Bau et al., 2022). We do not find a significant correlation between being LGBTQ+ and the probability of responding to the mental health questions in the survey (see Tables SM1 and SM2 in Supplementary Materials).

The database suffers from certain shortcomings which potentially increase our measurement error and simultaneously limit our ability to fulfill with the assumptions of causal inference. The data cannot be disaggregated by sexual orientation and/or gender identity. This limits our ability to identify effects for transgender people, whose economic and mental health outcomes during the pandemic might have differed due to greater exposure to discrimination or interrupted gender-affirming health care (Campbell et al., 2023; Carpenter et al., 2024; Campbell et al., 2024). Because the survey was only administered to respondents who described themselves as "female," the sample is likely to underrepresent people who identify as non-binary. Importantly, our estimates might suffer from different forms of endogeneity, such as omitted variable biases, as we lack of proper information on the occupational status and income levels of individuals in the sample, limiting the possibility of controlling for confounders. One could expect an upward bias in the estimates of mental health symptoms such as anxiety or depression, as higher income levels and occupational status are on average negatively correlated with LGBTQ+ people (Badgett et al., 2024; Zanoni et al., 2024; Tampellini, 2024), and at the same time, higher income/occupational status are associated with less prevalence of mental health illness (Shields-Zeeman & Smit, 2022; Thomson et al., 2022). Hence, the results below should be interpreted with caution and from a correlational perspective.

4 Results for anxiety, worries about mental well-being and depression

Table 2 shows the estimated marginal effects from estimating Eq. (1): Columns 1-3 report anxiety, Columns 4-6 report worries about mental well-being, and Columns 7-9 report depression. All models in the table associate LGBTQ+ status with a higher probability of experiencing these mental health

symptoms. LGBTQ+ women are 8.1 percentage points more likely to report anxiety, 9.7 percentage points more likely to report worries about mental well-being, and 10.4 percentage points more likely to suffer from depression.

Table 2: LGBTQ+ Women and Mental Health during the Pandemic: Anxiety, Worries about Mental Well-being and Depression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. variable:	Anxiety			Worries about Mental Well-being			Depression		
LGBTQ+	0.157***	0.080***	0.081***	0.216***	0.104***	0.097***	0.214***	0.115***	0.104***
	(0.023)	(0.017)	(0.017)	(0.017)	(0.015)	(0.015)	(0.020)	(0.017)	(0.017)
Country FE	✗	✓	✓	✗	✓	✓	✗	✓	✓
Control set	✗	✗	✓	✗	✗	✓	✗	✗	✓
No. of Obs.	25700	25700	25700	25700	25700	25700	25700	25700	25700
Pseudo-R^2	0.0030	0.0627	0.0641	0.0090	0.0627	0.0651	0.0083	0.0587	0.0588

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table 2: Results for average marginal effects using probit models. Dependent variables are dummy variables for having feelings of anxiety (Cols. 1-3), having worries about mental well-being (Cols. 4-6) or suffering from depression (Cols. 7-9). Control set includes: age, being married or cohabit with a partner, having children below the age of 15 in the same household, dummies for education(secondary, upper secondary and higher education), dummies for labor market status (home-maker, employed/self-employed, unemployed, student or retired), geographic area (rural area/village, small/middle sized town, large sized town), national citizenship, log of the cumulative rate of COVID deaths per country population, and the Global Acceptance Index (GAI).

4.1 The role of children in the household

We next consider whether the results in Table 2 depend on household composition. Previous research with different samples finds inconclusive results for the effect of having young children on anxiety or psychological distress (De Pedraza et al., 2020; Zamarro & Prados, 2021). We estimate the following model, which incorporates the interaction between LGBTQ+ status and the presence of children below 15 years of age in the household.

$$Y_{ic} = \beta_0 + \beta_1 LGBTQ^+_{ic} + \beta_2 Children_{ic} + \beta_3 LGBTQ^+ * Children_{ic} + \gamma X'_{ic} + \alpha Z'_c + \delta_c + e_{ic} \quad (2)$$

where Y_{ic} is the dependent variable (alternatively: anxiety, worries about mental well-being, and depression), and the rest of the terms are the same as in Eq. (1). By adding the interaction $LGBTQ^{+} * Children_{ic}$, we allow the effect of being LGBTQ+ to vary across women living with and without young children. A significant estimate of β_3 will suggest that the LGBTQ+ effect on mental health also depends on whether or not the individual lives with children in the same household. A positive sign of β_3 will increase the likelihood of poor mental health for LGBTQ+ women with children relative to LGBTQ+ women without children. To the contrary, a negative sign will reduce the likelihood of poor mental health for LGBTQ+ women with children relative LGBTQ+ women without children.

Table 3 shows both coefficients and marginal effects of Eq. (2). Columns 1 to 6 use the whole sample, and include the interaction ($LGBTQ^{+} * Children_{ic}$): for each dependent variable, we show two columns for the same model (one for coefficients and another for marginal effects). This is done to show the significance of the interaction, which can only be observed by the coefficients. Marginal effects of an interaction term cannot be computed, and if computed, are wrong (Williams, 2012): the value of an interaction term does not change independently of the values of the component terms (in our case, $LGBTQ^{+}_{ic}$ and $Children_{ic}$), so the effect for the interaction cannot be estimated separately. We find that such interaction is only significant for the model using anxiety as a dependent variable, but not for worries about mental well-being and depression.

Table 3 also reports results using sub-samples of women living with and without children below the age of 15 (Columns 7-12). Column 8 shows that using the sub-sample of women who live with children, the LGBTQ+ effect in anxiety is no longer significant. Importantly, Table 3 shows the robustness of our main results, since the marginal effects associated with LGBTQ+ remain the same.

Table 3: LGBTQ+ Identity Interacted with Children below 15 yr-old in the Household

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. variable	Anxiety		Worries MW		Depression		Anxiety		Worries WB		Depression	
Sample	All						No child	Child	No child	Child	No child	Child
Reported result	Coef.	ME	Coef.	ME	Coef.	ME	ME	ME	ME	ME	ME	ME
LGBTQ	0.318***	0.082***	0.356***	0.097***	0.359***	0.104***	0.109***	0.026	0.099***	0.095***	0.101***	0.110***
	(0.056)	(0.017)	.0499	(0.015)	.0579	(0.017)	(0.021)	(0.028)	(0.016)	(0.022)	(0.020)	(0.025)
Children	-0.011	-0.008	-0.016	-0.006	-0.026	-0.009						
	(0.025)	(0.008)	(0.023)	(0.006)	(0.026)	(0.007)						
Interaction	-0.281**		-0.106		-0.085							
(LGBTQ+*Children)	(0.0898)		(0.065)		(0.079)							
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Full control set	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
No. of Obs.	25700		25700		25700		17306	8394	17306	8394	17306	8394
Pseudo-R^2	0.0645		0.0651		0.0588		0.0702	0.0518	0.0775	0.0407	0.0752	0.0318

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table 3: Results using probit models: Columns 1, 3 and 5 show coefficients (Coef.) instead of average marginal effects (ME). The rest of the results show average marginal effects. Columns 1 to 6 include the interaction between LGBTQ+ status and children below the age of 15 in the household. Columns 7 to 12 use either the sample of women without children (below the age of 15) in the household (No child) or women living with at least one child below the age of 15 years old (Child). The interaction models and partitions of the database are replicated for the three dependent variables (anxiety, worries about mental well-being (MW), and depression). Control set as in Table 2.

Figure 2 shows that the predicted probabilities of reporting anxiety for cishet women with and without children are almost the same, 37.2% and 37.6% respectively, and that for LGBTQ+ women, the predicted probabilities are much higher in the absence of children in the household (38.6% and 49.3% for LGBTQ+ women living with and without children , respectively).

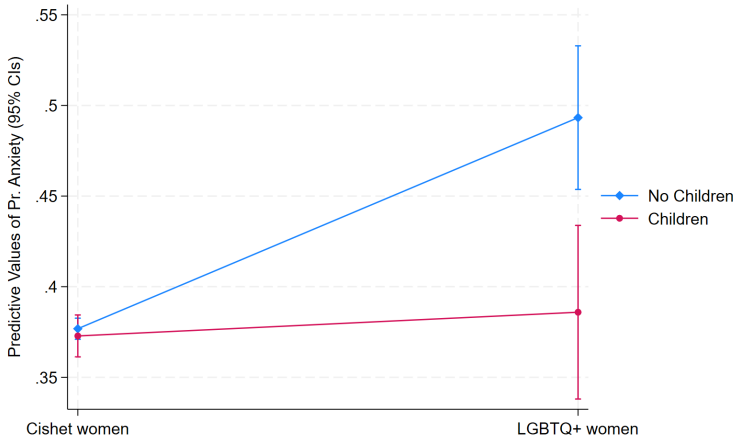


Figure 2: Predicted Probability of Anxiety of LGBTQ+ Status interacted with Children below the age of 15 in the Household

Figure 3 computes the differences in these predicted probabilities. We show a significant average marginal effect of LGBTQ+, and a non-significant marginal effect of living with children. We estimate that the LGBTQ+ status' effect evaluated when they live with children, that is, the interaction effect between LGBTQ+ status and living with children, is negative and significant. On average, LGBTQ+ women are 8.2 percentage points more likely than cishet women to report anxiety. The role of children by its own is not statistically significant in experiencing anxiety, a finding that aligns with the results in De Pedraza et al. (2020). We estimate a significant interaction effect between being LGBTQ+ and having children, which shows the change in the LGBTQ+ effect in the probability of anxiety with and without living with children. This interaction effect suggests that LGBTQ+ women living with children are 10.3 percentage points less likely to report anxiety than LGBTQ+ women living without children.

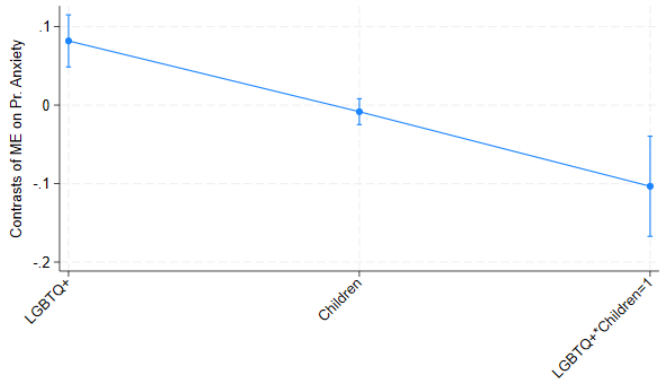


Figure 3: Marginal Effects of LGBTQ+ Status, Children and Interaction Effect in Anxiety

Our results are robust to a series of sensitivity checks. We first replicate the interactive model in Eq. (2) with anxiety as a dependent variable using a dummy for "being parent of children below the age of 15," rather than living with children in the same household. By using this variable, we make our regression models more comparable to those in related research (Zamarro & Prados, 2021; Huebener et al., 2021; Cheng et al., 2021). The results are similar to the ones in the main text (see Figure A5 in Appendix). Other sets of robustness checks are relegated to Supplementary Materials: The first set of robustness checks use an indicator variable that takes the value of 1 when respondents reported any of the suggested mental health symptoms (see Table SM3 for regression results and Figure SM2 for the interaction effect). The second set of robustness checks drop one generation at a time replicating models in Table 2. Additionally, we conducted several sensitivity checks, available upon reasonable request: i) dropping one country at a time, ii) use of alternative measures of the incidence of the pandemic, and iii) alternative operationalizations of models for containment policies, using dummies for responses of a value of 4 or major effects (value of 5) in mental health impacts from COVID-19 policies (available upon request).

4.2 Anxiety and children in the household: a causal mediation analysis approach

We explore the extent to which differences in the mental health effect of LGBTQ+ status during the pandemic are mediated through the presence of children in the household. Previous research found that the deterioration of mental health was related to increases in unpaid work in the home, especially with childcare and homeschooling (Cheng et al., 2021). Hence, we establish a pathway

whereby LGBTQ+ women have different probabilities of living with children than cishet women, thus affecting how LGBTQ+ status influenced anxiety levels during the pandemic. Figure 4 plots a simple graphical representation of this mechanism. Identifying as LGBTQ+ causally affects the outcome (having anxiety) both directly and indirectly through the mediator (children in the household). To estimate this pathway, we employ the potential-outcome framework of casual mediation analysis (Imai et al., 2010, 2011; Hicks & Tingley, 2011).

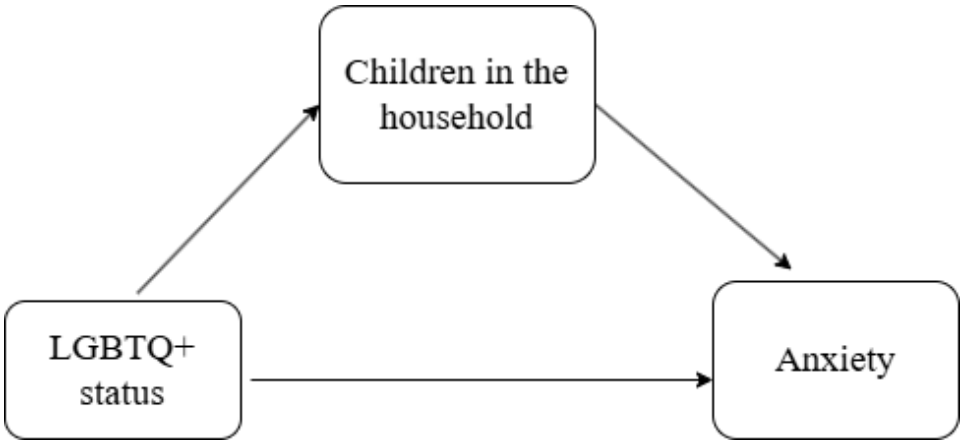


Figure 4: Living with Children in the Household as Mediator of the Effect of LGBTQ+ Status on Anxiety during the Pandemic

4.2.1 Causal mediation analysis: structural equation setting

Causal mediation analysis has gained momentum in economics with the surge of randomized control trials, but it can equally be applied to observational data.[8] In our setting, we let identifying as LGBTQ+ be the exposure or treatment, in the jargon of causal mediation analysis (see Celli (2022)), we let living with children in the same household be the mediator, and anxiety be the outcome. We first estimate the anxiety level that would occur for LGBTQ+ women with the probability of living with children as being LGBTQ+ women, and then subtract the counterfactual potential anxiety level that would occur for LGBTQ+ women but with the probability of living with children of cishet women. Put it differently, we compare differences in the effect on anxiety for a fixed treatment status (being LGBTQ+) but with different potential values of the mediator (living with children). The

[8]For applications of causal mediation analysis in economics, see Heckman & Pinto (2015); Carpena & Zia (2020); Harris-Fry et al. (2022). For an application to LGBTQ+ acceptance in political science research, using experimental and observational data, see respectively Flores et al. (2018) and Hildebrandt et al. (2019).

difference between these two estimates of the probability of reporting anxiety provides the indirect effect, the so-called "average causal mediated effect" (ACME) of the treatment through the mediator. The total effect of LGBTQ+ status on anxiety is thus decomposed into the ACME and the "average direct effect" (ADE).[9]

We let the mediator have differential effects on mental health for LGBTQ+ women and cishet women. In doing so, we include the interaction between LGBTQ+ status and the presence of children in the mediator-outcome model of the system of equations of the causal mediation analysis. Women in same-sex couples could have a more equal distribution of childcare and unpaid care work than women living with men, and thus, anxiety levels due to childcare might be lower for LGBTQ+ women than for cishet women. By including such an interaction, our model becomes less restrictive, contrary to other causal mediation models in the literature that impose no interaction between the mediator and treatment (Carpena & Zia, 2020; Nguyen et al., 2021).

We compute the ACME and ADE using the following system of two probit regressions:

$$M_{ic} = \beta_0 + \beta_1 LGBTQ^{+}_{ic} + \gamma X'_{ic} + \alpha Z'_c + \delta_c + e_{1ic} \tag{3}$$

$$Y_{ic} = \alpha_0 + \alpha_1 LGBTQ^{+}_{ic} + \alpha_2 M_{ic} + \alpha_3 LGBTQ^{+} * M_{ic} + \gamma X'_{2ic} + \omega Z'_c + \delta_c + e_{2ic} \tag{4}$$

where M_{ic} is our mediator variable, that is, living with children, and Y_{ic} is the probability of reporting anxiety, as in our previous setting (Fig. 2 and 3). To provide causal interpretations, causal mediation analysis assumes that there is no omitted variable affecting neither the mediation nor the outcome variables. The data limitations exposed above are amplified here, as we cannot control for levels of income in the structural equation of the presence of children as the dependent variable (M_{ic}) nor in the anxiety equation (Y_{ic}). Based on these limitations, we do not intend to provide causal interpretations but rather, exploratory evidence from the causal mediation analysis, as it is done in previous research using this quantitative method (Harris-Fry et al., 2022).

4.2.2 Potential-outcomes framework: results of causal mediation analysis

Potential-Outcomes Framework: results for potential outcomes means The potential-outcomes framework provides the predicted probabilities of reporting anxiety for four different scenarios depending

[9]See Nguyen et al. (2021) for more details on such decomposition.

on the values of the expected probabilities obtained from the treatment model (Y) and the mediator model (M). Recall that our treatment is identifying with being LGBTQ+ and our mediator is living with children below the age of 15. The potential-outcome framework obtains ACME, ADE and ATE by first, computing the system of equations 3 and 4, and then, "switching on and off" the LGBTQ+ effect in the mediator. That is, we first compute the probability of LGBTQ+ women living with children under 15 years old, and we use this estimate to consider the LGBTQ+ effect in experiencing anxiety, using the counterfactual probabilities.

We provide the potential-outcomes framework's estimates in Table 4.[10] One can interpret the probabilities in these four different scenarios in an "as if" way: i) if every individual in the sample identified as LGBTQ+, both in the outcome and mediation models (Eq. 3 and 4), the expected average probability of anxiety during the pandemic would be 46.6% $E[Y_i(1, Mi_i(1))]$, ii) every individual identified as LGBTQ+ in the outcome model (Eq. 4) and every individual were cishet in the mediator model (Eq. 3), this expected probability would be 45.7% $E[Y_i(1, Mi_i(0))]$, iii) if nobody identified as LGBTQ+ in the outcome model and every individual was LGBTQ+ in the mediator model, the expected average of anxiety would be 37.6% $E[Y_i(0, Mi_i(1))]$, and finally, iv) if nobody identified as LGBTQ+ in the outcome model or in the mediator model, we would get a 37.5% expected probability of anxiety $E[Y_i(0, Mi_i(0))]$. We report this in Table SM6. Comparing the $E[Y_i(1, Mi_i(1))]$ and $E[Y_i(1, Mi_i(0))]$ estimates, we imagine a scenario where everyone identifies as LGBTQ+, except that we use the counterfactual in the mediator, that is, if LGBTQ+ women had the probability of living with kids if they were cishet. The difference between these predicted probabilities is the average causal mediation effect.

ACME is thus given by the difference between $E[Y_i(1, Mi_i(1))]$ and $E[Y_i(1, Mi_i(0))]$, which is 46.6% minus 45.7% (resulting in 0.94 percentage points). ADE is given by the difference between $E[Y_i(1, Mi_i(0))]$ minus $E[Y_i(0, Mi_i(0))]$, in our case: 45.7% minus 36.5% (resulting in 8.14 percentage points), and ATE, or total effect, is the difference between $E[Y_i(1, Mi_i(1))]$ and $E[Y_i(0, Mi_i(0))]$, that is, 46.6% minus 36.5%, resulting in 9.08 percentage points.

[10]The outcomes of the structural models are available upon request. The mediation model, where the dependent variable is having children, is estimated using a probit model that includes LGBTQ+ as independent variable together with the same controls of Eq. 2. We obtain a marginal effect associated with LGBTQ+ status of -9.1 percentage points (SE 0.015) significant at 1% in the likelihood of living with children in the same household. We use the Stata 18 package "mediate" developed in Hicks & Tingley (2011). Table 4 displays results using "pomeans" command in Stata 18 after running the "mediate" structural equation regressions.

Table 4: Predicted Probabilities of Anxiety using Causal Mediation Analysis

Panel A: Potential-outcomes means			
Potential scenarios	Pr. Anxiety	S.E.	p-value
$E[Y_i(0, Mi_i(0))]$	0.375	0.003	0.000
$E[Y_i(1, Mi_i(0))]$	0.457	0.015	0.000
$E[Y_i(0, Mi_i(1))]$	0.376	0.003	0.000
$E[Y_i(1, Mi_i(1))]$	0.466	0.016	0.000
Panel B: Decomposition of ATE in ACME and ADE			
ACME	0.009	0.003	0.002
ADE	0.081	0.015	0.000
ATE	0.091	0.015	0.000

Robust standard errors in parenthesis

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table 4: Potential-outcomes probabilities using causal mediation analysis. Structural models include the full set of controls as in Eq. 2, and the treatment-outcome model in Eq. 4 includes the interaction between $LGBTQ^{+}_{ic}$ and $Children_{ic}$.

Figure 5 shows the results of the decomposition of the total effect of LGBTQ+ in anxiety using causal mediation analysis. We provide the ACME, ADE and ATE (with confidence intervals at 95%): the presence of children in the household significantly mediates the link between LGBTQ+ status and anxiety. This indirect effect implies a 0.9 percentage points (at 5% significance level), thus representing 10.3% of the total effect of LGBTQ+ status in anxiety, while 89.7% of the total effect is due to other mechanisms. The direct effect of LGBTQ+ in anxiety is 8.1 pp, similar to our previous estimates (see Col. 4 Table 1 and Col. 2 Table 2). Thus, our causal mediation analysis results serve as a sensitivity check of our main findings of the paper.

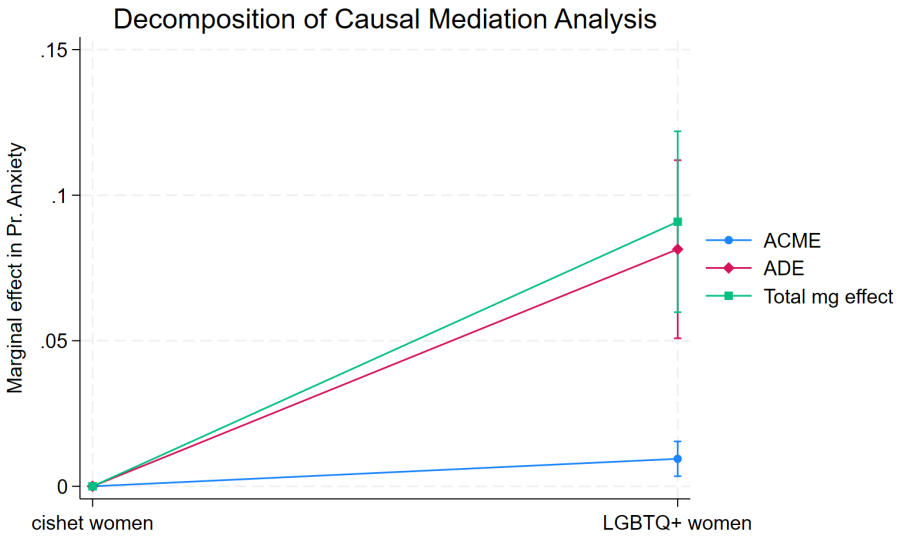


Figure 5: Decomposition of Total Effect into Indirect and Direct Effects in Anxiety

5 Results for mental health effect of containment policies

Our second set of models use as dependent variables the mental health effect of containment policies, measured in a 1-5 Likert-type scale, where 1 reflects minor mental health effect and 5 reflects major mental health effect. We use the model in Eq. (1) and employ ordered probit models.[11] Table 5 provides estimated coefficients that significantly associate LGBTQ+ status with greater mental health effects from workplace and office closure as well as from school and childcare closure policies. The other three types of containment policies, the augmented models do not significantly associate LGBTQ+ status with a higher mental health effect (Columns 6, 8 and 10).[12]

[11] Treating ordinal data as metric and using linear probability models is problematic, as they are more likely to can incur in both type 1 and type 2 errors and distort the size of the estimates (Liddell & Kruschke, 2018).

[12] Recall that the number of observations for the models using containment policies' impact in mental health is lower than those in the previous set of results (see Table SM2 in Supplementary Materials for a confirmation on that LGBTQ+ were not significantly associated with a higher response rate).

Table 5: LGBTQ+ Status Effect in Mental Health Impact from Policies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep.variable	WP office closures		Childcare closures		Lockdown		People limit		Travel limit	
LGBTQ	0.275***	0.089**	0.246***	0.135***	0.284***	0.057	0.129***	0.014	0.123***	-0.030
	(0.043)	(0.043)	(0.044)	(0.040)	(0.042)	(0.039)	(0.038)	(0.032)	(0.031)	(0.029)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Full control set	✗	✓	✗	✓	✗	✓	✗	✓	✗	✓
No. of Obs.	17733	17733	17099	17099	17733	17733	17733	17733	17733	17733
Pseudo-R^2	0.0201	0.0389	0.0128	0.0524	0.0134	0.0287	0.0095	0.0162	0.0117	0.0224

Robust standard errors clustered at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table 5: Results for coefficients using ordered probit models. Dependent variables are Likert-type variables using 1-5 scale, being 1 (minor effect) to 5 (major effect), on mental health of COVID-19 policies related to "Workplace and office closures and their effects" (Cols. 1-2); "School and childcare closures and the need for home schooling / caring for children at home" (Cols. 3-4); "Lockdown and curfew measures" (Cols. 5-6); "Limitations in the number of people you could meet at home or visit" (Cols. 7-8); and "Travel restrictions, limiting your options to go abroad" (Cols. 9-10). Models in odds Columns include country fixed effects and the full set of control variables (control set in Table 1 plus age).

Figure 6 shows the marginal effects of being LGBTQ+ for each value of the 1-5 scale mental health effect of workplace and office closure policies (model in Column 2, Table 5). Whereas the differences in 2 ,3 and 4 are menial and even not significant, LGBTQ+ women were 2.7 percentage points less likely to have minor mental health effect and 2.3 percentage points more likely to have major mental health effect from workplace and office closure policies. Figure 7 reports marginal effects for the mental health effect of school and childcare closure policies for LGBTQ+ women relative to cishet women (model in Column 4, Table 5). The estimates associate LGBTQ+ women with 4.4 percentage points less probability of having minor effect and 3.5 percentage points more probability of having major mental health effect from school and childcare closures.

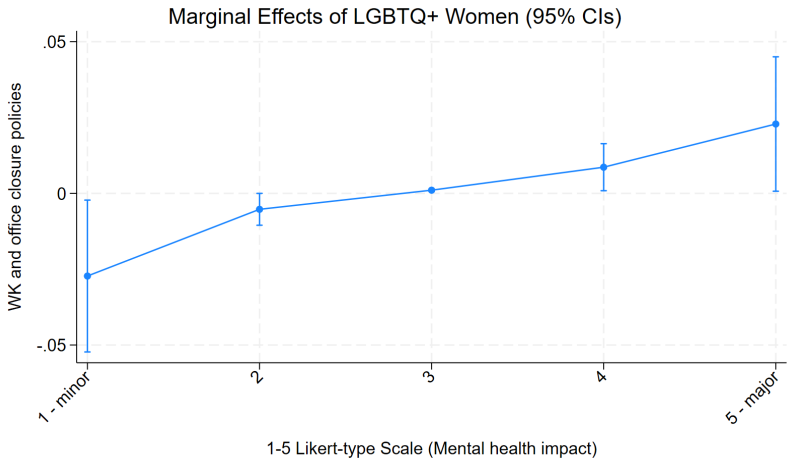


Figure 6: Marginal effects of LGBTQ+ status in mental health impact of WP and Office Closures

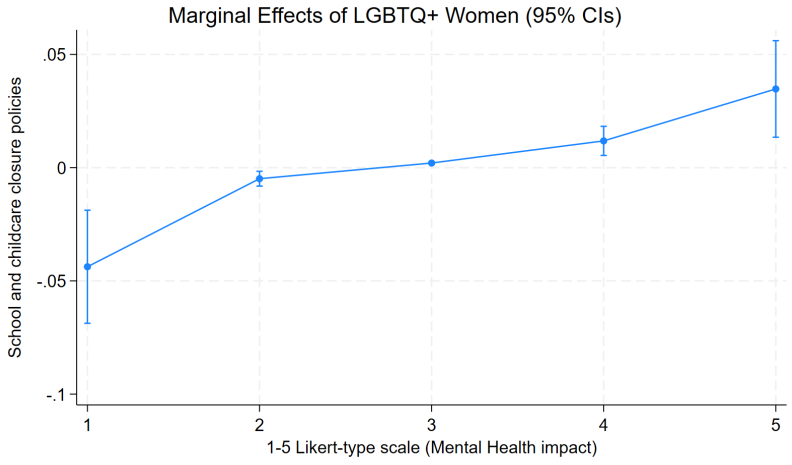


Figure 7: Marginal effects of LGBTQ+ status in mental health impact of Schools and Childcare Closures

5.1 The role of children in the household for school and childcare closures

The last step in our analysis is to interact $LGBTQ+_{ic}$ and $Children_{ic}$, that is, we compute Eq. (2) using the 1-5 Likert-type scale of mental health effect from school and childcare closures as dependent variable. Table 6 shows a significant and negative role of this interaction, meaning that the more prevalence women of mental health effects from school and childcare closures for LGBTQ+ is moderated by the presence of children in the household. We use partitions of the sample based on living with or without children in the same household in Columns 2 and 3 (Table 6). The results suggest that when there are no young children in the household, LGBTQ+ women are more likely to have more severe mental health effects from these policies than cishet. However, comparing LGBTQ+ women and cishet women living with children, LGBTQ+ women are no longer more likely to suffer more than cishet from school and childcare closures.

Figure 8 shows the marginal effects of LGBTQ+ status in the probability of having minor and major effects (values 1 and 5), by living with and without children in the household. On average, LGBTQ+ women are 5 percentage points less likely to have minor and 2.5 percentage points to have major mental health effects than cishet from this type of containment policies. LGBTQ+ women living with children are 8.5 percentage points more likely to have minor and 5.6 percentage points less likely to major mental health effects than LGBTQ+ women living without children from policies related to school and childcare closures.

Table 6: Mental Health Impact from Childcare Closure COVID-19 Policies

Dep. variable: 1-5 Likert-type scale on mental health impact of childcare closure	(1)	(2)	(3)
Sample	All	No Children	Children
LGBTQ+	0.221***	0.197***	0.035
	(0.049)	(0.051)	(0.067)
Children	0.667***		
	(0.035)		
LGBTQ+*Children	-0.249***		
	(0.084)		
Country FE	✓	✓	✓
Control set	✓	✓	✓
No. of Obs.	17099	10705	6394
Pseudo-R^2	0.0526	0.0285	0.0111

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table 6: Results for coefficients using ordered probit models. Dependent variable is a Likert-type variable using 1-5 scale, being 1 (minor effect) to 5 (major effect), on mental health of COVID-19 policies related to "School and childcare closures and the need for home schooling / caring for children at home." All models include country fixed effects and the set of control variables. Columns 2 and 3 use partitions of the sample on the basis of no children below the age of 15 in the same household (No Children) and having them (Children).

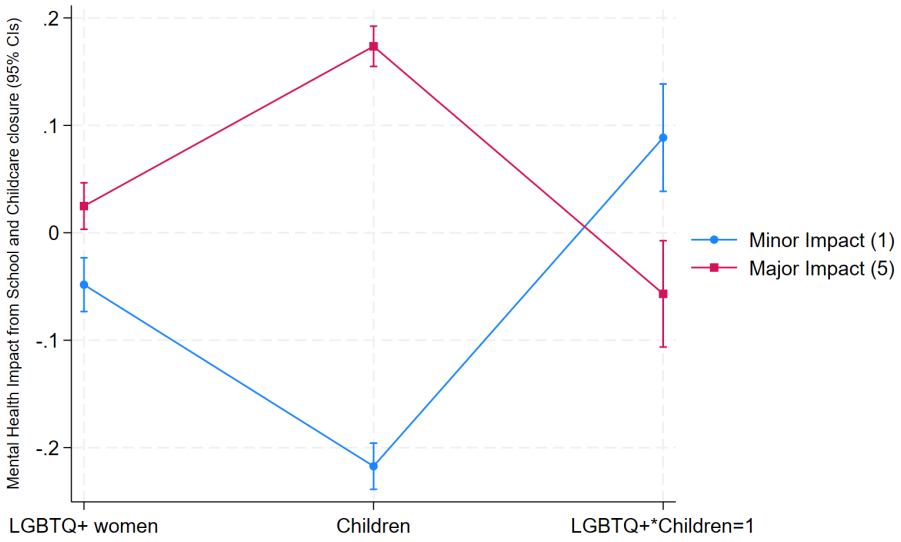


Figure 8: Marginal effects of LGBTQ+ status interacted with children below the age of 15 in the household (focus on minor and major effects)

6 Conclusion

This paper has analyzed the effect of LGBTQ+ status on women's mental health during the pandemic in a large sample of European countries. Existing research has focused on mental health effects during the pandemic for the general population and has provided evidence that women had more psychological distress, anxiety and depression. However, the implications of the pandemic for LGBTQ+ people remain relatively under-explored. LGBTQ+ women, relative to cisgender heterosexual women, could have been more adversely affected during the pandemic due to discrimination, interruption of gender-affirmative care and health needs, and social isolation. To the best of our knowledge, we provide the first test of a potential LGBTQ+ divide *among* women in mental health outcomes during the pandemic.

We employ probit and ordered probit models on a survey database of 25,700 women from 26 European Union countries that control for individual-level determinants of mental health together with country-level metrics of the incidence of the pandemic and acceptance of the LGBTQ+ community. Our estimates suggest that LGBTQ+ women were more likely to report anxiety, be worried about mental well-being, and suffer from depression than cisgender heterosexual women. We specify interactive models to study whether the link between LGBTQ+ and mental health depends on the presence of children in the household. We find that the LGBTQ+ effect in anxiety depends nega-

tively on the presence of children in the household, meaning that the presence of children moderates the higher prevalence of anxiety for LGBTQ+ women. Using the subsample of women living with children, women from sexual/gender minorities were not significantly more likely than cisgender heterosexual to report anxiety. Our findings expand the works of Zamarro & Prados (2021) and Cheng et al. (2021) by adopting a LGBTQ+ perspective in anxiety outcomes among women during the pandemic. Nevertheless, LGBTQ+ women were unconditionally associated with higher probabilities of worries about mental well-being and suffering from depression.

Results from our causal mediation analysis indicate that the presence of children in the household mediates the link between LGBTQ+ and anxiety. In particular, having school-age children in the household accounts for 1 percentage point of the total effect of LGBTQ+ on anxiety, representing approximately 10% of the total effect. The direct effect of LGBTQ+ in anxiety (8 percentage points) is due to other mechanisms. While other studies have shown that having school-age children in the household is one of the most important reasons why women, on average, had a worsening in mental health outcomes compared to men, the results of our study indicate that this parenting effect mattered more for cishet women than for women who are sexual and gender minorities. Other mechanisms, which could include inequitable healthcare, lack of family support, and social isolation, appear to have mattered more for LGBTQ+ women and cishet women.

Our results for the impacts of containment policies suggest that the lack of family support is particularly important among these potential mechanisms. Our estimates show that LGBTQ+ women were more likely to report major mental health effects derived from workplace and office closure policies than cisgender heterosexual women. For school and childcare center closures, however, the presence of children moderates the higher prevalence of mental health impacts for LGBTQ+ women. Other COVID-19 containment policies, such as limitations on the number of people to meet, travel restrictions and curfews, do not significantly differ between cisgender heterosexual women and women from sexual/gender minorities once we control for the full set of confounders.

We have three key findings. First, we uncover that LGBTQ+ women, compared to cisgender heterosexual women, were associated with a higher probability of negative mental health outcomes. This could be interpreted as a sign of increasing LGBTQ+-based discrimination and increasing unmet health needs (i.e. gender-affirmative care), specially for transgender women and non-binary people. Second, we find that different symptoms of mental health were differently affected: the LGBTQ+ effect in anxiety was relatively lower than for worries about mental health and depression. Further, anxiety is mediated by the presence of children, a mechanism that is absent from the other

two symptoms. Third, containment policies affected more severely LGBTQ+ women, but different policies unleashed different effects. Again, children in the household, specifically in the case of school and childcare policies, seem to matter for the LGBTQ+ women. One interpretation behind the differential mental health effects of these policies can be the lack of gender and sexuality responsiveness in policy-making.

To conclude, the message of this paper is that the pandemic and its containment policies affected more severely the mental health of women from sexual and gender minorities. Pre-existing patterns of mental health disparities, which privileged men, cisgender, and heterosexual people, were exacerbated in the twin health and economic crisis imposed by the pandemic. Heteronormativity and cisnormativity in the design of COVID-19 containment policies could imply lower access of transgender women to gender-affirmative care and other health needs.

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Appendix

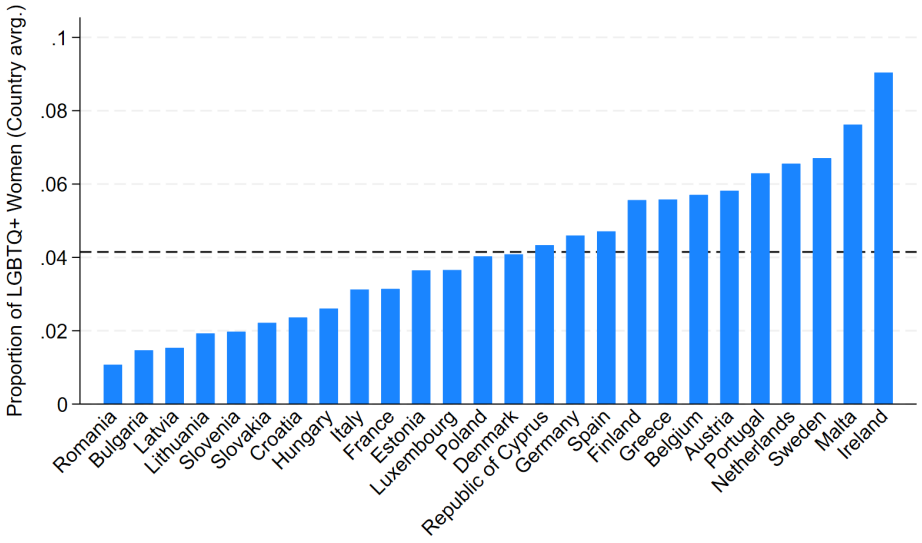


Figure A1: Share of Women who Identify as LGBTQ+

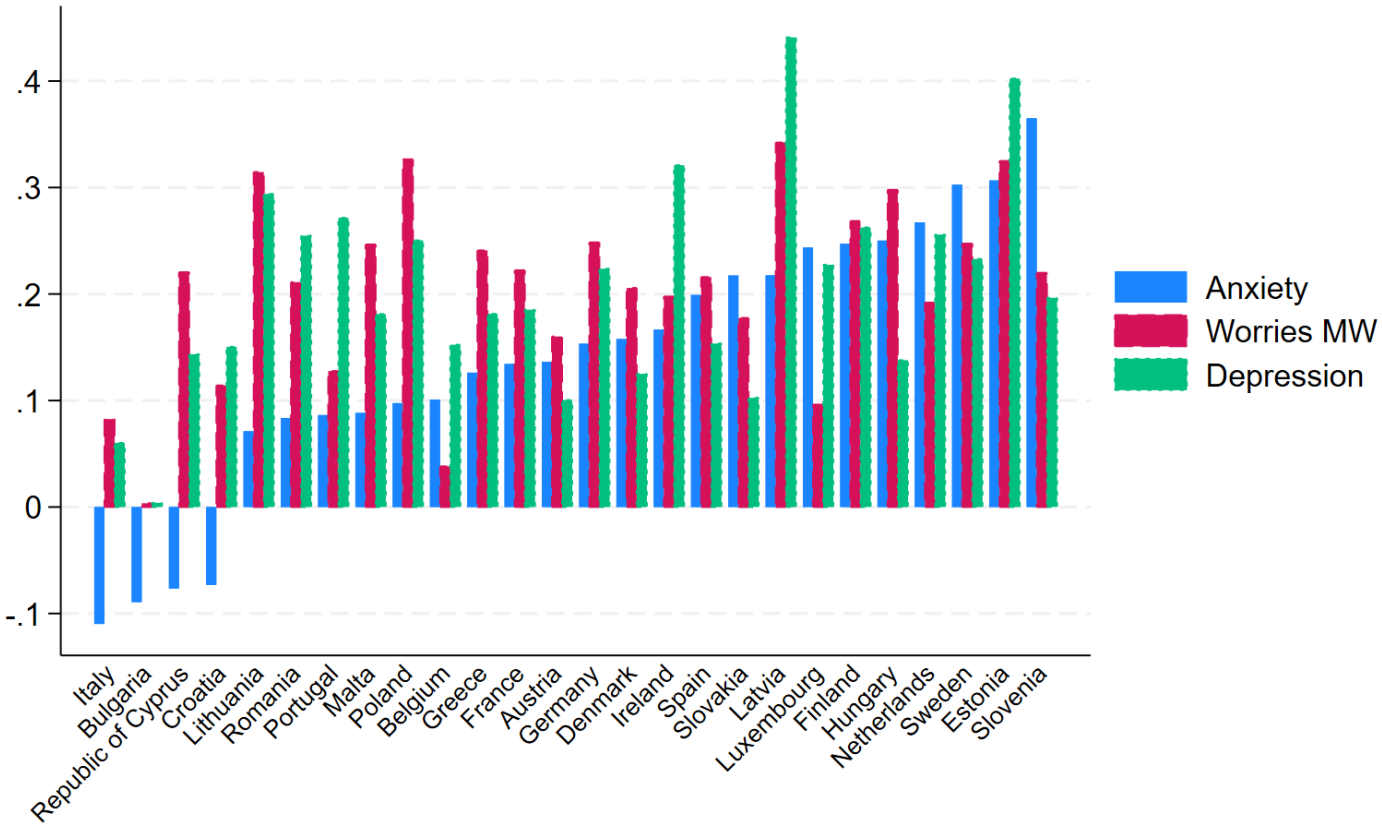


Figure A2: Gaps in LGBTQ+ vs Cishet women in Mental Health Outcomes during the Pandemic (Country avrg.)

Table A1: Summary Statistics

	Whole sample				Cishet women				LGBTQ+ women			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
1st set Dependent Variables: Mental health symptoms												
Anxiety	0.38	0.49	0	1	0.37	0.48	0	1	0.53	0.50	0	1
Worries about Mental WB	0.22	0.41	0	1	0.21	0.40	0	1	0.42	0.49	0	1
Depression	0.23	0.42	0	1	0.22	0.42	0	1	0.44	0.50	0	1
Indicator (Table SM2)	0.86	0.34	0	1	0.86	0.34	0	1	0.94	0.24	0	1
2nd set Dependent Variables: Mental Health Impact of COVID-19 Policies' questions												
WP and Office closure	2.81	1.47	1	5	2.80	1.47	1	5	3.14	1.42	1	5
School and Childcare closure	2.74	1.53	1	5	2.73	1.53	1	5	3.04	1.53	1	5
Lockdown and curfew measures	3.18	1.40	1	5	3.16	1.40	1	5	3.55	1.27	1	5
People limit	3.05	1.40	1	5	3.04	1.40	1	5	3.22	1.33	1	5
Travel limit	2.93	1.47	1	5	2.92	1.47	1	5	3.09	1.41	1	5
Control variables												
Children	0.33	0.47	0	1	0.40	0.49	0	1	0.38	0.48	0	1
Parent of young children	0.31	0.46	0	1	0.31	0.46	0	1	0.25	0.43	0	1
Parent	0.47	0.50	0	1	0.47	0.50	0	1	0.41	0.49	0	1
Age	46.19	16.76	15	91	46.91	16.56	15	91	29.66	12.07	15	75
Married or cohabits	0.69	0.46	0	1	0.69	0.46	0	1	0.67	0.47	0	1
Secondary education	0.03	0.17	0	1	0.03	0.17	0	1	0.02	0.14	0	1
Upper secondary education	0.30	0.46	0	1	0.31	0.46	0	1	0.19	0.39	0	1
Higher education	0.50	0.50	0	1	0.51	0.50	0	1	0.37	0.48	0	1
Home maker	0.06	0.23	0	1	0.06	0.23	0	1	0.03	0.17	0	1
Working in the labor market	0.63	0.48	0	1	0.63	0.48	0	1	0.63	0.48	0	1
Unemployed	0.04	0.19	0	1	0.04	0.19	0	1	0.05	0.21	0	1
Student	0.05	0.23	0	1	0.05	0.21	0	1	0.20	0.40	0	1
Retired	0.18	0.39	0	1	0.19	0.39	0	1	0.03	0.18	0	1
Area	2.10	0.78	1	3	2.09	0.78	1	3	2.14	0.78	1	3
Not national	0.04	0.19	0	1	0.03	0.18	0	1	0.05	0.23	0	1

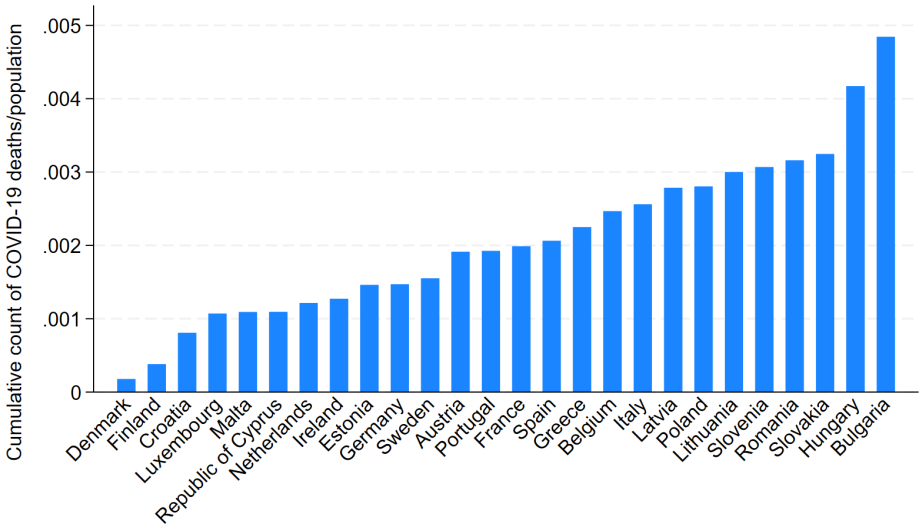


Figure A3: Cumulative Count of COVID-19 Deaths to Country Population (week of 25 January 2022)

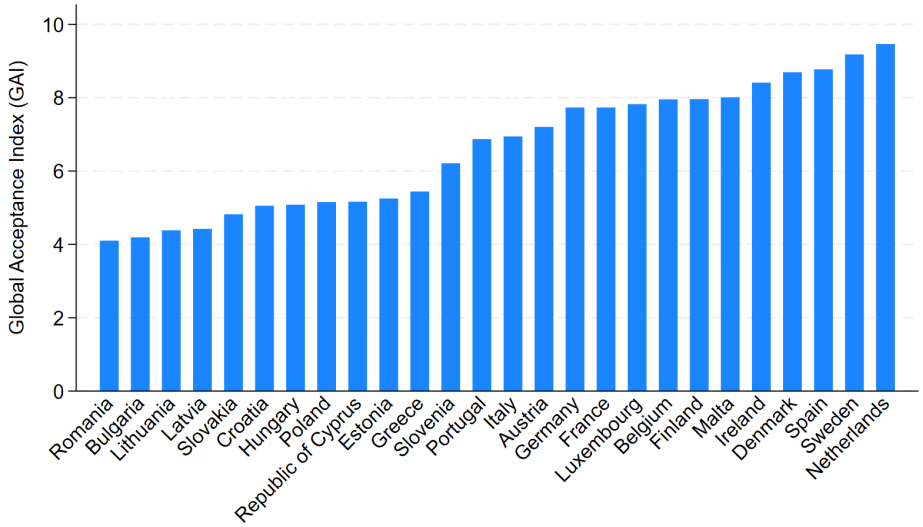


Figure A4: Global Acceptance Index (GAI), Williams Institute, UCLA

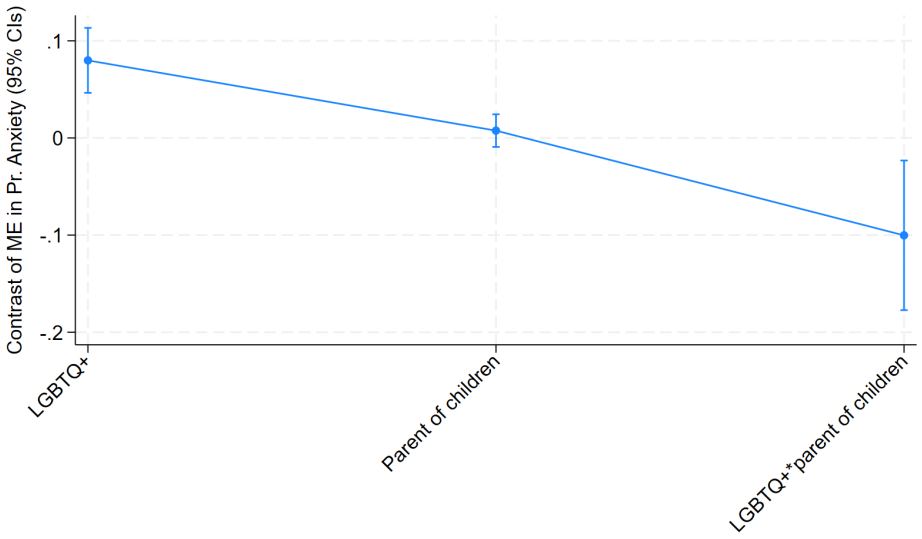


Figure A5: Marginal effects of LGBTQ+ Replicating Interaction in Col. 2 Table 2 using "Parent of Children"

Supplementary Materials

Definition of Data and Data Sources

Definition of dependent variables:

Since the start of the COVID-19 pandemic, which of these feelings / situations have you identified with the most?

- Anxiety: anxious
- Worries about Mental Well-being: concerned about my mental well-being
- Depression: feeling depressed / suffering from depression

Since the beginning of the COVID-19 pandemic, governments have taken various measures to stop the spread of the virus. On a scale from 1 to 5, to what extent did these measures and their effects have a negative impact on your mental health?

1. Workplace and office closures and their effects (temporary / forced unemployment, homeworking, etc.)
2. School and childcare closures and the need for home schooling / caring for children at home
3. Lockdown and curfew measures, limiting your options to shop, go out, go to events, etc.
4. Limitations in the number of people you could meet at home or visit
5. Travel restrictions, limiting your options to go abroad

Data source: European Parliament (2022) *Flash Eurobarometer 2712 (Women in Times of COVID-19)*

Definition of independent variables:

- LGBTQ+: Do you identify as any of the following? (yes/no): Lesbian, gay, bisexual, trans, non-binary, intersex or queer

- Children: How many children under the age of 15 are living in your household?
- Married or cohabits: Which of the following best describes the household you live in? "Couple with or without children" or "Multi-generational household (for example including grandparent, parents and children)" or "Co-living or other forms of communal living (for example with friends or students)"
- Secondary education: up to 15 years of education
- Upper secondary education: 16-19 years of education
- Higher education: 20 years of education or more
  As far as your current occupation is concerned, you are
- Home maker: looking after the home
- Working in the labor market: self-employed or employee
- Unemployed: seeking a job
- Student: student
- Retired: retired
- Age: how old are you?

Data source: European Parliament (2022) *Flash Eurobarometer 2712 (Women in Times of COVID-19)*

Country-level independent variables

- Severity of the pandemic: 14-day notification rate of reported deaths per 1 000 000 population in the week of the survey (25 January - 3 February 2022). Data source: European Centre for Disease Prevention and Control (ECDC)
- The Global Acceptance Index (GAI): uses data from more than 2,750 surveys conducted over 30 years to measure changing levels of acceptance toward LGBT people and issues in 175 countries. The GAI provides each nation with a score of 0 to 10 to indicate their level of accep-

tance. Data source: School of Law Williams Institute, UCLA https://williamsinstitute.law.ucla.edu/projects/gai/

Response rates by LGBTQ+ and cishet women

Table SM1: Summary Statistics of Response Rates of Dependent Variables

	Whole sample				Cishet women				LGBTQ+ women			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Response rates of Mental Health questions												
Do not know	0.01	0.08	0	1	0.01	0.08	0	1	0.00	0.05	0.00	1.00
Prefer not to say	0.00	0.05	0	1	0.00	0.05	0	1	0.00	0.03	0.00	1.00
Response rates of Mental Health Impact of COVID-19 Policies' questions:												
Not know or does not apply response for												
WP and Office closure	0.02	0.14	0	1	0.02	0.14	0	1	0.01	0.11	0	1
School and Childcare closure	0.01	0.11	0	1	0.01	0.11	0	1	0.01	0.08	0	1
Lockdown and curfew measures	0.01	0.08	0	1	0.01	0.08	0	1	0.00	0.04	0	1
People limit	0.01	0.09	0	1	0.01	0.09	0	1	0.00	0.07	0	1
Travel limit	0.01	0.12	0	1	0.02	0.12	0	1	0.01	0.08	0	1

Regression on response rates by LGBTQ+ and cishet women

Table SM2: Response Rate by LGBTQ+ Women on Mental Health Questions

	(1)	(2)	(2)	(2)
	Mental Health questions		WP Office closure	School and Childcare closure
	Do not know	Prefer not to say	Not know/not applies	Not know/not applies
LGBTQ+	-0.237	-0.272	0.051	0.051
	(0.175)	(0.287)	(0.047)	(0.047)
Age	✓	✓	✓	✓
Country FE	✓	✓	✓	✓
No. of Obs.	25700	25700	25700	25700
Pseudo-R^2	0.0423	0.0274	0.0243	0.0243

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table SM2: Estimated coefficients of probit models using as dependent variables the probability of not knowing (Col. 1), prefer not to say (Col. 2) of mental health questions, and the probability of not knowing or not applicable of mental health impact question of "Workplace and office closure" policies (Col. 3) and of "School and childcare closure" policies (Col. 4). All models include LGBTQ+ women, that is the focal independent variable, age and country fixed effects.

Robustness checks I: alternative measure of mental health symptoms

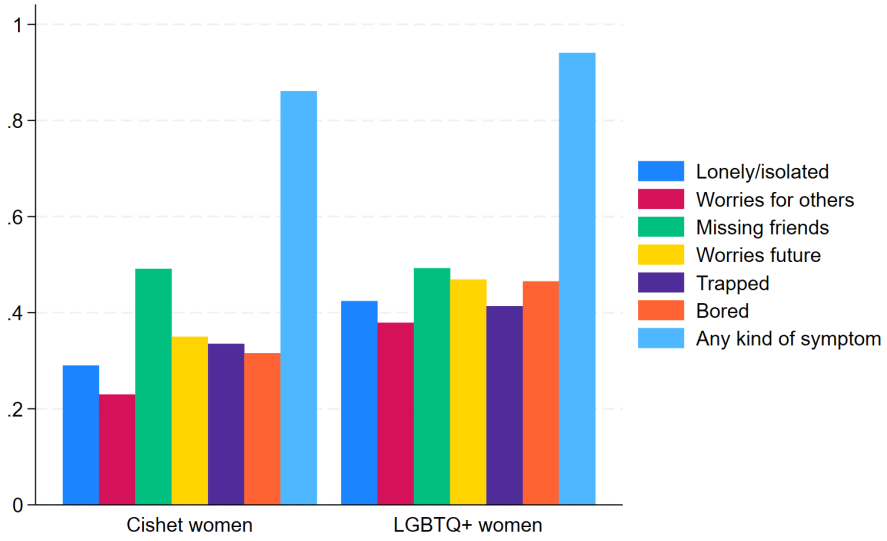


Figure SM1: Prevalence of Mental Health Symptoms, by LGBTQ+ Status

Notes Figure SM1: prevalence of mental health symptoms 1) feeling lonely / isolated 2) worried about others developing mental health problems 3) worried about / missing friends / family 4) worried about my future 5) feeling trapped / stuck at home 6) feeling bored / fed up / going stir crazy 7) any symptom (1 to 6 plus anxiety, worries about mental well-being and depression)

Table SM3: Indicator of Any Kind of Mental Health Symptoms

Dep. var.: Indicator of mental health symptoms	(1)	(2)		(3)	(4)
Sample	All	All		No child	Child
Reported result	ME	Coef.	ME	ME	ME
LGBTQ	0.042***	0.183**	0.041***	0.039**	0.060**
	(0.011)	(0.079)	(0.011)	(0.017)	(0.026)
Children	0.003	0.009	0.003		
	(0.006)	(0.031)	(0.006)		
Interaction LGBTQ*Children		0.180			
		(0.191)			
Country FE	✓	✓		✓	✓
Full control set	✓	✓		✓	✓
No. of Obs.	25,700	25,700		17,306	8,394
Pseudo- R^2	0.0800	0.0801		0.0765	0.0740

Clustered standard errors at country level parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table SM3: Estimated marginal effects of probit models as in Column 4 (Table 2). Dependent variable is the probability of having any kind of mental health symptom. All models include country fixed effects and the full set of control variables. Column 2 is divided into coefficients and marginal effects, the rest of the Columns show marginal effects only.

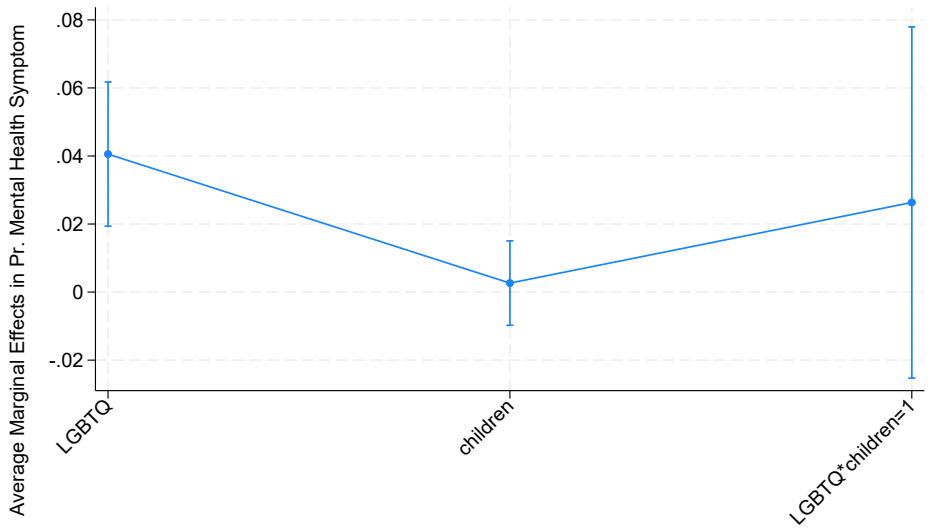


Figure SM2: Interaction of LGBTQ+ and Children in Indicator of Mental Health Symptom

Robustness checks II: dropping one generation at a time

Table SM4: Robustness Check on Anxiety - Dropping one Generation at a Time

	(1)	(2)	(3)	(4)	(5)
Dropped Generation:	Silent	Boomer	X Gen	Millennial	Z Gen
LGBTQ	0.082***	0.082***	0.091***	0.085***	0.060***
	(0.017)	(0.019)	(0.019)	(0.020)	(0.019)
Country FE	✓	✓	✓	✓	✓
Control set	✓	✓	✓	✓	✓
No. of Obs.	25355	18301	18570	18584	21990
Pseudo-R^2	0.0623	0.0492	0.0726	0.0686	0.0654

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table SM4: Estimated marginal effects of probit models as in Column 4 (Table 1). Dependent variable is the probability of having feelings of anxiety. Each column drops one generation at a time. All models include country fixed effects and the full set of control variables.

Table SM5: Robustness Check on Worries about Mental Well-being - Dropping one Generation at a Time

	(1)	(2)	(3)	(4)	(5)
Dropped Generation:	Silent	Boomer	X Gen	Millennial	Z Gen
LGBTQ	0.097***	0.104***	0.096***	0.108***	0.079***
	(0.015)	(0.016)	(0.016)	(0.017)	(0.022)
Country FE	✓	✓	✓	✓	✓
Control set	✓	✓	✓	✓	✓
No. of Obs.	25355	18301	18570	18584	21990
Pseudo-R^2	0.0643	0.0482	0.0753	0.0752	0.0546

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table SM5: Estimated marginal effects of probit models as in Column 4 (Table 8). Dependent variable is the probability of having worries about mental well-being. Each column drops one generation at a time. All models include country fixed effects and the full set of control variables.

Table SM6: Robustness Check on Depression - Dropping one Generation at a Time

	(1)	(2)	(3)	(4)	(5)
LGBTQ	0.105***	0.114***	0.107***	0.111***	0.074***
	(0.017)	(0.018)	(0.014)	(0.021)	(0.022)
Country FE	✓	✓	✓	✓	✓
Control set	✓	✓	✓	✓	✓
No. of Obs.	25355	18301	18570	18584	21990
Pseudo-R^2	0.0572	0.0452	0.0696	0.0707	0.0457

Clustered standard errors at country level in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Notes Table SM6: Estimated marginal effects of probit models as in Column 4 (Table 12). Dependent variable is

the probability of suffering from depression. Each column drops one generation at a time. All models include country fixed effects and the full set of control variables.