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When a Common Shock Hits Differently: Gender, Adolescence, and the COVID-19 Well-Being Gap

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When a Common Shock Hits Differently: Gender, Adolescence, and the COVID-19 Well-Being Gap*

Abstract

Adverse shocks can create inequalities if some groups respond more strongly than others. This paper examines whether a common disruption leads to differential changes in children's subjective well-being by gender. We use longitudinal data from the Luxembourg Child Well-Being Survey, which follows the same children before (2019) and after (2021) the COVID-19 pandemic, a major disruption to schooling, social interactions, and daily routines. Using child fixed-effects models, we estimate within-child changes in life satisfaction, positive affect, and negative affect. Girls and boys report similar levels of life satisfaction and positive affect before the disruption but follow markedly different trajectories afterward. Girls experience larger declines in life satisfaction and positive affect and a larger increase in negative affect, with the sharpest deteriorations concentrated in school experiences, family relationships, self-perceptions, and loneliness. As a result, a sizeable gender gap in subjective well-being emerges. The divergence increases with age and remains robust to alternative specifications, selective attrition, and alternative cardinalizations of ordinal well-being scales. We find little evidence that the gender gap is concentrated among specific socio-economic groups.

JEL classification

I31, I14, I21, J13, J16, D63

Keywords

child well-being, gender differences, socio-emotional development, shocks, COVID-19

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1 Introduction

Adverse shocks experienced during childhood can have long-lasting consequences for health, human capital accumulation, and well-being. A large literature has documented the effects of family-level shocks, such as parental job loss, divorce, illness or parental death, as well as broader societal shocks including economic crises, natural disasters, and, more recently the COVID-19 pandemic.[1] These studies show that childhood shocks can have persistent consequences for socio-emotional development, educational attainment, and later-life outcomes.

Although these shocks differ in nature, a consistent finding across this literature is that children do not respond uniformly to adverse events. Children from disadvantaged socio-economic backgrounds generally experience larger adverse effects because they have fewer resources available to buffer disruptions (Hansen and Stutzer, 2022). Several studies also document differences by gender, although the evidence is mixed. Some report larger deteriorations in girls' emotional well-being following parental health shocks(Bratti and Mendola, 2014; Glaser and Pruckner, 2023) or prolonged maternal unemployment (Lindo, 2011). Others find stronger effects among boys, particularly following paternal shocks or parental death (Nikolova and Nikolaev, 2021; Böckerman et al., 2023), while several studies find little evidence of systematic gender differences (Borah et al., 2026; Kristiansen, 2021). Since the COVID-19 pandemic, a growing literature has documented substantial declines in children's mental health and subjective well-being (for systematic reviews and meta-analyses, see Samji et al. 2022; Miao et al. 2023; Madigan et al. 2023). Several studies report larger deteriorations among girls than boys, although the magnitude and consistency of these gender differences vary across countries, outcomes, and study designs (Mendolia et al., 2022; Breaux et al., 2021; Ravens-Sieberer et al., 2022). Proposed mechanisms include disruptions in peer relationships, increased loneliness, and changes in family and school environments (Loades et al., 2020a; Lee, 2020).

Despite this extensive literature, several questions remain. First, much of the existing evidence relies on parent reports, clinical indicators, or measures of psychological distress. Comparatively

[1] At the family level, studies analyse the consequences of parental job loss and unemployment (Peter, 2016; Mörk et al., 2020), parental health shocks (Glaser and Pruckner, 2023), and parental death (Ferrara et al., 2025). At the macro level, the literature considers economic recessions (Oreopoulos et al., 2008), armed conflicts (Shemyakina, 2011), environmental shocks (Maccini and Yang, 2009), and large-scale school disruptions during the COVID-19 pandemic (Engzell et al., 2021; Maldonado and De Witte, 2022).

less is known about how children themselves perceived and experienced the pandemic through their own reports of subjective well-being. This distinction is important because adults and child reports capture different perspectives and often show only moderate agreement (Achenbach et al., 1987; Kraemer et al., 2003; De Los Reyes et al., 2015). Second, while many studies document overall changes in children's mental health, fewer examine which dimensions of children's daily lives account for the emergence of gender differences in subjective well-being. Understanding whether these differences are related to school experiences, family relationships, self-perceptions, or social connections can provide important insights into the mechanisms through which major disruptions affect children.

The COVID-19 pandemic provides a unique opportunity to study these questions. Unlike many adverse events that affect only certain families, the pandemic disrupted schooling, peer interactions, leisure activities and daily routines for all children simultaneously. Our focus on Luxembourg is of particular relevance here because the country introduced extensive income protection and family support measures that significantly reduced the direct economic impact of the crisis. This setting allows us to examine whether a broadly shared disruption generated differential changes in children's subjective well-being rather than inequalities arising primarily from unequal economic exposure.

In this paper, we using the COVID-19 pandemic as a common disruption affecting children's daily routines, social interactions, and school experiences and we ask whether girls and boys respond differently when exposed to the same adverse circumstances. We use longitudinal data from the Luxembourg Child Well-Being Survey and estimate within-child changes in well-being using child fixed effects. We examine three complementary dimensions of subjective well-being: life satisfaction, positive affect, and negative affect. We also assess the robustness of our findings to alternative cardinalisations of ordinal well-being scales following Kaiser and Lepinteur (2025).

Our analysis yields four main findings. First, girls and boys display similar levels of life satisfaction and positive affect before the pandemic but follow markedly different trajectories afterwards. Second, this widening gap can be linked to specific domains: girls' satisfaction with their appearance, school experience, and their family relationships declines more steeply than for boys, while their loneliness increases more sharply as well, indicating that self-image and relationships are the key areas where this disparity emerges. Third, the gender-based response to the shock becomes

substantially larger with age. This indicates that common disruptions may amplify gender inequalities as children progress through adolescence. Finally, we find little evidence that the emerging gender gap is concentrated among disadvantaged socio-economic groups.

This paper contributes to the literature in four ways. First, it provides longitudinal evidence on gender differences in children's subjective well-being following the COVID-19 pandemic. Second, it relies on children's own reports of subjective well-being, providing direct evidence on how children themselves experienced the disruption rather than relying on proxy assessments. Third, by jointly analysing cognitive well-being, positive affect, negative affect, and satisfaction across different life domains, it provides a more comprehensive picture of where the gender gap emerges. Finally, it shows that the divergence becomes larger during early adolescence but remains broadly similar across socio-economic environments, highlighting the role of developmental processes alongside family circumstances.

The remainder of the paper is organized as follows. Section 2 describes the institutional context. Section 3 presents the data and the construction of the child well-being measures. Section 4 outlines the empirical strategy. Section 5 reports the main results, while Section 6 presents robustness checks. Section 7 concludes.

2 Background and institutional context

Luxembourg recorded its first confirmed case of COVID-19 on 29 February 2020. As infections increased, the government introduced extensive restrictions in March 2020. Early childhood education and care services, schools, universities, and non-essential businesses were temporarily closed, and social distancing measures were implemented. Primary schools remained closed from 16 March to 24 May 2020, while secondary schools reopened gradually from early May. Although schools remained largely open during the 2020–2021 school year, temporary closures, quarantines, and remote instruction continued to disrupt schooling.

The restrictions extended beyond education. Social gatherings were limited, extracurricular activities were suspended or reduced, and children's opportunities to interact with peers were constrained. At the same time, many parents experienced substantial changes in working arrangements,

including remote work and temporary interruptions of professional activities. Consequently, the disruption affected several dimensions of children's daily lives simultaneously, including schooling, social relationships, leisure activities, and family environments.

Luxembourg combined these restrictions with extensive social protection measures. The government introduced special family leave schemes that allowed parents to interrupt work to care for children affected by school and childcare closures, while preserving most of their income.[2] Universal health care and unemployment protection further limited the economic consequences of the crisis for many households. As a result, the disruption primarily altered children's daily environments rather than generating a large-scale income shock.

Importantly, these measures applied broadly to the population and did not target specific groups of children. The disruption therefore provides a useful setting to study how children respond to a common adverse shock. The timing of the survey waves allows us to compare children's well-being before the disruption (2019) and after an extended period of exposure to these changes (2021).

Several mechanisms could generate gender-differentiated responses to a common shock. One possibility is that girls are more vulnerable to disruptions affecting social relationships and daily routines because peer relationships become increasingly important during adolescence and girls tend to exhibit higher levels of internalizing symptoms than boys (Rose and Rudolph, 2006; Salk et al., 2017). Restrictions on social interactions and repeated disruptions to schooling may therefore have larger consequences for girls' socio-emotional well-being.

An alternative possibility is that boys are more adversely affected by some types of shocks. Studies of parental unemployment and parental death report larger adverse effects for boys in some settings, suggesting that gender differences in children's responses depend on the nature of the disruption (Nikolova and Nikolaev, 2021; Böckerman et al., 2023). By contrast, other studies find stronger effects among girls following parental health shocks or the COVID-19 pandemic (Glaser and Pruckner, 2023; Mendolia et al., 2022), while several well-identified studies find little evidence of systematic gender differences (Borah et al., 2026; Kristiansen, 2021). Taken together, the existing evidence suggests that gender differences in children's responses to adverse shocks are likely to

[2]See Zhelyazkova et al. (2021) for more information about support to parents in Luxembourg during the coronavirus pandemic.

depend on both the type of shock and the institutional context.

3 Data

The survey follows the framework of the International Survey of Children's Well-Being (ISCWeB) and collects detailed information on children's subjective well-being, daily activities, family environment, and socio-demographic characteristics (Rees et al., eds, 2020). The survey data are linked to administrative records on household income and family characteristics using pseudonymized individual identifiers. Participation to the survey required parental consent and all data were linked and processed in accordance with national data protection regulations.

The Child Well-Being Survey is nationally representative of children aged 8, 10, and 12 living in Luxembourg. In 2019, all children of these ages affiliated with the Luxembourg social security system were invited to complete an online questionnaire. The survey was administered between June and mid-July and was available in five languages (Luxembourgish, French, German, English, and Portuguese), reflecting the country's multilingual context. Approximately 8,000 children participated, corresponding to a response rate of 40%.

A follow-up survey was conducted in 2021 among children who participated in the 2019 wave. Data collection took place during the same period of the year as in 2019, limiting concerns related to seasonality. The wording and response scales remained identical across the two waves, ensuring the comparability of the well-being measures over time. Approximately 2,000 children participated in the follow-up survey.

The resulting panel contains 4,238 child–wave observations corresponding to 2,119 children observed in both waves. Missing values on the variables used in the analysis lead to the exclusion of 1,252 observations, yielding a final analytical sample of 2,896 child–wave observations (1,448 children observed twice).[3]

Children in the analytical sample are on average 11 years old in 2021, and approximately half are girls. Most children live with at least one sibling, and around two-thirds have at least one parent born abroad, reflecting the demographic composition of Luxembourg. Household income is

[3]Appendix Figure A.1 describes the sample selection.

measured as equivalised household income using the modified OECD equivalence scale. To account for the skewed distribution of income, the logarithm of equivalised household income is used in the regression analysis. Appendix Table B.1 reports descriptive statistics for the analytical sample.

Measures of subjective well-being

A large literature studies the measurement of child well-being (Conti and Heckman, 2013). This literature emphasizes that subjective well-being is multidimensional and includes both cognitive and affective components (Schimmack et al., 2002). Cognitive well-being reflects an individual's overall evaluation of life, whereas affective well-being captures emotional experiences (Kahneman and Krueger, 2006). These dimensions may respond differently to external shocks (Kettlewell et al., 2019), which motivates analysing them separately.

All well-being measures are based on children's self-reports. Prior work shows that children from around age eight can provide reliable assessments of their well-being when questions are age-appropriate (Casas and Rees, 2015). Self-reported measures provide direct information about children's emotional experiences that cannot be captured through parent reports. This distinction is important because parents' assessments of their children's socio-emotional well-being may not fully reflect children's own perceptions. A large interdisciplinary literature documents systematic differences across informants in the measurement of child skills and well-being (Achenbach et al., 1987; Kraemer et al., 2003; De Los Reyes et al., 2019). These divergences reflect differences in interpretation, context, and reference points rather than purely random measurement error. This evidence underscores the value of collecting information directly from children, as it captures their own perceptions of the circumstances that affect them.

The first measure captures *cognitive well-being*. Cognitive well-being is measured using a single-item life satisfaction question in which children are asked to evaluate their life as a whole on an 11-point scale ranging from 0 ("not at all satisfied") to 10 ("completely satisfied"). Higher values indicate higher levels of life satisfaction.

The second measure captures *affective well-being*, which is collected only for children aged 10

and above.[4] Affective well-being is measured using a set of items capturing positive and negative emotional states experienced during the previous two weeks. Following the core affect framework (Feldman Barrett and Russell, 1998), the survey includes items related to positive affect (e.g. feeling happy, calm, or full of energy) and negative affect (e.g. feeling sad, stressed, or bored). Positive and negative affect indices are constructed by averaging the corresponding items. Higher values of positive affect indicate better emotional well-being, while higher values of negative affect indicate worse emotional well-being.

Appendix Table B.2 reports summary statistics for the three well-being measures used in the analysis. Taken together, these measures allow us to examine whether a common shock affects cognitive and emotional dimensions of well-being differently.

Life domains and related measures

The survey also collects information on several domains of children's lives, including school experiences, peer relationships, family relationships, autonomy, and feelings of safety. We use these measures in Section 5 to explore potential mechanisms underlying the emergence of the gender gap in well-being.

Children report their satisfaction with each life domain (family life, friendships, school, neighborhood, and time use) in response to the question "How satisfied are you with ... ?", using an 11-point Likert scale ranging from 0 ("not at all satisfied") to 10 ("completely satisfied"). In addition, the survey collects information on loneliness. Loneliness is measured using three questions asking children how frequently they feel that they "lack friends," feel "left out," or feel "lonely," with responses ranging from 0 ("never") to 5 ("every day").[5]

Weights and representativeness

The survey provides sampling weights to account for the sampling design and differential response probabilities. Initial weights are calibrated to the 2019 population structure and subsequently corrected for the lower response rate observed in the 2021 follow-up. Descriptive statistics use

[4] Because affective well-being is collected only for children aged 10 years and above, the estimation sample is smaller for this outcome.

[5] The scale is adapted from the Roberts version of the UCLA Loneliness Scale (Roberts et al., 1993). The scale shows good internal consistency, with a Cronbach's alpha of 0.75.

survey weights. Because the empirical analysis relies on child fixed effects and focuses on within-child changes, the main regressions are estimated without weights.

4 Empirical Strategy

Our objective is to examine whether girls and boys experienced different changes in subjective well-being following the disruption. We exploit the longitudinal structure of the Luxembourg Child Well-Being Survey, which follows the same children before (2019) and after (2021) the disruption.

We estimate the following child fixed-effects specification:

$$WB_{it} = \beta_1 Post_t + \beta_2 (Girl_i \times Post_t) + X_{it}\gamma + \alpha_i + \epsilon_{it} \tag{1}$$

where WB_{it} denotes subjective well-being outcomes of child i at time t, and $Post_t$ equals one in 2021. The coefficient β_1 captures the average change in well-being over time for boys, while β_2 captures the differential change for girls relative to boys between 2019 and 2021. Child fixed effects α_i absorb all time-invariant individual characteristics, including gender and stable reporting tendencies. The vector X_{it} includes time-varying child and household characteristics. Standard errors are clustered at the child level.

The coefficient of interest is β_2, which captures whether girls experienced a different change in well-being than boys between 2019 and 2021. For life satisfaction and positive affect, a negative coefficient indicates a larger deterioration among girls. For negative affect, a positive coefficient indicates a larger increase among girls.

Because the specification includes child fixed effects, identification relies on within-child variation over time. The estimates therefore compare each child to himself or herself before and after the disruption while accounting for all time-invariant characteristics, including stable personality traits, family background, and persistent reporting styles. The analysis focuses on heterogeneous responses to a common shock rather than differences in exposure to the shock.

A key assumption underlying this approach is that unobserved child-specific traits are sufficiently stable over the period considered. Existing evidence suggests that this assumption provides a

reasonable approximation.[6]

Our objective is not to identify the causal effect of specific policies implemented during the pandemic. Instead, we examine whether girls and boys followed different well-being trajectories after a major disruption that affected children's daily lives, social interactions, and school experiences. Because the data include only one pre-disruption observation, we cannot test for differential pre-trends. The estimates should therefore be interpreted as differential changes in well-being between girls and boys rather than causal effects of specific policy interventions.

To examine heterogeneous responses to the shock, We extend the baseline specification by allowing the gender-differentiated effect to vary across socio-economic environments. we estimate models including triple interaction terms between the post indicator, gender, and baseline characteristics capturing household income, parental labour market status, and family structure. These specifications test whether the differential change in well-being for girls relative to boys depends on children's socio-economic conditions. These analyses are descriptive and aim to document heterogeneity in responses rather than to identify causal effects of specific socio-economic characteristics.

We conduct a set of additional checks to assess the credibility of the identifying assumption. We examine whether girls and boys already display different age profiles in subjective well-being in 2019, which would suggest diverging trajectories prior to the pandemic. In addition, we test whether panel attrition is systematically related to gender and baseline well-being. Third, we evaluate the sensitivity of the results to alternative cardinalizations of the ordinal well-being scales following Kaiser and Lepinteur (2025).

To explore potential mechanisms, we complement the main analysis by examining changes in specific life domains. These analyses do not identify causal mechanisms but document how changes in children's daily experiences vary with changes in subjective well-being.

[6] A meta-analysis by Roberts and DelVecchio (2000) reports test–retest correlations of about 0.45 for children aged 6–12, indicating moderate rank-order stability. Evidence from longitudinal cohorts such as ALSPAC (e.g. Morris et al. (2021)) shows that stability varies across measures, with relatively consistent behavioural indicators and lower persistence for other socio-emotional skills. These results imply that fixed effects remove an important share of persistent heterogeneity. However, residual within-child variation may still reflect both genuine changes in traits, particularly during a period of rapid development and in response to a major shock, and measurement error, which may attenuate estimated coefficients. In the robustness section, we will test for age dynamic.

5 Results

This section examines whether a gender gap in subjective well-being emerges following a common shock. We begin with descriptive evidence before turning to within-child estimates.

5.1 The emergence of a gender gap in subjective well-being

Figure 1 plots mean levels of life satisfaction, positive affect, and negative affect by gender in 2019 and 2021. It shows little difference between boys and girls before the pandemic for life satisfaction and positive affect, but a clear widening of the gender gap by 2021 across all three dimensions. Appendix Table B.2 reports the corresponding average levels.

Non-parametric tests confirm these patterns. The distributions of life satisfaction and positive affect do not differ significantly between boys and girls in 2019, but diverge in 2021. In contrast, differences in the distribution of negative affect are already present before the pandemic and persist thereafter.[7]

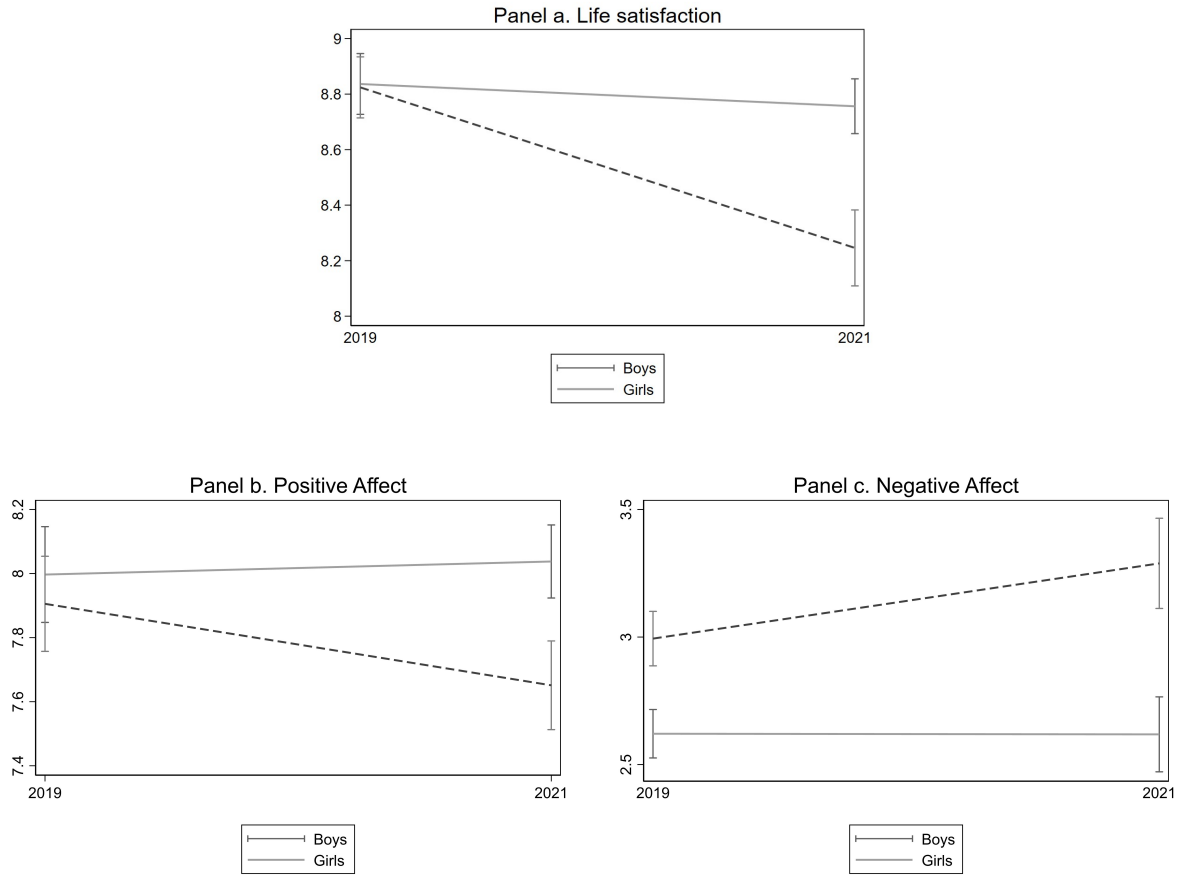
Before the pandemic, boys and girls report similar levels of life satisfaction and positive affect. The difference in life satisfaction is small and insignificant. Girls report slightly higher levels of negative affect than boys in 2019, although the magnitude of this difference remains modest.

Between 2019 and 2021, well-being trajectories diverge by gender. Girls experience a decline in life satisfaction and positive affect, while boys' well-being changes only modestly. At the same time, negative affect increases among girls. As a result, the gender gap widens across all three dimensions of well-being by 2021.

While these descriptive patterns suggest a divergence in well-being trajectories, they do not account for observable characteristics or unobserved individual heterogeneity. The next section examines whether these differences persist when comparing the same children over time.

[7] Kolmogorov–Smirnov tests provide suggestive evidence of distributional differences. Given the discrete nature of the outcomes, rank-sum tests are more appropriate in this context; they yield similar conclusions.

Figure 1: Descriptive Evidence on Gender Differences in Children's Well-Being Before and After the Pandemic



Notes: The figure reports mean levels of life satisfaction, positive affect, and negative affect by gender in 2019 and 2021. All measures are based on children's self-reports. Positive affect and negative affect are constructed as averages of multiple items capturing emotional states over the previous two weeks. Vertical bars represent 95% confidence intervals. Differences across years reflect changes in average well-being over time, without controlling for individual characteristics.

5.2 Differential responses to a common shock

The descriptive evidence suggests that girls and boys followed different well-being trajectories after the disruption. We now examine whether this divergence persists when comparing the same children over time.

Table 1 presents the fixed-effects estimates of change in well-being between 2019 and 2021, while Figure 2 plots the estimated coefficients on the interaction between gender and the post-pandemic period ($Girl_i \times Post_t$). This coefficient captures the differential change in well-being for girls relative to boys over the period.

The results indicate a clear divergence in well-being trajectories. Boys' well-being remains broadly stable over time, whereas girls experience a larger decline following the shock. Conditional on similar pre-shock levels, the interaction coefficient indicates that girls' life satisfaction declined by 0.51 points relative to boys, corresponding to 0.32 standard deviations.

A similar pattern emerges for affective well-being. Positive affect declines significantly more among girls (-0.38 points, corresponding to 0.22 standard deviations), suggesting a meaningful reduction in the frequency of positive emotional states.

For negative affect, the fixed-effects estimates indicate a stronger increase among girls, corresponding to 0.50 points (0.22 standard deviations). However, this pattern is less consistent across specifications: pooled OLS estimates are smaller and not statistically significant (Table 2). This suggests that the evidence for negative affect is more sensitive to model specification than for positive dimensions of well-being.

The estimates remain stable when socio-economic controls are included, indicating that differences in observable characteristics do not account for the divergence. Moreover, the similarity between specifications with and without controls suggests that compositional changes play a limited role.

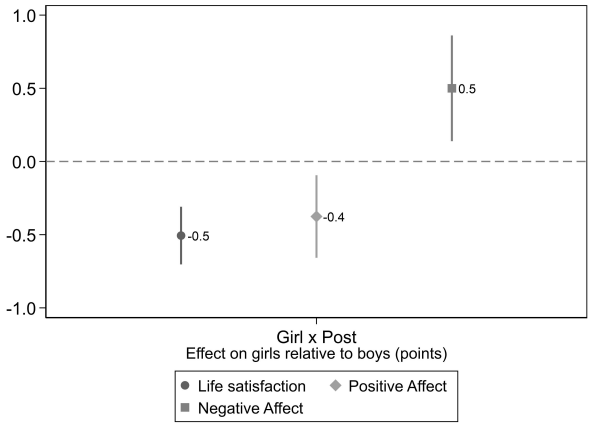
Taken together, the results indicate that the gender gap in subjective well-being emerges through differential responses to a common shock. Except for negative affect, girls and boys display similar levels of well-being before the disruption but follow markedly different trajectories afterward.

Table 1: Gender Differences in Changes in Children's Well-Being: Fixed-Effects Estimates

	(1) LS	(2) LS	(3) PA	(4) PA	(5) NA	(6) NA
Post	-0.100	-0.114	-0.139	-0.133	0.124	0.143
	(0.066)	(0.071)	(0.099)	(0.100)	(0.118)	(0.119)
Girl × Post	-0.506***	-0.506***	-0.364**	-0.376***	0.487***	0.500***
	(0.100)	(0.100)	(0.144)	(0.144)	(0.185)	(0.184)
Child FE	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES
R-sq	0.053	0.059	0.030	0.039	0.027	0.039
Observations	2685	2685	2208	2208	2208	2208

Notes: The table reports child fixed-effects estimates of changes in subjective well-being between 2019 and 2021. LS: life satisfaction, PA: positive affect, NA: negative affect. The coefficient on $Girl \times Post$ captures the differential change in well-being for girls relative to boys between this period. Time-varying controls include: child's age, log equivalent household income, number of siblings, parental labour market status, and housing conditions. Standard errors clustered at the child level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 2: Gender Differences in Changes in Children's Well-Being Following a Common Shock



Notes: The figure plots coefficient estimates of the interaction term $Girl \times Post$ from child fixed effects regressions. Outcomes include life satisfaction, positive affect, and negative affect. The coefficients capture the differential change in well-being for girls relative to boys between 2019 and 2021. circle correspond to Life Satisfaction, diamond to Positive Affect and square to Negative Affect. Vertical bars indicate 95% confidence intervals. Positive values indicate that girls experience a larger increase (or a smaller decline) in well-being than boys, while negative values indicate the opposite.

Table 2: Gender Differences in Changes in Children's Well-Being: Pooled OLS Estimates

	(1) LS	(2) LS	(3) PA	(4) PA	(5) NA	(6) NA
Girl	0.031	0.057	-0.054	-0.044	0.542***	0.538***
	(0.080)	(0.079)	(0.111)	(0.111)	(0.150)	(0.151)
Post	-0.086	-0.025	0.040	-0.027	0.101	0.171
	(0.066)	(0.066)	(0.090)	(0.091)	(0.111)	(0.114)
Girl × Post	-0.526***	-0.535***	-0.274**	-0.273**	0.111	0.099
	(0.100)	(0.100)	(0.130)	(0.130)	(0.173)	(0.172)
Child FE	NO	NO	NO	NO	NO	NO
Controls	NO	YES	NO	YES	NO	YES
R-squared	0.024	0.055	0.007	0.023	0.019	0.034
Observations	2685	2685	2208	2208	2208	2208

Notes: The table reports pooled OLS estimates for comparison with fixed-effects results. LS: life satisfaction, PA: positive affect, NA: negative affect. The coefficient on *Girl* × *Post* captures the differential change in well-being for girls relative to boys between 2019 and 2021. Control include: child's age, first-born status, number of siblings, migration background, log equivalent household income, parental labour market status, mother's age at birth, parent's education and housing conditions. Standard errors are clustered at the child levels and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

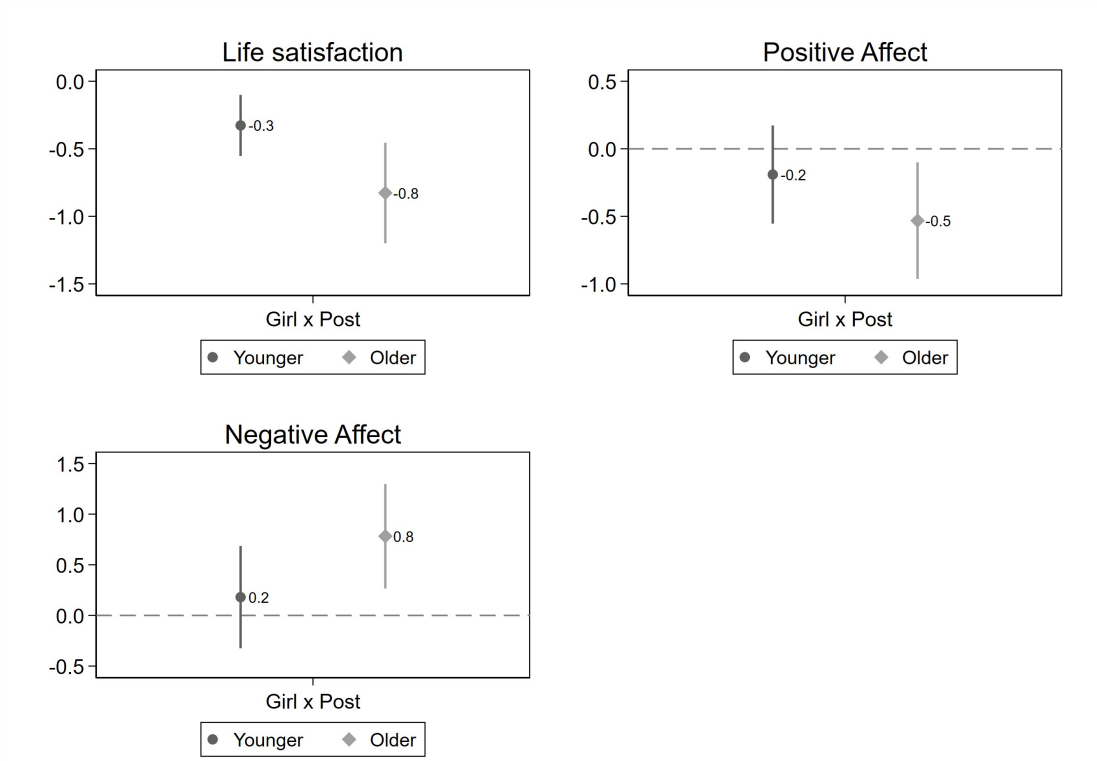
5.3 The divergence increases with age

Figure 3 examines whether the gender differential response to the shock varies across age groups. The results reveal substantial heterogeneity along the age dimension. While girls experience a relative deterioration in well-being compared to boys at all ages, the magnitude of this divergence increases markedly with age. For life satisfaction, the gender differential increases from about 0.3 points among younger children to around 0.8 points among older children. A similar pattern is observed for positive affect (from approximately 0.2 to 0.5 points) and negative affect (from about 0.2 to 0.8 points). These findings suggest that the divergence in well-being trajectories emerges primarily during late childhood and early adolescence.

These patterns indicate that the widening of gender disparities in well-being is not uniform across age groups but is concentrated among older children. This finding is consistent with evidence that sensitivity to social and emotional environments increases with age, particularly during adolescence (Blakemore, 2018), making older girls more responsive, and potentially more vulnerable, to common shocks.

Beyond age, children's socio-economic environments may also influence how well-being evolves

Figure 3: Heterogeneity in Gender Differences in Well-Being Responses by Age



Notes: The figure plots coefficient estimates of the interaction term $Girl \times Post$ from child fixed effects regressions, separately by age group. The coefficients capture the differential change in well-being for girls relative to boys between 2019 and 2021. Circles correspond to children aged 8–10 in 2019 and diamonds to children aged 12 in 2019. Vertical bars indicate 95% confidence intervals. Positive values indicate that girls experience a larger increase (or a smaller decline) in well-being than boys, while negative values indicate the opposite.

over this period. The next section examines whether the gender-differentiated response varies across family background and baseline well-being.

5.4 The divergence is not concentrated among disadvantaged children

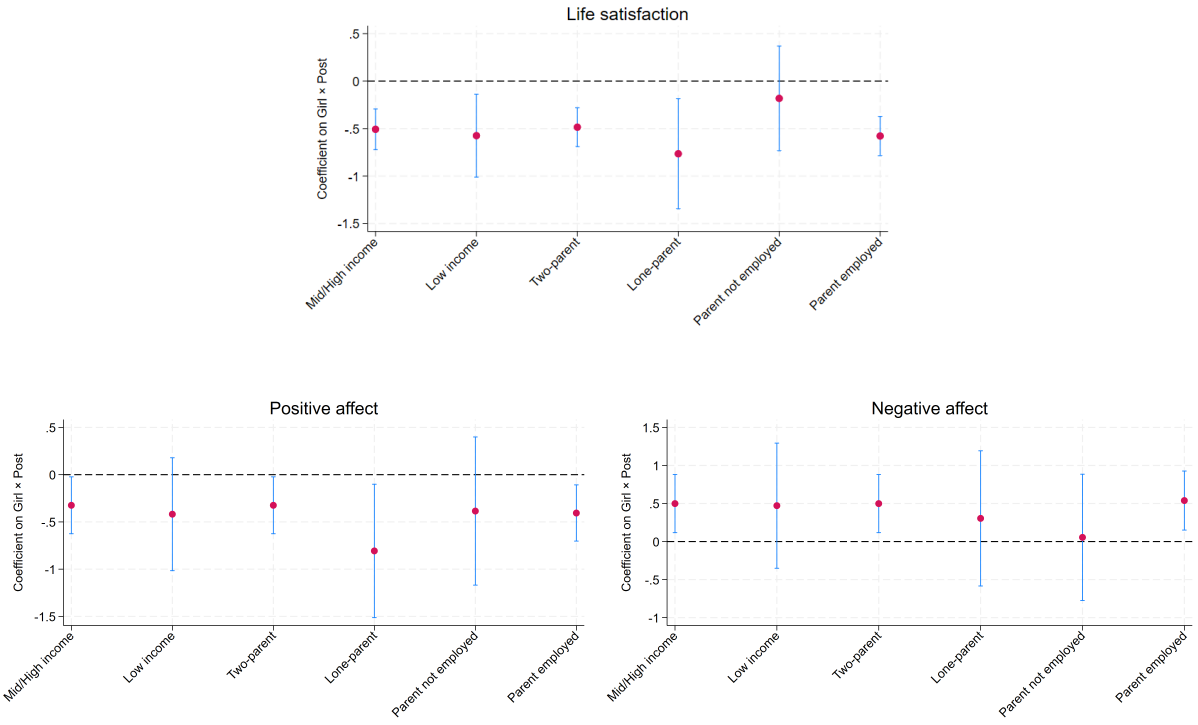
The average estimates reported above may mask heterogeneity across children's socio-economic environments. Family resources, household structure, and social background may shape both exposure to the disruptions generated by the pandemic and children's ability to cope with them. We therefore examine whether the gender-differentiated response to the shock varies across key dimensions of socio-economic conditions.

To do so, we extend the baseline specification by interacting the gender-specific post-pandemic effect with indicators of socio-economic conditions measured at baseline. In particular, we consider three dimensions: household income, parental labour market status, and family structure. Household income is captured by an indicator for being in the bottom quartile of the income distribution in 2019, while family structure and parental employment are measured using indicators for living in a single-parent household and for having an employed parent, respectively. For each dimension, we estimate specifications including triple interaction terms between gender, the post-pandemic indicator, and the socio-economic variable of interest. This approach allows testing whether the differential change in well-being for girls relative to boys varies systematically across socio-economic groups.

Figure 4 indicates that girls experience a larger decline in well-being than boys across all the three groups. The magnitude of the gap remains broadly similar when comparing children from different income levels, family structures and parental employment.

Overall, the results provide little support of systematic heterogenity in the gender gap across socio-economic groups. While there are some differences in point estimates, these are not precisely estimated and do not suggest meaningful divergence across groups. The emergence of the gender gap appears broad-based rather than concentrated among specific socio-economic groups. T

Figure 4: Heterogeneity in Gender Differences in Well-being Responses



Notes: The figure plots the estimated coefficient on *Girl* × *Post* from child fixed-effects regressions across socio-economic groups. The coefficients measure the differential change in life satisfaction for girls relative to boys between 2019 and 2021. Household income, parental employment, and family structure are measured in 2019. Vertical bars represent 95% confidence intervals.

5.5 Summary of the evidence

The evidence points to a consistent pattern. Girls and boys begin from similar levels of subjective well-being but react differently to a common disruption. The resulting divergence is observed across both evaluative and emotional dimensions of well-being, increases with age, and is not confined to specific socio-economic groups.

The previous sections document the emergence of a broad-based gender gap in subjective well-being following the disruption. We now turn to potential mechanisms and examine whether changes in specific domains of children's lives are consistent with the observed divergence.

5.6 Potential mechanisms

To shed light on the mechanisms underlying the divergence in well-being trajectories documented above, this section examines whether changes in specific life domains differ by gender and how they relate to changes in overall well-being. These analyses rely on within-child variation and should be interpreted as descriptive rather than causal.[8] They do not identify the contribution of each domain to the overall gender gap in well-being.

Figure 5 reports estimates from child fixed-effects regressions in which each life domain is used as the dependent variable. The figure displays the coefficient on the interaction between gender and the post-pandemic period (2021). Negative coefficients indicate that satisfaction in the corresponding domain declined more for girls than for boys. Appendix Table B.5 presents the full set of estimates.

The results reveal systematic gender differences across several domains. Satisfaction with family life, school, and self-perceptions declines significantly more among girls. The largest effect is observed for appearance, followed by school and family domains. Time use also declines more for girls, although the magnitude of the effect is smaller. In addition, girls experience a larger increase in loneliness relative to boys, consistent with evidence documenting higher levels of loneliness among girls across countries and age groups (Cosma et al., 2023).

Taken together, these patterns suggest that the gender divergence in overall well-being may reflect heterogeneous changes in children's daily environments. In particular, the domains that

[8]To facilitate comparisons across outcomes, all domains measures are standardized using the pooled sample. Results using original scales are reported in the Appendix.

deteriorate more for girls correspond closely to those that capture social interactions and self-perceptions, two dimensions that are central to children's socio-emotional development.

These findings are consistent with existing evidence on gender differences in daily activities and family environments. Time-use studies show that girls tend to spend more time on domestic tasks than boys, and that this gap increased during the pandemic (Del Boca et al., 2022). Changes in family routines may therefore contribute to heterogeneous changes in well-being across gender, as shifts in household organization and parental demands are associated with children's socio-emotional outcomes (Prime et al., 2020).

In addition, children may be indirectly affected by economic shocks through their parents. A large literature shows that parental stress and economic hardship affect children's outcomes, including socio-emotional health (for a recent review, see Page, 2024). Using UK data, Mendolia et al. (2021) document a widening gender gap in children's well-being during the pandemic, particularly among disadvantaged households. These mechanisms provide a potential link between changes in family environments and the gender differences documented here.

These results can also be interpreted in light of the broader literature on responses to major life events. The COVID-19 pandemic constitutes such an event, as it disrupted several dimensions of children's daily lives simultaneously. Existing evidence shows that major life events can generate persistent changes in subjective well-being (Lucas, 2007), although individuals differ in their responses (Yap et al., 2014). A key factor shaping these responses is how individuals perceive and experience the event (Luhmann et al., 2021; Prizmić-Larsen et al., 2020). This perspective is consistent with the gender differences documented above, as girls may respond more strongly to changes in social and relational environments.

Figure 6 further examines the within-child association between domain-specific measures and well-being outcomes using child fixed-effects models. The results show that changes in these domains are strongly associated with changes in well-being within individuals, with substantial heterogeneity across outcomes.

In particular, loneliness is strongly associated with negative affect than with positive affect, and also closely related to life satisfaction. This pattern is consistent with evidence showing that

increased loneliness and social isolation are associated with worse mental health outcomes among children and adolescents during the COVID-19 period (Loades et al., 2020b; Magson et al., 2021). Similar patterns are observed in adult populations, where women report higher levels of loneliness (Rebechi et al., 2024). Domains related to social relationships display comparable patterns, with stronger associations for life satisfaction and negative affect than for positive affect.

In contrast, domains related to family relationships and self-perceptions are strongly associated with both life satisfaction and positive affect, while their association with negative affect is more limited. These patterns indicate that different domains of children's lives relate differently to cognitive and affective dimensions of well-being.

Taken together, these findings provide a coherent picture of how gender differences emerge and evolve following a common shock. The domains that deteriorate more for girls are also those most strongly associated with within-child changes in well-being. While these associations do not identify causal effects, they are consistent with gender differences in both exposure and sensitivity to changes in social interactions, time use, and family environments.

6 Robustness Checks

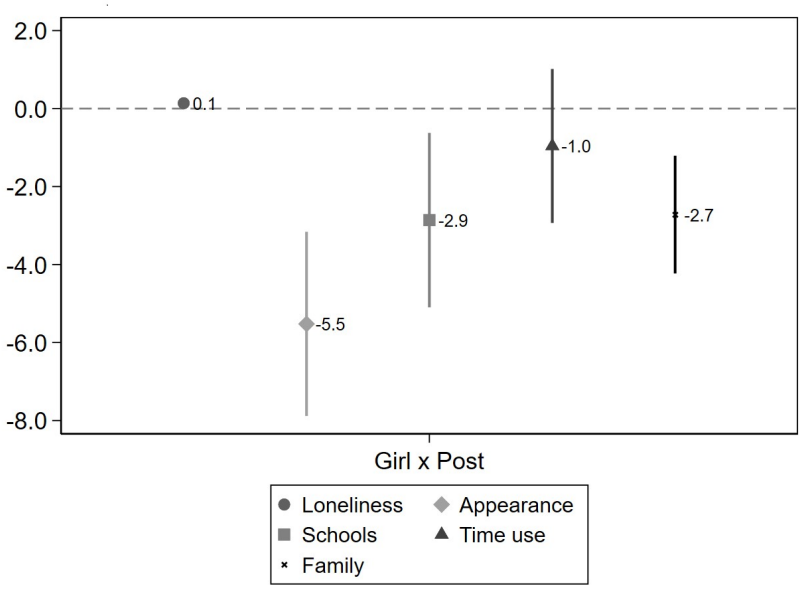
This section assesses the robustness of the main findings to alternative measurement assumptions, pre-existing differences in well-being trajectories, selective panel attrition, and potential reporting issues.

6.1 Alternative cardinalizations of subjective well-being scales

Subjective well-being measures are collected using ordinal response scales, and estimated effects may depend on how these scales are treated empirically. We therefore assess the robustness of the results to alternative cardinalizations following the approach proposed by Kaiser and Lepinteur (2025). Specifically, we apply the `coeff_reverser` command, which evaluates whether the sign of the estimated coefficient remains stable across all admissible monotonic transformations of the outcome variable.

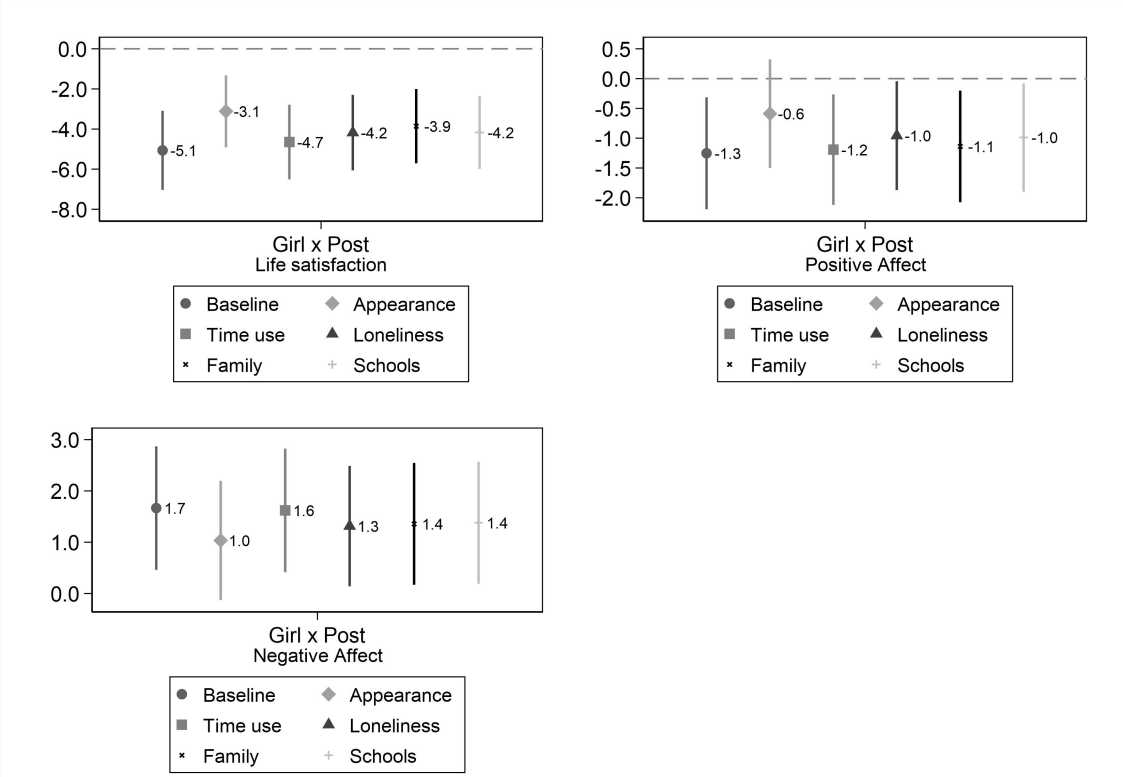
The results indicate that the estimated gender differential is robust for life satisfaction and

Figure 5: Gender Differences in Changes in Life Domains Following a Common Shock



Notes: The figure reports coefficients from child fixed-effects regressions where each life domain is used as the dependent variable. The coefficients correspond to the interaction term $Girl \times Post$ and capture the differential change in domain-specific satisfaction for girls relative to boys between 2019 and 2021. All domain variables are standardized using the pooled sample to facilitate comparison across outcomes. Negative coefficients indicate that satisfaction declined more for girls than for boys, while positive coefficients indicate the opposite. Standard errors are clustered at the child level, and vertical bars represent 95% confidence intervals.

Figure 6: Within-Child Associations Between Life Domains and Well-Being



Notes: The figure reports coefficient estimates from child fixed effects regressions of well being on domain-specific measures. The coefficients capture within-child associations between changes in each domain and changes in well-being between 2019 and 2021. Positive values indicate that increases in satisfaction in a given domain are associated with increases in well-being, while negative values indicate the opposite. Symbols represent point estimates and vertical bars indicate 95% confidence intervals. Standard errors are clustered at the child level.

positive affect (Appendix Table B.7). For both outcomes, the coefficient on $Girl \times Post$ remains negative across all admissible transformations. For negative affect, sign reversals occur only under extreme departures from linearity. Overall, the findings suggest that the emergence of the gender gap is not driven by specific assumptions regarding the cardinal interpretation of the well-being measures.

6.2 Pre-trends and age dynamics

A potential concern is that the estimated gender gap reflects pre-existing differences in well-being trajectories rather than differential responses to the shock. To assess this possibility, we estimate cross-sectional regressions using the 2019 wave only, allowing the relationship between age and subjective well-being to differ by gender.

The results provide little evidence of differential age profiles prior to the disruption. Interaction terms between age and gender are small and statistically insignificant across the three well-being dimensions. These findings suggest that girls and boys followed broadly similar well-being trajectories before the shock.

6.3 Attrition and sample selection

We next examine whether selective attrition may bias the results. We estimate linear probability models in which an indicator for non-response in 2021 is regressed on baseline well-being, gender, and their interaction (Appendix Table B.9).

Baseline well-being does not significantly predict attrition, and neither gender nor its interaction with baseline well-being is statistically significant. We also compare observable characteristics across survey waves (Appendix Table B.8) and find no meaningful changes in sample composition. Taken together, these results suggest that selective attrition is unlikely to explain the observed gender differences in well-being trajectories.

6.4 Reporting behaviour and seasonality

A final concern is that the estimated gender gap reflects differences in reporting behaviour rather than genuine changes in underlying well-being. Previous research documents gender differences in

the reporting of emotions and internalising symptoms (Chaplin and Aldao, 2013; Sanchis-Sanchis et al., 2020; Salk et al., 2017; Van Droogenbroeck et al., 2018). However, several features of the analysis mitigate this concern.

First, girls and boys report similar levels of life satisfaction and positive affect before the disruption, while substantial differences emerge only afterward. This pattern is difficult to reconcile with purely stable reporting differences. Second, the child fixed-effects specification removes all time-invariant reporting styles, implying that the estimates rely exclusively on within-child changes over time.

A related concern is seasonality. Both survey waves were conducted during the same period of the year (June to mid-July), which improves comparability across waves and reduces the likelihood that seasonal fluctuations explain the observed changes.

Taken together, these robustness checks provide little evidence that the observed gender gap is driven by pre-existing differences in trajectories, selective attrition, reporting behaviour, or specific assumptions regarding the measurement of subjective well-being. The main findings therefore appear robust across a range of alternative specifications and identification concerns.

7 Conclusion

This paper examines whether a common adverse shock generates differential changes in children's subjective well-being. Using longitudinal data from the Luxembourg Child Well-Being Survey, we compare children's well-being before and after a major disruption that affected schooling, social interactions, and daily routines.

The results reveal a consistent pattern across multiple dimensions of subjective well-being. Girls and boys report similar levels of life satisfaction and positive affect before the shock but follow significantly different trajectories afterward. Girls experience larger declines in life satisfaction and positive affect and a larger increase in negative affect. This divergence is not homogeneous. It grows with age, suggesting that older girls are particularly sensitive to changes in their social and educational environments, and it is consistent across income levels, family structures, and parental employment. The results are robust across alternative specifications, measurement assumptions,

and checks for selective attrition and pre-existing age trends.

The sources of this divergence are striking. Girls' satisfaction with school, family relationships, and their own appearance deteriorates more sharply than for boys, and their feelings of loneliness increases faster too. These are also the areas most strongly linked to within-child changes in well-being. The picture that emerges is that girls fared worse, particularly in those aspects of life most connected to self-image and relationships. While these analyses do not identify causal mechanisms, they provide evidence consistent with gender differences in how children experience and respond to major disruptions.

Our findings contribute to the literature on children's responses to adverse shocks, most of which has focused on health, education, and human capital accumulation rather than subjective well-being. The patterns identified here suggest that common shocks can produce unequal outcomes in subjective well-being because children respond differently once the shock hits. Understanding these heterogeneous responses is important for identifying which children are most vulnerable during periods of social and economic instability.

Whether this gender gap persists, narrows, or widens further as children move through adolescence is an open question that requires longer-term longitudinal data. More generally, identifying the mechanisms underlying girls' and boys' differential responses to common shocks remains an important avenue for future research on child development.

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Data availability

The data used in this study are not publicly available due to restrictions imposed by the data holder. The authors are available to assist researchers in the process of submitting an access request.

Ethics declarations

Research involving human participants

Ethical approval for the research design was granted by the ethics committee of Luxembourg Institute of Socio-Economic Research (LISER).

Informed consent

Participants and their parents were fully informed about the study. Children's informed consent was obtained actively, and parents also provided consent through an active informed consent procedure.

Conflict of interest

No relevant financial or non-financial conflicts of interest to disclose.

References

Achenbach, Thomas M., Stephanie H. McConaughy, and Catherine T. Howell, "Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity," *Psychological Bulletin*, 1987, *101* (2), 213–232.

Barrett, Lisa Feldman and James A. Russell, "Independence and Bipolarity in the Structure of Current Affect," *Journal of Personality and Social Psychology*, 1998, *74* (4), 967–984.

Blakemore, Sarah-Jayne, "Avoiding Social Risk in Adolescence," *Current Directions in Psychological Science*, 02 2018, *27*, 096372141773814.

Boca, Daniela Del, Noemi Oggero, Paola Profeta, and Mariacristina Rossi, "Did COVID-19 Affect the Division of Labor within the Household? Evidence from Two Waves of the Pandemic in Italy," *IZA Journal of Labor Economics*, 2022, *11* (1), 1–20.

Böckerman, Petri, Mika Haapanen, and Christopher Jepsen, "Early Parental Death and Its Association with Children's Mental and Economic Well-Being in Adulthood: A Nationwide Population-Based Register Study," *Journal of Epidemiology and Community Health*, 2023, *77* (10), 625–631.

Borah, Mona, Andreas Knabe, and Christian Lücke, "Is a Sorrow Shared a Sorrow Doubled? Parental Unemployment and the Life Satisfaction of Adolescent Children," *Review of Economics of the Household*, 2026, *24*, 475–497.

Bratti, Massimiliano and Mariapia Mendola, "Parental health and child schooling," *Journal of Health Economics*, None 2014, *35* (C), 94–108.

Breaux, Rosanna, Meredith R. Dvorsky, Nicole P. Marsh, Christine D. Green, Amanda R. Cash, Dipali M. Shroff, Nicole Buchen, Joshua M. Langberg, and Stephen P. Becker, "Prospective Impact of COVID-19 on Mental Health Functioning in Adolescents With and Without Attention-Deficit/Hyperactivity Disorder: Protective Role of Emotion Regulation Abilities," *Journal of Child Psychology and Psychiatry*, 2021, *62* (9), 1132–1139.

Casas, Ferran and Gwyther Rees, "Measures of Children's Subjective Well-Being: Analysis of the Potential for Cross-National Comparisons," *Child Indicators Research*, 2015, *8* (1), 49–69.

Chaplin, Tara M. and Amelia Aldao, "Gender Differences in Emotion Expression in Children: A Meta-Analytic Review," *Psychological Bulletin*, 2013, *139* (4), 735–765.

Conti, Gabriella and James J. Heckman, "The Economics of Child Well-Being," in Asher Ben-Arieh, Ferran Casas, Ivar Frones, and Jill Korbin, eds., *Handbook of Child Well-Being: Theories, Methods, and Policies in Global Perspective*, Dordrecht: Springer, 2013.

Cosma, Alina, Shynar Abdrakhmanova, Diana Taut, Karen Schrijvers, Carolina Catunda et al., "A Focus on Adolescent Mental Health and Wellbeing in Europe, Central Asia and Canada: Health Behaviour in School-Aged Children International Report from the 2021/2022 Survey. Volume 1," Technical Report, World Health Organization Regional Office for Europe 2023.

Droogenbroeck, Filip Van, Bram Spruyt, and Gil Keppens, "Gender differences in mental health problems among adolescents and the role of social support: Results from the Belgian Health Interview Survey," *BMC Psychiatry*, 2018, *18* (1), 6.

Engzell, Per, Arun Frey, and Mark D. Verhagen, "Learning loss due to school closures during the COVID-19 pandemic," *PNAS*, 2021, *118* (17).

Ferrara, Alessandro, Jan P. Heisig, Jonas Radl, and Alena Scheinert, "Parental Health Shocks and Child Outcomes at Ages 17–25: Evidence From Germany," *Journal of Marriage and Family*, 2025, *88* (1), 257–257.

Glaser, Florian and Gerald J. Pruckner, "A Hard Pill to Swallow? Parental Health Shocks and Children's Mental Health," *Health Economics*, 2023, *32* (12), 2768–2800.

Hansen, Kerstin F. and Alois Stutzer, "Parental unemployment, social insurance and child well-being across countries," *Journal of Economic Behavior & Organization*, None 2022, *204* (C), 600–617.

Kahneman, Daniel and Alan B. Krueger, "Developments in the Measurement of Subjective Well-Being," *Journal of Economic Perspectives*, March 2006, *20* (1), 3–24.

Kaiser, Caspar and Anthony Lepinteur, "Measuring the Unmeasurable? Systematic Evidence on Scale Transformations in Subjective Survey Data," Technical Report arXiv:2507.16440, arXiv 2025.

Kettlewell, Nathan, Richard W. Morris, Nicholas Ho, Deborah A. Cobb-Clark, Sally Cripps, and Nick Glozier, "The differential impact of major life events on cognitive and affective wellbeing," *SSM - Population Health*, 2019, *10*, 100533.

Kraemer, Helena Chmura, Jeffrey R. Measelle, Julie C. Ablow, Marilyn J. Essex, W. Thomas Boyce, and David J. Kupfer, "A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives," *American Journal of Psychiatry*, 2003, *160* (9), 1566–1577.

Kristiansen, Ida Lykke, "Consequences of serious parental health events on child mental health and educational outcomes," *Health Economics*, 2021, *30* (8), 1772–1817.

Lee, Joyce, "Mental Health Effects of School Closures During COVID-19," *The Lancet Child & Adolescent Health*, 2020, *4* (6), 421.

Lindo, Jason M., "Parental job loss and infant health," *Journal of Health Economics*, 2011, *30* (5), 869–879.

Loades, Maria E., Eleanor Chatburn, Natasha Higson-Sweeney, Shirley Reynolds, Roz Shafran, Anna Brigden, Chloe Linney, Matthew N. McManus, Chris Borwick, and Esther Crawley, "Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19," *Journal of the American Academy of Child & Adolescent Psychiatry*, 2020, *59* (11), 1218–1239.e3.

_ , _ , Nicola Higson-Sweeney, Shirley Reynolds, Roz Shafran, Anna Brigden, Charlotte Linney, Michael N. McManus, Christopher Borwick, and Esther Crawley, "Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19," *Journal of the American Academy of Child & Adolescent Psychiatry*, 2020, *59* (11), 1218–1239.e3.

Lucas, Richard E., "Adaptation and the Set-Point Model of Subjective Well-Being: Does Happiness Change After Major Life Events?," *Current Directions in Psychological Science*, 2007, *16* (2), 75–79.

Luhmann, Maike, Isabel Fassbender, Meredith Alcock, and Philipp Haehner, "A Dimensional Taxonomy of Perceived Characteristics of Major Life Events," *Journal of Personality and Social Psychology*, 2021, *121* (3), 633–668.

Maccini, Sharon and Dean Yang, "Under the weather: Health, schooling, and economic consequences of early-life rainfall," *American Economic Review*, 2009, *99* (3), 1006–1026.

Madigan, Sheri, Nicole Racine, Tracy Vaillancourt, Daphne J. Korczak, Jessica M. A. Hewitt, Patricia Pador, Jennifer L. Park, Brae Anne McArthur, Cynthia Holy, Rozlynn D. Neville et al., "Changes in Depression and Anxiety Among Children and Adolescents From Before to During the COVID-19 Pandemic: A Systematic Review and Meta-analysis," *JAMA Pediatrics*, 2023, *177* (6), 567–581.

Magson, Natasha R., Julia Y. A. Freeman, Ronald M. Rapee, Caroline E. Richardson, Ella L. Oar, and Jasmine Fardouly, "Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic," *Journal of Youth and Adolescence*, 2021, *50* (1), 44–57.

Maldonado, Joana Elisa and Kristof De Witte, "The effect of school closures on standardised student test outcomes," *British Educational Research Journal*, 2022, *48* (1), 49–94.

Mendolia, Silvia, Agne Suziedelyte, and Anna Zhu, "Have Girls Been Left Behind during the COVID-19 Pandemic? Gender Differences in Children's Mental Health," *Economics Letters*, 2021, *206*, 109999.

_ , _ , and _ , "Have Girls Been Left Behind During the COVID-19 Pandemic? Gender Differences in Pandemic Effects on Children's Mental Wellbeing," *Economics Letters*, 2022, *214*, 110458.

Miao, Ruoxuan, Yifei Chen, Kun Zheng et al., "Impact of the COVID-19 Pandemic on the Mental Health of Children and Adolescents: A Systematic Review and Meta-analysis of Longitudinal Studies," *Journal of Affective Disorders*, 2023.

Morris, Tim T., Danny Dorling, and George Davey Smith, "How Well Can We Predict Educational Outcomes? Examining the Roles of Cognitive and Non-Cognitive Skills Using Longitudinal Data," *Social Science & Medicine*, 2021, *287*, 114359.

Mörk, Eva, Anna Sjögren, and Helena Svaleryd, "Consequences of parental job loss on the family environment and on human capital formation-Evidence from workplace closures," *Labour Economics*, 2020, *67*, 101911.

Nikolova, Milena and Boris N. Nikolaev, "Family matters: The effects of parental unemployment in early childhood and adolescence on subjective well-being later in life," *Journal of Economic Behavior & Organization*, None 2021, *181* (C), 312–331.

Oreopoulos, Philip, Marianne E. Page, and Ann Huff Stevens, "The intergenerational effects of worker displacement," *Journal of Labor Economics*, 2008, *26* (3), 455–483.

Page, Marianne E., "New advances on an old question: Does money matter for children's outcomes?," *Journal of Economic Literature*, 2024, *62* (3), 891–947.

Peter, Frauke, "The effect of involuntary maternal job loss on children's behaviour and non-cognitive skills," *Labour Economics*, 2016, *42*, 43–63.

Prime, Heather, Mark Wade, and Dillon T. Browne, "Risk and resilience in family well-being during the COVID-19 pandemic," *American Psychologist*, 2020, *75* (5), 631–643.

Prizmić-Larsen, Zvjezdana, Ljiljana Kaliterna-Lipovčan, Randy Larsen, Tihana Brkljačić, and Andreja Brajša-Žganec, "The Role of Flourishing in Relationship Between Positive and Negative Life Events and Affective Well-Being," *Applied Research in Quality of Life*, 2020, *15* (5), 1413–1431.

Ravens-Sieberer, Ulrike, Anne Kaman, Christiane Otto, A. Adedeji, Ann-Kristin Napp, M. Becker, U. Blanck-Stellmacher, C. Löffler, Robert Schlack, and Heike Hölling, "Mental Health and Quality of Life in Children and Adolescents During the COVID-19 Pandemic—Results of the COPSY Study," *European Child & Adolescent Psychiatry*, 2022, *31*, 879–889.

Rebechi, Andrea, Anthony Lepinteur, Andrew E. Clark, Nattavudh Rohde, Claus Vögele, and Conchita D'Ambrosio, "Loneliness during the COVID-19 pandemic: Evidence from five European countries," *Economics and Human Biology*, 2024, *55*, 101427.

Rees, Gwyther, Shazly Savahl, Bong Joo Lee, and Ferran Casas, eds, *Children's Views on Their Lives and Well-Being in 35 Countries: A Report on the Children's Worlds Project, 2016–19*, Jerusalem, Israel: Children's Worlds Project (ISCWeB), 2020.

Reyes, Andres De Los, T. M. Augenstein, Meng Wang, S. A. Thomas, Deborah A. G. Drabick, D. E. Burgers, and Joshua Rabinowitz, "The validity of the multi-informant approach to assessing child and adolescent mental health," *Psychological Bulletin*, 2019, *145* (11), 1065–1099.

_ , _ , Min Wang, S. A. Thomas, D. A. G. Drabick, D. E. Burgers, and J. Rabinowitz, "The Validity of the Multi-Informant Approach to Assessing Child and Adolescent Mental Health," *Psychological Bulletin*, 2015, *141* (4), 858–900.

Roberts, Brent W. and Wendy F. DelVecchio, "The Rank-Order Consistency of Personality Traits from Childhood to Old Age: A Quantitative Review of Longitudinal Studies," *Psychological Bulletin*, 2000, *126* (1), 3–25.

Roberts, Robert E., Peter M. Lewinsohn, and John R. Seeley, "A brief measure of loneliness suitable for use with adolescents," *Psychological Reports*, 1993, *72* (3 Pt 2), 1379–1391.

Rose, Amanda J. and Karen D. Rudolph, "A Review of Sex Differences in Peer Relationship Processes: Potential Trade-Offs for the Emotional and Behavioral Development of Girls and Boys," *Psychological Bulletin*, 2006, *132* (1), 98–131.

Salk, Rachel H., Janet S. Hyde, and Lyn Y. Abramson, "Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms," *Psychological Bulletin*, 2017, *143* (8), 783–822.

Samji, Hasan, Justin Wu, Ayesha Ladak, Catherine Vossen, Emily Stewart, Natasha Dove, David Long, Grant Snell, Areej Alqassem, Winston Cheng et al., "Review: Men-

tal Health Impacts of the COVID-19 Pandemic on Children and Youth—A Systematic Review," *Child and Adolescent Mental Health*, 2022, *27* (2), 173–189.

Sanchis-Sanchis, A. et al., "Effects of Age and Gender in Emotion Regulation," *Frontiers in Psychology*, 2020, *11*, 946.

Schimmack, Ulrich, Ed Diener, and Shigehiro Oishi, "Life-Satisfaction Is a Momentary Judgment and a Stable Personality Characteristic: The Use of Chronically Accessible and Stable Sources," *Journal of Personality*, 2002, *70*, 345–384.

Shemyakina, Olga, "The effect of armed conflict on accumulation of schooling: Results from Tajikistan," *Journal of Development Economics*, 2011, *95* (2), 186–200.

Yap, Stevie C. Y., Ivana Anusic, and Richard E. Lucas, "Does happiness change? Evidence from longitudinal studies," in Kennon M. Sheldon and Richard E. Lucas, eds., *Stability of Happiness*, Elsevier, 2014, pp. 127–145.

Zhelyazkova, Nevena, Froukje Gerber, and Monika Valentova, "Parental Leave Under COVID-19: Global Perspectives," in "Annual Conference of the International Network for Leave Policies and Research 2020" 2021. Paper presented at the Annual Conference of the International Network for Leave Policies and Research.

Appendix A Data flow process

Our analytical sample is constructed using data from the Luxembourg Children's Well-Being Survey combined with administrative records. The initial dataset includes all children observed in 2019 (7,738) and 2021 (2,119).

Survey data are matched to administrative records using the unique identifier LOGIN. Observations that cannot be matched are excluded (1,657 in 2019 and 512 in 2021). The data are then cleaned by excluding individuals with incomplete information on key outcome variables, socio-economic characteristics of the household, and individual controls.

The final analytical sample includes 2,986 observations corresponding to 1,448 children observed in both survey waves.

Survey weights are adjusted to account for differential response rates. Initial weights are calibrated using the 2019 population structure and corrected for the lower response rate observed in 2021.

Figure A.1 illustrates the construction of the analytical sample.

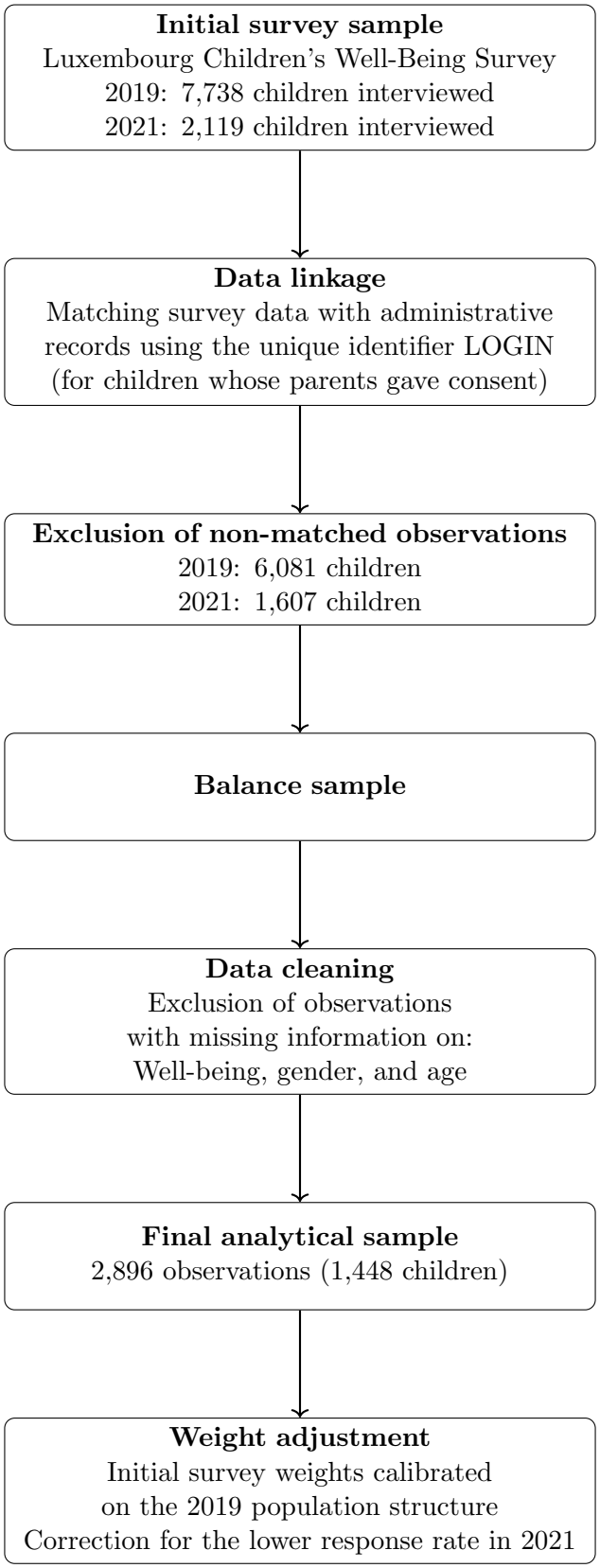

Figure A.1: Construction of the analytical sample

Appendix B Supplementary Tables and Figures

Table B.1: Summary statistics by year-Balanced sample

	(1) 2019	(2) 2021	(3) 2021–2019
Age (years)	9.943	11.943	2.000***
Girl	0.491	0.492	0.001
First-born child	0.700	0.700	0.000
Number of siblings	0.759	0.759	0.000
Parent: low education	0.637	0.621	-0.015
Two parents born abroad	0.478	0.478	0.000
One parent native	0.203	0.203	0.000
Two parents native	0.319	0.319	0.000
Father employed	0.834	0.836	0.001
Mother employed	0.814	0.823	0.009
Mother's age at birth	31.938	31.938	0.000
Equivalized household income	64,781	67,749	2,968
Observations	1,448	1,448	2,896

Notes: The table reports sample means for the 2019 and 2021 waves. Column (3) reports the difference between 2021 and 2019. *** p<0.01.

Table B.2: Gender Differences in Children's Well-Being

	(1) Boy	(2) Girl	(3) Diff. 2019	(4) Boy	(5) Girl	(6) Diff. 2021
Overall life satisfaction	8.83	8.83	0.0	8.75	8.25	0.50***
Positive affect	7.99	7.90	0.09	8.04	7.65	0.40***
Negative affect	2.55	2.64	-0.09***	2.64	3.30	-0.66***
Observations	737	711	1,448	737	711	1,448

Notes: The table reports mean levels of children's well-being by gender in 2019 and 2021. Differences correspond to mean differences between boys and girls. *** p<0.01

Table B.3: Gender Differences in Changes in Children's Well-Being: Pooled OLS Estimates

	LS		PA		NA	
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	0.031	0.056	-0.054	-0.044	0.542***	0.538***
	(0.080)	(0.079)	(0.111)	(0.111)	(0.150)	(0.151)
Post	-0.086	-0.024	0.040	-0.027	0.101	0.171
	(0.066)	(0.066)	(0.090)	(0.091)	(0.111)	(0.114)
Girl × Post	-0.526***	-0.534***	-0.274**	-0.273**	0.111	0.099
	(0.100)	(0.100)	(0.130)	(0.130)	(0.173)	(0.173)
First born		0.111		-0.057		0.030
		(0.095)		(0.108)		(0.142)
Nb of siblings		0.072		0.023		-0.076
		(0.052)		(0.060)		(0.086)
Parent: low education		0.061		0.013		-0.010
		(0.045)		(0.052)		(0.071)
Mother's age at birth		-0.003		-0.008		-0.002
		(0.008)		(0.008)		(0.012)
Lone parent		-0.537***		-0.147		0.301*
		(0.126)		(0.117)		(0.163)
Parent: employed		0.192*		0.206*		-0.372**
		(0.111)		(0.122)		(0.153)
Two parents native	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Two parents born abroad		0.178**		0.047		0.001
		(0.079)		(0.094)		(0.128)
One parent native		0.166*		0.037		-0.024
		(0.095)		(0.109)		(0.151)
Household income (Log)		-0.006		-0.014		0.042
		(0.044)		(0.051)		(0.068)
Own bedroom		0.152		0.245**		0.078
		(0.105)		(0.124)		(0.156)
Constant	8.831***	9.568***	7.986***	9.457***	2.543***	2.437***
	(0.058)	(0.595)	(0.079)	(0.725)	(0.096)	(0.956)
Child FE	NO	NO	NO	NO	NO	NO
Controls	NO	YES	NO	YES	NO	YES
Observations	2685	2685	2208	2208	2208	2208
R-squared	0.024	0.055	0.007	0.023	0.019	0.034

Notes: The table reports pooled OLS estimates for comparison with fixed-effects results. LS: life satisfaction, PA: positive affect, NA: negative affect. The coefficient on *Girl* × *Post* captures the differential change in well-being for girls relative to boys between 2019 and 2021. Standard errors are clustered at the child levels and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.4: Gender Differences in Changes in Life Domains: Fixed-Effects Estimates

	LS		PA		NA	
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.100	-0.114	-0.139	-0.133	0.124	0.143
	(0.066)	(0.071)	(0.099)	(0.100)	(0.118)	(0.119)
Girl × Post	-0.506***	-0.506***	-0.364**	-0.376***	0.487***	0.500***
	(0.100)	(0.100)	(0.144)	(0.144)	(0.185)	(0.184)
Lone parent		-0.198		-0.158		0.393
		(0.263)		(0.442)		(0.450)
Parent: employed		-0.024		-0.739**		-0.305
		(0.272)		(0.356)		(0.448)
Household income (Log)		0.146		0.068		-0.007
		(0.142)		(0.178)		(0.224)
Own bedroom		0.194		0.096		-0.595*
		(0.184)		(0.221)		(0.348)
Constant	8.848***	6.692***	8.094***	8.261***	2.685***	0.875
	(0.025)	(1.598)	(0.044)	(2.110)	(0.056)	(2.770)
Child FE	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES
Observations	2685	2685	2208	2208	2208	2208
R-squared	0.053	0.059	0.030	0.039	0.027	0.039

Notes: The table reports FE estimates where each column corresponds to a life-domain measure. The coefficient on *Girl* × *Post* captures the differential change in domain-specific satisfaction for girls relative to boys between 2019 and 2021. All domain variables are standardized using the pooled sample. Control variables include time-varying child and household characteristics. Standard errors are clustered at the child levels and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.5: Gender gap in Life domains- FE

	(1) Family	(2) Neighborhood	(3) School	(4) Appearance	(5) Time use	(6) Loneliness
Girl × Post	-0.523***	-0.378**	-0.446**	-0.774***	-0.358**	0.137***
	(0.175)	(0.173)	(0.184)	(0.197)	(0.179)	(0.050)
Child FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq	0.247	0.254	0.191	0.142	0.238	0.007
Observations	2675	2659	2682	2676	2665	2685

Notes: Standard errors are clustered at the child levels and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.6: Summary descriptive statistics for life-domain satisfaction

	2019			2021		
	Boy	Girl	Difference	Boy	Girl	Difference
Appearance	8.981	8.923	-0.058	8.684	8.140	0.579***
Family	9.597	9.623	0.026	9.173		0.265***
School	8.594	8.868	0.274	8.481		0.003
Time use	9.163	9.104	-0.059	8.891		0.160*
Loneliness	-0.060	-0.034	0.026	-0.087		-0.153***
Observations	737	711	1448	737	711	1448

Notes: The table reports mean levels of satisfaction across life domains in 2019 and 2021. The difference column reports the change between survey waves. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.7: Robustness to Monotonic Transformations of the Outcome Variable

	Coef.	Min. coef.	Max. coef.	Min. c
Life satisfaction	-0.658***	-1.850	0.008	-1.700
Positive affect	-1.103***	-2.872	-0.043	—
Negative affect	0.759**	-0.280	1.902	0.300

Notes: This table reports the robustness of the estimated gender differential (girl × post) to monotonic transformations of the outcome variables using the coefficient reverser procedure. Coef. denotes the baseline estimate. Min. coef. and Max. coef. report the lower and upper bounds of the coefficient under admissible transformations. Min. c indicates the minimum degree of non-linearity required to reverse the sign of the coefficient. A missing value (—) indicates that no sign reversal is possible within the considered range. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.8: Comparison of Respondents Across Survey Waves

	(1) 2019	(2) 2021	(3) Difference
Girl	0.492	0.497	-0.004
Age (year t)	9.928	11.919	-1.991***
First born	0.681	0.708	-0.025
Nb of siblings	0.812	0.766	0.042
Parent: low education	0.668	0.626	0.042*
Mother age at birth	30.959	31.833	-0.844***
Lone parent	0.158	0.149	0.006
Parent: employed	0.837	0.826	0.008
2 parents born abroad	0.527	0.481	0.050***
1 parent native	0.185	0.205	-0.020
2 parents native	0.288	0.314	-0.030*
Household income (Log)	10.716	10.804	-0.096***
Own bedroom	0.774	0.857	-0.082***
Observations	5700	1478	7178

Notes: Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.9: Predictors of Attrition Between 2019 and 2021

	(1) Life satisfaction	(2) Positive Affect	(3) Negative Affect
Girl	0.062	-0.020	0.010
	(0.069)	(0.076)	(0.023)
Overall life satisfaction	0.001		
	(0.006)		
Girl × Overall life satisfaction	-0.007		
	(0.008)		
Positive affect		0.004	
		(0.006)	
Girl × Positive affect		0.001	
		(0.009)	
Negative affect			0.004
			(0.005)
Girl × Negative affect			-0.009
			(0.007)
Age of the child in 2021	0.000	-0.005	-0.006
	(0.004)	(0.007)	(0.007)
First born	-0.052***	-0.035*	-0.036*
	(0.016)	(0.020)	(0.020)
Nb of siblings	-0.009	-0.006	-0.006
	(0.009)	(0.011)	(0.011)
Parent: low education	0.016*	0.005	0.005
	(0.009)	(0.012)	(0.012)
Mother: age at birth	-0.009***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)
Lone parent	0.026	0.025	0.025
	(0.017)	(0.021)	(0.021)
Parent: employed	0.025	0.033	0.033
	(0.018)	(0.022)	(0.022)
2 parents native	*Ref.*	*Ref.*	*Ref.*
2 parents born abroad	0.040***	0.038**	0.037**
	(0.015)	(0.018)	(0.018)
1 parent native	-0.002	-0.028	-0.029
	(0.018)	(0.023)	(0.023)
Household income (Log)	-0.024**	-0.024**	-0.023**
	(0.009)	(0.011)	(0.011)
Own bedroom	-0.008	-0.003	-0.004
	(0.015)	(0.019)	(0.019)
Constant	1.259***	1.229***	1.254***
	(0.124)	(0.172)	(0.164)
Observations	5316	3483	3483
R-squared	0.020	0.016	0.016

Notes: This table reports estimates from a linear probability model of attrition between 2019 and 2021. The dependent variable is an indicator equal to one if the child is observed in the 2021 wave, and zero otherwise. All explanatory variables are measured at baseline (2019). Standard errors are clustered at the child level and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.10: Association between pre-pandemic characteristics and change in well-being (2019-2021)

	(1) LS	(2) LS	(3) PA	(4) PA	(5) NA	(6) NA
Girl	-0.512***	-0.495***	-0.422***	-0.390***	0.459**	0.491***
	(0.095)	(0.098)	(0.137)	(0.142)	(0.178)	(0.183)
Controls	NO	YES	NO	YES	NO	YES
Observations	1448	1343	936	866	936	866
R-squared	0.020	0.049	0.010	0.031	0.007	0.027

Notes: This table reports the association between pre-pandemic characteristics and changes in children's well-being between 2019 and 2021. The dependent variable is the individual-level change in well-being over the period. All explanatory variables are measured at baseline (2019). The estimates should be interpreted as descriptive correlations rather than causal effects. Standard errors are clustered at the child level and reported in parentheses. Standard significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.