

The Happiness Paradox of Birth Order

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Abstract: That happiness tracks income is an abiding finding in the social science literature. First-born children tend to have higher socioeconomic attainment than later-borns, and therefore are expected to be relatively happier. Using data from representative U.S. surveys (approximately 15,000 individuals and 7,000 siblings), I find that although first-borns have substantially higher income levels, birth order effects on indicators of psychological well-being—life satisfaction, positive affect, and mental health—are statistically non-significant. Nevertheless, observed first-born effects on life satisfaction, albeit small, align with differences implied by birth order income gaps and the income–well-being gradient. By contrast, first-borns have significantly lower levels of positive affect and mental health than implied by their income advantage, revealing a happiness paradox. Possible explanations for the paradox are explored. These findings highlight the relevance of social context in shaping the income–happiness link, and invite investigation into relational determinants of well-being that may be independent of material success.

Keywords: happiness; subjective well-being; birth order; income effect

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ONE of the most robust findings in the social science literature is that there is a positive association between income and happiness (Diener et al. 2010; Kahneman and Deaton 2010; Killingsworth 2021; Newman, Gordon, and Mendes 2025). Money matters for happiness—or more formally, subjective well-being (SWB)—not only because it is necessary for fulfilling needs and wants (Veenhoven 1991), but also because people are sensitive to how much money they have compared to their “reference groups,” or similarly situated others (Alderson and Katz-Gerro 2016; Firebaugh and Schroeder 2009; Liao 2021). However, previous research has also revealed certain paradoxical cases where SWB seems not to track economic conditions: higher well-being in poorer rural areas versus cities (Sørensen 2021), lower life satisfaction among materially driven individuals (Headey 2008), more reactivity to adverse events among the affluent (Rauf 2023a), and null happiness effects of cash transfers among low-income individuals (Magnuson et al. 2025). These apparent violations of the positive manifold of affluence and happiness illuminate the role of sociological processes, and especially noneconomic phenomena, in shaping well-being. This article focuses on one such important and universally relevant phenomenon: the families into which we are born.

Families of origin are crucibles of cognitive, psychological, and emotional development for children, as well as sources of some of the primary and enduring social relationships throughout the life course. Processes originating in the family can

have an outsized influence on individuals' lives well into adulthood (Lutfey and Mortimer 2006). Much research has been devoted to understanding the impacts of inter-household differences in social class and family structure on children's outcomes. But even within families, children in different birth orders can have heterogeneous experiences due to variation in familial configurations at key developmental stages, differential allocation of parental resources, and the nature of role identities defined by their birth order (Kammeyer 1967; Steelman et al. 2002; Zajonc and Markus 1975).

A large body of prior research shows that first-born children, on average, out-compete later-borns in academic and labor market success (Black, Devereux, and Salvanes 2011; Conley, Pfeiffer, and Velez 2007; Grätz 2018; Kristensen and Bjerkedal 2007; Zhang 2025). Theories about happiness suggest that the resulting inequalities will be mirrored in differential levels of happiness due to not only the differences in material conditions, but also because siblings can be important reference groups with which one might compare one's relative socioeconomic standing. However, evidence about well-being effects of birth order is mixed, with some studies finding that first-borns experience more psychological distress (Carballo et al. 2013; Feehan et al. 1994; Franklin et al. 2024; Kramer, Kushner, and Rzhetsky 2026) and others suggesting that being first-born is protective for psychological well-being (Black, Devereux, and Salvanes 2016; Easey et al. 2019; Rostila, Saarela, and Kawachi 2014).

Drawing a coherent picture of birth order effects on income and well-being from the extant literature is complicated by methodological issues. First, although there is robust evidence of a first-born advantage in education and some labor market outcomes, such effects could be short-lived, with income differences fizzling out by middle adulthood. For instance, in some European countries, later-borns have lower starting wages but catch up to first-borns after a decade of labor market entry (Bertoni and Brunello 2016). Family incomes may also become equalized between siblings through non-wage income or compensatory kin transfers (Altonji, Hayashi, and Kotlikoff 2000; Cherlin 2023). As such, whether birth order even affects holistic economic conditions underpinning the well-being–income link—such as total earnings or family income—remains an open question. Second, even if a birth order income gap persists, it may be too small to warrant expectations of any meaningful effect on happiness. Relatedly, affective and mental health dimensions of well-being seem to be less responsive to money than evaluative dimensions (Diener et al. 2010; Kahneman and Deaton 2010; Lindqvist, Östling, and Cesarini 2020); as such, the absence of effects in one aspect of well-being does not necessarily imply the absence of well-being effects altogether. Third, previous findings about psychological effects of birth order are based on heterogeneous social settings, samples, model specifications, life course stages, and birth cohorts. Such methodological heterogeneity could potentially explain at least some of the variation in findings across studies.

This article examines birth order effects on income and psychological well-being to investigate whether these effects imply a happiness paradox. I use data from probability samples of two U.S. cohorts to estimate effects in the population and within families. To develop a comprehensive picture of the effects of birth rank on economic conditions, I analyze permanent total income and permanent family income during midlife. Permanent income measures reflect the same life

course stage for all participants, are less prone to measurement error, and are more predictive of well-being than current income (D'Ambrosio, Jäntti, and Lepinteur 2020; Rauf 2023b). To interrogate potential variation across dimensions of well-being, I examine three measures: life satisfaction, positive affect, and mental health (Headey, Kelly, and Wearing 1993; Lucas, Diener, and Suh 1996). I also estimate income–happiness associations in these data to compute the implied birth order effects on well-being given the income gap between first- and later-borns, and compare implied and observed effects for each of the six combinations of income and well-being indicators. Finally, I examine the role of non-attainment processes in shaping the link between birth order and happiness.

Background

Effects of Birth Order for Life Outcomes

Social scientists have long argued that the order in which siblings are born influences how they experience the world (Kammeyer 1967; Steelman et al. 2002; Zajonc and Sulloway 2007). According to one theory—the confluence model (Zajonc and Markus 1975)—siblings experience differences in family environments because familial configurations vary during critical periods of their development, such that the availability of parental time and resources is most ample during the early childhood of first-borns. Consistent with this theory, research shows that U.S. parents indeed spend more time in cognitively engaging activities with their first-born children (Lehmann, Nuevo-Chiquero, and Vidal-Fernandez 2018). Another reason that birth order could differentially structure children's experiences is that certain birth ranks are regarded as meaningful social roles, entailing distinct rewards, expectations, and responsibilities (Turner 2001). One reward that seems to accompany the eldest child's role is greater parental investment in the child's human capital development, even when other siblings are present. For instance, parents allocate more nutrition to their eldest child (Jayachandran and Pande 2017; Stradford, Van Poppel, and Lumey 2017), are more likely to provide preventive medical care for the oldest child (Kaplan, Mascie-Taylor, and Boldsen 1992; Pruckner et al. 2021), and are more likely to send their first-born to a private school (Conley and Glauber 2006). However, eldest children may also experience more role strain, such as caregiving responsibilities for younger siblings, especially in the wake of parental absence or economic stressors (e.g., Conley 2004; Settersten, Elder, and Pearce 2021).

As a result of differential family environments, one may expect siblings' outcomes to vary across a variety of life domains. One domain where consistent birth order effects have been observed is socioeconomic attainment: compared to later-borns, first-borns on average have higher test scores (Black et al. 2011; Conley et al. 2007), higher educational attainment (Black, Devereux, and Salvanes 2005; Booth and Kee 2009; Grätz 2018; Zhang 2025), more remunerative college majors (Barclay, Hällsten, and Myrskylä 2017), higher-paying occupational roles (Black, Grönqvist, and Öckert 2018), and higher wages (Bertoni and Brunello 2016; Black et al. 2005; Kantarevic and Mechoulam 2006). In other domains, results are mixed. For example, birth order has no meaningful effects on a wide range of social

attitudes in the United States (Freese, Powell, and Steelman 1999). Although some personality differences between first- and later-borns have been noted, the specific traits identified differ across studies (e.g., Ashton and Lee 2025; Paulhus, Trapnell, and Chen 1999; Steelman and Powell 1985); at least one study has found no birth order effects on personality traits in the United States, United Kingdom, and Germany (Rohrer, Egloff, and Schmukle 2015).

Part of the difficulty in attributing average sibling differences to birth order is selection bias. Sibling configuration is randomly assigned in the sense that people do not choose their own birth rank, and neither is rank associated with genetic differences (Isungset et al. 2022). Nevertheless, there is selection into birth order because later-borns have larger sibships; in turn, larger family size is associated with worse child outcomes due to the “dilution” of parental resources (Steeleman et al. 2002). Additionally, parental socioeconomic status (SES) predicts sibship size (Currie and Moretti 2003). Given the relevance of socioeconomic class for many life outcomes of interest, class and sibship size are both sources of confounding. Another confounder is the age of the mother at birth: children born to teenage mothers have worse birth outcomes (net of SES) due to age-related biological processes (Fishman and Min 2018; Valero De Bernabé et al. 2004), and women’s average age at the time of first-birth is automatically younger than at later-births. To some extent, dissimilar results in prior studies may be explained by differential strategies to account for selection. Nevertheless, as far as birth order inequalities in socioeconomic attainment are concerned, there is considerable evidence of significant differences both between- and within-families across diverse cultural and institutional contexts.

Expectations about Birth Order Effects on Subjective Well-Being

The positive effects of being first-born on attainment-related outcomes suggest that eldest children would typically have higher incomes than later-borns. This expectation about birth order income differences also entails expectations about higher psychological well-being among first-borns for several reasons: (1) Having more economic resources positively affects psychological well-being by improving people’s quality of life and buffering against psychologically distressing experiences (Businelle et al. 2014; Rauf 2023b; Veenhoven 1991). (2) Social comparison accounts of happiness suggest that the higher incomes of first-borns may induce feelings of “relative deprivation” in later-born siblings (Merton 1968; Stouffer 1949), lowering the latter’s psychological well-being (Alderson and Katz-Gerro 2016; Firebaugh and Schroeder 2009; Liao 2021). (3) Certain factors could lead to selection into both income and happiness: for instance, preferential parental treatment may positively impact the health and happiness of first-born children, which may in turn benefit both their future psychological well-being and earnings (De Neve and Oswald 2012; Oswald, Proto, and Sgroi 2015). In sum, we may expect parallel first-born advantages in income and well-being due to the multiple pathways that maintain the association between these two variables.

On the other hand, two processes associated with being first-born could temper or offset positive psychological effects of higher income. (1) Differential responsiveness to income: if eldest children’s success is driven by the internalization of

higher parental expectations of academic or material achievement, they could be more likely to develop traits such as materialism and competitiveness. Although these traits fuel achievement, they can also increase the threshold of achievement at which people feel satisfied with their lives (Headey 2008; Sirgy et al. 2013). This could result in lower income elasticity among first-borns compared to later-borns. (2) Effects on non-income determinants of happiness: as mentioned, being the eldest child can entail various role expectations that may not always improve well-being. For example, parents more frequently subject their eldest children to punishment for failing to live up to their educational expectations (Hotz and Pantano 2015), which could be a scarring experience with lingering psychological consequences. First-borns may also face more familial demands, especially with regard to help and caregiving (Settersten et al. 2021; Sutor and Pillemer 2007). In turn, their socialization into nurturant roles and closeness with parents can leave eldest children more vulnerable to adverse “network events” (Kessler and McLeod 1984). As such, although there are reasons to suspect that first-borns will on average be happier, there are also compelling reasons why the opposite may be the case.

Prior Evidence of Birth Order Effects on Happiness

Prior findings about the effects of birth order on outcomes related to psychological well-being are mixed. Studies of youth generally suggest that eldest children have higher rates of emotional disorders compared to later-borns (Carballo et al. 2013; Feehan et al. 1994; Franklin et al. 2024; Fullerton et al. 1989; Qi et al. 2025). One recent study of U.S. health insurance records also reports higher prevalence of depression diagnoses among first-borns in a sample aged 15–60 years (Kramer et al. 2026). Other studies of adults have reported null birth order effects on life satisfaction in Germany (Rohrer, Egloff, and Schmukle 2017) and mental health in the United Kingdom (Stannard, Berrington, and Alwan 2019). To my knowledge, only one study, by Black et al. (2016), has found positive first-born effects of approximately 0.11 s.d. on happiness and 0.09 s.d. on mental health among Norwegian adults.¹ And one specific dimension of negative well-being—suicidality—has also been reported to be lower among both first-born youth and adults across several studies (Andrews 2006; Bjørngaard et al. 2013; Rostila et al. 2014; Steck et al. 2018).

Synthesizing these findings into a coherent narrative about birth order effects is less than straightforward. As mentioned earlier, the variation in findings may partly be due to the strategies used to address confounding. However, some of the differences may not be mere statistical artifacts. One reason for genuine differences in effects reported across studies could be cultural and institutional contexts, which can moderate the impact of social factors on happiness (Ono and Lee 2013). Another reason could be that different dimensions of well-being may be more or less reactive to changes in economic and social conditions. For example, affect and mental health seem to be less responsive to money than evaluative well-being (Diener et al. 2010; Kahneman and Deaton 2010; Lindqvist et al. 2020).

Given the goal of this article to interrogate whether birth order has similar directional effects on income and happiness, I examine effects on both sets of outcomes within the same social context, using uniform modeling strategies in

order to rule out statistical artifacts. Further, I examine three different measures of SWB to tease out potentially divergent effects across dimensions of well-being.

Data

This study uses data from the National Longitudinal Survey of Youth (NLSY) cohorts of 1979 and 1997 (Bureau of Labor Statistics 2025, 2026). These samples are nationally representative of, respectively, U.S. residents who were aged between 14 and 22 years in 1979 and between 12 and 18 years in 1997. Several attributes of these datasets make them particularly well-suited for this inquiry. First, both have followed individuals from youth to midlife at a regular frequency (initially annually, and then biennially), and collected high-quality, repeated measures of income and well-being. Second, the sampling designs are quite similar, as are the instruments, including most measures of key variables, which allows pooling the samples to increase statistical power. Third, siblings were sampled for a substantial proportion of the households, which enables within-family analysis for a subset of respondents. By design, the sampled siblings in the NLSY have limited age gaps, which precludes comparisons between first- and higher-ranked siblings. However, the relatively limited range of birth years within each dataset also limits cohort effects, which could otherwise be a potential source of bias (Zhang 2025).

NLSY79 dropped about 2,722 supplementary sample cases after 1990; I exclude these. I also exclude individuals who died before age 30 (<200 cases in each sample) and those who were missing information on birth order. For the remaining cases, missing data were imputed using chained multiple imputation. Details about imputation are provided in the online supplement S1. The analyses also exclude twins and only children, as these groups do not directly contribute to the estimation of differences between first- and later-borns and are typically excluded from studies of birth order (e.g., Barclay et al. 2017; Black et al. 2018).

The final combined analytic sample size is 15,306 cases; including 7,056 biological siblings. The full sample allows the detection of a minimum effect size of about 0.05 s.d. with 80 percent power.² As stated earlier, the magnitude of a significant positive effect of being first-born reported in a previous study is roughly around 0.1 s.d. (Black et al. 2016). The present study is well-powered to detect an effect half as large at the population level (though not in within-family models).

Both NLSY datasets oversampled disadvantaged groups, and therefore unweighted estimates are not representative of the underlying populations. To obtain unbiased estimates, all analyses employ survey weights that account for the probability of selection and attrition. I use the custom weights provided by the NLSY for analyses of cases in any and all years. Weights are normalized within each cohort so that each is equally weighted. After weighting, the full and sibling samples have comparable family and demographic characteristics (see full descriptive statistics in Table S1 in the online supplement).

Birth Order

NLSY79 only has reliable data for biological siblings (full and half, without further distinction), whereas NLSY97 collected data on all sibling relations. To create a uniform measure, I define birth order with respect to biological siblings (including both alive and deceased). Although this focus on biological siblings is a shortcoming, it allows for a cleaner test of birth order differences operating via the environment, as adoptive or step-siblings may have experienced non-monotonic changes in their sibling rank during childhood, making it difficult to pin down the effects of their birth order. In NLSY79, birth rank is established based on an item indicating relative birth order with respect to each sibling, but precise age differences are not available for all sibling dyads. Therefore, I can more accurately establish whether a respondent was first-born or later-born for the largest number of cases than the birth rank and/or age gaps between siblings. Further details about sibling data are provided in the online supplement S1.

Income

I examine two measures: personal and family income. Personal income includes wages, salary, military service income, and farm and business income (minus expenses). This measure most directly reflects first-born advantages via human capital acquisition. Family income is a more comprehensive measure of economic conditions, including the labor earnings of the respondent and their spouse, capital earnings, and income transfers. This measure therefore also captures non-labor market effects of birth order on material quality of life, for example through financial support from parents (Mechoulan and Wolff 2015) or through assortative mating.

Both income measures were collected in every survey wave, although there is some missing data due to non-interview or non-response. I impute missing values based on the person-specific intercept and age trend in each cohort. I then average real income measures (converted to 2023 constant dollars) over ages 29 to 40 for each participant to obtain permanent income. Research on income trends in European countries shows that later-borns have lower starting wages but experience stronger earnings growth in the first 10 years of labor market entry (Bertoni and Brunello 2016); I exclude early labor market years to avoid biasing estimates in favor of first-borns. Since the oldest NLSY97 respondents are only in their mid-40s in the latest survey, I cap age at 40 so that permanent income reflects a similar life course window across all cases.

Subjective Well-Being

I examine three dimensions of well-being: life satisfaction (LS), positive affect (PA), and mental health (MH). LS pertains to the overall evaluation of one's life; PA refers to the frequency of experienced happiness in the recent past; and MH is measured as the inverse of the seven-item Center for Epidemiological Studies Depression (CES-D) scale (Radloff 1977). These measures were collected at different ages and exhibit age trends.³ With the goal of approximating average well-being during midlife, I adjust for age using a locally weighted age trend for each cohort.⁴ Where

multiple measures are available, I average detrended measures for each participant across survey waves. Because well-being items were not available in every wave, I use a longer window of observation than that used for computing permanent income; this is justified given that well-being exhibits a strong trait component (Lucas and Donnellan 2007) and the data are already detrended for age effects. With the exception of life satisfaction in NLSY97 (recorded only once, at ages 23 to 29),⁵ only measures recorded at or after age 25 are used. The maximum age at which well-being is reported is 66 years in NLSY79, and 44 years in NLSY97. Measures are standardized within cohort. See the online supplement S1 for specific question wording and the timing of data collection.

Analytic Approach

The Effect of Birth Order on Life Outcomes

I define the birth order effect as the average difference in an outcome (i.e., income or well-being) between first- and later-borns that is due to the postnatal environment. I estimate birth order effects using weighted linear regressions that control for observed sources of confounding. The model is specified as follows:

$$Y_i = \alpha + \delta_1 FB_i + \mathbf{X}_i \beta + u_i, w_i, \quad (1)$$

where Y is the outcome of interest and individuals are indexed by i . FB is a dichotomous variable indicating first-born versus later-born status (reference category). δ_1 is the estimate of the birth order effect. $\mathbf{X}$ is a vector of covariates, which include sibship size, whether the mother was a teenager at the time of birth, the socioeconomic condition of the family of origin (operationalized as the highest educational attainment among parents, the log of family income in Wave 1, and parental coresidence during childhood), the respondent's sex, race/ethnicity (black, Hispanic, and other), and survey cohort. Survey weight is represented by w_i . Because the full sample contains a subset of related individuals, standard errors are clustered by household to account for interdependence between observations.

Although model 1 adjusts for observable sources of confounding, it does not address potential unobservable sources of selection into birth order. A stricter test would entail comparing differences between first- and later-borns within the same family. As a supplementary test, I also estimate family fixed-effects (FFE) models, specified as follows:

$$Y_{if} = \alpha_f + \delta_2 FB_{if} + \mathbf{X}_i \beta + v_{if}, w_f. \quad (2)$$

The subscripts i and f index individuals and families, respectively. The fixed effect, α_f , controls for all observable and unobservable attributes of the family that are shared between siblings. Race/ethnicity is constant within families in this sample (I exclude a handful of families that had different-race siblings).⁶ Covariates include variables that vary within families: binary indicators of gender and birth to a teenage mother. δ_2 is the within-family estimate of the birth order effect. NLSY did not provide family level sampling weights, so I adjust for the differential probability

of selection by approximating the smallest person weight within the family as the family weight (w_f).

Differences in the magnitude of δ_1 and δ_2 will indicate the extent of unobserved confounding of birth order effects in the population-level analyses. Prior research in non-U.S. settings has found these differences to be trivial for outcomes related to attainment (Black et al. 2016). However, regardless of differences in estimated effect sizes, there will be greater uncertainty around δ_2 , given the much smaller sample size and the data-intensiveness of fixed effects models.

The Association between Income and Well-Being

To interrogate whether the observed well-being differences between first- and later-borns align with expectations based on the birth-order income gaps—i.e., to test if there is a “paradox” of happiness—I begin by estimating the magnitude of the association between permanent income and well-being.

Previous research shows that various dimensions of well-being exhibit diminishing returns to income, such that the relationship between well-being and log income is relatively linear (Kahneman and Deaton 2010; Layard, Mayraz, and Nickell 2008; Rauf 2023b; Stevenson and Wolfers 2013). In Figure 1, I plot the locally weighted scatterplot smoothing (LOWESS) trend between each of the well-being measures and the log of permanent family and personal income, respectively. The top and bottom 5 percent of observations are excluded to remove potential outliers (Layard et al. 2008). These graphs show that this relationship is linear for the most part, which justifies modeling well-being as a function of log income.

I use the following model to estimate the income–well-being association:

$$wellbeing_i = a + b_1 \log(income_i) + \mathbf{X}_i \beta + e_{if}, w_f \quad (3)$$

where b_1 is the income elasticity of well-being, net of covariates. I add \$100 to the income measures before taking the log to avoid excluding observations with zero income. The vector of covariates, $\mathbf{X}$, only includes factors that potentially confound the income–well-being association (Bartram 2021): namely, sex, race/ethnicity, and survey cohort.

Next, I compute the expected effect of being first-born on well-being as the average effect of increasing income by a magnitude of δ_1 dollars. Note that income is linear in Equation (1) but logged in Equation (2). To estimate the expected well-being difference, I calculate the difference in predicted values of well-being given $\log(income_i)$ and $\log(income_i + \delta_1)$. The expected effect of birth order on well-being is defined as this difference multiplied by b_1 .

Tests of Mechanisms

To interrogate **differential elasticity**, I re-estimate Equation (3) on samples stratified by birth order and compare the estimates of b_1 using a t-test. The role of **non-attainment processes** is tested using structural equation models (SEMs), where the total effect of being first-born on well-being is decomposed into a direct effect and an indirect effect through a non-attainment process, Z (Sobel 1987). This model is

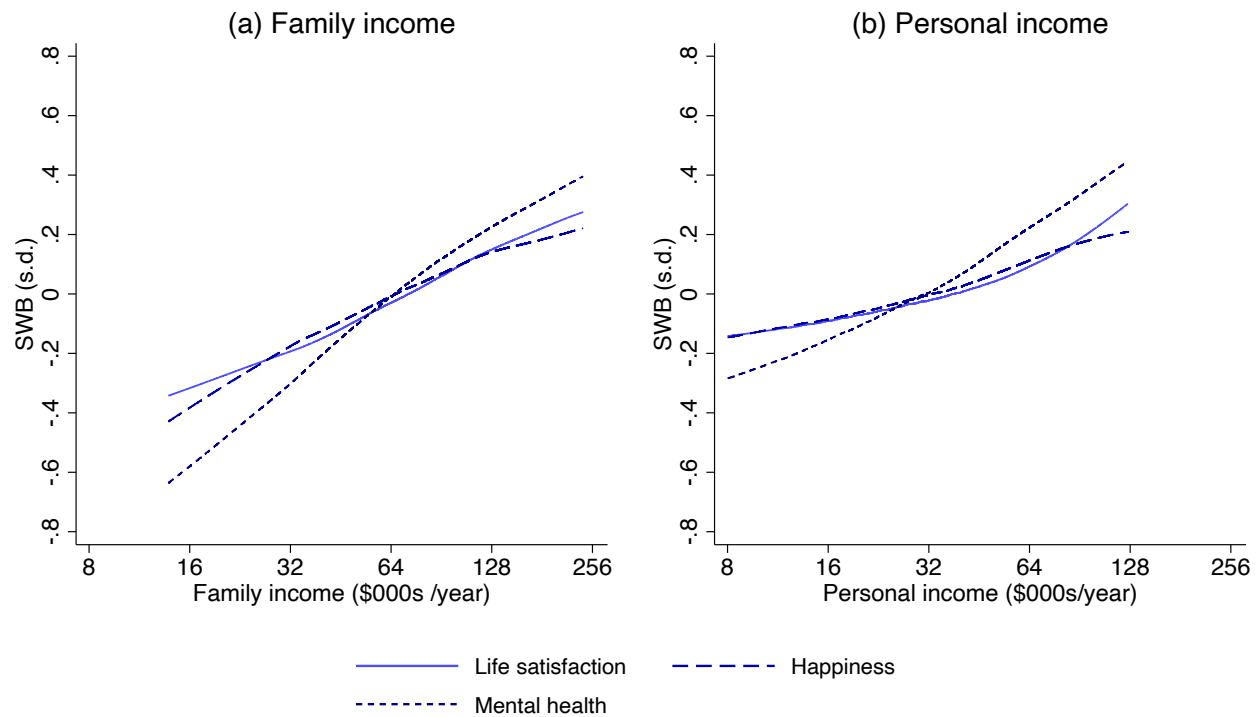


Figure 1: Relationship between income and subjective well-being. *Note:* permanent income is computed as the average of real income in 2023 constant dollars during ages 29 to 40. Well-being measures were residualized on age using locally weighted smoothing regressions and converted to z-scores.

specified as follows:

$$wellbeing_i = \alpha + \beta_1 FB_i + \beta_2 Z_i + \gamma' \mathbf{X} + u_i, w_i \quad (4)$$

$$Z_i = \lambda + \theta_1 FB_i + \phi' \mathbf{X} + e_i, w_i. \quad (5)$$

$\mathbf{X}$ includes the same set of covariates as in Equation (1). The indirect effect of birth order via Z is the product of θ_1 and β_2 .

Results

Do First-Borns Have Higher Incomes?

Figure 2 shows first-born effects on earned and family incomes, respectively (complete regression results are reported in Table S2.1 in the online supplement). In the population, first-borns on average earn about \$6,000/year ($p = 0.019$) more compared to later-borns, net of sibship size and family SES. There is a similarly sized effect of birth order within families (\$6,700/year and $p = 0.138$), although confidence intervals (CIs) here are much wider. Differences in personal income are comparatively smaller, but in a consistent direction: on average, first-borns earn about \$2,800/year ($p = 0.008$) more than later-borns, net of sociodemographic

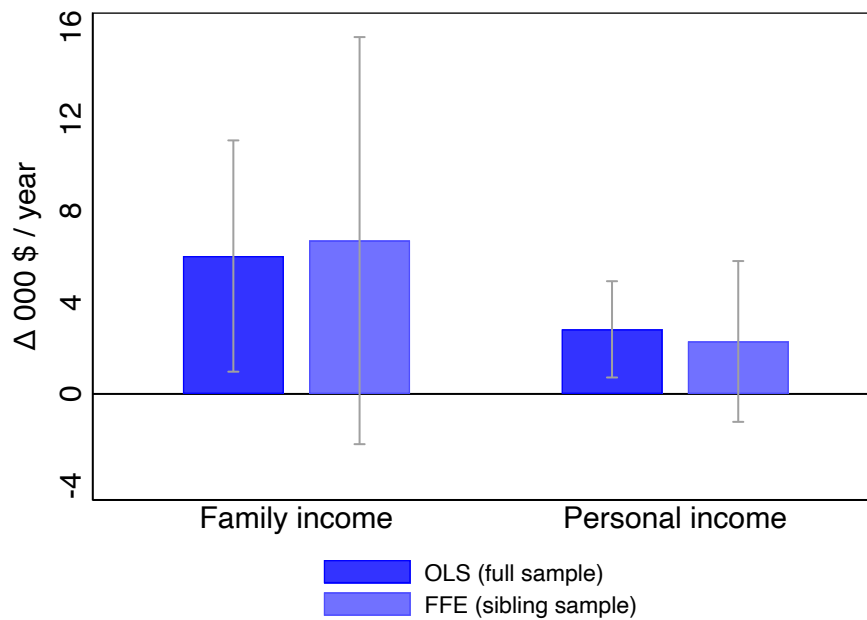


Figure 2: Effects of being first-born on permanent income. *Note:* capped bars show 95 percent CIs. Estimates are weighted. OLS (ordinary least squares) regressions control for sex, race/ethnicity, sibship size, parental education, log of parental income in Wave 1, parents' coresidential status in Wave 1, birth to a teenage mother, and National Longitudinal Survey of Youth (NLSY) cohort; $N = 15,306$. FFE (family fixed effects) regressions control for sex and teenage birth; $N = 7,056$.

controls. And within families, the first-born effect on personal income is about \$2,300/year ($p = 0.196$). To put the magnitude of these effects in context, the average first-born effect on family and personal income in these models, respectively, translates to an 8 percent and 7 percent increase over the sample median income. This effect size is larger than the estimated causal effect on children's incomes of a four year increment in parental education (Lee, Roys, and Seshadri 2024) or the benefit of attending a pre-K program for children from middle-income families (Bartik 2014).⁷

Given the limitations of the sibling sample (discussed earlier), it is not surprising that FFE estimates are not statistically significant. However, the comparable magnitude of effects across OLS and FFE estimates suggests that the income differences in the population are not meaningfully biased by unobserved confounding after controlling for sibship size and family variables. The differences in effects between family income and personal income suggest that eldest children's advantages in material conditions accrue through both labor market and non-labor market channels. As mentioned, the latter could include parental transfers, capital earnings, and selection into marriage with higher-earning partners. Irrespective of the income source, these results confirm that in midlife, first-borns are on average more materially advantaged than later-borns.

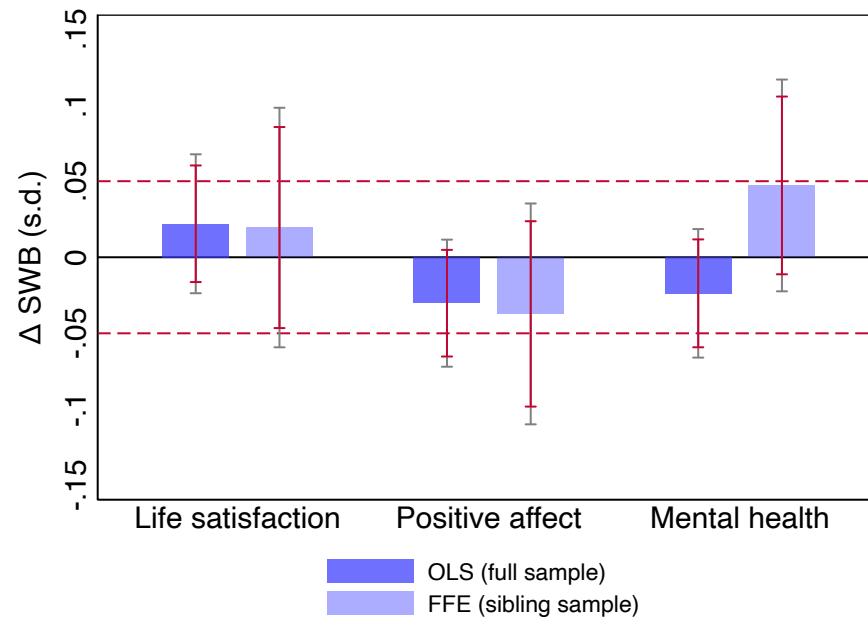


Figure 3: Effects of being first-born on subjective well-being in midlife. *Note:* gray capped bars show 95 percent CIs; red capped bars show 90 percent CIs. Dashed horizontal lines show equivalence bounds of ± 0.05 s.d., which is approximately the minimum detectable effect size in this sample. Estimates are weighted. OLS regressions control for sex, race/ethnicity, sibship size, parental education, log of parental income in Wave 1, parents' coresidential status in Wave 1, birth to a teenage mother, and NLSY cohort; $N = 15,306$. FFE regressions control for sex and teenage birth; $N = 7,056$.

Are First-Borns Happier?

Next, I interrogate whether first-borns also experience a well-being advantage compared to later-borns. This seems to not be the case. Figure 3 shows that across all three well-being measures, there are small and non-significant differences between first- and later-borns (complete regression results are provided in Table S2.2 in the online supplement). The effect sizes in the population are smaller than a 20th of a standard deviation ($\beta_{LS} = 0.02$ s.d., $\beta_{PA} = -0.03$ s.d., and $\beta_{MH} = -0.02$ s.d.). Effect sizes are similarly small in FFE models ($\beta_{LS} = 0.03$ s.d., $\beta_{PA} = -0.04$ s.d., and $\beta_{MH} = 0.05$ s.d.).

As mentioned, the minimum detectable effect size for population estimates is approximately 0.05 s.d. (with 80 percent power), and much smaller for FFE estimates. This means that despite the observed effects being non-significant at $p < 0.05$, we cannot rule out that there may be small true effects that these samples failed to detect. I use equivalence tests (Lakens, Scheel, and Isager 2018) to interrogate whether the data are consistent with true effect sizes being smaller than ± 0.05 s.d. This involves constructing 90 percent CIs, such that the distance from the equivalence threshold of ± 0.05 provides a one-sided t-test of whether the absolute effect is smaller than the threshold. For life satisfaction, the 90 percent CI for both OLS and FFE estimates exceeds the upper bound of the equivalence threshold, suggesting that we cannot rule out a true effect as large as 0.05 s.d. In contrast for positive

affect, the 90 percent CIs for OLS and FFE estimates cross the lower equivalence bound, suggesting that the true effect could be as negative as -0.05 s.d.

For mental health, results are mixed, with the OLS estimate being possibly as negative as and FFE estimates as positive as the equivalence threshold. Directional differences between OLS and FE estimates can typically be interpreted as evidence of unobserved confounding in the former. Here, however, such an interpretation could be incorrect, given the lack of evidence of bias due to unobserved confounding in other measures (i.e., the other two well-being measures as well as income). Moreover, the FFE models are not well-powered to detect small effects, and it is not unreasonable here to expect a sign error (Gelman and Carlin 2014). It is also worth noting that a negative first-born effect on mental health would be consistent with findings from a different U.S. sample (Kramer et al. 2026).

Is There a Happiness Paradox of Birth Order?

The aforementioned analyses showed that birth order has a significant and positive effect on permanent income but not on well-being. Given the robust association between income and well-being reported in the literature, these results appear inconsistent. However, to establish that there is indeed a happiness paradox, one needs to know whether these effects significantly differ from what one would expect given both the first-born effect on income and the strength of the income–well-being association.

In Figure 4, I compare the observed first-born effect in well-being outcomes against expected effects implied by birth order differences in family and personal incomes, respectively. Estimates of expected effects are based on models articulated in Equation (3) (full results are provided in Table S3.1 in the online supplement). The CIs are adjusted such that nonoverlapping intervals indicate statistically significant differences at $p < 0.05$ (Knol, Pestman, and Grobbee 2011).

For life satisfaction (panel A), observed effects of being first-born are consistent in both sign and magnitude with the expected effects. The overlapping CIs indicate that differences between observed and expected effects are statistically insignificant. As such, even though birth order effects on life satisfaction are not statistically significant, there is no evidence for a paradox in this case. However, for positive affect (panel B), observed and expected effects point in opposite directions: first-borns experience, on average, 0.05 s.d. *lower* positive affect than expected based on their income advantage. These results are consistent for both population-level and within-family estimates, and the differences between observed and expected effects are statistically significant at $p < 0.05$.

In the case of mental health (panel C), observed population and within-family estimates contradict: the OLS estimates significantly differ from expected effects (by 0.06 s.d. and $p < 0.05$), whereas FFE estimates align with expectations. However, as mentioned, I regard the FFE estimate with skepticism given the anomalousness of this result and the possibility of a sign error.

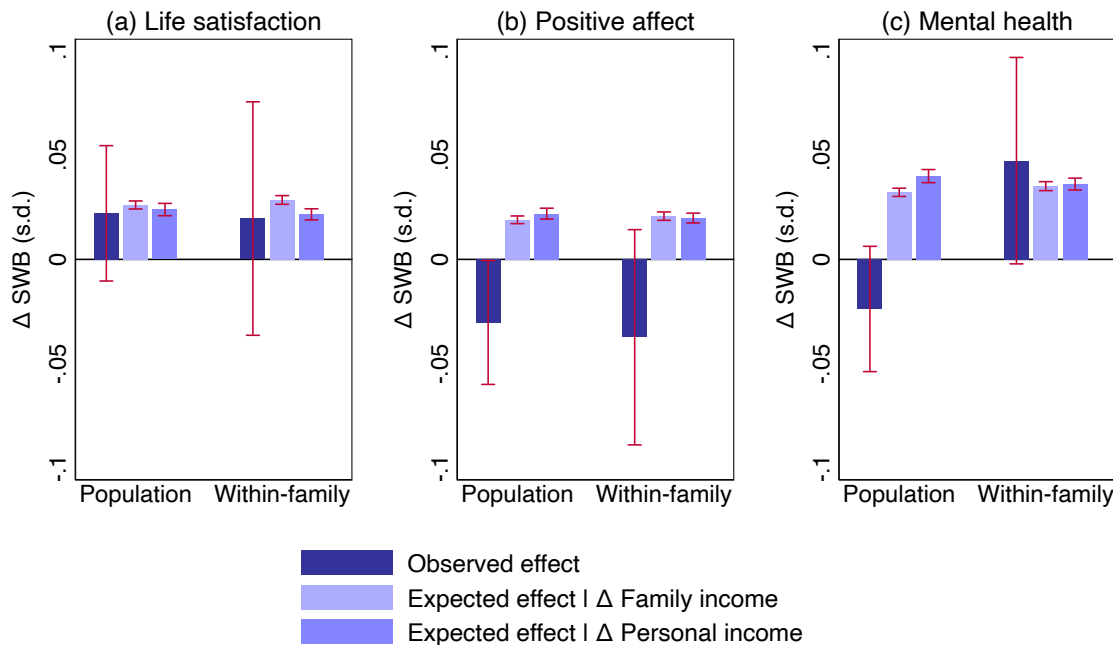


Figure 4: Expected versus observed differences in well-being by birth order. Note: red capped bars show 83.4 percent CIs, such that nonoverlapping bars indicate statistically significant differences at $p < 0.05$. Observed effects are obtained from weighted linear regression models controlling for sex, race/ethnicity, sibship size, parental education, log of parental income in Wave 1, parents' coresidential status in Wave 1, birth to a teenage mother, and NLSY cohort. Expected effects are based on weighted linear regressions predicting well-being as a function of log of permanent income; $N = 15,306$.

What Explains the Negative Population Effects of Being First-Born?

A definitive result from the aforementioned analyses is that in the population, first-borns have about 0.05–0.06 s.d. lower positive affect and mental health than implied by their income advantage over later-borns. In this section, I investigate two possible explanations for this result: (1) first-borns may be less responsive to income, and (2) being first-born may adversely impact non-income determinants of happiness, offsetting the impact of income.

As a test of differential elasticity, I estimated the association between income and well-being in stratified samples of first- and later-borns, respectively (Fig. 5; full results are provided in Tables S3.2 and S3.3 in the online supplement). Based on these data, there do not appear to be any birth order differences in reactivity. This negates the theory that first-born children's socioeconomic success may have accompanied the internalization of happiness-suppressing traits, such as competitiveness or materialism.

I next interrogate whether birth order may adversely affect well-being through non-pecuniary pathways. I consider two sets of non-pecuniary determinants of happiness: (1) physical and psychological endowments, and (2) familial roles and relations. To examine changes in these factors over the life course, I created separate measures pertaining to experiences in youth (here, pre-25 years) and midlife (post-25 years). Full definitions are provided in the online supplement S4. Except for

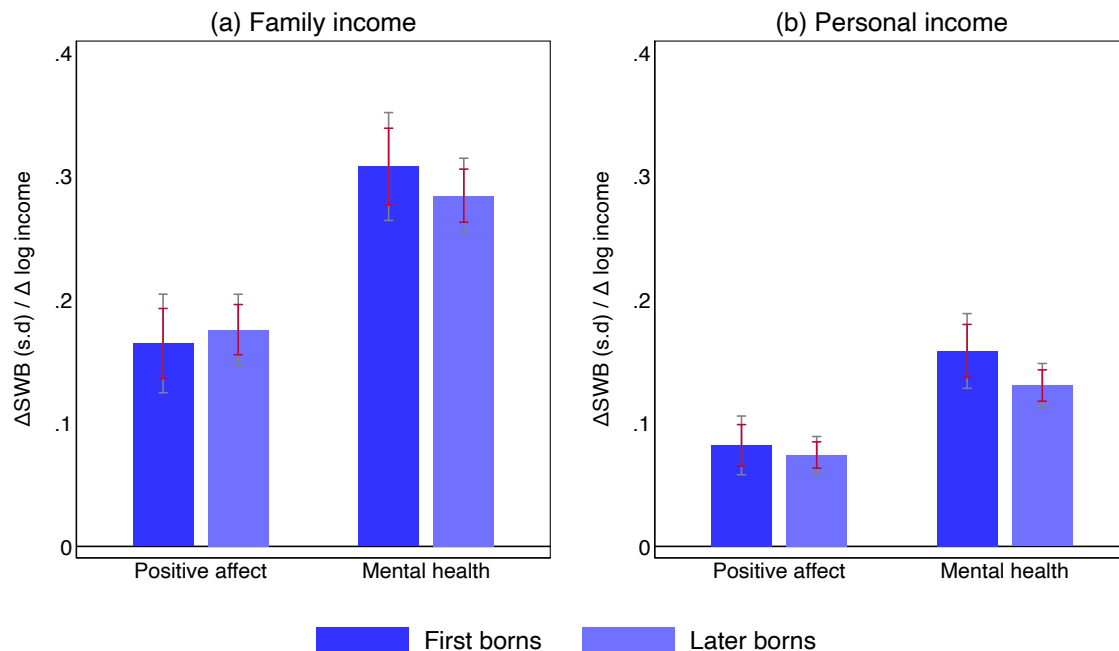


Figure 5: Moderation of the income–well-being association by birth order. *Note:* capped gray bars show 95 percent CIs; red bars show 83.4 percent CIs. Nonoverlapping red bars indicate statistically significant differences between coefficients at $p < 0.05$. Estimates are based on weighted linear regression models controlling for sex, race/ethnicity, and the NLSY cohort.

health in adolescence, all other measures were only available in one of the two NLSY samples.

Figure 6 summarizes estimates from SEMs for the part of the birth order effect on well-being that could be explained via a specific non-income channel.⁸ Overall, being first-born does not seem to negatively impact happiness through most of the channels that could be observed here: health, internal locus of control, self-esteem, parental help, and even being a caregiver appear to have a net positive influence on the well-being of first-borns. The only exception is parental abuse, which seems to be a pathway through which being first-born negatively impacts affective experience and mental health in adulthood. This finding aligns with previous accounts of first-borns being subject to stricter parenting (Hotz and Pantano 2015). Even though here this does not seem to affect first-borns' perceptions of being loved, childhood abuse can nevertheless have a lingering effect on mental health (Horwitz et al. 2001).

To directly investigate the extent to which having been abused by parents might explain the happiness paradox, I estimated models predicting birth order effects on SWB after controlling for parental abuse (Table S4 in the online supplement).⁹ Net of abuse incidence, the birth order gap in SWB outcomes is considerably less negative (in OLS models: $\beta_{PA} = +0.0001$; $\beta_{MH} = -0.005$ s.d), although it remains smaller than the expected difference in SWB implied by the income gap. This suggests that harsher parenting could be one of the factors contributing to the happiness paradox of birth order.

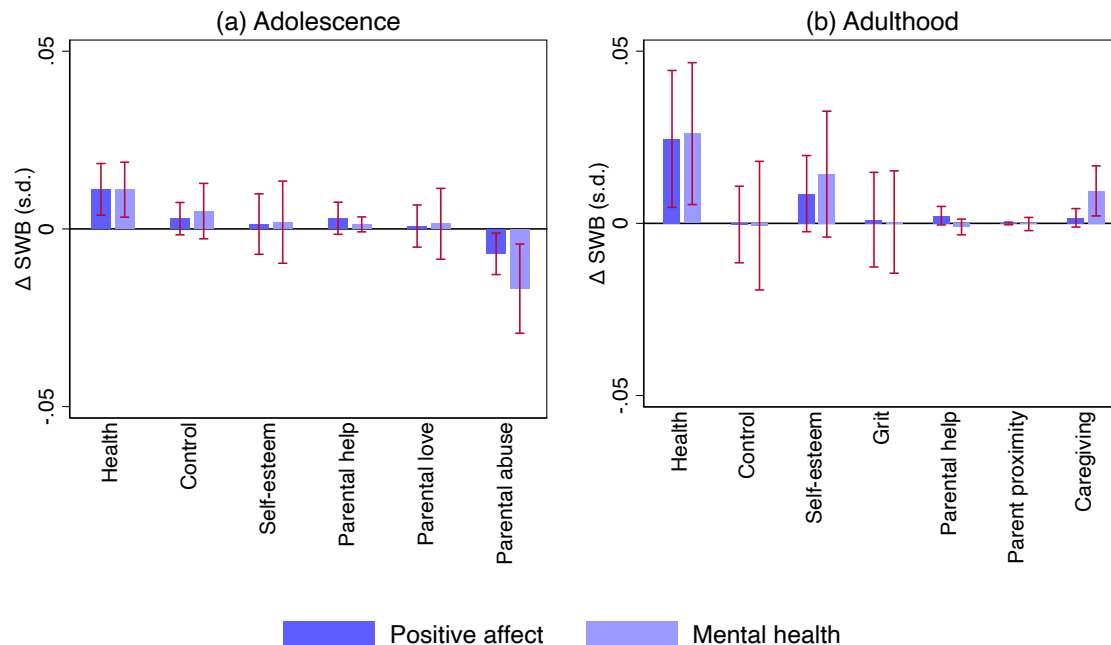


Figure 6: Effects of being first-born on non-pecuniary endowments and familial relations. *Note:* capped bars indicate 95 percent CIs. Youth and midlife measures were collected before and after age 25, respectively. Estimates are based on the results of structural equation models and show the effect of being first-born that is attributable to the specific mechanism. Models control for sex, race/ethnicity, sibship size, parental education, log of parental income in Wave 1, parents' coresidential status in Wave 1, birth to a teenage mother, and NLSY cohort. Sample sizes vary across measures of mechanisms.

Discussion

This article set out to interrogate whether the effects of birth order on income and psychological well-being are consistent with theories about happiness. Given first-born siblings' advantage over later-borns in socioeconomic attainment, it was expected that first-borns would also have higher levels of permanent income and psychological well-being during midlife. To test whether this is the case, I used data from large longitudinal surveys of U.S. adults that provided extensive information on income and well-being, and allowed the estimation of differences within siblings for a sizeable proportion of the participants. The results showed that net of family-level confounders, being first-born had a substantial effect on family and personal income in middle adulthood. The magnitude of these effects was considerable, surpassing the causal effect of having parents with four additional years of education or attending a pre-K program. However, given the income-happiness gradient, the income advantage of first-borns implied only a modest happiness boost, in the range of 0.02–0.04 s.d. Observed first-born effects ranged from -0.04 to +0.05 s.d., and did not reach significance at $p < 0.05$. For life satisfaction, equivalence tests suggested that first-born effects are likely to be positive, and the observed effects were also within the range implied by birth order income differences. However, for mental health and positive affect, equivalence tests could

not rule out a true negative effect of being first-born, contrary to what was expected. As such, there appeared to be a happiness paradox of birth order for some but not all dimensions of psychological well-being.

These results should be interpreted in the context of this study's scope and limitations. The analyses are based on people who grew up in the United States. Compared to many other developed countries, Americans do not have easy access to affordable childcare, generous social safety nets, or free college education, all of which can potentially exacerbate within-family inequalities in early life by forcing the rationing of limited parental resources and contribute to familial stressors in later life. Indeed, as noted earlier, in at least one country (Norway) with a much more generous welfare state system, positive well-being effects of being first-born have been reported (Black et al. 2016). Second, due to limitations of sample sizes and the accuracy of available measures, several possible sources of heterogeneity in birth order differences could not be investigated, including variation within later-borns, sibling gender configurations, and the role of social versus biological sibling rank. Finally, as mentioned, within-family analyses were not well-powered due to the significantly smaller sample size and the inclusion of fixed effects parameters.

These results have three implications. First, they emphasize the importance of considering effect sizes in research on happiness. A large body of scholarship has been devoted to understanding the role of money in shaping happiness, but results are often discussed only in terms of direction and statistical significance. How we talk about the income–happiness relationship matters because individuals' life decisions may be influenced by their understanding of the income–happiness link, and cultural narratives about this relationship can have implications for public opinion on important policy matters (Rauf and Freese 2023). The findings of this study underscore the problem with overlooking effect sizes: first-borns had meaningfully higher incomes than later-borns by certain criteria, but given the income–happiness gradient, that level of income inequality did not translate into very meaningful expectations for a happiness gap. Even where there was a genuine “happiness paradox”—i.e., in the case of affect and mental health—small effect sizes perhaps tempered the surprise with which one might regard this paradox. Second, these findings provide further evidence of critical variation across the dimensions of subjective well-being. That only life satisfaction reliably tracked the birth order income gap is consistent with a previous study, where a major change in wealth had a much larger effect on life satisfaction than on other indicators of well-being (Lindqvist et al. 2020). It is important to note, though, that this difference is not because life satisfaction was more responsive to money than other aspects of well-being *per se* (see Table C1 in the online supplement); rather, perhaps LS was *less* responsive to non-material aspects of life compared to the other two measures. Finally, these findings bring into focus non-material sources of happiness. Albeit small, there was a happiness paradox of birth order in certain dimensions of well-being, which was seemingly attributable to early familial influences. That family and early life matter for psychological health is not a novel finding. However, contextualized vis-à-vis income effects, the happiness paradox of birth order highlights the limited ability of money to compensate for relational sources of (un)happiness, inviting greater attentiveness to the latter.

Notes

- 1 Average effect size for all later-born sibling ranks, divided by outcome standard deviation.
- 2 To minimize the risk of Type II error, I do not implement multiple testing correction. Multiple testing corrections mitigate Type I error when testing an “omnibus” hypothesis, where rejecting a nested null hypothesis suffices to also reject the omnibus (García-Pérez 2023).
- 3 Correlation with age is statistically significant in NLSY79 for life satisfaction ($r = 0.04$), and mental health ($r = -0.04$); and in NLSY97 for positive affect ($r = 0.07$).
- 4 This avoids imposing a functional form (see Kratz and Brüderl 2025). Results are similar when measurement models are used to extract the “trait” component, where repeated measures are collected.
- 5 This measure may capture the effects of anticipated income.
- 6 I exclude three families in NLSY79 and 21 families in NLSY97, where race/ethnicity varied between siblings.
- 7 Lee et al. estimate that a one year increase in parental education increases children’s earnings by 1.2 percent. Bartik estimates a 5 percent increase in lifetime earnings.
- 8 Full model results are not provided because 50 models were estimated in each of the imputed datasets. Results presented here are aggregated across models; standard errors are combined using Rubin’s rule.
- 9 These analyses are based only on NLSY79 due to limited data availability, and as such, are not directly comparable to the full-sample baseline estimates shown in Figure 2. However, baseline estimates based only on NLSY79 data are similar to the full-sample estimates: $\beta_{PA} = -0.01$ s.d. and $\beta_{MH} = -0.02$ s.d.

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