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Working Paper

The adolescent origins of patience: Global evidence from aggregate instability

ifo Working Paper, No. 428

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Bertermann, Alexander (2026) : The adolescent origins of patience: Global evidence from aggregate instability, ifo Working Paper, No. 428, ifo Institute - Leibniz Institute for Economic Research at the University of Munich, Munich

This Version is available at:

<https://hdl.handle.net/10419/343154>

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Working Papers

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Imprint:

ifo Working Papers

Publisher and distributor: ifo Institute – Leibniz Institute
for Economic Research at the University of Munich

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The Adolescent Origins of Patience: Global Evidence from Aggregate Instability[★]

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July 24, 2026

Abstract

This paper identifies adolescence as a formative period in the development of time preferences. Using data from 80,000 individuals in 76 countries, I exploit within-country, cross-cohort variation in exposure to aggregate instability—natural disasters, inflation crises, and sovereign defaults. Instability experienced between ages 13 and 17 reduces long-run patience, whereas comparable shocks experienced before or after this developmental stage show no detectable effects. Evidence from second-generation immigrants in Germany reveals similar age-specific effects when origin-country instability is transmitted only indirectly through family networks, suggesting that the mechanism operates through psychological rather than material channels.

JEL Classification: D90, D91, D01, O10, J24, I31

Keywords: Patience; Adolescence; Preference formation; Sensitive periods; Aggregate shocks; Experience effects

[★]I am grateful to Raphael Brade, Marco Castillo, Deborah Cobb-Clark, Hannah Schildberg-Hörisch, Uwe Sunde, Anke Windisch, and Ludger Woessmann for helpful suggestions, and to seminar participants at LMU Munich and DIW Berlin, as well as participants at the ifo Summer Conference, for valuable comments.

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1 Introduction

How do people come to value future outcomes? Patience is fundamental to intertemporal decision-making and constitutes a key primitive in both macroeconomic and microeconomic models. At the individual level, empirical evidence highlights patience as a major determinant of educational attainment, savings behavior, and lifetime earnings (Sutter et al., 2013; Golsteyn, Grönqvist, and Lindahl, 2014; Cadena and Keys, 2015). At the aggregate level, recent worldwide survey data reveal substantial heterogeneity in patience across countries (Falk et al., 2018), with cross-country differences in patience explaining a sizable share of the variation in economic development and human capital accumulation (Hanushek et al., 2022; Sunde et al., 2022; Hanushek et al., 2026).

Yet despite growing evidence on the consequences of patience, we know far less about its origins—specifically, when in the life cycle these preferences crystallize and what environmental forces drive their long-run formation. While prior research suggests that preferences begin to emerge in childhood and stabilize by adulthood (Cunha and Heckman, 2007; Meier and Sprenger, 2015; Schildberg-Hörisch, 2018; Sutter, Zoller, and Glätzle-Rützler, 2019), the precise developmental window during which time preferences are formed remains largely unknown.

In this paper, I argue that aggregate instability shapes patience, with adolescence as the period in which such experiences have their strongest and most lasting effects. The argument builds on models of endogenous time preferences, in which patience depends partly on confidence that future rewards will materialize (Becker and Mulligan, 1997; Sozou, 1998; Dasgupta and Maskin, 2005). Consistent with this idea, countries with greater historical instability exhibit lower average patience, and respondents who perceive the future as stable and predictable report substantially higher patience. Among adolescents, this association is larger than the patience gap associated with parental socioeconomic status. I therefore study major episodes of aggregate instability—natural disasters, inflation crises, and sovereign defaults—as signals about whether the broader environment reliably rewards long-term investment. I hypothesize that these signals are especially formative during adolescence, when the capacity for abstract, future-oriented reasoning develops and salient events in the broader environment can become lasting reference points for perceptions of future stability and predictability (Rubin, Rahhal, and Poon, 1998; Steinberg et al., 2009; Crone and Dahl, 2012; Steinberg, 2014).

To test this hypothesis, I link respondents' age-specific exposure to aggregate instability to experimentally validated measures of adult patience from the Global Preferences Survey (Falk et al., 2018), which covers approximately 80,000 individuals across 76 countries. Individuals born in different years within the same country experience the same historical events at different developmental stages, generating within-country, cross-cohort variation

in exposure to major natural disasters, inflation crises, and sovereign defaults. Exploiting this variation, I find a pronounced age gradient: effects are most negative for exposure during adolescence (ages 13–17), whereas comparable exposure at earlier or later ages has no detectable effect.

This pattern proves robust across shock types and identification strategies. All three categories of aggregate shocks—natural disasters (environmental instability), hyperinflation episodes (monetary instability), and sovereign defaults (institutional instability)—generate similar adolescent-specific effects, indicating that the mechanism transcends the particular source of instability. Point estimates also become more negative as the number of distinct types of instability experienced during adolescence increases, though less than proportionally, consistent with different shocks conveying partially overlapping signals about future stability.

Restricting the sample to individuals who experienced at least one instability shock between ages 0 and 30 and comparing the relative effects of exposure at different developmental stages yields the same age-specific pattern. Relative to exposure during early adulthood (ages 18–25), only exposure during adolescence (ages 13–17) significantly reduces patience. This within-exposed specification sharpens identification by exploiting only quasi-random variation in the timing of shocks, holding constant the fact of exposure itself.

The findings are consistent across contexts and specifications. The adolescent-specific effect is present across genders, and there is no evidence of systematic heterogeneity by institutional environment or level of economic development, as captured by democratic institutions and OECD membership. The similarity across subgroups points to a common developmental mechanism rather than one driven by context-specific factors. Consistent with this interpretation, estimates remain unchanged when sequentially excluding ten-year birth cohorts or individual countries.

The results are robust to a wide range of alternative specifications. They hold when using the total number of shocks experienced within each age window; when including birth-cohort-specific country trends; when controlling for GDP per capita during exposure periods to account for potential wealth effects; and when residualizing patience with respect to individual risk attitudes to isolate time preferences from the risk component of intertemporal choice. Further supporting a causal interpretation, placebo tests based on pre-birth instability shocks yield null results, while a specification-curve analysis (Simonsohn, Simmons, and Nelson, 2020) across 108 combinations of shock thresholds, exposure metrics, and age-window definitions yields consistently negative and statistically significant adolescent coefficients, indicating that the pattern is not driven by discretionary choices in the empirical design.

Finally, the effect is preference-specific. Exposure to instability shocks during adolescence reduces patience but has no detectable effect on prosociality and at most a marginal effect on risk attitudes. After correcting for multiple-hypothesis testing across preference domains, only the adolescent effect on patience is statistically significant, reinforcing the interpretation that the results reflect changes in time preferences rather than broader shifts in behavioral traits.

Two complementary analyses point to psychological rather than material channels. First, I study second-generation immigrants who were born and raised in the same host country but retain observable ties to different parental origin countries through sole or dual foreign citizenship. Origin-country shocks reach respondents only indirectly, through family networks or media, and have limited direct effects on their local material circumstances. Moreover, the shocks studied in this paper show no systematic relationship with subsequent remittance flows, providing further evidence against indirect material transmission through family transfers. The resulting age profile mirrors the main findings: exposure to origin-country instability during adolescence reduces patience later in life, whereas exposure at other developmental stages has no detectable effect.

Second, I examine whether this adolescent-specific sensitivity extends to personal instability and persists after accounting for household resources, parental responses, and shared family background. The death of someone close can destabilize an individual's immediate environment and undermine confidence that future plans will materialize, a perception central to future-oriented decision-making. Experiencing such a death during adolescence significantly reduces patience, whereas exposure at earlier or later ages shows no detectable effect. The pattern persists after accounting for household resources and parental responses, and remains visible in both within-family comparisons between siblings and within-person comparisons over time.

The results contribute to three literatures. First, I extend research on the determinants and malleability of time preferences (Sutter et al., 2013; Alan and Ertaç, 2018; Falk et al., 2021). While prior studies emphasize family- and individual-level factors such as parental values and household structure (Falk et al., 2021; Brenøe and Epper, 2022; Chowdhury, Sutter, and Zimmermann, 2022) or cognitive ability (Dohmen et al., 2010), and recent experimental evidence shows that the effectiveness of educational interventions tends to decline with age (Kaiser, Menkhoff, and Oberrauch, 2023; Breitzkopf et al., 2025),¹ I provide complementary evidence that exposure to aggregate instability during adolescence—but not

1. In particular, Kaiser, Menkhoff, and Oberrauch (2023) find that a financial training intervention increases patience 15 months after implementation primarily among younger participants (aged 16–20), with effects declining steadily with age, while Breitzkopf et al. (2025) show that a socio-emotional learning program implemented in schools has a sizable impact on patience among seven- and eight-year-old children, but little effect among older children.

at other ages—generates long-run differences in adult time preferences. This age-specific pattern suggests that time preferences, like cognitive skills (Cunha and Heckman, 2007), are subject to sensitive periods during which environmental inputs exert disproportionately large effects. However, the timing differs: while cognitive abilities are generally most malleable in early childhood (Cunha and Heckman, 2008), the formation of patience appears to follow a different developmental profile, with sensitivity to aggregate instability peaking during adolescence. This developmental approach also differs from existing literature on how shocks affect patience in adulthood, which reports mixed findings—ranging from null or temporary effects to rare cases of persistent change (Callen, 2015; Chuang and Schechter, 2015; Chantarat et al., 2019; Kuroishi and Sawada, 2024; Beine et al., 2025). These studies test whether contemporary shocks can alter already-formed preferences. This paper instead examines how exposure during adolescence—when preferences are still developing—causally shapes the preference differences observed decades later. This distinction between preference formation before adulthood and potential preference change later in life helps explain both why educational interventions show age-declining effects and why adult-shock studies yield mixed findings.

Second, this paper speaks to the literature on childhood environment and long-run outcomes (e.g., Almond and Currie, 2011; Chetty and Hendren, 2018; Chyn and Katz, 2021). While existing work highlights the role of negative childhood shocks in shaping adult socioeconomic outcomes through the destruction of resources (Jensen, 2000; Van den Berg, Lindeboom, and Portrait, 2006; Deuchert and Felfe, 2015; Stuart, 2022), I provide direct evidence for an additional mechanism: shocks to the aggregate environment shape the value individuals place on the future. This preference channel can operate independently of material losses and may help explain the persistent effects of childhood instability even among individuals who recover fully economically.

Third, I contribute to research on experience effects and the formation of attitudes and beliefs (Alesina and Fuchs-Schündeln, 2007; Malmendier and Nagel, 2011; Giuliano and Spilimbergo, 2025). These studies typically examine how experiences shape risk attitudes or political beliefs. I add to this literature by showing that formative experiences of instability shape time preferences, with sensitivity peaking during adolescence—a developmental period in which the cognitive capacity for abstract future-oriented reasoning develops and experiences can disproportionately shape perceptions of the world (Steinberg, 2014; Crone, 2017; Munawar, Kuhn, and Haque, 2018).

The findings have important policy implications. With climate change projected to increase the frequency and intensity of many climate-related hazards over the coming decades (IPCC, 2021), understanding how instability shapes preferences becomes crucial for assessing long-term development prospects in shock-prone regions. The results further suggest

that policies protecting adolescents from aggregate volatility may yield returns beyond their direct protective effects: by preserving patience during this period, such programs could generate persistent benefits throughout the life course. This preference-formation channel is, in principle, distinct from material damages, suggesting that conventional cost-benefit analyses focusing solely on material losses may substantially underestimate the lifetime costs of instability.

The paper proceeds as follows. Section 2 develops the hypothesis that patience is especially sensitive to aggregate instability during adolescence and presents descriptive evidence motivating this mechanism. Section 3 describes the data. Section 4 outlines the identification strategy. Section 5 presents the main results. Section 6 examines psychological versus material channels. Section 7 concludes.

2 Sensitive Periods in the Formation of Patience

Patience requires trust in the future: a belief that investments made today will eventually pay off. When the environment is unpredictable, the expected return to waiting falls, making patience less valuable. Experiences that inform beliefs about future stability may therefore shape patience, and the timing of such experiences should matter. Instability encountered while perceptions of the future are still forming may leave persistent effects, whereas instability encountered after worldviews have settled should leave weaker ones. This section develops this intuition into the paper's central hypothesis, presents descriptive evidence supporting its premises, and derives the age-gradient implications that distinguish it from other developmental accounts.

Instability and the reliability of future payoffs. In models of endogenous time preference, discounting is not a fixed primitive but partly reflects the perceived reliability of future payoffs. Becker and Mulligan (1997) model patience as the result of investments in imagining the future and show that uncertainty, by lowering the return to such investments, raises the degree of time preference. Evolutionary accounts similarly link discounting to the risk that delayed payoffs fail to materialize or arrive at uncertain times (Sozou, 1998; Robson, 2001; Dasgupta and Maskin, 2005), and Robson and Samuelson (2009) show that aggregate uncertainty, the class of risk studied in this paper, can generate discount rates above those warranted by idiosyncratic risk alone. More generally, preferences in these models adapt to the statistical structure of the environment (Netzer, 2009), and parents are predicted to instill patience when its perceived returns in the child's future environment are high (Doepke and Zilibotti, 2017). Aggregate instability might therefore be informative about the envi-

ronmental feature that these models identify as central to the formation of patience: the reliability with which long-term investments yield future returns.

Two descriptive patterns are consistent with this premise. At the aggregate level, countries with greater historical exposure to instability exhibit systematically lower average patience. Using exposure across different shock categories since 1950—sovereign defaults, hyperinflation episodes, and major natural disasters—as a measure of historical instability, I find that each additional shock category is associated with 0.168-standard-deviation lower national patience in 2012 ($p < 0.01$; Appendix Table A.1).²

At the individual level, I examine this premise by fielding a survey item in the 2025 wave of the ifo Education Survey, an established representative survey of the German population (e.g., Lergetporer et al., 2018; Freundl et al., 2023; Lergetporer and Woessmann, 2025). The item asks respondents to rate their agreement with the statement: “When I think about the future, I assume that the world will generally be stable and predictable.” Table 1 shows that German adolescents aged 14–17 who strongly agree with this statement are 0.57 standard deviations more patient ($p < 0.01$), an association larger than the patience difference associated with having a university-educated parent, one of the strongest predictors of children’s economic preferences (Falk et al., 2021). The same pattern appears among adults, for whom perceived future stability predicts patience more than three times as strongly as a one-standard-deviation increase in household income (Appendix Table A.3).

Table 1. Perceived Future Stability and Patience among German Adolescents

	Dependent variable: Patience
High perceived future stability and predictability	0.569*** (0.135)
At least one parent has a university degree	0.463*** (0.060)
Observations	1,033

Notes. This table reports an OLS regression of standardized patience on perceived future stability and parental education. Patience is measured using the experimentally validated question: “Are you generally an impatient person, or someone who always shows great patience?” (Vischer et al., 2013). Responses range from 0 (“very impatient”) to 10 (“very patient”) on an 11-point scale and are standardized to have mean zero and standard deviation one. “High perceived future stability and predictability” is a binary indicator equal to one for respondents who selected “strongly agree” on a 5-point Likert scale in response to the statement: “When I think about the future, I assume that the world will generally be stable and predictable.” The sample consists of individuals aged 14 to 17. The age distribution is as follows: age 14 (N = 283), age 15 (N = 274), age 16 (N = 245), and age 17 (N = 231). The data are drawn from the youth subsample of the ifo Education Survey 2025, a representative sample of German adolescents. See Freundl et al. (2023) for details on sampling and survey design. Robust standard errors are reported in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Together, these patterns support the premise that patience is closely related to the perceived reliability of the future. They are, however, correlational, and they leave open the

2. Appendix Table A.2 reports the association separately by shock type.

developmental question at the center of this paper: when in the life cycle do signals about the reliability of the broader environment most strongly shape patience?

Age-specific sensitivity of patience to aggregate instability. I propose that adolescence is the period during which patience is most sensitive to aggregate instability. A central lesson from the skill-formation literature is that the effects of developmental inputs vary across stages. For example, investments in cognitive skills tend to yield their highest returns in early childhood (Cunha and Heckman, 2007, 2008). At the same time, recent work highlights adolescence as another developmentally consequential period, with meaningful mobility in relative skill rankings (Hoxby, 2021; Eshaghnia, Heckman, and Landersø, 2025). Taken together, these findings suggest that sensitive periods depend on both the trait in question and the input that shapes it.

For patience, aggregate instability may matter not only through the hardship it can impose but also through the information it conveys about the predictability of the wider environment. For such information to shape patience, individuals must be able to interpret aggregate events as signals about the long-run future—a capacity that develops markedly during adolescence. Consistent with this view, future orientation strengthens substantially between ages 13 and 16 and can account for meaningful age-related variation in delay discounting (Steinberg et al., 2009). Adolescence is also characterized by heightened sensitivity to the wider world (Crone and Dahl, 2012; Blakemore and Mills, 2014; Steinberg, 2014), and experiences from this stage are disproportionately represented in autobiographical memory (Rubin, Rahhal, and Poon, 1998; Munawar, Kuhn, and Haque, 2018). If valuations in adulthood are partly shaped by remembered experience (Stewart, Chater, and Brown, 2006; Bordalo, Gennaioli, and Shleifer, 2020), instability encoded during adolescence may be especially important for how individuals value the future later in life.

This mechanism, which I refer to as the adolescent-encoding hypothesis, predicts that sensitivity to aggregate instability peaks during adolescence. Before adolescence, children may experience instability but may not yet be able to interpret aggregate events as signals about the reliability of future rewards. During adolescence, expanding future-oriented reasoning coincides with the formation of lasting reference points about the wider world, making instability especially likely to shape perceptions of future reliability. By early adulthood, individuals can interpret aggregate shocks, but such events are more likely to produce only marginal updates to an established outlook on the future than to contribute to its initial formation. The central prediction is therefore that aggregate instability has its strongest lasting effect on patience when experienced during adolescence.

Descriptive evidence also suggests that patience remains malleable during adolescence. Incentivized panel data on German schoolchildren show that the estimated patience gap between children with a Turkish migration background and native German children is es-

entially zero at ages 12–14, whereas at ages 15–17 children with a Turkish migration background are 0.33 standard deviations less patient (Appendix Tables A.4 and A.5). Many of these families maintain ties to a country with a markedly more turbulent macroeconomic history, making the comparison potentially related to the broader mechanism considered here.

Other developmental accounts of age-specific sensitivity. The adolescent-encoding hypothesis is related to, but more specific than, the impressionable-years hypothesis (Krosnick and Alwin, 1989). This literature emphasizes late adolescence and early adulthood as a broad period during which experiences can have lasting effects on political attitudes, macroeconomic beliefs, and labor-market expectations (Giuliano and Spilimbergo, 2025). In economic applications, this window is often operationalized as ages 18–25, a natural formative period for outcomes that become salient during transitions into adult roles, such as job preferences at labor-market entry (Cotofan et al., 2023). The impressionable-years window therefore provides an important benchmark: if patience followed the same timing, the effects of aggregate instability would remain elevated into early adulthood. For patience, however, the adolescent-encoding hypothesis implies a narrower formative window. Because patience is not tied to a particular life-course transition, such as labor-market entry, but instead to the emergence of future-oriented reasoning and perceptions of the reliability of distant payoffs, sensitivity to aggregate instability is expected to peak during adolescence rather than remain uniformly elevated into early adulthood.

Two alternative accounts imply different age profiles. A direct-adversity account, rooted in research on adverse childhood experiences and life-history theory, emphasizes disruptions to household resources, stress physiology, and caregiving environments (Belsky, Steinberg, and Draper, 1991; Felitti et al., 1998; Ellis et al., 2009; Kidd, Palmeri, and Aslin, 2013; McLaughlin and Sheridan, 2016; Adamopoulou, Colombo, and Triviza, 2024). If aggregate shocks affect patience mainly through these channels, sensitivity would be strongest in early childhood, especially ages 0–5, and decline thereafter. Experience-based updating with recency weighting instead predicts no special formative window: if individuals revise preferences continuously and place greater weight on recent events (Malmendier and Nagel, 2011), effects should be flat across ages or stronger for shocks experienced closer to the survey date. The empirical task is therefore to estimate the age gradient directly and assess whether sensitivity peaks in adolescence, declines from early childhood, remains elevated into early adulthood, or instead reflects continuous updating.

Finally, the adolescent-encoding hypothesis is specific in scope. It does not imply that early childhood is unimportant for patience or that material and psychological channels are mutually exclusive. Early family inputs may shape some components of patience, and some shocks may affect both resources and beliefs. The claim is that patience is most sensitive to

aggregate instability during adolescence, when perceptions of the stability and predictability of the future environment are forming.

3 Data

The analysis combines individual-level patience data with measures of historical aggregate shocks. Section 3.1 describes the Global Preferences Survey, which provides internationally comparable patience measures for 76 countries. Section 3.2 details the construction of three shock types and explains how they are matched to respondents across developmental stages. Section 3.3 introduces German household datasets used to investigate mechanisms.

3.1 Global Preferences Survey

The main analysis uses individual-level data from the Global Preferences Survey (GPS), collected as part of the 2012 Gallup World Poll (Falk et al., 2018). The GPS provides experimentally validated measures of economic preferences for approximately 80,000 individuals from representative samples in 76 countries, covering up to 90 percent of the world’s population. Figure A.1 maps the resulting cross-country variation in average patience. Respondents span birth cohorts from 1913 to 1997 and were ages 15–99 at the time of the survey.

The GPS measures patience through two survey items validated against incentivized laboratory behavior. The first elicits intertemporal trade-offs through five binary choices: “Would you rather receive 100 euro today or x euro in 12 months?” where x varies to identify each respondent’s indifference point.³ The second captures self-assessed willingness to delay gratification on an 11-point scale. The GPS combines these items using experimentally derived weights, producing a standardized measure (mean zero, standard deviation one) where higher values indicate greater patience (Falk et al., 2018). This patience measure strongly predicts key development outcomes. Table A.6 shows that cross-country differences in patience account for a substantial share of the variation in GDP per capita, learning-adjusted years of schooling, life expectancy, and savings rates, underscoring the measure’s economic relevance.

3.2 Aggregate Shocks

I examine three types of aggregate shocks that plausibly signal future uncertainty and instability: natural disasters (environmental instability), hyperinflation episodes (monetary

3. In euro-area countries, the question is presented in euros as in the example. In all other countries, amounts are expressed in local currency and adjusted for purchasing power.

instability), and sovereign defaults (institutional instability). Each constitutes a salient disruption that may erode confidence that patient investments will pay off.

Natural Disasters. Disaster data come from the Emergency Events Database (EM-DAT) maintained by the Centre for Research on the Epidemiology of Disasters (Delforge et al., 2025). EM-DAT compiles global disaster events from 1900 onward, recording earthquakes, floods, droughts, storms, and other natural hazards along with their human and economic impacts. I define a major disaster as an event affecting at least one million individuals—a threshold chosen to capture disasters that become nationally salient through widespread media coverage, government emergency response, and disruption of economic activity beyond localized areas. This restriction ensures measured exposure reflects aggregate instability visible to the general population, including individuals who did not personally experience property damage or casualties.

In the GPS sample, 16% of respondents experienced at least one major natural disaster between ages 0 and 30. Figure 1 displays exposure patterns across countries and cohorts during adolescence (ages 13–17), revealing substantial variation, ranging from 0 percent of cohorts in countries like Egypt to 22 percent in Vietnam. Figure A.2 presents analogous variation for the full childhood and early adulthood period (ages 0–30).

Hyperinflation. Inflation data come from Reinhart and Rogoff (2009), the IMF’s International Financial Statistics, and IMF archival records. Drawing on Fischer, Sahay, and Végh (2002), I classify inflation episodes with annual rates of 50% or higher as hyperinflation—a threshold at which monetary instability becomes highly salient to the general population through rapid erosion of purchasing power, frequent price changes, and shifts in payment behavior.

Among GPS respondents, 34% experienced at least one hyperinflation episode during ages 0–30. Exposure again varies meaningfully across countries and cohorts: during adolescence, the share of country-specific GPS birth cohorts exposed ranges from 0% in many developed economies to 39% in Turkey (Figure 1).

Sovereign Defaults. Data on sovereign defaults come from the updated chronology in Reinhart and Rogoff (2009). Sovereign defaults signal institutional failure: governments failing to meet their debt obligations. These episodes typically trigger currency crises, capital flight, and political upheaval, thereby plausibly undermining confidence in the future.

In the estimation sample, 49% of respondents experienced at least one sovereign default between ages 0 and 30. Figure 1 shows that cohort exposure during adolescence ranges from 0% in countries like the Netherlands to 87% in Russia, reflecting both long histories of serial default in some nations and the concentrated wave of emerging market defaults in the 1980s.

Complementarity Across Shock Types. Taken together, the three shock types capture distinct but complementary dimensions of aggregate instability. Natural disasters reflect environmental disruptions largely outside government control, hyperinflation captures monetary instability arising from policy failures or external pressures, and sovereign defaults signal institutional weakness and political dysfunction. Their low pairwise correlations—0.08 between disasters and hyperinflation, 0.09 between disasters and defaults, and 0.29 between hyperinflation and defaults (Table A.7)—indicate that each contributes largely independent variation. This feature serves two analytical purposes. First, it allows me to construct a parsimonious shock index that counts the number of distinct instability signals to which an individual was exposed during a given age window. Second, it provides a way to assess whether the results generalize across environmental, monetary, and institutional sources of instability: if the mechanism operates through a common signal of instability rather than shock-specific channels, effects should appear consistently across shock types.

Sample Construction and Shock Exposure. I match these aggregate shocks to GPS respondents based on country of residence and birth year.⁴ Drawing on insights from developmental psychology (Collins, 1984; Arnett, 2000; Steinberg, 2014), I partition exposure into five age windows: early childhood (0–5), middle childhood (6–12), adolescence (13–17), early adulthood (18–25), and later adulthood (26–30). For each window, I construct a shock index that counts the number of distinct shock types experienced. The index ranges from 0 to 3, with mean values between 0.24 and 0.49 across age windows. Table A.8 reports its distribution.

Matching shocks to respondents’ 2012 country of residence may misclassify exposure for individuals who spent childhood or adolescence elsewhere and may omit individuals displaced by the crises studied here. Classical exposure misclassification would attenuate the estimates, while selective migration or mortality could bias them in either direction. These concerns are mitigated by the relatively limited prevalence of international migration over the study period. In 2010, international migrants accounted for about 3.3 percent of the world population (United Nations, Department of Economic and Social Affairs, 2013). I address the remaining concerns through robustness checks that sequentially exclude individual countries, including major migrant-receiving countries, and restrict the sample to younger respondents or post-1945 cohorts, for whom survivorship concerns are less severe.

Figures 1 and A.2 display shock exposure by country and birth cohort during adolescence (ages 13–17) and over the full developmental period from birth through age 30, re-

4. Country designations follow the GPS survey year (2012). Historical polities are mapped to modern successor states as defined in the GPS: the Ottoman Empire is mapped to Turkey, Iraq, Syria, Lebanon, Jordan, Israel, and the Palestinian Territories; the USSR to its 15 successor republics; and Yugoslavia to its successor states, including North Macedonia, Montenegro, and Kosovo.

spectively. Table A.9 presents summary statistics for the estimation sample, which consists of 79,591 individuals across 76 countries. On average, respondents are 42 years old, and 55% are female.

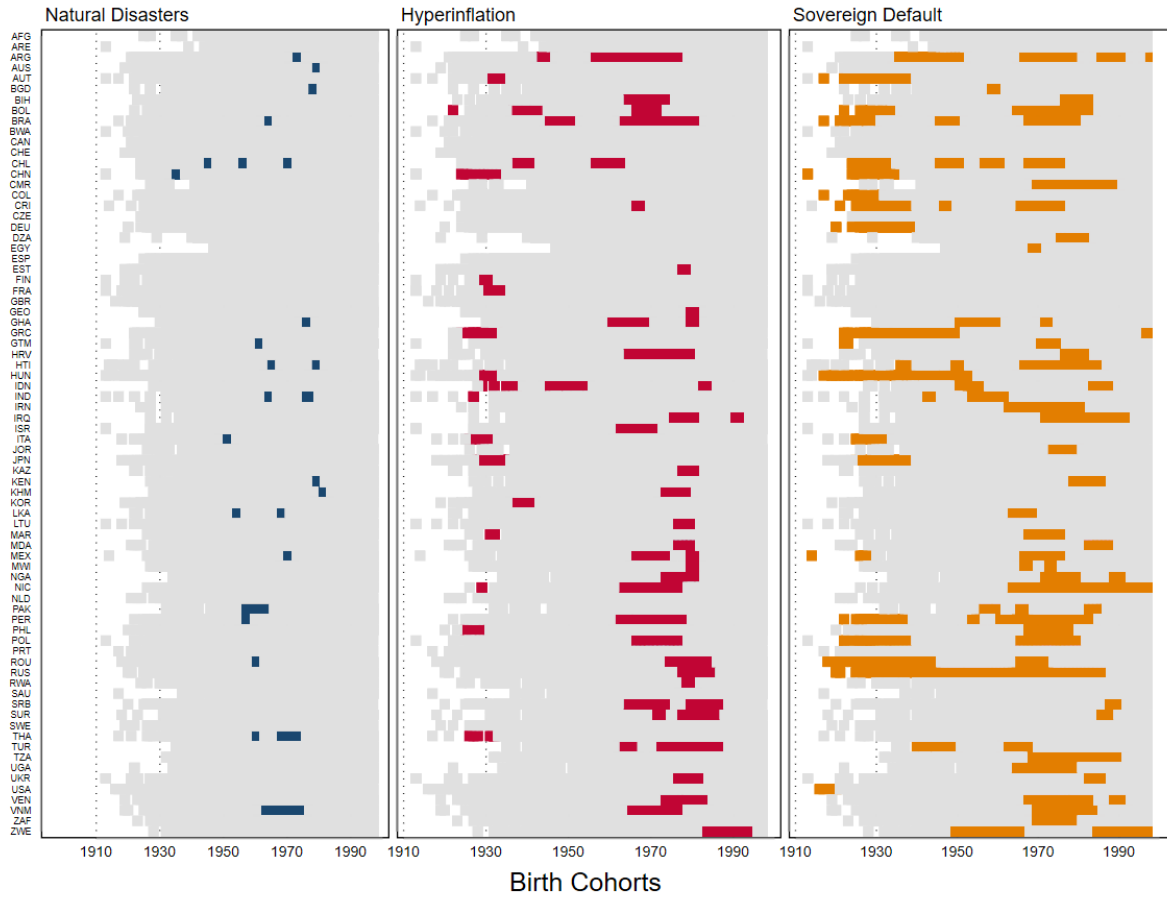


Figure 1. Exposure to Aggregate Shocks During Ages 13-17 by Country and Cohort

Notes. This figure displays the identifying variation by showing shock exposure during adolescence (ages 13–17) across all 76 countries and 85 birth cohorts in the Global Preferences Survey. Birth cohorts are shown on the horizontal axis (spanning 1913–1997) and countries on the vertical axis in alphabetical order. Each cell represents a country-cohort combination. Colored squares indicate exposure to at least one shock of the respective type during ages 13–17: blue for natural disasters affecting at least one million people, red for hyperinflation episodes with annual inflation of at least 50%, and orange for sovereign defaults. Gray squares indicate no exposure to the respective shock type. White squares indicate birth cohorts not represented in the GPS sample. Data sources: Global Preferences Survey (Falk et al., 2018) for patience and demographics; EM-DAT (Delforge et al., 2025) for natural disasters; Reinhart and Rogoff (2009), IMF International Financial Statistics, and IMF archival records for hyperinflation; Reinhart and Rogoff (2009) for sovereign defaults.

3.3 German Survey Data

To investigate mechanisms, I draw on two large-scale survey datasets from Germany: the German Socio-Economic Panel (SOEP) and the German Twin Family Panel (TwinLife).

3.3.1 German Socio-Economic Panel. The German Socio-Economic Panel (SOEP) is a nationally representative longitudinal household survey conducted annually since 1984 (Wagner, Frick, and Schupp, 2007; Goebel et al., 2019). The estimation sample includes individuals observed in at least one of the four survey waves containing patience measures (2008,

2013, 2018, 2023). When individuals appear in multiple waves, I retain only their first observation to maintain a cross-sectional design comparable to the GPS analysis and to avoid giving disproportionate weight to individuals observed more frequently. Patience is measured using an experimentally validated item: “Are you generally an impatient person, or someone who always shows great patience?” on an 11-point scale from 0 (“very impatient”) to 10 (“very patient”) (Vischer et al., 2013). I standardize this measure to have a mean of zero and a standard deviation of one.

To study indirect exposure to origin-country instability, I focus on second-generation immigrants—individuals born in Germany to foreign-born parents—who hold foreign citizenship, either exclusively or alongside German citizenship. I assign respondents an origin country based on their foreign citizenship. This citizenship-based assignment provides an observable formal tie to the parental country of origin and allows me to examine whether instability can shape preference formation when the relevant events occur abroad and reach respondents only indirectly, through family networks or media exposure.⁵

For each respondent, I then measure origin-country instability based on birth year and the timing of shocks in the assigned origin country. The shock index captures the same three shock types as in the GPS analysis—natural disasters affecting at least one million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults—occurring within each age window. Table A.10 reports average shock exposure and characteristics of the estimation sample.

3.3.2 TwinLife Panel. TwinLife is a longitudinal study of families with twins in Germany, following approximately 4,000 twin pairs and their families across four waves from 2014 to 2022 (Hahn et al., 2016; Diewald et al., 2024). Patience is measured using the same experimentally validated 11-point item as in the SOEP. The item is administered from age 10 onward, and the resulting measure is standardized to have mean zero and standard deviation one. TwinLife surveys all participating household members, including twins, their parents, and non-twin siblings, thereby providing measures of parental patience, parenting inputs, and within-family variation.

Respondents report whether someone close to them, such as a relative or friend, died in the previous 12 months. This measure provides an individual-level analogue to aggregate instability: just as disasters and high inflation can destabilize the broader environment, bereavement can destabilize an individual’s immediate environment and may make the fragility of future plans especially salient. Because TwinLife observes patience from age 10

5. Eighty-nine percent of the estimation sample was born before 2000. Under the *jus sanguinis* regime in place before the 2000 reform of the German Citizenship Act, children born in Germany to non-German parents generally inherited their parents’ nationality and did not automatically acquire German nationality. In this sample, foreign citizenship therefore often reflects the legal default rather than an active choice.

onward, it allows me to examine whether this form of personal instability shapes emerging preferences before many educational and labor-market choices are made, complementing the long-run evidence from the GPS and SOEP samples.

The estimation sample comprises 15,107 person-wave observations from 8,826 unique individuals aged 10 and older. Approximately 21% of observations experienced the death of someone close during the 12 months preceding a survey wave. Table A.11 presents summary statistics, including measures of household resources, parental patience, and parenting behaviors.

4 Identification Strategy

The empirical strategy exploits quasi-experimental variation in shock timing across birth cohorts within countries to identify whether adolescence constitutes a sensitive period during which exposure to instability shapes patience later in life. I measure exposure to three types of aggregate instability: natural disasters affecting at least one million individuals, high inflation episodes with annual rates of 50% or higher, and sovereign defaults.

4.1 Baseline Specification

The baseline specification estimates how shock exposure at different developmental stages affects patience later in life:

$$\text{Patience}_{ic} = \beta_1 \cdot \text{ShockIndex}_{0-5,ic} + \beta_2 \cdot \text{ShockIndex}_{6-12,ic} + \beta_3 \cdot \text{ShockIndex}_{13-17,ic} + \beta_4 \cdot \text{ShockIndex}_{18-25,ic} + \beta_5 \cdot \text{ShockIndex}_{26-30,ic} + \mathbf{X}'_{ic} \boldsymbol{\delta} + \gamma_c + \lambda_b + \varepsilon_{ic} \quad (1)$$

where Patience_{ic} denotes individual i 's standardized patience in country c , $\text{ShockIndex}_{a-b,ic}$ counts the number of distinct shock types experienced between ages a and b , γ_c and λ_b are country and birth-year fixed effects, and $\mathbf{X}_{ic}$ is a vector of controls that includes a gender indicator in the baseline specification, with further specifications adding country-level conditions for each age window. The coefficients β_1 through β_5 identify effects of exposure during early childhood (0–5), middle childhood (6–12), adolescence (13–17), early adulthood (18–25), and later adulthood (26–30).⁶

The identifying variation stems from differential exposure timing across birth cohorts within countries. Because shocks are measured at the country-year level, identification

6. These age windows are motivated by research in developmental psychology on distinct stages of psychological and cognitive development (Collins, 1984; Arnett, 2000; Steinberg, 2014).

comes from variation in the developmental stage at which different birth cohorts within the same country experience the same national events. Consider two individuals in the same country: one born in 1960, the other in 1970. If their country experienced a natural disaster in 1975, the first individual was exposed during adolescence (age 15) while the second was exposed during early childhood (age 5). Country fixed effects absorb all time-invariant country characteristics. Birth-year fixed effects control for global cohort trends. The identifying assumption is that, conditional on these fixed effects, the timing of within-country shocks is orthogonal to individual determinants of patience.

This specification identifies both the overall effect of shock exposure and the relative sensitivity across developmental stages. For the central question of whether sensitivity to shocks varies systematically with age, the critical parameters are the relative magnitudes of β_1 through β_5 . Any bias that affects all coefficients proportionally preserves their relative magnitudes and thus does not threaten inference about differential sensitivity across ages.

4.2 Within-Exposed Specification

To isolate the relative effects across ages and impose weaker identifying assumptions, I estimate a complementary specification restricted to individuals who experienced at least one shock during ages 0–30:

$$\text{Patience}_{ic} = \beta_1 \cdot \text{ShockIndex}_{0-5,ic} + \beta_2 \cdot \text{ShockIndex}_{6-12,ic} + \beta_3 \cdot \text{ShockIndex}_{13-17,ic} + \beta_4 \cdot \text{ShockIndex}_{26-30,ic} + \mathbf{X}'_{ic} \boldsymbol{\delta} + \gamma_c + \lambda_b + \varepsilon_{ic} \quad (2)$$

where exposure during ages 18–25 serves as the omitted reference category. This specification requires only that, conditional on ever experiencing a shock, its timing across age windows is orthogonal to other determinants of patience. This accommodates concerns that certain countries or cohorts may be more prone to shocks for reasons that independently affect patience formation. The estimates thus identify how sensitivity to instability shocks varies across developmental stages, holding constant the fact of exposure itself.

5 Age-Specific Sensitivity of Patience to Aggregate Instability

I now turn to the paper's central hypothesis: that the impact of instability on long-run patience depends on the developmental stage at which exposure occurs, with adolescence representing a particularly formative period.

5.1 Baseline Estimates

Table 2 reports baseline estimates using an instability shock index that aggregates exposure to major natural disasters, hyperinflation episodes, and sovereign defaults. The estimates reveal a pronounced age gradient. In the baseline specification (column 1), exposure during adolescence (ages 13–17) reduces long-run patience by 0.039 standard deviations ($p < 0.01$), whereas exposure at other developmental stages yields substantially smaller and statistically insignificant estimates: -0.012 ($SE = 0.009$) for ages 0–5, -0.011 ($SE = 0.008$) for ages 6–12, 0.007 ($SE = 0.009$) for ages 18–25, and 0.005 ($SE = 0.010$) for ages 26–30. This adolescent-specific effect is statistically distinct from the coefficients for all other age windows (all $p < 0.05$) and remains significant under inference procedures that account for potential serial correlation of shocks within countries.⁷

Robustness. The adolescent effect is robust across a wide range of alternative specifications. Column (2) of Table 2 adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window to account for potential wealth effects; and column (4) reports results using patience residualized with respect to risk attitudes to isolate time preferences from the risk component of intertemporal choice. Across all specifications, the adolescent coefficient remains stable, ranging from -0.033 to -0.039 standard deviations, while coefficients for exposure outside this window remain small and statistically insignificant.

Additional tests of exposure timing likewise show no detectable effects outside adolescence. Adding a pre-conception placebo window, an in-utero exposure window, and a post-age-30 exposure window to the four standard specifications yields small and statistically insignificant coefficients for each of these windows, while leaving the adolescent coefficient essentially unchanged (Table A.12). Column (5) of the same table additionally controls for institutional quality during each age window, measured by average Polity2 scores from the Polity Project (Marshall and Gurr, 2020). The adolescent estimate is again unaffected.

Figure 2 relaxes the discrete age-window structure by estimating effects for overlapping five-year exposure windows. The effect becomes more negative in late childhood, is most negative during adolescence, and fades by early adulthood. This pattern indicates that the adolescent peak in sensitivity is not an artifact of the particular age bins used in Table 2. Consistent with this interpretation, splitting the immediate post-adolescent period shows no comparable effect for ages 18–20. The adolescent-specific pattern therefore does not appear to extend into early adulthood (Table A.13).

7. For the adolescence coefficients (ages 13–17), wild-cluster bootstrap p -values (Cameron, Gelbach, and Miller, 2008; Roodman et al., 2019) are below 0.001 in columns (1)–(3) and equal to 0.001 in column (4). Moreover, randomization-inference p -values (Young, 2019), obtained by permuting full cohort exposure vectors within countries, are 0.001, 0.001, 0.001, and 0.003 across columns (1)–(4).

Table 2. Exposure to Aggregate Shocks at Different Ages and Adult Patience

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.012 (0.009)	-0.012 (0.009)	0.007 (0.010)	0.012 (0.009)
Ages 6–12	-0.011 (0.008)	-0.010 (0.007)	0.002 (0.009)	0.000 (0.008)
Ages 13–17	-0.039*** (0.008)	-0.038*** (0.008)	-0.037*** (0.008)	-0.033*** (0.009)
Ages 18–25	0.007 (0.009)	0.006 (0.009)	0.008 (0.009)	0.008 (0.009)
Ages 26–30	0.005 (0.010)	0.004 (0.010)	0.001 (0.011)	-0.003 (0.010)
Observations	79,591	79,591	66,767	66,439

Notes. The table reports OLS estimates of the relationship between exposure to aggregate shocks at different developmental stages and patience later in life. Patience is standardized to have a mean of zero and a standard deviation of one. The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. The mean shock index is 0.47 for ages 0–5, 0.49 for ages 6–12, 0.37 for ages 13–17, 0.38 for ages 18–25, and 0.24 for ages 26–30. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences. The resulting residuals are then standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (3). Standard errors are clustered at the country level. Wild-cluster bootstrap p -values for the ages 13–17 coefficient, based on 9,999 replications (Cameron, Gelbach, and Miller, 2008), are < 0.001 , < 0.001 , < 0.001 , and 0.001 across columns (1)–(4). Randomization inference that permutes cohorts' entire exposure vectors within countries, preserving the within-country distribution and serial correlation of shocks, yields p -values of 0.001, 0.001, 0.001, and 0.003 across columns (1)–(4), based on 1,000 draws in each case. Observations are weighted using sampling weights from the GPS. Wald tests assess whether the coefficient on exposure during ages 13–17 (from the baseline specification) differs significantly from those for other age groups. The differences are statistically significant in all comparisons: $p = 0.012$ (ages 0–5), $p = 0.020$ (ages 6–12), $p = 0.001$ (ages 18–25), and $p = 0.001$ (ages 26–30). Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Additional checks address measurement choices and sample composition. The adolescent-specific pattern is robust to standardizing patience within countries (Table A.14), normalizing exposure by window length (Table A.15), and measuring exposure as the share of years within each window during which a shock is active (Table A.16). Restricting the sample to younger respondents or to post-1945 cohorts produces similar estimates, alleviating concerns about survivorship (Table A.17). Sequentially excluding 10-year birth-cohort groups or individual countries leaves the adolescent estimate largely unchanged, indicating that the results are not driven by any particular cohort group or country (Figures A.3 and A.4).

The result is also robust to using an alternative exposure metric that counts total shock occurrences rather than distinct shock types. Table A.18 shows that exposure during adolescence reduces adult patience by 0.010 standard deviations per additional shock ($p < 0.01$), while exposure at other ages yields substantially smaller and statistically insignificant es-

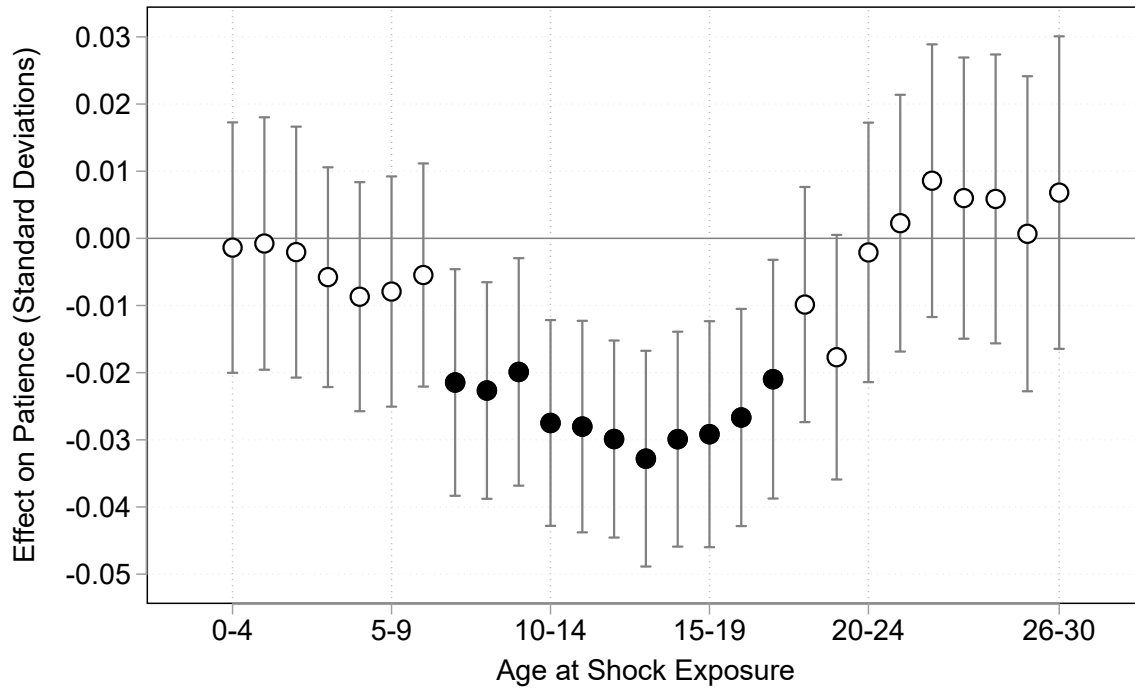


Figure 2. Shock Exposure and Adult Patience: Moving Five-Year Age Windows

Notes. This figure provides a granular examination of how sensitivity to aggregate instability shocks varies across the life course. Each point represents the coefficient from a separate regression of patience on shock exposure during a five-year age window. Windows overlap and begin at each age from 0 to 26. Within each window, the shock index counts the number of distinct shock types experienced (sovereign default, hyperinflation ($\geq 50\%$ annual inflation), natural disaster affecting ≥ 1 million people), ranging from 0 to 3. Vertical bars indicate 95% confidence intervals. Filled markers denote coefficients statistically significant at the 5% level; hollow markers denote insignificant estimates. All specifications include a gender indicator, birth-year fixed effects, country fixed effects, birth-cohort-specific country trends, and GDP per capita during the exposure window, corresponding to the most saturated specification from Table 2, column (3). Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. *Source:* Global Preferences Survey.

timates. Figure A.5 presents the corresponding moving-window estimates and shows the same concentration of negative effects during adolescence.

Finally, the baseline specification requires choices about the shock thresholds, the exposure metric, and the exact adolescent window. Figure A.6 therefore reports a specification-curve analysis (Simonsohn, Simmons, and Nelson, 2020) that re-estimates the adolescent coefficient across 108 specifications varying these design choices: the disaster threshold (0.5, 1, or 2 million people affected, or 1% of the national population), the inflation threshold (40, 50, or 100 percent), the exposure metric (distinct shock types, duration share, or any shock), and the adolescent window (ages 12–16, 13–17, or 14–18). All 108 coefficients are negative (median -0.046), and all but one are statistically significant at the five percent level. The single exception ($p = 0.052$) arises when the strictest inflation threshold (100 percent) is combined with the population-share disaster definition and the duration-share metric.

Heterogeneity Across Subgroups. Table A.19 examines heterogeneity by gender, OECD membership, and institutional quality during adolescence. The estimated adolescent effect is similar across subgroups, and none of the interaction terms is statistically significant. This pattern suggests that the mechanism is not confined to a particular institutional or development context.

Other Preferences. Are other economic preferences similarly shaped by instability shocks during adolescence? The GPS also elicited experimentally validated measures of risk attitudes and prosociality (Falk et al., 2018). While these preference dimensions might also be influenced by aggregate shocks, it is conceptually less straightforward to formulate clear empirical hypotheses about age-specific sensitivity.

Table A.20 reports the corresponding estimates. Adolescent shock exposure has no detectable effect on prosociality and, at most, a weak effect on risk attitudes: the risk-attitude coefficient is statistically insignificant in the baseline specification and becomes only marginally significant after adding trends and GDP controls. After correcting for multiple-hypothesis testing across the three preference domains, patience is the only domain with a statistically significant adolescent effect.

Outside the hypothesized window, exposure at ages 26–30 is associated with somewhat greater risk tolerance and lower prosociality in the baseline specification. These estimates were not predicted *ex ante*, lose significance once GDP per capita during each exposure window is accounted for, and do not survive correction for multiple-hypothesis testing (Holm-adjusted $p > 0.5$).

5.2 Effects by Shock Type

Table A.21 estimates age-specific effects for each shock type separately. All three sources of instability display a similar age gradient. Exposure during adolescence reduces adult patience by 0.090 standard deviations for natural disasters ($p < 0.01$), 0.034 standard deviations for hyperinflation episodes ($p < 0.10$), and 0.037 standard deviations for sovereign defaults ($p < 0.05$). In contrast, exposure at other ages yields smaller and mostly statistically insignificant estimates. The exceptions are sovereign-default exposure at ages 0–5, which is significant in the baseline but falls to a third of its size and loses significance once GDP-per-capita controls are added, and a marginally significant disaster coefficient at ages 6–12; neither approaches the adolescent estimates in robustness across specifications. The consistency of this age gradient across environmental, monetary, and institutional shocks suggests

that the adolescent effect reflects a general response to instability rather than mechanisms specific to particular shock types.⁸

Multiple Shocks. Table A.22 shows that point estimates become more negative as the number of distinct shock types experienced during adolescence increases, though less than proportionally. The joint effect of exposure to all three shock types remains smaller than the sum of their separate effects reported in Table A.21. This subadditivity is consistent with different forms of instability conveying distinct but partially overlapping signals about the reliability of the future.

5.3 Variation in Shock Timing among the Exposed

The baseline specification identifies both the overall effect of shock exposure and the relative sensitivity across developmental stages by comparing individuals exposed at different ages with those never exposed. To isolate relative age-specific effects and impose weaker identifying assumptions, Table 3 presents a complementary specification restricted to individuals who experienced at least one shock between ages 0 and 30. This within-exposed design exploits only variation in the timing of exposure, holding constant the fact of exposure itself.

The results confirm the adolescent-specific pattern. Using early adulthood (ages 18–25) as the reference category, exposure during ages 13–17 reduces patience by 0.027 standard deviations ($p < 0.01$), while exposure at other ages produces substantially smaller and statistically insignificant estimates. Columns (2)–(4) estimate the within-exposed specification separately for each shock type. Natural disasters exhibit the largest adolescent effect (-0.072 SD, $p < 0.05$), followed by hyperinflation (-0.031 SD, $p < 0.10$) and sovereign defaults (-0.030 SD, $p < 0.05$). Despite differences in magnitude, all three shock types display peak sensitivity during adolescence.

8. This alignment is unlikely to arise by chance. The three shock types are only weakly correlated across countries and cohorts (Table A.7), and adolescence is the only age window in which all three coefficients are negative and statistically significant (Table A.21). Randomly reassigning the timing of each shock type across cohorts within countries and re-estimating separate regressions for each type never reproduces a pattern as negative and statistically significant as the one observed in the data across 1,000 placebo draws ($p = 0.001$).

Table 3. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Ever-Exposed Sample

	Dependent variable: Patience			
	Shock Index (1)	Natural Disaster (2)	Hyper-inflation (3)	Sovereign Default (4)
<i>Ages at shock exposure (reference category: ages 18–25):</i>				
Ages 0–5	0.011 (0.008)	0.009 (0.035)	0.021 (0.018)	−0.004 (0.015)
Ages 6–12	−0.004 (0.008)	−0.012 (0.030)	−0.023 (0.015)	−0.007 (0.010)
Ages 13–17	−0.027*** (0.008)	−0.072** (0.030)	−0.031* (0.017)	−0.030** (0.014)
Ages 26–30	0.014 (0.013)	0.029 (0.031)	0.012 (0.029)	0.025 (0.018)
Observations	50,098	13,062	26,717	39,176

Notes. This table restricts the sample to individuals who experienced at least one shock during ages 0–30. The dependent variable is patience, standardized to have mean zero and standard deviation one. All specifications include a gender indicator, birth-year fixed effects, and country fixed effects. Standard errors clustered at the country level are reported in parentheses. Ages 18–25 serve as the omitted reference category, so the reported coefficients capture the effect of exposure during each respective age window relative to exposure in early adulthood, holding constant exposure in other periods. Column (1) uses a combined shock index (range 0–3) counting the number of distinct shock types experienced within each age window: natural disasters affecting at least one million people, hyperinflation episodes with annual inflation of at least 50%, and sovereign defaults. The sample is restricted to individuals who experienced at least one shock of any type during ages 0–30 (63 percent of the full sample). Columns (2)–(4) disaggregate by shock type, restricting the sample to individuals who experienced at least one shock of the specified type between ages 0 and 30: natural disasters (16% of full sample), hyperinflation (34% of full sample), and sovereign defaults (49% of full sample). Figure A.2 displays the corresponding samples by cohort and country. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Exploring Material versus Psychological Pathways

The age-specific pattern documented above suggests that adolescence is a formative period in the development of time preferences. The concentration of effects between ages 13 and 17 refines the broader impressionable-years account (Krosnick and Alwin, 1989; Giuliano and Spilimbergo, 2025): for patience, sensitivity does not appear uniformly elevated throughout late adolescence and early adulthood, but peaks before adulthood. This age profile is difficult to reconcile with the other mechanisms discussed in Section 2. It runs counter to a direct-adversity account, which predicts the largest effects in early childhood and declining sensitivity thereafter. It is also inconsistent with continuous or recency-weighted updating, since shocks experienced after adolescence, including after age 30, are unrelated to patience in adulthood (Tables 2 and A.12). Instead, sensitivity is concentrated in adolescence.

This timing aligns with findings in developmental psychology, which indicate that adolescence marks the stage when individuals begin to engage in systematic reasoning about the future (e.g., Casey et al., 2008; Steinberg, 2014; Crone, 2017). Before adolescence, individuals may lack the cognitive capacity to interpret aggregate instability as information about long-run prospects. After adolescence, instability shocks may be absorbed into established worldviews, generating at most temporary adjustments.

Thus, the adolescent-encoding hypothesis yields a further testable implication for the underlying channel. If instability shapes patience by altering perceptions of the future, its effects should persist even when direct material losses are limited. I examine this implication using two complementary designs based on indirect and personal exposure to instability.

6.1 Indirect Exposure: Origin-Country Instability

To help disentangle psychological from material channels, I turn to second-generation immigrants who were born and raised in the same host country but remain linked to different parental origin countries. This setting substantially attenuates the direct relationship between origin-country shocks and local material circumstances. In the German context examined here, instability in the parental origin country does not directly disrupt the schools respondents attend, the labor markets they enter, or the households in which they live. Information about these events may nevertheless reach them through family narratives, media coverage, and other origin-country ties.

The German Socio-Economic Panel is particularly well suited for this exercise because it combines an experimentally validated measure of patience (Vischer et al., 2013) with detailed citizenship information for second-generation immigrants whose parental countries of origin span more than 70 countries. I use sole or dual foreign citizenship to assign respondents to an origin country. If instability shapes patience primarily through psychological channels, origin-country shocks experienced during adolescence should still reduce patience later in life. By contrast, if direct material channels dominate, little or no effect should emerge. I further assess indirect material transmission by examining whether these shocks are followed by increased remittance inflows.

The estimating equation mirrors the baseline specification, except that shocks are assigned by origin country o rather than by country of residence:

$$\text{Patience}_{iot} = \sum_w \beta_w \cdot \text{OriginShockIndex}_{w,io} + \mathbf{X}'_i \boldsymbol{\delta} + \gamma_o + \lambda_b + \mu_t + \varepsilon_{iot}, \quad (3)$$

where w indexes the developmental age windows. For each window w , $\text{OriginShockIndex}_{w,io}$ counts the number of distinct shock types occurring in individual i 's origin country o during that window. The terms γ_o , λ_b , and μ_t denote origin-country, birth-year, and survey-year

fixed effects, respectively, and X_i contains a gender indicator. Standard errors are clustered at the origin-country level. The source of identifying variation mirrors the baseline design: respondents linked to the same origin country but born in different years are indirectly exposed to the same origin-country shocks at different developmental stages.

Table 4 reports the results. Column (1) shows that origin-country shocks during ages 13–17 reduce patience later in life by 0.128 standard deviations ($p < 0.05$), while exposure at other ages yields smaller and statistically insignificant estimates, qualitatively mirroring the main findings. Column (2) adds birth-cohort-specific country trends. Column (3) residualizes patience with respect to risk attitudes, and column (4) uses additional SOEP measures not available in the GPS to examine whether the effect could reflect broader pessimism about the future. Specifically, it residualizes patience with respect to expected life satisfaction in five years and concerns about macroeconomic conditions, personal finances, and health. If the effect operated through these forward-looking beliefs, removing their variation from the patience measure should attenuate the adolescent coefficient. It does not. The coefficient remains stable across all specifications, suggesting that the result is not driven by risk attitudes or pessimistic expectations.

Figure A.7 provides a more granular view using moving five-year windows, again showing coefficients that are most negative for exposure during adolescence, though the moving-window estimates are noisier than their GPS counterparts given the smaller sample.

The larger SOEP point estimates, relative to those from the GPS, may reflect the more targeted nature of the design. Citizenship provides an observable formal link to the country of origin, which may facilitate transmission of origin-country shocks through family networks or media. By contrast, the GPS estimates average over entire national populations, including many individuals for whom a given shock may have been less salient or less directly experienced. The SOEP and GPS coefficients therefore need not coincide exactly. They are nevertheless statistically compatible, as the corresponding GPS estimates fall within the 95 percent confidence intervals of the SOEP estimates.

Finally, Tables A.23 and A.24 examine whether origin-country shocks are followed by increased remittance inflows. Using country-level data from 1970 to 2010, I find little evidence of a robust or systematic increase in remittances following the shocks studied in this paper.⁹

9. Evidence from higher-frequency data suggests that remittances may rise immediately after severe disasters but typically decline thereafter, leaving annual totals largely unchanged (Bragg et al., 2018).

Table 4. Exposure to Origin-Country Shocks at Different Ages and Adult Patience

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) Risk-residualized	(4) Future-outlook residualized
<i>Ages at origin-country shock exposure:</i>				
Ages 0–5	-0.011 (0.052)	-0.023 (0.052)	-0.018 (0.054)	-0.010 (0.054)
Ages 6–12	0.021 (0.078)	0.029 (0.081)	0.016 (0.079)	0.010 (0.080)
Ages 13–17	-0.128** (0.064)	-0.114* (0.066)	-0.125** (0.061)	-0.125* (0.065)
Ages 18–25	0.013 (0.069)	-0.013 (0.078)	0.013 (0.069)	0.011 (0.070)
Ages 26–30	-0.080 (0.063)	-0.070 (0.064)	-0.081 (0.063)	-0.080 (0.067)
Observations	3,763	3,763	3,756	3,763

Notes. The table reports OLS estimates of the relationship between exposure to origin-country shocks and patience later in life. The shock index is a combined measure (range 0–3) summing exposure to the three types of aggregate shocks also used in the GPS analysis: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. The mean of the origin-country shock index ranges between 0.055 and 0.070 across age windows. All specifications control for a gender indicator, origin-country, birth-year, and survey-year fixed effects. Column (1) presents this baseline specification; column (2) adds birth-cohort-specific country trends. In column (3), the patience measure is residualized with respect to individual risk preferences. In column (4), it is residualized with respect to expected life satisfaction in five years, as well as concerns about macroeconomic conditions, personal finances, and health. In both cases, the resulting residuals are standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (2). The sample includes second-generation immigrants with foreign citizenship observed in at least one SOEP wave containing patience measures (2008, 2013, 2018, or 2023). For individuals observed in multiple waves, only the first available observation is retained. All observations with nonzero adolescent exposure were born before 2000, and restricting the sample to these cohorts leaves the age gradient essentially unchanged. The slightly smaller sample in column (3) reflects missing risk-preference information for seven respondents. Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the origin-country level. Wild-cluster bootstrap p-values for the ages 13–17 coefficient (9,999 replications, Webb weights; Roodman et al., 2019) are 0.030, 0.098, 0.022, and 0.036 across columns (1)–(4). Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2 Personal Exposure: Bereavement

Aggregate shocks destabilize the broader environment, whereas personal losses destabilize an individual's immediate world. If instability shapes patience primarily through psychological rather than material channels, both types of shocks should matter most when experienced during adolescence despite their different economic scale. The TwinLife panel allows me to examine this prediction using a qualitatively different form of instability: the death of someone close. Bereavement is informative in this context because it can destabilize an individual's immediate environment and alter beliefs about the reliability of future plans without necessarily entailing aggregate economic disruption. A death in one's close environment may make the future feel less predictable precisely when perceptions of future reliability are forming and patience may be developing in response to them. If the instability channel operates psychologically, such personal shocks should display an age gradient similar to that of aggregate shocks, with the strongest effects during adolescence.¹⁰

10. Moreover, TwinLife measures patience already during childhood and adolescence, prior to many educational and labor-market decisions, allowing for an examination of whether instability also shapes time preferences before downstream life choices.

The bereavement measure is an indicator equal to one if a respondent reports that someone close to them—a family member or another important person—died during the 12 months preceding the interview. Because TwinLife measures patience only from age 10 onward, the analysis begins at that age and divides pre-adult exposure into two windows with similar numbers of observations: ages 10–14 and ages 15–17. Exposure at age 18 or later serves as the adult comparison group. As a result, these bins do not exactly match the aggregate-shock windows, but they nevertheless preserve the key developmental contrast between late childhood, adolescence, and adulthood.

Table 5 reports the estimated effects of bereavement across these developmental stages. The pattern closely mirrors the age gradient observed for aggregate shocks. In the baseline specification in Panel A, experiencing the death of someone close during ages 15–17 reduces patience by 0.123 standard deviations ($p < 0.05$). By contrast, estimates for bereavement during ages 10–14 and ages 18 and older are small and statistically insignificant (0.030, $SE = 0.059$; and -0.026 , $SE = 0.024$, respectively). Figure A.8 provides a more granular view using moving five-year windows and shows the same age pattern, with the most negative estimate in mid-adolescence.

Panel B augments the baseline specification with controls for household income, parental patience, parental investment behaviors, and other family characteristics. The adolescent coefficient remains similar in magnitude, at -0.101 standard deviations ($p < 0.05$), indicating that the relationship is not accounted for by observed household resources or parental responses. Table A.25 examines these possible pathways directly. Bereavement is not significantly related to parental patience or parenting behaviors. The only detectable change is a modest decline in household income, which is accounted for in Panel B.

Panel C adds household fixed effects, exploiting comparisons among siblings who experience bereavement at different ages. Because TwinLife surveys twins together with participating non-twin siblings, the same family-level bereavement can be observed for siblings at different developmental stages. This specification absorbs all time-invariant family characteristics, including persistent differences in socioeconomic status and parental traits. The adolescent coefficient remains negative and statistically significant, with an estimate of -0.191 standard deviations ($p < 0.01$), while the estimates for ages 10–14 and ages 18 and older remain smaller and statistically insignificant.

Finally, Panel D exploits the panel dimension of TwinLife and replaces household with individual fixed effects, comparing the same person across waves with and without a recent bereavement. This specification absorbs all time-invariant individual characteristics, including stable personality traits. The adolescent estimate remains negative and statistically significant at -0.127 standard deviations ($p < 0.01$), while within-person estimates at other ages are small and statistically insignificant.

Table 5. Personal Bereavement at Different Ages and Patience

	Dependent variable: Patience		
	Ages 10-14	Ages 15-17	Ages 18 and older
<i>Panel A: Baseline</i>			
Experienced death of someone close	0.030 (0.059)	-0.123** (0.050)	-0.026 (0.024)
Observations	1,810	2,291	11,006
<i>Panel B: With household and parental controls</i>			
Experienced death of someone close	0.027 (0.060)	-0.101** (0.050)	-0.002 (0.021)
Observations	1,810	2,291	11,002
<i>Panel C: With household fixed effects</i>			
Experienced death of someone close	-0.098 (0.063)	-0.191*** (0.050)	-0.007 (0.042)
Observations	7,607 (1,820 families)		
<i>Panel D: With individual fixed effects</i>			
Experienced death of someone close	-0.061 (0.068)	-0.127*** (0.048)	0.004 (0.026)
Observations	11,590 (5,309 individuals)		

Notes. This table examines age-specific sensitivity to experiencing the death of someone close. The dependent variable is patience, standardized to have mean zero and standard deviation one. The explanatory variable is a binary indicator equal to one if the respondent reports that a family member or other important person died in the past 12 months. Exposure rates increase only modestly with age: 18.9% for ages 10–14, 20.2% for ages 15–17, and 21.6% for ages 18 and older. In Panels A and B, each estimate represents a separate regression restricting the sample to individuals within the specified age range. The three age bins partition childhood and adulthood into late childhood (ages 10–14), mid-adolescence (15–17), and adulthood (18 and older), with cutoffs designed to yield roughly equal numbers of observations in the first two groups. The analysis begins at age 10 because TwinLife first administers the patience question at this age. All specifications account for survey year fixed effects. Panel A presents baseline estimates without additional controls. Panel B adds controls for respondent gender, household net income (euros per month), perceived family financial difficulties as reported by the child, migration background, East German residence, maternal and paternal patience, positive parental investment indices for mothers and fathers (averaging four child-reported items: showing affection, praise, emotional support when sad, and advice on personal problems), and negative parental investment indices for mothers and fathers (averaging seven child-reported items: punishment, disappointment, enforcing rules, yelling, scolding, empty threats, and difficulty maintaining rules). Some variables—particularly the parental investment indices—are available for only a subset of observations (see Table A.11). To avoid sample attrition, I include missing value indicators for these measures and impute missing values with a distinct constant. Panel C is estimated in a single pooled specification that interacts the bereavement indicator with the three age-bin indicators and includes household fixed effects; the reported coefficients are the age-bin-specific interaction effects. Identification comes from within-family variation in the age at which siblings experience bereavement. The Panel C sample comprises twins and participating non-twin siblings. The adolescent estimate is robust to using the full household sample, including adult household members (–0.173, SE = 0.049), and to a within-twin-pair specification comparing co-twins who differ in bereavement exposure (–0.181, SE = 0.071; 335 exposure-discordant pairs). Panel D is estimated in a single pooled specification that interacts the bereavement indicator with the three age-bin indicators and replaces household with individual fixed effects; the reported coefficients are the age-bin-specific interaction effects. Identification comes from comparing the same individual across waves with and without a recent bereavement (1,927 individuals change bereavement status across waves). Individuals observed only once in the sample are excluded because they provide no within-person variation and therefore do not contribute to coefficient identification. Restricting the Panel D sample to the child generation leaves the adolescent estimate unchanged (–0.127, SE = 0.048) and yields a small, statistically insignificant estimate for bereavement at ages 18 and older (0.062, SE = 0.041; N = 6,221). Standard errors in parentheses are clustered at the household level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Taken together, the bereavement results show that adolescent-specific sensitivity extends beyond aggregate shocks and persists after accounting for stable family- and

individual-level differences: even personal instability is most strongly related to patience when experienced during adolescence.

7 Conclusion

This paper identifies adolescence as a sensitive period during which exposure to aggregate instability shapes the formation of time preferences. Using within-country, cross-cohort variation in exposure to natural disasters, inflation crises, and sovereign defaults among approximately 80,000 individuals in 76 countries, I show that shocks experienced between ages 13 and 17 reduce patience later in life by about 0.04 standard deviations, whereas comparable shocks experienced before or after this window show no detectable effects.

Evidence from second-generation immigrants in Germany reveals comparable age-specific effects when instability shocks in the country of origin are transmitted only indirectly through family networks or media consumption, suggesting that the mechanism operates primarily through psychological rather than material channels. Consistent with this interpretation, personal bereavement, which destabilizes an individual's immediate environment without aggregate economic consequences, reduces patience only when experienced during adolescence. This age-specific relationship persists after accounting for household income and parental investment and in specifications with household and individual fixed effects.

The findings extend the economic framework of skill formation to preference development, indicating that time preferences follow a different developmental trajectory from cognitive skills. While cognitive abilities tend to exhibit the highest malleability in early childhood (Cunha and Heckman, 2007, 2008), parts of patience appear to crystallize during adolescence—when individuals first develop stable perceptions about the future and the prefrontal cortex undergoes rapid maturation (Steinberg, 2014).

The results have important policy implications. First, they identify adolescence as a potentially important window for interventions aimed at fostering future-oriented behavior, consistent with evidence that the effects of financial-literacy programs on patience decline with age (Kaiser, Menkhoff, and Oberrauch, 2023). Second, they highlight a less visible cost of instability. Beyond its immediate welfare consequences, exposure to aggregate volatility during adolescence reduces long-run patience, potentially contributing to persistent underdevelopment in shock-prone regions. Third, the findings point to potentially high returns from stabilization policies that protect adolescents during periods of instability, a consideration that may become increasingly important as climate-related hazards grow more frequent or severe (IPCC, 2021).

More broadly, the findings suggest that the costs of instability extend far beyond the periods in which shocks occur. Where instability recurs, successive adolescent cohorts may form time preferences under volatile conditions, offering one possible explanation for persistent cross-country differences in patience. By identifying adolescence as the period of greatest sensitivity, the paper shows how instability experienced during this formative stage can leave a lasting imprint on how individuals value the future.

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Appendix A Additional Figures and Tables

Table A.1. Historical Instability Shocks and National Patience

Dependent variable: National Patience (2012)	
Number of shock types since 1950	-0.168*** (0.042)
Countries	76

Notes. The dependent variable is the standardized measure of patience from the Global Preferences Survey, elicited in 2012 (Falk et al., 2018). The explanatory variable counts how many of the following three shock types occurred in a country between 1950 and 2012: sovereign default, hyperinflation episodes ($\geq 50\%$ annual inflation), and natural disasters affecting ≥ 1 million people. The sample mean is 1.64 shock types per country. Ten countries experienced no shocks, 24 experienced one, 25 experienced two, and 17 experienced all three shock types. Robust standard errors are reported in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2. Historical Instability Shocks by Type and National Patience

	Dependent variable: National Patience (2012)			
	(1) Default only	(2) Hyperinflation only	(3) Disaster only	(4) All jointly
Any sovereign default since 1950	-0.347*** (0.091)			-0.303*** (0.095)
Any hyperinflation since 1950		-0.224*** (0.077)		-0.149* (0.077)
Any major natural disaster since 1950			-0.089 (0.091)	-0.037 (0.081)
Constant	0.216** (0.084)	0.097 (0.066)	0.047 (0.080)	0.275*** (0.096)
Countries	76	76	76	76

Notes. The dependent variable is the standardized measure of patience from the Global Preferences Survey, elicited in 2012 (Falk et al., 2018). Each column reports OLS coefficients from a separate regression with robust standard errors in parentheses. The explanatory variables are binary indicators equal to one if the country experienced at least one shock of the specified type between 1950 and 2012: sovereign default (63% of countries), hyperinflation with annual inflation of at least 50% (45% of countries), or natural disaster affecting ≥ 1 million people (57% of countries). Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3. Perceived Future Stability and Patience among German Adults

Dependent variable: Patience	
High perceived future stability and predictability	0.487*** (0.101)
Net household income	0.142*** (0.019)
Observations	2,825

Notes. This table reports an OLS regression of standardized patience on perceived future stability and net monthly household income. Patience is measured using the experimentally validated question: “Are you generally an impatient person, or someone who always shows great patience?” (Vischer et al., 2013). Responses range from 0 (“very impatient”) to 10 (“very patient”) on an 11-point scale and are standardized to have mean zero and standard deviation one. “High perceived future stability and predictability” is a binary indicator equal to one for respondents who selected “strongly agree” on a 5-point Likert scale in response to the statement: “When I think about the future, I assume that the world will generally be stable and predictable.” Net monthly household income is standardized to mean zero and standard deviation one. The data are drawn from the ifo Education Survey 2025, a representative sample of Germany’s adult population. See Freundl et al. (2023) for details on sampling and survey design. Robust standard errors are reported in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4. Patience Gap Between Children of Turkish and Native German Origin by Age

	Dependent variable: Patience	
	Ages 12–14	Ages 15–17
Turkish background	-0.004 (0.154)	-0.325** (0.168)
Observations	1,462	1,364

Notes. The dependent variable measures patience using an incentivized time-preference task in which children make 24 binary choices between a smaller immediate reward and a larger delayed reward. Specifically, the patience measure counts the number of patient choices (i.e., selections of the larger-later option) and then standardizes this count to have a mean of zero and a standard deviation of one. Controls include survey year and birth year fixed effects. Data are drawn from the five annual waves of the Bonn Intervention Panel available through SOEP-IS, covering survey years 2016–2020 (Rathje and Glemser, 2021). The panel follows German schoolchildren in Bonn and Cologne who were born between 2002 and 2004. 5.4 percent of the children have a Turkish migration background. Because these cohorts are observed only through 2020, no respondent is older than 18 in these data. The 12–14 / 15–17 cutoff splits the observed ages into two groups of similar size. Standard errors (in parentheses) are clustered at the individual level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5. Patience Gap Between Children of Turkish and Native German Origin by Age: Interaction Specification

	Dependent variable: Patience
Turkish background	−0.008 (0.155)
Ages 15–17	−0.009 (0.077)
Turkish background × Ages 15–17	−0.311* (0.185)
Observations	2,826

Notes. The dependent variable measures patience using an incentivized time-preference task in which children make 24 binary choices between a smaller immediate reward and a larger delayed reward. Specifically, the patience measure counts the number of patient choices (i.e., selections of the larger-later option) and then standardizes this count to have a mean of zero and a standard deviation of one. The reference category is native German children aged 12–14. Controls include survey year and birth year fixed effects. Data are drawn from the five annual waves of the Bonn Intervention Panel available through SOEP-IS, covering survey years 2016–2020 (Rathje and Glemser, 2021). The panel follows German schoolchildren in Bonn and Cologne who were born between 2002 and 2004. 5.4 percent of the children have a Turkish migration background. Because these cohorts are observed only through 2020, no respondent is older than 18 in these data. Standard errors (in parentheses) are clustered at the individual level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

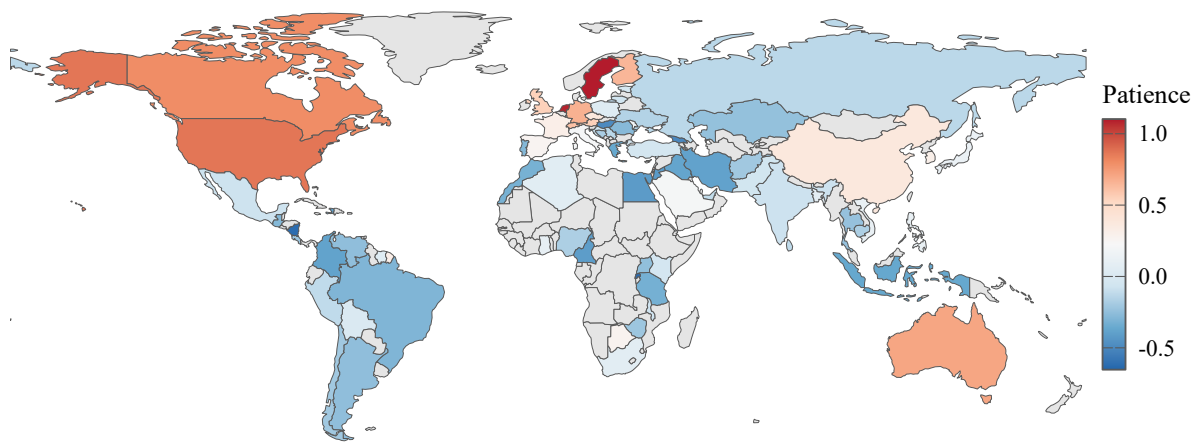


Figure A.1. Global Variation in Patience

Notes. This figure displays country-level averages of patience measured in 2012 as part of the Global Preferences Survey (Falk et al., 2018), which surveyed representative samples of approximately 80,000 individuals across 76 countries, covering roughly 90% of the world's population. Patience is standardized globally to have a mean of zero and a standard deviation of one. All colored countries are represented in the estimation sample. Red shading indicates above-average patience and blue shading below-average patience, with darker tones indicating larger deviations from the global mean (in standard deviations; see color bar). Gray shading indicates countries not included in the GPS sample.

Table A.6. Patience and Human Development

	GDP per capita (normalized)	Years of schooling (normalized)	Life expectancy (normalized)	Saving rate (normalized)	HDI (normalized)
Patience (normalized)	0.179*** (0.056)	0.746*** (0.092)	0.524*** (0.076)	0.210*** (0.074)	0.759*** (0.090)
R ²	0.067	0.324	0.236	0.063	0.334
Countries	75	73	76	71	76

Notes. Each column reports estimates from a separate OLS regression, with the column header indicating the outcome variable. In all specifications, the explanatory variable is average national patience measured in 2012 from the Global Preferences Survey (Falk et al., 2018). All variables are normalized to range from 0 to 100 to facilitate comparison of effect magnitudes across outcomes with different scales. Column (1) uses real GDP per capita in 2011 U.S. dollars from the Maddison Project Database (Bolt and van Zanden, 2025); column (2) uses learning-adjusted years of schooling from the World Bank's World Development Indicators (World Bank, 2024), which combines schooling quantity with quality adjustments based on harmonized test scores (Filmer et al., 2020); column (3) uses life expectancy at birth; column (4) uses gross domestic savings as a percentage of GDP; and column (5) uses the Human Development Index (HDI), a multidimensional summary measure developed by the United Nations Development Programme, intended to capture broad human flourishing across dimensions related to education, health, and standard of living (United Nations Development Programme, 2025). Robust standard errors are reported in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

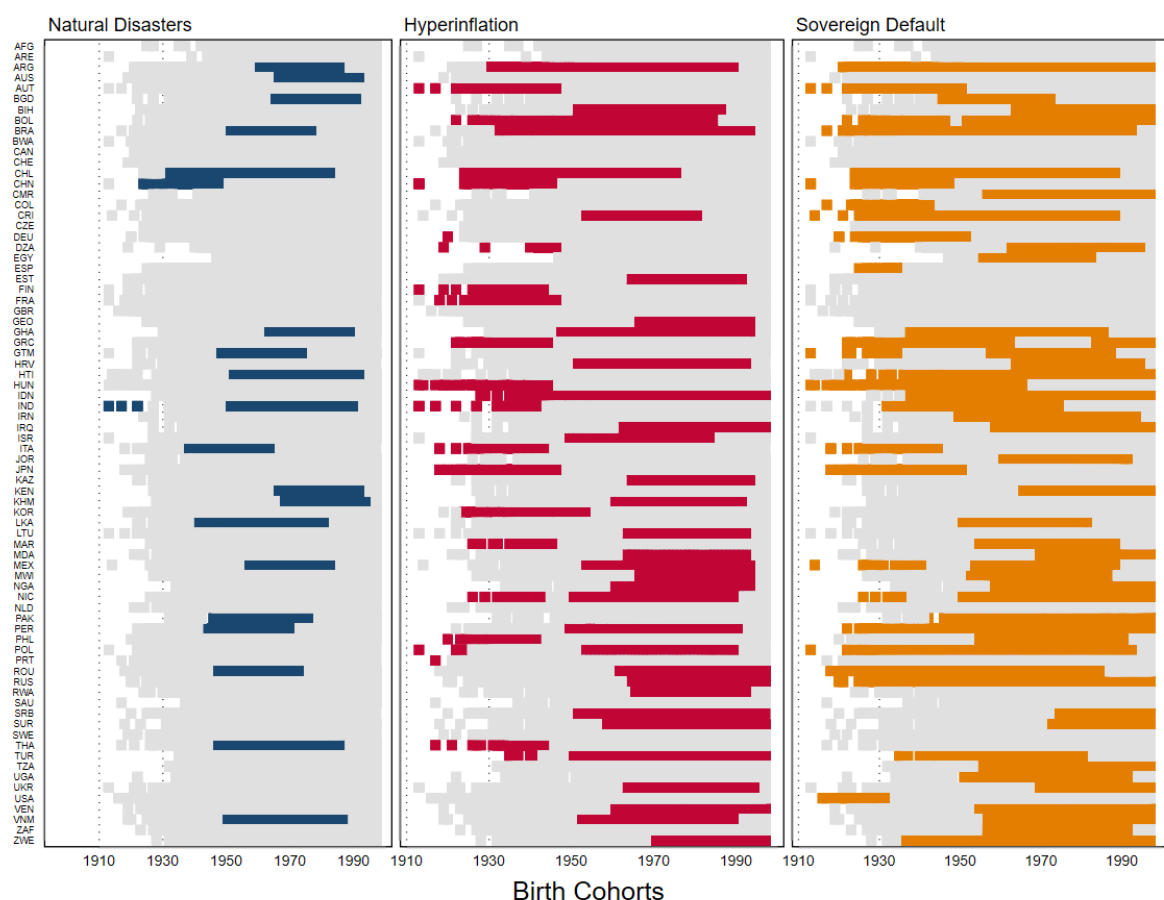


Figure A.2. Exposure to Aggregate Shocks During Ages 0-30 by Country and Cohort

Notes. This figure displays shock exposure during ages 0–30 across all countries and birth cohorts in the Global Preferences Survey. Birth cohorts are shown on the horizontal axis (spanning 1913–1997) and countries on the vertical axis in alphabetical order. Each cell represents a country-cohort combination. Colored squares indicate exposure to at least one shock of the respective type during ages 0–30 and correspond to the samples used in Table 3: blue for natural disasters affecting at least one million people, red for hyperinflation episodes with annual inflation of at least 50%, and orange for sovereign defaults. Gray squares indicate no exposure to the respective shock type. White squares indicate birth cohorts not represented in the GPS sample. Data sources: Global Preferences Survey (Falk et al., 2018) for patience and demographics; EM-DAT (Delforge et al., 2025) for natural disasters; Reinhart and Rogoff (2009), IMF International Financial Statistics, and IMF archival records for hyperinflation; Reinhart and Rogoff (2009) for sovereign defaults.

Table A.7. Correlations Among Aggregate Shocks Experienced During Adolescence

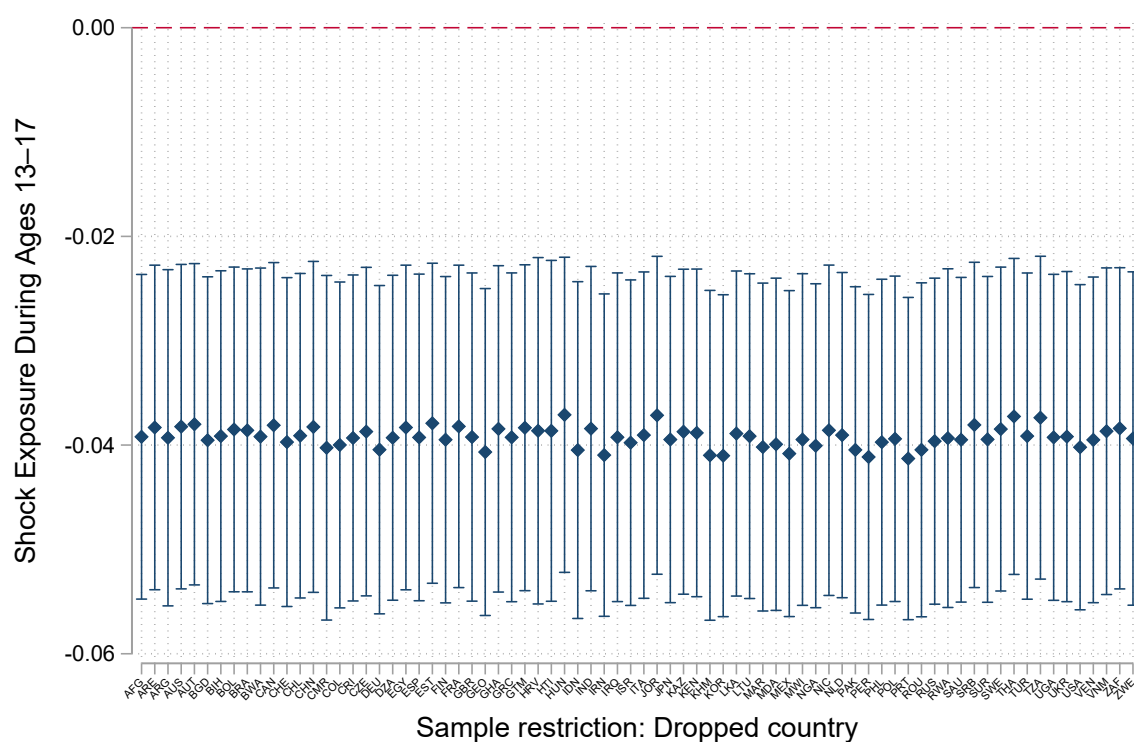
	Natural disaster	Sovereign default	Hyperinflation
Natural disaster	1.000		
Sovereign default	0.090	1.000	
Hyperinflation	0.083	0.290	1.000

Notes. This table reports pairwise correlations among aggregate shock variables experienced during adolescence (ages 13–17) for GPS respondents. Natural disasters are defined as events affecting at least one million people; hyperinflation as episodes with annual inflation rates of 50% or higher; and sovereign defaults as instances of a government’s failure to meet its debt obligations.

Table A.8. Distribution of Distinct Aggregate Shocks Experienced During Adolescence

Number of Distinct Shock Types	Frequency	Percent	Cumulative (%)
0	56,658	71.19	71.19
1	16,986	21.34	92.53
2	5,442	6.84	99.37
3	505	0.63	100.00
Total	79,591	100.00	

Notes. This table reports the distribution of GPS respondents by exposure to zero, one, two, or three distinct aggregate shocks during ages 13–17. The three aggregate shocks are (i) natural disasters affecting at least one million people, (ii) hyperinflation episodes with annual inflation of 50% or more, and (iii) sovereign defaults.

**Figure A.3.** Shock Exposure During Adolescence and Adult Patience: Robustness to Excluding Countries

Notes. This figure examines whether the estimated effect of adolescent shock exposure on adult patience is driven by any single country. Each point shows the coefficient on adolescent shock exposure (ages 13–17) from a separate OLS regression of standardized patience on the shock index. The shock index counts the number of distinct shock types (0–3) experienced during adolescence: natural disasters affecting at least one million people, hyperinflation episodes with annual inflation of at least 50%, and sovereign defaults. Moving left to right along the horizontal axis, each regression sequentially excludes one country from the estimation sample, cycling through all 76 countries in alphabetical order. The horizontal axis displays three-letter ISO country codes for the excluded countries. All regressions include the baseline set of controls: a gender indicator, birth-year fixed effects, and country fixed effects. Standard errors are clustered at the country level. Vertical bars indicate 95% confidence intervals. Observations are weighted using GPS sampling weights. *Source:* Global Preferences Survey.

Table A.9. Summary Statistics for the GPS Analysis Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Patience (standardized)	79,850	0.000	1.000	−1.313	2.764
Risk attitudes (standardized)	79,561	0.000	1.000	−1.875	2.466
Prosociality (standardized)	78,320	0.000	1.000	−4.084	2.516
Age	79,591	41.787	17.504	15	99
Female (=1)	79,850	0.546	0.498	0	1
<i>Shock index (number of distinct shock types experienced, by age window)</i>					
Ages 0–5	79,591	0.466	0.688	0	3
Ages 6–12	79,591	0.489	0.712	0	3
Ages 13–17	79,591	0.369	0.639	0	3
Ages 18–25	79,591	0.383	0.667	0	3
Ages 26–30	79,591	0.242	0.549	0	3
<i>Natural disaster exposure (disasters affecting ≥1 million people, by age window)</i>					
Ages 0–5	79,591	0.050	0.218	0	1
Ages 6–12	79,591	0.057	0.233	0	1
Ages 13–17	79,591	0.038	0.192	0	1
Ages 18–25	79,591	0.046	0.209	0	1
Ages 26–30	79,591	0.026	0.159	0	1
<i>Hyperinflation exposure (episodes with annual inflation ≥50%, by age window)</i>					
Ages 0–5	79,591	0.138	0.345	0	1
Ages 6–12	79,591	0.149	0.356	0	1
Ages 13–17	79,591	0.113	0.317	0	1
Ages 18–25	79,591	0.122	0.328	0	1
Ages 26–30	79,591	0.080	0.271	0	1
<i>Sovereign default exposure (default episodes, by age window)</i>					
Ages 0–5	79,591	0.278	0.448	0	1
Ages 6–12	79,591	0.283	0.451	0	1
Ages 13–17	79,591	0.218	0.413	0	1
Ages 18–25	79,591	0.215	0.411	0	1
Ages 26–30	79,591	0.136	0.343	0	1
<i>GDP per capita (in 2011 U.S. dollars, by age window)</i>					
Ages 0–5	66,767	7,283	7,036	489	41,657
Ages 6–12	66,767	8,252	7,833	521	51,574
Ages 13–17	66,767	9,485	9,021	508	65,526
Ages 18–25	66,767	11,231	10,462	536	70,541
Ages 26–30	66,767	13,151	11,988	525	76,521
<i>Total shock count (number of shock occurrences, by age window)</i>					
Ages 0–5	79,591	1.357	2.538	0	13
Ages 6–12	79,591	1.577	2.913	0	15
Ages 13–17	79,591	0.992	2.076	0	12
Ages 18–25	79,591	1.290	2.862	0	17
Ages 26–30	79,591	0.643	1.740	0	12

Notes. This table reports summary statistics for the GPS estimation sample, including merged treatment and control variables. Prosociality is the first principal component of standardized measures of altruism, trust, and positive reciprocity, following Kosse and Tincani (2020) and Bietenbeck, Sunde, and Thiemann (2025). Factor loadings are 0.649 for altruism, 0.417 for trust, and 0.636 for positive reciprocity. The eigenvalues are 1.477, 0.901, and 0.622, indicating that a one-dimensional construct is appropriate. The shock index counts the number of distinct shock types experienced during each age window: natural disasters affecting ≥1 million people, hyperinflation episodes (≥50% annual inflation), and sovereign defaults. Individual shock type variables are binary indicators equal to one if the respective shock occurred at least once during the window. Total shock count sums all shock occurrences within each age window. To preserve sample size, exposure in age windows not yet reached by younger cohorts at the time of the survey (2012) is coded as zero, which partly explains the lower means in the later windows. Excluding the youngest birth cohorts for which this applies does not affect the results (see Figure A.4). GDP per capita is taken from the Maddison Project Database (Bolt and van Zanden, 2025) and measured in 2011 U.S. dollars (real GDP divided by mid-year population).

Table A.10. Summary Statistics for the SOEP Analysis Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Sample characteristics</i>					
Patience (standardized)	3,763	0.000	1.000	-2.610	1.441
Gender: 1 = male, 2 = female	3,763	1.498	0.500	1	2
Year of birth	3,763	1985.297	14.158	1924	2006
Survey year	3,763	2020.546	4.389	2008	2023
Life satisfaction in 5 years	3,763	8.075	1.740	0	10
Concerns about macroeconomic conditions	3,763	2.005	0.635	1	3
Concerns about personal finances	3,763	2.012	0.685	1	3
Concerns about own health	3,763	2.072	0.709	1	3
Risk attitudes (standardized)	3,756	0.000	1.000	-2.050	1.836
<i>Exposure to origin-country shocks, assigned from citizenship (by age window)</i>					
Ages 0–5	3,763	0.061	0.298	0	2
Ages 6–12	3,763	0.070	0.319	0	2
Ages 13–17	3,763	0.055	0.280	0	3
Ages 18–25	3,763	0.066	0.319	0	3
Ages 26–30	3,763	0.057	0.297	0	2

Notes. This table reports summary statistics for the SOEP estimation sample, including the merged treatment variables. The sample draws on waves 2008, 2013, 2018, and 2023, the years in which patience is measured. The sample includes all second-generation immigrants with foreign citizenship and non-missing patience measures, and for each individual the first available observation is retained. Concern measures are based on respondents' ratings on a three-point scale from 1 (very concerned) to 3 (not concerned). The shock index counts the number of origin-country shock types experienced during each age window: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults.

Table A.11. Summary Statistics for the TwinLife Analysis Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Outcome and personal instability exposure</i>					
Patience (standardized)	15,107	0.000	1.000	-2.189	1.833
Experienced death of someone close (=1)	15,107	0.210	0.407	0	1
<i>Individual and household characteristics</i>					
Gender: 1 = male, 2 = female	15,103	1.540	0.498	1	2
German citizenship (=1)	15,046	0.963	0.188	0	1
Residence: 1 = East Germany, 2 = West Germany	15,102	1.821	0.383	1	2
Number of non-twin siblings	15,107	1.121	1.139	0	11
Family financial difficulties (=1)	15,069	0.120	0.325	0	1
Household net income (EUR/month)	14,273	4,661	2,947	79	37,450
Mother's patience (standardized)	13,629	0.356	0.970	-2.189	1.833
Father's patience (standardized)	10,845	0.330	0.943	-2.189	1.833
<i>Parenting inputs</i>					
Positive maternal investment	2,944	4.251	0.612	1	5
Negative maternal investment	2,944	2.517	0.605	1	4.714
Positive paternal investment	2,700	3.926	0.853	1	5
Negative paternal investment	2,700	2.378	0.651	1	4.500

Notes. This table reports summary statistics for the TwinLife estimation sample, drawing on data from all four available waves (2014–2022). Experienced death of someone close is measured using the question: “Did a family member or another important person pass away in the last 12 months?”. Family financial difficulties is measured using the question: “Has anyone in your family experienced significant financial difficulties or serious financial problems in the last 12 months? By family, we mean your closest relatives, such as your parents and siblings”. Number of non-twin siblings counts the twins’ siblings registered in the TwinLife family roster, including half-, step-, and adoptive siblings. Positive maternal/paternal investment indices average four items measuring emotional warmth: showing affection, praise, emotional support when sad, and advice on personal problems. Negative maternal/paternal investment indices average seven items: three measuring psychological control (punishment for disobedience, disappointment over misbehavior, enforcing rules), two measuring negative communication (yelling, scolding), and two measuring inconsistent parenting (empty threats, difficulty maintaining consistent rules). All parenting items are reported by the child and can range from 1 (never) to 5 (very often).

Table A.12. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Pre-Birth and Post-Age-30 Windows and Institutional Controls

	Dependent variable: Patience				
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized	(5) + Institutions
<i>Ages at shock exposure:</i>					
2–6 years before birth	-0.020 (0.014)	-0.017 (0.013)	-0.008 (0.016)	-0.010 (0.014)	-0.018 (0.020)
1 year before birth	-0.013 (0.014)	-0.014 (0.013)	-0.005 (0.014)	0.002 (0.013)	-0.010 (0.016)
Ages 0–5	0.001 (0.008)	0.001 (0.009)	0.010 (0.009)	0.013 (0.008)	0.009 (0.011)
Ages 6–12	-0.012 (0.009)	-0.011 (0.008)	-0.000 (0.009)	-0.001 (0.008)	0.003 (0.011)
Ages 13–17	-0.039*** (0.008)	-0.037*** (0.008)	-0.038*** (0.008)	-0.033*** (0.009)	-0.032*** (0.009)
Ages 18–25	0.005 (0.010)	0.005 (0.009)	0.006 (0.009)	0.007 (0.008)	0.008 (0.012)
Ages 26–30	-0.001 (0.010)	-0.003 (0.010)	0.000 (0.011)	-0.004 (0.011)	0.009 (0.013)
Ages 31–99	0.016 (0.015)	0.018 (0.015)	0.000 (0.015)	-0.000 (0.014)	0.012 (0.016)
Observations	79,591	79,591	66,767	66,439	53,016

Notes. This table probes the timing of the effect on both sides of the developmental window by adding three additional exposure windows to the four standard specifications of Table 2: a pre-conception placebo window, defined as exposure two to six years before birth; an in-utero exposure window, defined as exposure one year before birth; and a post-age-30 exposure window. The ages 31–99 window captures all exposure after age 30. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita across the developmental age windows. In column (4), the patience measure is first residualized with respect to individual risk preferences; the resulting residuals are standardized and used as the dependent variable in a regression with the full set of controls from column (3). Column (5) adds controls for institutional quality across the developmental age windows to the specification of column (3). To assess institutional quality, I draw on data from the Polity Project (Marshall and Gurr, 2020); the measure is based on the average Polity2 score, which rates countries on an autocracy–democracy scale. The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.13. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Splitting Early Adulthood

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.013 (0.009)	-0.012 (0.009)	0.007 (0.010)	0.012 (0.009)
Ages 6–12	-0.011 (0.008)	-0.011 (0.007)	0.002 (0.009)	0.000 (0.008)
Ages 13–17	-0.036*** (0.009)	-0.035*** (0.009)	-0.035*** (0.009)	-0.031*** (0.009)
Ages 18–20	-0.005 (0.010)	-0.006 (0.010)	-0.002 (0.010)	-0.001 (0.010)
Ages 21–25	0.007 (0.009)	0.007 (0.009)	0.009 (0.009)	0.009 (0.009)
Ages 26–30	0.005 (0.010)	0.004 (0.010)	0.000 (0.011)	-0.004 (0.011)
Observations	79,591	79,591	66,767	66,439

Notes. This table examines whether the adolescent effect extends into early adulthood by splitting the 18–25 window into ages 18–20, immediately following adolescence, and ages 21–25. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences; the resulting residuals are standardized and used as the dependent variable in a regression with the full set of controls from column (3). The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.14. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Within-Country Standardization

	Dependent variable: Patience (standardized within country)			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.006 (0.010)	-0.006 (0.010)	0.008 (0.011)	0.014 (0.010)
Ages 6–12	-0.009 (0.009)	-0.007 (0.009)	0.002 (0.010)	0.001 (0.009)
Ages 13–17	-0.041*** (0.009)	-0.040*** (0.009)	-0.043*** (0.009)	-0.038*** (0.010)
Ages 18–25	0.010 (0.010)	0.009 (0.010)	0.011 (0.010)	0.011 (0.010)
Ages 26–30	0.007 (0.011)	0.005 (0.011)	0.002 (0.012)	-0.002 (0.012)
Observations	79,591	79,591	66,767	66,439

Notes. This table replicates Table 2, but standardizes patience to mean zero and standard deviation one within each country rather than in the full sample. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the within-country standardized patience measure is first residualized with respect to individual risk preferences; the resulting residuals are standardized and used as the dependent variable in a regression with the full set of controls from column (3). The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.15. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Exposure Normalized by Window Length

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.020 (0.016)	-0.018 (0.015)	0.020 (0.015)	0.025* (0.014)
Ages 6–12	-0.020 (0.017)	-0.020 (0.016)	-0.005 (0.017)	-0.007 (0.016)
Ages 13–17	-0.052*** (0.013)	-0.051*** (0.013)	-0.051*** (0.013)	-0.045*** (0.013)
Ages 18–25	-0.004 (0.015)	-0.003 (0.015)	0.014 (0.016)	0.014 (0.016)
Ages 26–30	0.003 (0.016)	0.004 (0.016)	-0.000 (0.018)	-0.008 (0.017)
Observations	79,591	79,591	66,767	66,439

Notes. This table replicates Table 2, but measures exposure as a rate rather than a count. Because the age windows differ in length (6, 7, 5, 8, and 5 years), the total number of shock-type-years within each window—summing exposure to natural disasters affecting ≥ 1 million people, hyperinflation episodes with annual inflation of 50% or higher, and sovereign defaults—is divided by the length of that window. Coefficients therefore capture the effect of a one-unit increase in annualized shock exposure and are directly comparable across windows of different lengths. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences; the resulting residuals are standardized and used as the dependent variable in a regression with the full set of controls from column (3). Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.16. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Duration of Exposure

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.034* (0.019)	-0.032* (0.019)	0.015 (0.019)	0.024 (0.018)
Ages 6–12	-0.027 (0.023)	-0.027 (0.022)	-0.006 (0.022)	-0.009 (0.022)
Ages 13–17	-0.059*** (0.018)	-0.058*** (0.017)	-0.060*** (0.017)	-0.053*** (0.017)
Ages 18–25	-0.013 (0.020)	-0.012 (0.020)	0.009 (0.022)	0.013 (0.022)
Ages 26–30	0.008 (0.021)	0.006 (0.021)	0.005 (0.023)	-0.002 (0.022)
Observations	79,591	79,591	66,767	66,439

Notes. This table replicates Table 2, but measures exposure as the share of years within each age window during which at least one aggregate shock was active. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences; the resulting residuals are standardized and used as the dependent variable in a regression with the full set of controls from column (3). The underlying shocks are natural disasters affecting ≥ 1 million people, hyperinflation episodes with annual inflation of 50% or higher, and sovereign defaults; a year counts as a shock year if at least one of these was active. Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.17. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Survivorship Robustness

	Dependent variable: Patience			
	(1) Aged ≤ 60	(2) Aged ≤ 60 , + Trends, + GDP	(3) Born ≥ 1945	(4) Born ≥ 1945 , + Trends, + GDP
<i>Ages at shock exposure:</i>				
Ages 0–5	0.004 (0.009)	0.009 (0.011)	-0.005 (0.009)	0.002 (0.011)
Ages 6–12	0.002 (0.008)	0.004 (0.009)	-0.000 (0.008)	0.004 (0.009)
Ages 13–17	-0.030*** (0.009)	-0.037*** (0.009)	-0.034*** (0.008)	-0.039*** (0.009)
Ages 18–25	0.012 (0.009)	0.008 (0.009)	0.010 (0.009)	0.007 (0.009)
Ages 26–30	0.019* (0.010)	0.006 (0.011)	0.016 (0.010)	0.004 (0.011)
Observations	66,177	56,868	72,003	61,938

Notes. This table addresses potential survivorship bias arising if exposure to early-life instability affected the probability of being observed in the 2012 GPS survey. Columns (1) and (2) restrict the sample to respondents aged at most 60 at the time of the survey; columns (3) and (4) restrict it to cohorts born in 1945 or later. All specifications include birth-year and country fixed effects along with a gender indicator; columns (2) and (4) add birth-cohort-specific country trends and GDP per capita during each age window. The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

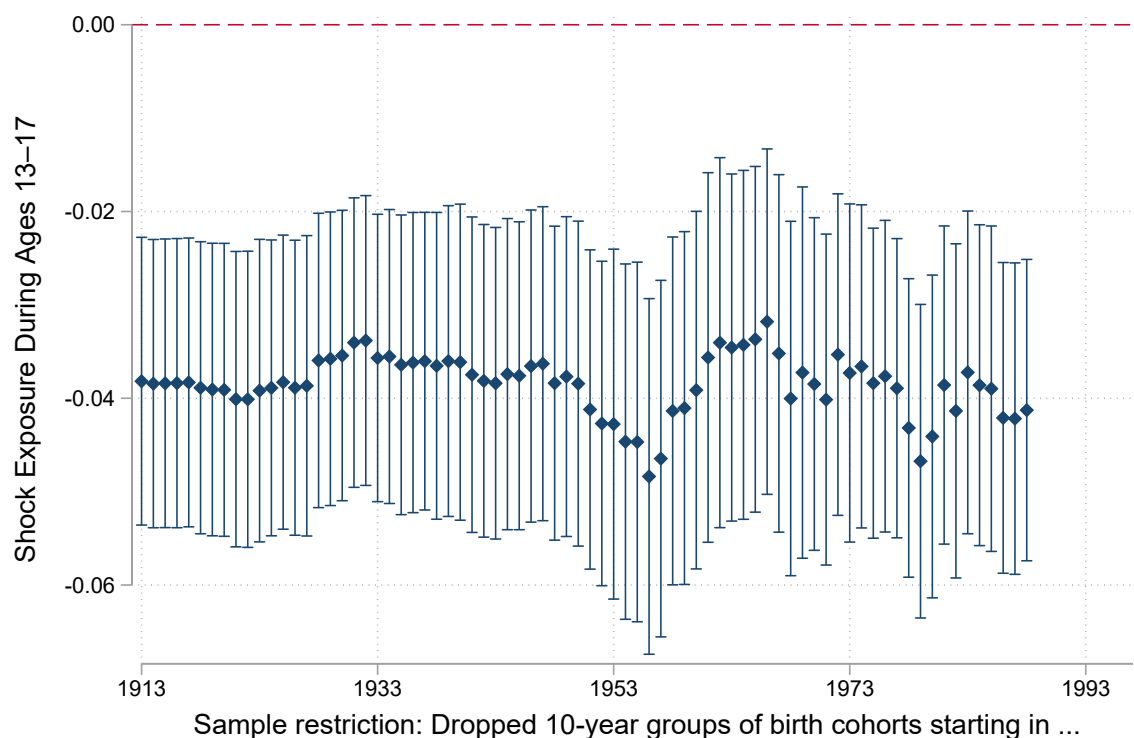


Figure A.4. Shock Exposure During Adolescence and Adult Patience: Robustness to Excluding Birth Cohorts

Notes. This figure examines whether the estimated effect of adolescent shock exposure on adult patience is driven by particular birth cohorts. Each point shows the coefficient on adolescent shock exposure (ages 13–17) from a separate OLS regression of standardized patience on the shock index. The shock index counts the number of distinct shock types (0–3) experienced during adolescence: natural disasters affecting at least one million people, hyperinflation episodes with annual inflation of at least 50%, and sovereign defaults. Moving left to right along the horizontal axis, each regression sequentially drops ten consecutive birth cohorts from the estimation sample. For example, the leftmost point drops cohorts born 1913–1922, the next point drops 1914–1923, and so forth, with the rightmost point dropping cohorts born 1988–1997. All regressions include the baseline set of controls: a gender indicator, birth-year fixed effects, and country fixed effects. Standard errors are clustered at the country level. Vertical bars indicate 95% confidence intervals. Observations are weighted using sampling weights from the GPS. *Source:* Global Preferences Survey.

Table A.18. Exposure to Aggregate Shocks at Different Ages and Adult Patience: Total Shock Count

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at shock exposure:</i>				
Ages 0–5	-0.003 (0.003)	-0.003 (0.003)	0.003 (0.003)	0.004* (0.002)
Ages 6–12	-0.003 (0.002)	-0.003 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Ages 13–17	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)
Ages 18–25	-0.000 (0.002)	-0.000 (0.002)	0.002 (0.002)	0.002 (0.002)
Ages 26–30	0.001 (0.003)	0.001 (0.003)	-0.000 (0.004)	-0.002 (0.003)
Observations	79,591	79,591	66,767	66,439

Notes. This table replicates Table 2, but uses an alternative shock index that counts the total number of shocks rather than the number of distinct shock types. The index is constructed by summing annual exposure to three categories of country-level shocks: (i) natural disasters affecting at least one million people, (ii) episodes of hyperinflation (defined as annual inflation $\geq 50\%$), and (iii) sovereign defaults. For each age window, the index counts the total number of shocks, allowing for multiple shock types within the same year to contribute additively. The mean total shock count is 1.36 for ages 0–5, 1.58 for ages 6–12, 0.99 for ages 13–17, 1.29 for ages 18–25, and 0.64 for ages 26–30. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences. The resulting residuals are then standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (3). Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

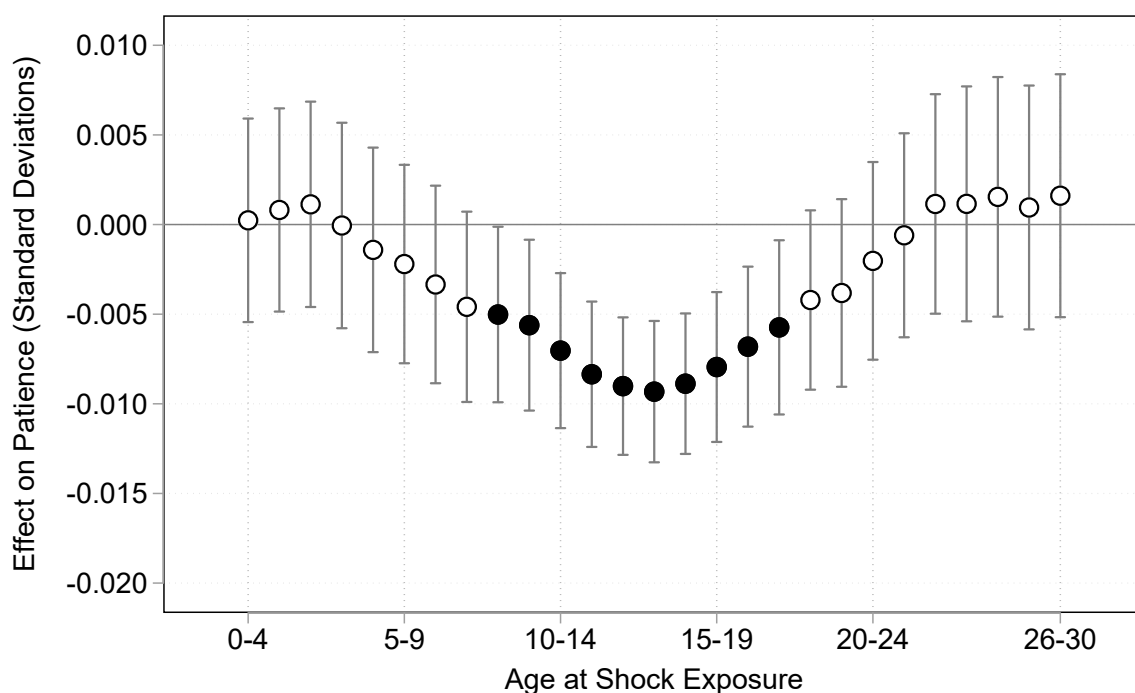


Figure A.5. Shock Exposure and Adult Patience: Moving Five-Year Age Windows Using Total Shock Count

Notes. This figure replicates Figure 2, but uses an alternative shock index that counts the total number of shocks rather than the number of distinct shock types. The index is constructed by summing annual exposure to three categories of country-level shocks: (i) natural disasters affecting at least one million people, (ii) episodes of hyperinflation (defined as annual inflation $\geq 50\%$), and (iii) sovereign defaults. For each age window, the index counts the total number of shocks, allowing for multiple shock types within the same year to contribute additively. Each point represents the coefficient from a separate regression of patience on shock exposure during a five-year age window. Windows overlap and begin at each age from 0 to 26. All specifications include a gender indicator, birth-year fixed effects, country fixed effects, birth-cohort-specific country trends, and GDP per capita during the exposure window, corresponding to the most saturated specification from Table A.18, column (3). Standard errors are clustered at the country level. Vertical bars indicate 95% confidence intervals. Observations are weighted using sampling weights from the GPS. Filled markers denote coefficients statistically significant at the 5% level; hollow markers denote insignificant estimates. *Source:* Global Preferences Survey.

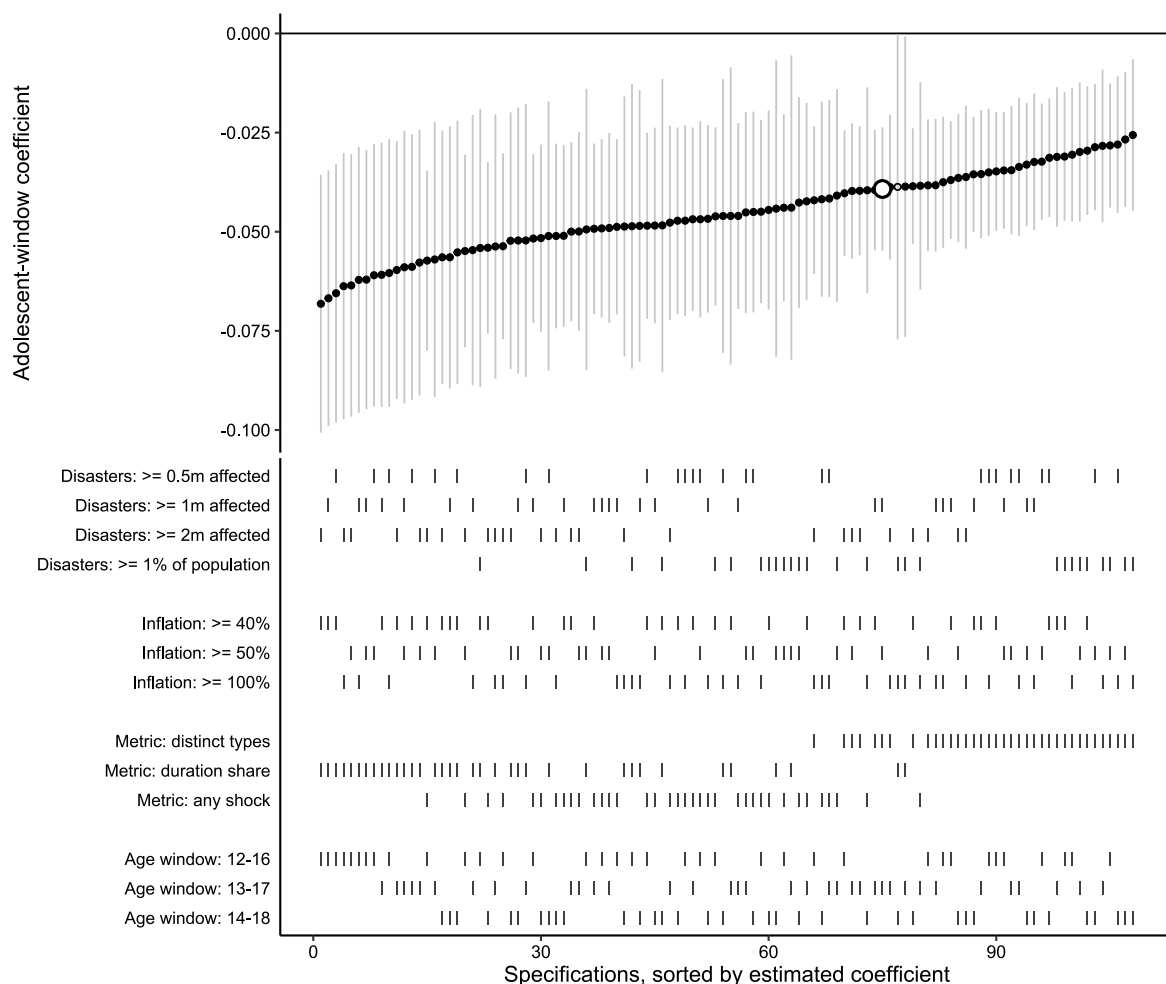


Figure A.6. Specification Curve for the Adolescent-Window Coefficient

Notes. The top panel plots the estimated adolescent-window coefficient from 108 specifications, sorted by magnitude, with 95% confidence intervals based on country-clustered standard errors. Filled markers denote coefficients that are negative and statistically significant at the 5% level. Hollow markers denote estimates that do not meet this threshold. All 108 coefficients are negative (median -0.046), and 107 are significant at the 5% level. The single exception has $p = 0.052$. The large open circle marks the paper's baseline specification, which is significant at the 1% level. The single small hollow marker corresponds to the specification with $p = 0.052$. The bottom panel indicates the design choices underlying each specification: the disaster threshold (at least 0.5, 1, or 2 million people affected, or at least 1% of the national population), the inflation threshold (annual inflation of at least 40, 50, or 100 percent), the exposure metric (number of distinct shock types, share of window years under an active shock, or a binary any-shock indicator), and the adolescent age window (12–16, 13–17, or 14–18). The shock index always combines the three baseline shock types: natural disasters, high-inflation episodes, and sovereign defaults. All specifications include birth-year and country fixed effects and a gender indicator, use GPS sampling weights, and cluster standard errors at the country level. *Source:* Global Preferences Survey.

Table A.19. Exposure to Aggregate Shocks During Adolescence and Adult Patience: Heterogeneity by Gender, OECD Membership, and Institutional Quality

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
Panel A: Heterogeneity by Gender				
Shock index (ages 13–17)	-0.039*** (0.010)	-0.038*** (0.010)	-0.044*** (0.011)	-0.035*** (0.011)
Shock index (ages 13–17) × Female	-0.001 (0.013)	-0.000 (0.013)	0.012 (0.015)	0.004 (0.014)
Observations	79,591	79,591	66,767	66,439
Panel B: Heterogeneity by OECD Membership				
Shock index (ages 13–17)	-0.035*** (0.009)	-0.033*** (0.008)	-0.034*** (0.009)	-0.028*** (0.009)
Shock index (ages 13–17) × OECD country	-0.022 (0.024)	-0.022 (0.024)	-0.015 (0.022)	-0.021 (0.023)
Observations	79,591	79,591	66,767	66,439
Panel C: Heterogeneity by Institutional Quality				
Shock index (ages 13–17)	-0.034*** (0.010)	-0.034*** (0.010)	-0.036*** (0.010)	-0.029*** (0.009)
Shock index (ages 13–17) × High institutional quality	-0.002 (0.017)	0.001 (0.018)	-0.006 (0.018)	-0.012 (0.017)
Observations	76,880	76,880	64,693	64,379

Notes. The table reports OLS estimates of the relationship between exposure to shocks during adolescence and patience later in life. Patience is standardized to have a mean of zero and a standard deviation of one. The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. To assess institutional quality, I use data from the Polity Project (Marshall and Gurr, 2020) to construct a measure of the institutional environment during ages 13–17. This measure is based on the average polity2 score, which places countries on a spectrum from autocracy to democracy. A median split is used to construct a binary indicator for high versus low institutional quality (46.8% classified as high). Individuals from OECD member countries account for 31.1% of the sample. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during ages 13–17. In column (4), the patience measure is first residualized with respect to individual risk preferences. The resulting residuals are then standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (3). Standard errors clustered at the country level are reported in parentheses. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

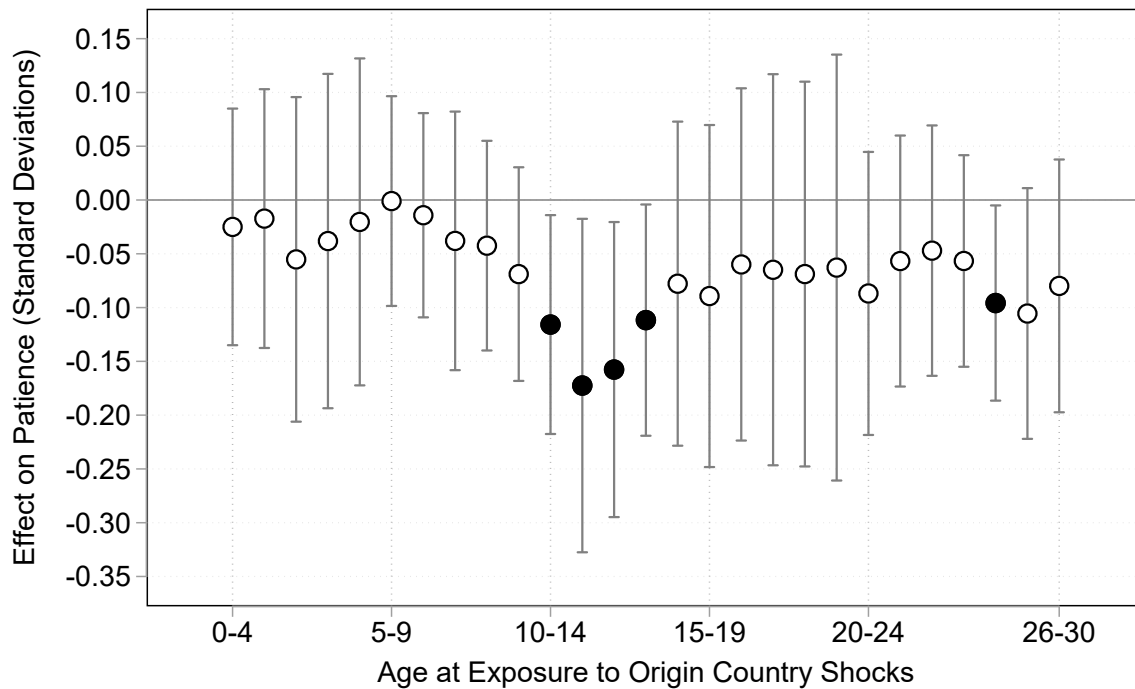


Figure A.7. Exposure to Origin-Country Shocks and Adult Patience: Moving Five-Year Age Windows

Notes. This figure examines how sensitivity to origin-country shocks varies across the life course. The sample comprises second-generation immigrants in Germany who hold foreign citizenship, including those with dual citizenship, observed in at least one SOEP wave containing patience measures (2008, 2013, 2018, or 2023). For individuals observed in multiple waves, only the first available observation is retained. Each point represents the coefficient from a separate regression of patience on origin-country shock exposure during a five-year age window. The shock index counts the number of distinct shock types (0–3) experienced in the origin country, assigned from citizenship as in Table 4: natural disasters affecting at least one million people, hyperinflation episodes (annual inflation $\geq 50\%$), and sovereign defaults. Windows overlap and begin at each age from 0 to 26. All specifications include origin-country fixed effects, survey-year fixed effects, birth-year fixed effects, birth-cohort-specific country trends, and a gender indicator, corresponding to the most saturated specification from Table 4, column (2). Standard errors are clustered at the origin-country level. Vertical bars indicate 95% confidence intervals. Filled markers denote coefficients statistically significant at the 5% level; hollow markers denote insignificant estimates. *Source:* German Socio-Economic Panel.

Table A.20. Exposure to Aggregate Shocks at Different Ages and Adult Risk Attitudes and Prosociality

	(1) Baseline	(2) + Trends	(3) + GDP
<i>Panel A: Risk attitudes</i>			
Ages 0–5	-0.023 (0.014)	-0.023 (0.014)	-0.024 (0.015)
Ages 6–12	0.007 (0.011)	0.006 (0.011)	0.008 (0.011)
Ages 13–17	-0.012 (0.010)	-0.013 (0.009)	-0.021* (0.011)
Ages 18–25	0.005 (0.011)	0.006 (0.011)	-0.001 (0.012)
Ages 26–30	0.030** (0.015)	0.028* (0.015)	0.024 (0.015)
Observations	79,135	79,135	66,439
<i>Panel B: Prosociality</i>			
Ages 0–5	0.013 (0.009)	0.013 (0.009)	0.004 (0.010)
Ages 6–12	-0.008 (0.010)	-0.009 (0.011)	-0.012 (0.009)
Ages 13–17	-0.000 (0.008)	0.001 (0.008)	-0.004 (0.008)
Ages 18–25	-0.003 (0.012)	-0.003 (0.012)	-0.002 (0.011)
Ages 26–30	-0.022** (0.010)	-0.021** (0.010)	-0.014 (0.012)
Observations	77,958	77,958	65,525
<i>Panel C: Multiple-hypothesis-testing-adjusted p-values</i>			
<i>Ages 13–17 coefficient; Holm adjustment across preference domains</i>			
Patience (Table 2)	<0.001	<0.001	<0.001
Risk attitudes	0.428	0.341	0.104
Prosociality	0.984	0.860	0.655

Notes. This table replicates Table 2, columns (1)–(3), using risk attitudes (Panel A) and prosociality (Panel B) as the respective dependent variables; the corresponding patience estimates are reported in Table 2. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. Risk attitudes are based on an experimentally validated measure that combines an 11-point self-assessment of willingness to take risks with a hypothetical lottery choice using experimentally derived weights (Falk et al., 2018). Prosociality is the first principal component of standardized measures of altruism, trust, and positive reciprocity, following Kosse and Tincani (2020) and Bietenbeck, Sunde, and Thiemann (2025). Both risk attitudes and prosociality are standardized to mean zero and standard deviation one. The shock index is a combined measure (range 0–3) summing exposure to three types of aggregate shocks: natural disasters affecting ≥ 1 million people, hyperinflation episodes ($\geq 50\%$ annual inflation), and sovereign defaults. The mean shock index is 0.47 for ages 0–5, 0.49 for ages 6–12, 0.37 for ages 13–17, 0.38 for ages 18–25, and 0.24 for ages 26–30. Panel C reports Holm-adjusted p -values for the ages 13–17 coefficient, controlling the family-wise error rate across patience, risk attitudes, and prosociality within each specification. The adjustment is applied across preference domains within columns, not across specifications. Applying the same correction across all fifteen age-by-domain estimates within a column leaves only the adolescent effect on patience statistically significant; the ages 26–30 effects on risk attitudes and prosociality, which are significant before adjustment, have Holm-adjusted p -values above 0.5. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.21. Exposure to Aggregate Shocks at Different Ages and Adult Patience by Shock Type

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
<i>Ages at natural disaster exposure:</i>				
Ages 0–5	-0.000 (0.019)	-0.007 (0.019)	-0.009 (0.020)	0.002 (0.019)
Ages 6–12	-0.035* (0.019)	-0.037* (0.019)	-0.036* (0.020)	-0.031* (0.018)
Ages 13–17	-0.090*** (0.028)	-0.088*** (0.027)	-0.086*** (0.026)	-0.082*** (0.026)
Ages 18–25	0.013 (0.032)	0.013 (0.033)	0.005 (0.028)	0.000 (0.025)
Ages 26–30	0.035 (0.024)	0.031 (0.026)	0.011 (0.027)	0.001 (0.026)
<i>Ages at sovereign default exposure:</i>				
Ages 0–5	-0.038*** (0.013)	-0.038*** (0.013)	-0.011 (0.015)	-0.004 (0.014)
Ages 6–12	-0.011 (0.013)	-0.013 (0.013)	0.014 (0.013)	0.014 (0.012)
Ages 13–17	-0.037** (0.015)	-0.036** (0.015)	-0.029* (0.015)	-0.022 (0.015)
Ages 18–25	0.005 (0.014)	0.004 (0.014)	0.013 (0.016)	0.014 (0.016)
Ages 26–30	0.009 (0.016)	0.007 (0.016)	0.022 (0.015)	0.020 (0.014)
<i>Ages at hyperinflation exposure:</i>				
Ages 0–5	0.016 (0.016)	0.021 (0.016)	0.026 (0.018)	0.027 (0.018)
Ages 6–12	-0.005 (0.015)	-0.001 (0.015)	-0.007 (0.015)	-0.014 (0.016)
Ages 13–17	-0.034* (0.018)	-0.030* (0.017)	-0.041** (0.018)	-0.038** (0.018)
Ages 18–25	0.005 (0.018)	0.004 (0.018)	0.001 (0.018)	0.003 (0.019)
Ages 26–30	-0.008 (0.019)	-0.007 (0.020)	-0.028 (0.022)	-0.034 (0.022)
Observations	79,591	79,591	66,767	66,439

Notes. The table reports OLS estimates with all three shock types entered simultaneously. Natural disasters are defined as events affecting ≥ 1 million people; hyperinflation as annual inflation $\geq 50\%$; sovereign defaults as failure to meet debt obligations. Mean exposure rates by shock type and age window (0–5, 6–12, 13–17, 18–25, 26–30): natural disasters (0.05, 0.06, 0.04, 0.05, 0.03); hyperinflation (0.14, 0.15, 0.11, 0.12, 0.08); sovereign defaults (0.28, 0.28, 0.22, 0.21, 0.14). Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during each age window. In column (4), the patience measure is first residualized with respect to individual risk preferences. The resulting residuals are then standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (3). Patience is standardized to have a mean of zero and a standard deviation of one. Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.22. Multiple Shock Types During Adolescence and Adult Patience

	Dependent variable: Patience			
	(1) Baseline	(2) + Trends	(3) + GDP	(4) Risk-residualized
One shock type	-0.048*** (0.013)	-0.047*** (0.013)	-0.046*** (0.013)	-0.041*** (0.013)
Two shock types	-0.080*** (0.018)	-0.076*** (0.018)	-0.071*** (0.018)	-0.062*** (0.019)
Three shock types	-0.083* (0.046)	-0.083* (0.042)	-0.129*** (0.046)	-0.120** (0.051)
Observations	79,591	79,591	66,767	66,439

Notes. The table reports OLS estimates of the relationship between exposure to shocks during adolescence and adult patience. Patience is standardized to have a mean of zero and a standard deviation of one. The explanatory variables indicate the number of shock types—natural disasters, hyperinflation episodes, or sovereign defaults—that occurred in the respondent's country during adolescence. The omitted category is no shock exposure, so all coefficients are interpreted relative to individuals with no exposure during adolescence. Table A.8 tabulates the frequency distribution of the shock index variable, and Table A.7 reports the correlation among shock types. Column (1) presents the baseline specification, including birth-year and country fixed effects along with a gender indicator; column (2) adds birth-cohort-specific country trends; column (3) additionally controls for GDP per capita during ages 13–17. In column (4), the patience measure is first residualized with respect to individual risk preferences. The resulting residuals are then standardized and used as the dependent variable in a regression that includes the full set of controls from the specification in column (3). Standard errors are clustered at the country level. Observations are weighted using sampling weights from the GPS. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.23. Aggregate Shocks and Remittance Inflows (Million USD), 1970–2010

	Dependent variable: Remittance inflows (million USD)		
	(1) Shocks in t	(2) Shocks in t and $t-1$	(3) Shocks in t to $t-2$
Natural disaster (t)	502.1 (321.1)	442.3 (278.1)	421.0 (261.3)
Hyperinflation (t)	373.7 (651.2)	262.8 (451.8)	235.5 (442.7)
Sovereign default (t)	-475.1 (401.3)	-332.0 (286.9)	-331.1 (280.5)
Natural disaster ($t-1$)		295.7 (257.4)	274.2 (226.1)
Hyperinflation ($t-1$)		190.3 (364.8)	152.6 (203.2)
Sovereign default ($t-1$)		-247.3 (298.8)	-59.9 (170.8)
Natural disaster ($t-2$)			137.7 (194.1)
Hyperinflation ($t-2$)			111.9 (310.5)
Sovereign default ($t-2$)			-302.1 (245.8)
Observations	1,935	1,935	1,935

Notes. This table examines whether remittance inflows respond to aggregate shocks. The dependent variable is total annual remittances, measured in millions of current U.S. dollars and drawn from the World Development Indicators (Azevedo, 2011). The sample is an unbalanced panel of 1,935 country-year observations across 70 countries in the GPS with available remittance data between 1970 and 2010. The sample starts in 1970 due to limited availability of remittance data before that year and ends in 2010, the last year covered by the inflation and sovereign default data used in this paper. Shock variables are binary indicators for: (i) natural disasters affecting at least one million people, (ii) hyperinflation episodes with annual inflation of 50% or more, and (iii) sovereign defaults. These constitute the three aggregate shocks used in this paper. Column (1) includes contemporaneous shocks; column (2) adds one-year lagged shocks; column (3) includes both one- and two-year lags. All specifications include country and year fixed effects. Standard errors clustered at the country level are shown in parentheses. Results are qualitatively unchanged when using the log of remittances as the outcome variable. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.24. Aggregate Shocks and Remittance Inflows (Share of GDP), 1970–2010

	Dependent variable: Remittance inflows (share of GDP)		
	(1) Shocks in t	(2) Shocks in t and t–1	(3) Shocks in t to t–2
Natural disaster (t)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Hyperinflation (t)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
Sovereign default (t)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
Natural disaster (t–1)		0.000 (0.001)	0.000 (0.001)
Hyperinflation (t–1)		0.001 (0.001)	0.001* (0.000)
Sovereign default (t–1)		-0.000 (0.001)	-0.000 (0.001)
Natural disaster (t–2)			-0.000 (0.001)
Hyperinflation (t–2)			0.001 (0.001)
Sovereign default (t–2)			-0.000 (0.001)
Observations	1,901	1,901	1,901

Notes. This table examines whether remittance inflows, expressed as a share of GDP, respond to aggregate shocks. Remittance data are drawn from the World Development Indicators (Azevedo, 2011), and GDP data are from the Maddison Project Database (Bolt and van Zanden, 2025), measured in 2011 U.S. dollars. The sample is an unbalanced panel of 1,901 country-year observations across 70 countries in the GPS with available remittance and GDP data between 1970 and 2010. The sample starts in 1970 due to limited availability of remittance data before that year and ends in 2010, the last year covered by the inflation and sovereign default data used in this paper. Shock variables are binary indicators for: (i) natural disasters affecting at least one million people, (ii) hyperinflation episodes with annual inflation of 50% or more, and (iii) sovereign defaults. These constitute the three aggregate shocks used in this paper. Column (1) includes contemporaneous shocks; column (2) adds one-year lagged shocks; column (3) includes both one- and two-year lags. All specifications include country and year fixed effects. Standard errors clustered at the country level are shown in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.25. Personal Bereavement and the Household Environment

	(1) Household	(2) Maternal	(3) Paternal	(4) Maternal Investment	(5) Paternal Investment	(6) Positive	(7) Negative
	Net Income	Patience	Patience	Positive	Negative	Positive	Negative
Experienced death of someone close	-255.551*** (73.249)	-0.005 (0.031)	-0.056 (0.035)	-0.027 (0.036)	0.001 (0.030)	0.013 (0.049)	-0.014 (0.035)
Observations	14,273	13,629	10,845	2,944	2,944	2,700	2,700

Notes. This table examines the relationship between recent bereavement and household environment. The explanatory variable is a binary indicator equal to one if the respondent reports that a family member or other important person died in the past 12 months. Approximately 21% of person-wave observations report such a loss. Household net income is measured in euros per month. Maternal and paternal patience measures are standardized to have mean zero and standard deviation one. Positive parental investment indices reflect emotional warmth (e.g., affection, praise, support), while negative indices reflect psychological control, negative communication, and inconsistent parenting. These indices are constructed from child-reported items measured on 1–5 Likert-type scales (from “never” to “very often”). Table A.11 presents summary statistics and further details. All specifications account for survey year fixed effects. Standard errors in parentheses are clustered at the household level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

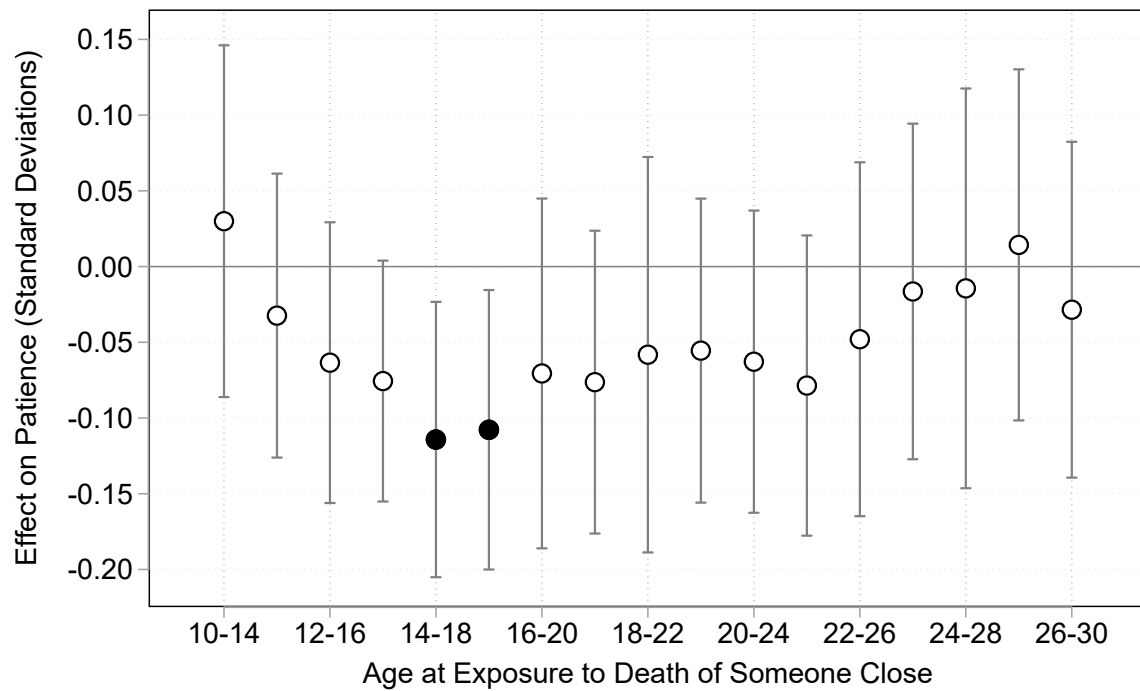


Figure A.8. Personal Bereavement and Patience: Moving Five-Year Age Windows

Notes. This figure examines age-specific sensitivity to recent bereavement. Each point represents the coefficient from a separate regression of standardized patience on an indicator for experiencing the death of a family member or close person within the past 12 months, during a five-year age window. Windows overlap and begin at each age from 10 to 26, with the analysis starting at age 10 when TwinLife first administers the patience question. Approximately 21% of person-wave observations report such a loss within the past 12 months. All specifications account for survey year fixed effects. Vertical bars denote 95% confidence intervals, constructed using standard errors clustered at the household level. Filled markers denote coefficients statistically significant at the 5% level; hollow markers denote insignificant estimates. *Source:* TwinLife.