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Moving homes, changing perspectives: How residential and social mobility in childhood shape locus of control and adult mental health

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ABSTRACT

Early-life relocations are often linked to developmental disruptions and poorer psychological outcomes. While their long-term implications are typically attributed to the frequency of residential moves, the role of social class changes accompanying those moves remains underexplored. To address this gap, we examine whether combined patterns of residential and social class mobility during childhood associate with adolescent locus of control at age 16 – the belief that one's outcomes are influenced by personal agency – and, in turn, adult mental health at age 34. Using five waves of the 1970 British Cohort Study, following participants from birth through 2004, we apply delta-adjusted inverse probability weighted mediation models to account for attrition and non-random missingness. We find that frequent moves are not inherently harmful. Instead, negative consequences primarily emerge when mobility is accompanied by downward class mobility within the family context. Conversely, moderate residential change in the context of upward class movement is connected to a stronger internal locus of control in adolescence and better mental health later in life. These associations hold independently of baseline socioeconomic status. A complementary test of moves into South-East England – characterised as an 'escalator' region – yields similar results to those for upward social mobility, underscoring the role of opportunity structures in shaping psychological trajectories. Our findings emphasise the value of contextualising residential mobility within broader life-course trajectories and point to locus of control as a key mechanism linking early instability to later inequality.

1. Introduction

Childhood is widely recognised as a formative period during which stability and disruption play a critical role in shaping long-term life chances. Prior research has shown that persistent exposure to instability, whether through economic insecurity, family breakdown, or frequent changes in environment, can erode key psychological and social resources that support healthy development (Simsek et al., 2021). Among the many transitions children may face, residential mobility and social class position stand out as especially consequential, as they determine the environments in which children live and the opportunities available to them. These two dimensions are deeply intertwined: moves are often triggered by economic hardship or employment shifts that alter a family's class location (Fomby and Sennott, 2013; Gambaro and Joshi, 2016). Yet they have been frequently analysed in isolation, often resulting in a reductionist

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view where residential mobility itself is equated with disadvantage. However, not all moves carry equal risk. For some children, relocations may offer access to better schools or safer neighbourhoods; for others, it reflects the cascading effects of disadvantage. In this study, we move beyond oversimplified accounts by examining how residential change and social mobility dynamics intersect over time, influencing children's psychological development in ways that carry forward into adulthood.

Understanding these pathways requires paying attention not only to outcomes but also to the mechanisms that transfer early structural instability into adulthood. One such mechanism is *locus of control*, which refers to the belief that life outcomes are shaped by personal agency versus external forces (Rotter, 1966). Prior research suggests that frequent moves reduce emotional regulation and social coherence, key precursors of an internal locus of control (Nowicki et al., 2018). Extending this line of inquiry, Oishi (2010) and colleagues (Oishi and Talhelm, 2012; Oishi and Tsang, 2022) propose that frequent relocation can unsettle children's social anchors and disrupt place-based identity, triggering adjustments in how they manage uncertainty, develop self-concept, and respond to changing environments. While some children adapt by strengthening personal agency, others, particularly introverts or those with fewer social supports, may struggle to maintain well-being in the face of continual disruption. Despite increasing interest in these dynamics, it remains unclear how children's residential mobility experiences are influenced by broader structural positions, and how these intersections relate to their evolving sense of agency and well-being over time.

We address these gaps by explicitly integrating two often-separate literatures on residential mobility and social stratification. Our approach conceptualises residential and social mobility as a compound exposure that captures both the frequency of residential moves and the direction of social class change from birth to age 16. Using data from the 1970 British Cohort Study (1970–2004), we examined how combined trajectories of social and residential mobility shape adolescents' locus of control and, in turn, contribute to adult mental well-being. To this end, we estimated mediation effects using survey-weighted linear models with inverse probability weighting and delta-adjusted sensitivity analysis to address missingness. We complemented our analysis by including the concept of escalator regions (Fielding, 1992) to examine whether relocating to an economically advantaged area provides psychological benefits, offering an alternative spatial operationalisation of upward mobility. In doing so, we advance a more differentiated framework that explains how, and for whom, early-life relocations become a source of opportunity or vulnerability.

2. Early-life mobility, social class position, and the formation of locus of control

Locus of control is a psychological construct that captures individuals' generalised beliefs about how they perceive life outcomes as contingent on their own behaviour versus external forces. People with an internal locus of control tend to attribute success and failure to personal effort and decision-making, while those with an external locus view outcomes as shaped by luck, fate, or powerful others (Rotter, 1966). While direct studies investigating the association between childhood mobility and locus of control are limited, related research provides insights into how residential relocations and household instability may impact children's socioemotional regulation, personal agency and cognitive development (Fowler et al., 2016; Nowicki et al., 2018). Previous studies have proposed that frequent movers, especially those who moved as children, tend to prioritise personal over collective identity (Oishi, 2010). Moving often disrupts stable community ties and group affiliations, which otherwise serve as anchors for self-definition and identity. As a result, mobile individuals place more weight on individual traits, such as personal abilities or preferences, instead of family roles or social belonging. Building on this foundation, longitudinal research by Oishi and Talhelm (2012) suggests that, over time, frequent moves in childhood are associated with lower subjective well-being and even higher mortality risk, but only among movers who are introverts. On the contrary, extroverts are more resilient to the psychological toll of mobility, consistently exhibiting higher well-being and social integration despite frequent moves. The authors advocate that this resilience results from extroverts' greater social assertiveness and ability to form new connections, which facilitates the reconstruction of their social networks after each relocation. Oishi and Tsang (2022) integrate these insights by arguing that mobility plays a powerful role in shaping personality traits, including locus of control. Individuals who grow up in mobile environments tend to develop a stronger internal locus of control, as they come to rely on their own personal attributes rather than social roles or environmental stability to navigate change. However, this adjustment may come with drawbacks: chronic mobility heightens stress, weakens social bonds, and increases the risk of emotional dysregulation for some individuals. The authors emphasise that individual resilience against these negative consequences is moulded by personality traits, with extraversion acting as a protective factor.

From a sociological perspective, classic theories of class socialisation posit that working-class environments tend to emphasise external control, compliance, and constraint, while middle- and upper-class environments cultivate internal control, autonomy, and future planning (Kohn, 1977; Lareau, 2003; Shifrer and Pals, 2021). These differences reflect the social, material and institutional realities of class position: families with fewer resources often face more unpredictable environments and constrained choice sets, leading children to develop beliefs that their actions have limited impact on outcomes (Ahlin and Lobo-Antunes, 2015; Conger and Donnellan, 2007; Mittal and Griskevicius, 2014; Ross and Mirowsky, 2013; Shanahan and Bauer, 2005). At the same time, social class structures access to institutional contexts that reinforce or undermine internal control. For instance, children from lower SES backgrounds may enrol in schools with less consistent disciplinary practices, fewer opportunities for leadership or decision-making, and reduced feedback loops for effort-based success, all factors that are known to shape perceptions of control (Flouri, 2006). However, the sociological literature also highlights that a child's sense of agency emerges not simply from abstract class position, but from patterned experiences of constraint and possibility embedded in everyday life. While locus of control has often been treated as a proxy for inherited class advantage alone, recent work by Liu (2020) lends theoretical support to disentangling the effects of structural class origin from cumulative social experiences, such as residential mobility, in shaping children's sense of control. This view supports that locus of control is not merely a reflection of class-based advantage but a dynamic psychological resource shaped by lived exposure to (in)stability and adaptation across time and space. In other words, it is not only the class one is born into that matters, but also whether

families experience upward or downward mobility over time. Moving up the social ladder may expose children to new expectations, norms, and settings that foster internal control, while downward mobility may intensify uncertainty and undermine perceived agency. Thus, not only class background but also class mobility is critical to understanding the development of locus of control.

3. Childhood mobility and mental health in adulthood

Across dozens of studies spanning different target populations, countries, and methodologies, childhood residential mobility, especially when frequent, unplanned, or occurring during sensitive developmental periods, emerges as a significant trigger for a wide array of adverse outcomes, particularly in the psychological and behavioural domains. These effects, however, are not uniform. Research points to important moderators: Cho (2020) and Ginsburg et al. (2013) suggest that neighbourhood context can moderate the effects of moving, with supportive communities helping to mitigate mobility disruptions, while moves reflecting upward social mobility or improved housing or school environments may not carry the same psychological cost (Bures, 2003). A meta-analysis synthesising 64 studies published in three decades (1989–2020) and more than 800 effect sizes concludes that mobility is more likely to harm than benefit health overall, yet these effects are contingent upon the type of health outcome analysed, the age at outcome assessment, the age at moving, the frequency of moves, and the family confounders that are accounted for (Simsek et al., 2021). Evidence from these studies shows that children who experience repeated residential mobility are more likely to suffer from anxiety and depression in adulthood than their residentially stable counterparts. At the same time, this body of research also highlights a tendency to oversimplify the concept of childhood mobility, with most studies reducing it to the number of moves, typically measured using continuous, binary, or, less commonly, ordinal scales.

Various conceptual frameworks have been employed to understand the mechanisms by which moving as a child may impact health outcomes later in life. For example, the stress process model conceives childhood mobility as a stressor that leads to psychological strain and poorer mental health by undermining a child's sense of stability and security (Pearlin et al., 1981). The ecological systems theory offers a complementary perspective by emphasising the significance of a child's immediate surroundings, such as their home, school, and community (Bronfenbrenner, 1979). From this perspective, frequent relocations disrupt these environments, making it difficult for children to build stable relationships and access supportive networks. Such disruptions can negatively affect emotional development, thus strengthening the connection between residential mobility and adverse mental health outcomes. Additionally, life course studies on early experiences of residential mobility reveal how early life events can accumulate, affecting well-being trajectories in adulthood (Dannefer, 2003; Elder, 1998). The idea of cumulative advantage or disadvantage is crucial for understanding childhood mobility, as the impact of early instability has been shown to compound over time, thus providing support to a compelling mechanism explaining the long-term effects on psychological health.

4. Current study: childhood mobility and the mediating role of locus of control in long-term mental health

Most research on early-life mobility examines either residential or social class transitions in isolation. In contrast, this study

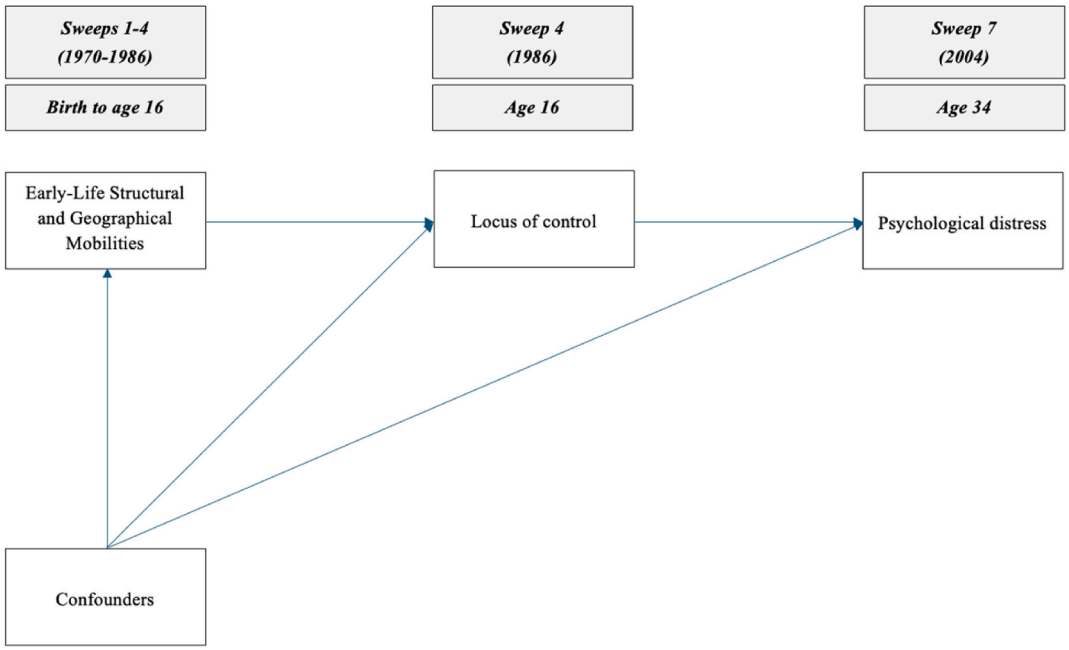

Fig. 1. Conceptual framework and study timeline.

investigates how these two forms of mobility combine to shape adult mental health through a key psychological mechanism: locus of control. We propose that the inconsistent associations between childhood mobility and adverse health outcomes reported in the life-course literature may arise not only from methodological variation or confounding family factors, but also from unmeasured individual-level psychological processes associated with how children perceive and adapt to mobility. Locus of control, or the extent to which individuals believe they have control over events in their lives, offers a compelling candidate to fill this explanatory gap. Previous studies reported above indicate that perceptions of personal control develop during childhood and are influenced by structural factors, family relationships, and life events, such as residential mobility and changes in social status. Accordingly, although locus of control in our analyses is measured only once at age 16, we conceptualise it as a psychological orientation that emerges over time through interactions with earlier social and environmental contexts. As such, our measure traces a developmental endpoint of prior experiences rather than an isolated snapshot, reflecting the cumulative influence of early-life circumstances on adolescents' sense of agency.

We anticipate that residential mobility, particularly when frequent or unplanned, may disrupt children's sense of predictability and control. Some children may internalise these disruptions as evidence that external forces dictate their life course. Others, however, with more protective environments or coping resources, may maintain a more internal locus, buffering against the long-term negative effects of mobility. In turn, we examine whether these early experiences are associated with psychological distress in adulthood, defined as symptoms of depression and anxiety measured at age 34 using the Malaise Inventory. Fig. 1 illustrates how our conceptual framework unfolds across the longitudinal timeline of the 1970 British Cohort Study.

Our analysis is situated in the United Kingdom during the 1970s, a period marked by rising housing instability (Forrest and Murie, 1988), widening regional inequalities (Smith, 1989), and shifting patterns of class mobility amid economic restructuring (Goldthorpe, 1987). Against this backdrop, residential moves often reflected structural constraint as much as personal choice. Understanding how children experienced and internalised these changes provides a unique window into the psychological costs and consequences of instability during a period of systemic volatility.

Children who develop an internal locus of control are expected to fare better psychologically in adulthood. Findings from the 1970 British Cohort Study revealed that children with a more internal locus of control at age 10 were significantly less likely to suffer from psychological distress at age 30 (Gale et al., 2008). Crucially, locus of control mediates the effects of childhood IQ on adult health, pointing to its role as a psychological mechanism linking early cognitive and social environments to long-term health trajectories. Elkins and Schurer (2020) support this life-course mediation pathway by showing that an internal locus of control is associated with positive lifetime outcomes, especially for female and socioeconomically disadvantaged individuals. Murasko (2007) presents locus of control as a component of personality hardiness, which helps mitigate stress and promote well-being. Similarly, Brown and Siegel (1988) found that adolescents with an internal locus of control reported fewer depressive symptoms and coped more effectively with stress in early adulthood, a pattern reinforcing the idea that control beliefs foster emotional resilience. The Dunedin Study, which followed the lives of 1037 babies born in 1972–1973 at Queen Mary Maternity Hospital, New Zealand, further emphasises that children's sense of control and self-regulation are deeply intertwined with future mental health trajectories (Moffitt et al., 2011; Richmond-Rakerd et al., 2021).

Therefore, these studies converge on a suggestive hypothesis that warrants further scrutiny: a child's developing sense of control is not merely a reflection of their environment but also a predictor of how well they will navigate future challenges. Locus of control operates as a non-cognitive lens through which life events are interpreted, and in doing so, it might be linked to both immediate responses to adversity and long-term psychological well-being. Building on this premise, our study introduces a dual analytical strategy to examine how the experience of mobility during the formative years of childhood affects adult outcomes through the development of locus of control. Specifically, we investigate whether the social meaning of mobility (i.e., whether it occurs in the context of upward, downward, or stable class trajectories) is associated with children's internal control beliefs. Additionally, we incorporate an alternative operationalisation of mobility that focuses on regional opportunity structures, by testing whether relocation to South-East England, a region historically linked to accelerated upward mobility through internal migration during the 1970s (Fielding, 1992), enhances locus of control and indirectly improves long-term psychological well-being.

This dual approach is driven by both conceptual and methodological motivations. Conceptually, it distinguishes mobility as a combination of residential and social trajectories from mobility as movement towards spatial opportunities. Methodologically, it enables us to assess the robustness of our findings through various interpretations of mobility, thus encompassing a wider array of mobility-related developmental exposures. In both models, we shift focus away from oversimplified assessments of mobility as merely beneficial or harmful. Instead, we highlight how children perceive and interpret their movement across social and spatial contexts, and how these experiences inform their developing sense of control, which can potentially affect health outcomes in adulthood.

5. Method

5.1. Data source

The 1970 British Cohort Study (BCS70) gathers information regarding the births and families of 17,198 infants born across England, Scotland, Wales, and Northern Ireland during the week of April 5–11, 1970. Our analysis focuses on five editions: the initial birth cohort (1970), three childhood surveys conducted at ages 5, 10, and 16 (in 1975, 1980, and 1986), and a follow-up study at age 34 (2004). From the original 17,198 cohort members in 1970, follow-up data were successfully obtained for 11,622 individuals by 1986. The response rate at age 16 was particularly low due to a teachers' strike that occurred during the study's fieldwork, which prevented many respondents from receiving their questionnaires. We employ inverse probability weighting and delta-adjusted

sensitivity analyses to account for attrition bias and assess the robustness of our findings under various missing-data assumptions. This approach enabled us to maintain 9325 cases with valid data on the mediator (i.e., locus of control at age 16) and 6074 cases related to the outcome (i.e., psychological distress at age 34). A comprehensive explanation of the analytical strategy is provided in Section 5.3 below, while the handling of missing data is detailed in Appendix 1.

5.2. Measures

5.2.1. Early-life structural and geographical mobilities

We developed a composite indicator that integrates residential and social class mobility between birth and age 16 to capture socially embedded mobility across childhood and adolescence. To measure residential mobility, we computed the total number of residential moves (i.e., any changes of address) reported between ages 0 and 16, categorising them into '*0 moves*', '*1–2 moves*', and '*3 or more moves*' to reflect increasing levels of housing instability. Although no universally fixed cutoff exists from a life-course perspective, prior research often distinguishes between stable environments (no moves), moderate mobility (1–2 moves), and high mobility (3 or more moves), with the latter generally linked to greater developmental disruption (Jelleyman and Spencer, 2008; Wu and Bernard, 2024). Our definition therefore offers a balance between conceptual clarity and statistical precision, minimising fragmentation while preserving meaningful differences in exposure.

Social classes in the BCS70 are demarcated according to the occupational statuses of parents or caregivers (Goldthorpe and McKnight, 2006). Drawing on all available information across four waves of the BCS70 cohort study – parental occupational class at child ages 0, 5, 10, and 16 – we first harmonised the original occupational class variables and recoded them into a four-category NS-SEC scheme based on Rose et al. (2005): '*low (unskilled and partly skilled)*', '*lower-middle (skilled manual and non-manual)*', '*upper-middle (managerial and technical)*', and '*high (professional)*'. Next, we classified respondents' longitudinal trajectories based on social mobility patterns and structural constraints across time. For example, respondents who remained in the same class across all waves were assigned to a '*stable*' category. We retained directional categories such as '*upward*' or '*downward*' to reflect unidirectional trajectories. Cases displaying nonlinear movement across classes (i.e., both upward and downward transitions over time) were initially labelled as '*fluctuating*'. However, a closer inspection revealed that they represented a heterogeneous mix of upward, downward, and stable net outcomes. To avoid interpretational ambiguity and maintain parsimony, we recoded them into directional categories based on net change between age 0 and their most recent valid social class, typically at age 16 (or earlier, if missing). Specifically, if the final class was higher than at birth, the trajectory was coded as '*upward*'; if the final class was lower, it was coded as '*downward*'; and if class remained the same, it was recoded as '*stable*'.

Building on this, we constructed a nine-category indicator of cumulative structural mobility by combining each individual's social class mobility classification with their total number of residential moves between ages 0 and 16. This process involved matching each respondent to a specific category based on their level of residential mobility (0, 1–2, or 3+ moves) and their social mobility type (upward, downward, or stable). For instance, a respondent with three or more residential moves and a trajectory of upward social mobility was categorised as '*3+ moves upward*'. In comparison, someone with no residential moves and no class mobility beyond structural constraints was categorised as '*0 moves stable*', our reference category in all models. By integrating these two dimensions into a single composite variable, we capture a more dynamic view of early-life mobility that accounts for both movement through space and movement across the social hierarchy.

In a complementary analysis, we introduce a measure of regional opportunity mobility by identifying whether children moved into an escalator region during childhood. In UK urban studies, escalator regions – most notably South-East England in the 1970s – are characterised by concentrated employment growth prospects, particularly for in-migrants (Champion, 2012; Fielding, 1992). Our aim was to evaluate whether this historically mobility-enhancing context yields comparable associations with locus of control and later mental health. With this objective in mind, we constructed a categorical indicator of regional mobility based on whether and when the child's household lived in the South-East of England, defined as Greater London and twelve surrounding counties, between birth and age 16. The variable distinguishes four groups: children who always lived outside the South-East (reference group), those who always lived within the region, those who moved out of the South-East, and those who moved into the South-East during childhood. We include this indicator in a separate model to contrast mobility as a class trajectory with mobility as access to regional opportunity.

5.2.2. Mediator variable: locus of control at age 16

The locus of control scale, administered at age 16, consists of 19 items. The questionnaire assesses the extent to which individuals believe they have control over life events. Examples include '*most of the time it is not worth trying hard because things never turn out right anyway*' and '*a high mark is just a matter of luck for me*'. Responses were coded so that higher scores indicate a more internal locus of control (believing that personal actions shape outcomes). In comparison, lower scores reflect a more external locus of control (believing that external forces, such as luck or powerful others, determine outcomes).

5.2.3. Long-term outcome at age 34: psychological distress (Malaise Inventory score)

Psychological distress is measured in the BCS70 through the Malaise Inventory (Rutter et al., 1970). At the age of 34, nine 'yes-no' items are asked to cover emotional disturbance, mood disorders and associated physical symptoms. Examples of questions include: '*Do you feel tired most of the time?*', '*Do you often get into a violent rage?*', and '*Does your heart often race like mad?*'. An overall score for a cohort member is the sum across the individual variables, yielding a score ranging from 0 to 9. We centred it at 4 to maintain consistency with prior research (Arias de la Torre et al., 2021; Gondek et al., 2022), with this value being the cutoff for identifying symptoms associated with depression.

5.2.4. Confounders

All models incorporate a comprehensive set of covariates to account for early-life conditions and individual characteristics tied to adolescent development and adult outcomes. We adjust for baseline social class (as an ordinal variable with the four NS-SEC groups mentioned earlier), and other family-related confounders, including: the age of the mother at cohort member's birth (in years), family structure during childhood (0 = *always with both parents*; 1 = *otherwise*), household educational deprivation at birth (0 = *some qualifications*; 1 = *no qualifications*), and parental ethnic background. Given that almost all the cohort members belong to ethnic groups labelled as '*English, Welsh, Scottish and Northern Irish*', '*Irish*', or '*other European*' (96 per cent), we collapsed these categories to code ethnicity as a dummy (0 = *European*, 1 = *non-European*). We also include a covariate capturing the proportion of time spent in lower social classes across childhood to account for differences in cumulative socioeconomic disadvantage. This adjustment is particularly important given that our mobility measure groups together individuals who are stable at different ends of the class spectrum (i.e., those consistently in low-SES positions and those stably advantaged). While both are classified as '*stable*' in terms of social mobility, their lived experiences and developmental contexts likely differ substantially. By controlling for cumulative exposure to lower-class status, we ensure that the depth or duration of socioeconomic disadvantage does not confound the effects attributed to mobility patterns. Finally, we controlled for cohort members' sex (0 = *male*; 1 = *female*), and their conceptual maturity at age 5, measured through the Human Figure Drawing Test (Harris, 1963). With a theoretical range spanning from 0 to 30, scores on the Human Figure Drawing test in the BCS70 cohort ranged from 0 to 23. In line with previous studies (Flouri, 2006), we standardised these scores (z-scores) to adjust for baseline individual differences in capacity and learning.

All the variables used in the regression models are described in Table 1.

5.3. Analytical strategy

To address substantial non-response at age 16, we implemented a two-step strategy combining inverse probability weighting (IPW) with delta-adjusted sensitivity analysis (further details are included in Appendix 1). Preliminary missingness diagnostics revealed that dropout was systematically associated with early-life disadvantage, as lower social class, family disruption, educational deprivation, male gender, and a more external locus of control all predicted non-response. We used IPW to reweight observed cases based on the probability of missing locus of control as a function of early-life covariates, using logistic regressions. We assessed representativeness after inverse probability weighting by comparing weighted and unweighted baseline characteristics (see Supplementary Table S1).

Table 1
Description of variables for the full baseline cohort.

	N	%, unless otherwise stated
Sweep 7. Psychological distress (range = −4, 5)	6074	$\bar{x} = -2.4$
Sweep 4. Locus of control at age 16 (range = 0, 19)	9325	$\bar{x} = 10.9$
Sweeps 1–4. Cumulative structural mobility		
Residential stability (0 moves), stable	1026	11.0
Residential stability (0 moves), downward	690	7.4
Residential stability (0 moves), upward	338	3.6
Occasional mobility (1–2 moves), stable	1676	18.0
Occasional mobility (1–2 moves), downward	1257	13.5
Occasional mobility (1–2 moves), upward	635	6.8
Frequent mobility (3+ moves), stable	1252	13.4
Frequent mobility (3+ moves), downward	2030	21.8
Frequent mobility (3+ moves), upward	421	4.5
Sweeps 1–4. Regional mobility		
Always been living outside the South-East	6291	71.3
Always been living inside the South-East	1971	22.3
Moving into South-East	215	2.4
Moving out of South-East	344	3.9
Sweeps 1–4. Proportion of time in lower class (range = 0, 1)	9325	$\bar{x} = 0.2$
Sweeps 1–4. Family structure, always with both parents		
Otherwise	1036	11.1
Sweep 2. Household education deprivation		
No qualification	3740	38.9
Sweep 2. Conceptual maturity at age 5 (range = −5, 3.8)	9325	$\bar{x} = -0.06$
Sweep 1. Age of the mother at birth (scaled) (range = −2.1, 5.1)	9325	$\bar{x} = 0.01$
Sweep 1. Social class at birth		
Low	1941	21.0
Lower-middle	5639	60.4
Upper-middle	1238	13.2
High	507	5.4
Sweep 1. Family ethnic minority background		
Non-European	373	4.0
Sweep 1. Sex		
Female	4658	49.9

Note: Percentages may not sum to 100 due to rounding. Dichotomous variables are coded such that the value shown represents category = 1.

Post-weighting, standardised mean differences were near zero for all covariates ($|SMD| \leq 0.01$), indicating that the weighted sample closely reflected the original cohort. Building on this, we incorporated a delta adjustment grid to formally account for uncertainty in the missing data process by systematically varying assumptions about unobserved values. This approach systematically perturbs the imputed values of key variables – locus of control, social class, and residential mobility – by adding controlled shifts (deltas) informed by observed attrition patterns and theoretical expectations. By applying a range of 24 delta scenarios, we could examine how strongly the main findings depend on assumptions about the missing data process. For each scenario, we adjusted the imputation of missing values to reflect increasingly unfavourable assumptions. Missing locus of control scores were replaced with the sample median shifted downward by a small or large amount ($\Delta \in -1.5, -0.25$), simulating the possibility that those with missing data had lower perceived control. Social class at age 16 was reassigned by moving one or two steps down from the baseline class ($\Delta \in -2, -1$), while the number of moves between ages 10–16 was increased by one or three moves ($\Delta \in 1, 3$) to reflect the likelihood that missing cases experienced greater residential instability. This approach enables a structured sensitivity analysis and provides a tipping point framework to assess the strength and stability of our inferences. Regarding other predictors, missingness was negligible (below 5 per cent), and listwise deletion had a minimal impact on the analytic sample.

We investigate how childhood mobility patterns associate with psychological development and adult mental health using a mediation framework in which locus of control at age 16 functions as an intervening factor. To test mediation, we fit two survey-weighted linear regressions using *svyglm* in R: first, the mediator model predicting locus of control from socio-spatial mobility and covariates, and second, the outcome model predicting adult psychological distress (measured by the Malaise Inventory score at age 34), from locus of control, socio-spatial mobility, and the same covariates. Indirect effects are computed as the product of (*a*-path) the coefficient linking mobility to locus of control and (*b*-path) the coefficient linking locus of control to adult distress, with standard errors obtained using the delta method. To address potential bias from missing data that may not be random, we repeated this procedure across all 24 delta-adjusted missingness scenarios.

5.3.1. Robustness checks

One potential concern with our mediation models is that the observed effects of mobility on adolescents' locus of control might merely reflect underlying differences in social class at birth. To address this, we residualised locus of control at age 16 on early-life indicators of class background (see Appendix 2). This approach removes the portion of variation in locus of control that is statistically explained by class origin and early-life disadvantage, thereby isolating the part of adolescents' perceived control that is not structurally linked to their class background. Therefore, by focusing on this residualised measure, we test whether our exposure variable predicts meaningful variation in control beliefs above and beyond what would be expected solely based on early class position. As an additional robustness check, we estimated models excluding the locus of control mediator to directly test the association between childhood mobility and adult mental health. This comparison clarifies whether the observed patterns depend on the mediation framework or whether similar direct effects emerge under alternative specifications. Panel A used the main analysis cohort (restricted to respondents with observed locus of control at age 16, $N = 4858$) with inverse probability weights applied, while Panel B relied exclusively on early-life measures up to age 10 ($N = 6356$), thereby avoiding attrition at age 16. Results are reported in

Table 2
Correlates of locus of control at age 16. Estimates are derived from survey-weighted linear regressions with delta adjustments. The sensitivity grid includes shifts in the mediator (ΔLoC = −1.5 to −0.25), in social class (ΔNS-SEC = −2, −1), and in residential moves (Δmoves = 1, 3), applied to account for potential bias from non-random missingness at age 16.

	Mean estimate	Min estimate	Max estimate	No. Of $p < 0.05$ across models (n = 24)
Exposure variable				
Cumulative structural mobility (*ref.=0 moves, stable class*)				
Residential stability (0 moves), downward	−0.49	−0.63	−0.34	24
Residential stability (0 moves), upward	0.25	0.16	0.33	2
Occasional mobility (1–2 moves), stable	−0.13	−0.18	−0.11	0
Occasional mobility (1–2 moves), downward	−0.53	−0.77	−0.32	24
Occasional mobility (1–2 moves), upward	0.32	0.26	0.40	24
Frequent mobility (3 moves), stable	−0.13	−0.26	−0.04	4
Frequent mobility (3 moves), downward	−0.62	−0.85	−0.41	24
Frequent mobility (3 moves), upward	0.07	0.05	0.09	0
Confounders				
Social class at birth (*ref.=high*)				
Low	−1.03	−1.36	−0.85	24
Lower-middle	−0.81	−0.91	−0.71	24
Upper-middle	−0.47	−0.52	−0.42	24
Proportion of time in lower class	−0.21	−0.28	−0.13	10
Family structure (*ref.=always with both parents v. otherwise*)	−0.20	−0.24	−0.18	24
Household education deprivation (*ref.=any qualification v. no qualification*)	−0.36	−0.39	−0.33	24
Age of the mother at the cohort member's birth	0.04	0.03	0.04	0
Family ethnic minority background (*ref.=European v. non-European*)	−0.05	−0.07	−0.04	0
Sex (*ref.=male v. female*)	−0.10	−0.17	−0.02	12
Conceptual maturity at age 5	0.11	0.10	0.12	24

Supplementary Table S2.

6. Results

6.1. Cumulative structural mobility and the locus of control at age 16

Across the full range of delta-adjusted scenarios reported in Table 2, adolescents who experienced downward social mobility displayed consistently lower internal locus of control levels than those in the reference group (zero moves, no class changes). We observe a clear dose-response pattern in the negative association between downward mobility and locus of control. Even among those who remained residentially stable, downward class mobility was associated with significantly lower locus of control scores (mean estimate = −0.49; range = −0.63 to −0.34; 24 out of 24 models significant). The negative impact intensified with increased residential mobility: adolescents who experienced one or two moves showed stronger effects (estimates ranging from −0.77 to −0.32, all $p < 0.01$), while those who moved three or more times exhibited the most pronounced decline in perceived locus of control (estimates ranging from −0.85 to −0.41, all $p < 0.01$). These results indicate that frequent moves compound the psychological strain of downward social mobility, amplifying its detrimental effects on adolescents' control beliefs.

Among upwardly mobile children, only those who moved occasionally (once or twice) exhibited consistently positive and statistically significant associations with internal locus of control across all delta adjustments (mean = 0.32). This suggests that, when combined with social advancement, moderate exposure to residential change may provide adaptive experiences that foster a stronger sense of control. In contrast, upwardly mobile children who never moved showed positive but non-significant associations with internal locus of control, implying that some degree of environmental change may be necessary to foster adaptability and personal agency. However, these benefits were absent among those who experienced frequent moves (three or more from birth to age 16), denoting that excessive instability may overwhelm any developmental gains. While categories reflecting stable class trajectories yield inconsistent results overall, frequent residential mobility is associated with reduced locus of control under more extreme delta assumptions (mean = −0.13). Crucially, these effects persist even when the structural influence of class origin on the mediator is removed (see Appendix 2), lending greater confidence that they are not simply a reflection of early-life class background. A comprehensive summary of the results is reported in Table 2, while Fig. 2a-b visualise the mean estimates of all predictors across delta adjustments.

In terms of covariates, several emerged as stable predictors across specifications. Children from households with educational deprivation at birth (mean = −0.36) and those born into lower social classes (mean = −1.03) exhibited significantly lower internal

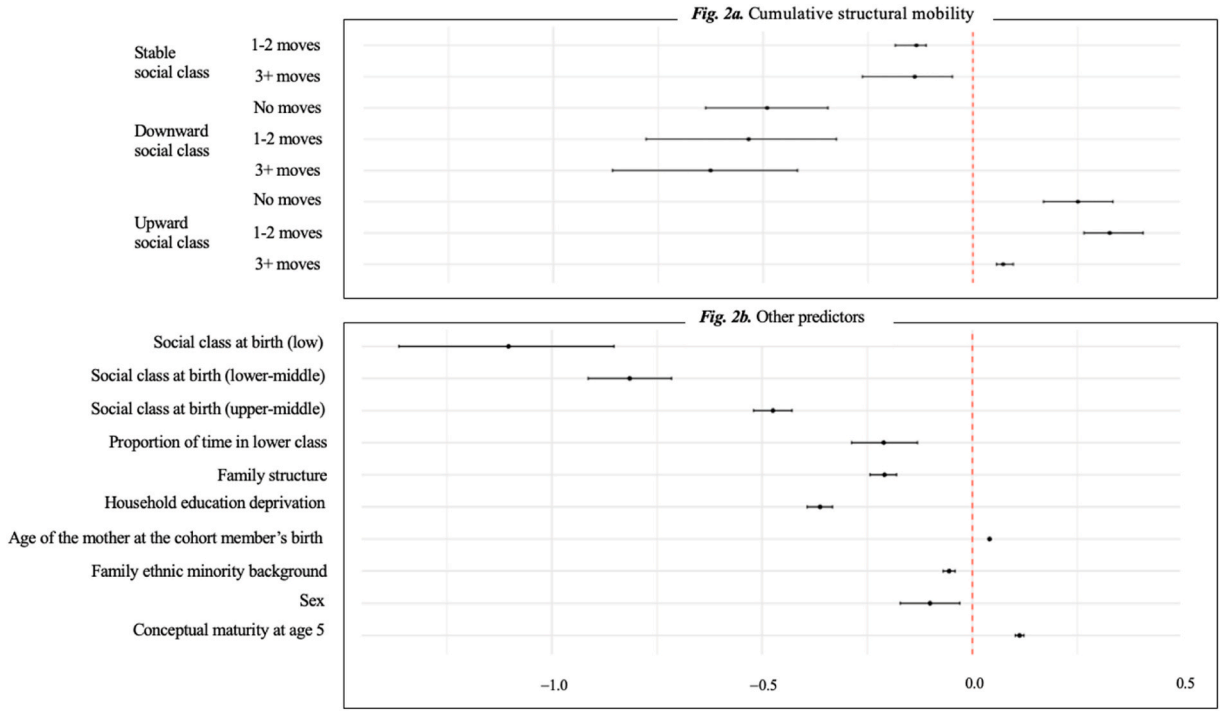

Fig. 2a–b. Estimated associations of cumulative structural mobility with the locus of control at age 16 across delta grid adjustments. Figures display standardised regression coefficients. Points represent estimated coefficients, and horizontal bars indicate 95 % confidence intervals. Cumulative structural mobility categories are presented in Fig. 2a in a conceptually meaningful order by number of moves and direction of class mobility. The reference category is residential and social class stability. All other predictors are ranked in Fig. 2b.

control across the board. In almost half of the delta specifications (10 out of 24 models), cumulative exposure to lower class is also significant and negative (mean = −0.21), pointing to a consistent association between early structural disadvantage and locus of control development. Conceptual maturity at age 5 (mean = 0.11), as measured by the Human Figure Drawing Test, and discontinuity in the family structure (mean = −0.20) were found to be significant predictors of locus of control at age 16 across all model specifications (mean = 0.11). Gender showed a robust association but only in half of the delta adjustments: results indicate that being female is linked to a lower internal locus of control (mean = −0.10), which aligns with previous research on gendered socialisation around autonomy and self-efficacy.

6.2. Estimated direct and indirect (mediated by locus of control) associations of cumulative structural mobility with adult mental health

In Table 3, we present estimates from two models: a direct effects model, which includes locus of control at age 16 to assess the residual, non-mediated association between cumulative structural mobility and psychological distress at age 34; and an indirect effects model, which quantifies the degree to which locus of control mediates this association.

Results show that frequent mobility, coupled with downward social class movement, is the only trajectory significantly associated with increased psychological distress in adulthood after adjusting for locus of control. In this group, the direct effect remains statistically significant with an average effect size of 0.17 (significant in 8 delta-adjusted models). This suggests a robust relationship between structurally downward mobility and later-life psychological vulnerability, independent of its effect via locus of control. In parallel, the indirect effect through diminished locus of control is also consistently significant, with an average estimate of 0.06 and significance across all 24 delta scenarios. This indicates that approximately 26 per cent of the total effect of frequent downward mobility on adult mental health can be explained by psychological mechanisms formed during adolescence. Other downward trajectories, including occasional mobility combined with downward class shifts, also show significant indirect effects (0.05 on average), despite no detectable direct effects. This pattern suggests that the erosion of perceived personal agency plays a significant role in shaping long-term psychological outcomes, particularly for individuals exposed to instability early in life. Conversely, some upwardly mobile individuals with moderate residential instability exhibit protective indirect effects, suggesting that moving in the context of improving structural position may foster a stronger sense of agency and resilience.

To ensure that these mediation findings were not a by-product of model specification, we conducted an additional robustness check excluding the mediator. As shown in Supplementary Table S2, the direct effects of socio-spatial mobility on adult malaise were consistently small and non-significant in both robustness specifications (*Panel A*: main cohort with inverse probability weights; *Panel B*: early-life measures only). This pattern reinforces the robustness of our findings and suggests that the influence of childhood mobility operates primarily through adolescent locus of control.

6.3. Escalator region effects: moving to opportunity and its long-term consequences

To explore how regional opportunity relates to psychological development and later well-being, we extended our analysis by shifting focus from class-based mobility to geographic mobility in a high-opportunity context. Specifically, we tested whether childhood relocation to the South-East of England, historically framed as an escalator region of social and economic advancement, was associated with adolescent locus of control and adult mental health outcomes.

Mirroring the baseline analytical approach, we first examined if our measure of regional mobility correlated with locus of control at age 16. The results in Table 4 indicate that moving into the South-East during childhood is associated with a consistent increase in internal locus of control, with a mean effect of 0.45 and statistically significant results across all delta-adjusted models. By contrast, no significant effects were detected for children who either remained in the South-East or moved out, suggesting that it is the act of relocating into the region, and not mere residence within it, that confers psychological benefits. Second, we estimated indirect associations to assess the mediating role of locus of control in the pathway from early-life regional mobility to adult distress. Relocating to the South-East was associated with a reduction in psychological distress, mediated by enhanced internal locus of control. The mean

Table 3
Summary of the direct and indirect estimates of cumulative structural mobility during childhood on psychological distress in adulthood at age 34, estimated via survey-weighted linear mediation models across 24 delta adjustments. Two models are included, estimating direct effects (including locus of control) and indirect effects (mediated via locus of control).

	Mean Direct Effects (with Mediator)	No. Of $p < 0.05$ (n = 24)	Mean Indirect Effects	No. Of $p < 0.05$ (n = 24)
Cumulative structural mobility (*ref.=0 moves, stable class*)				
Residential stability (0 moves), downward	0.06	0	0.05	24
Residential stability (0 moves), upward	0.16	0	−0.02	0
Occasional mobility (1–2 moves), stable	0.07	0	0.01	0
Occasional mobility (1–2 moves), downward	0.11	0	0.05	24
Occasional mobility (1–2 moves), upward	0.01	0	−0.03	24
Frequent mobility (3 moves), stable	0.15	0	0.01	4
Frequent mobility (3 moves), downward	0.17	8	0.06	24
Frequent mobility (3 moves), upward	0.07	0	−0.00	0

Table 4
Effects of regional mobility during childhood on locus of control at age 34, and indirectly on psychological distress in adulthood at age 34, across a grid of 6 delta values (i.e., systematic shifts in the assumed distribution of missing data) for locus of control, ranging from −1.5 to −0.25.

	Mean Effects on the Mediator (Locus of Control)	No. Of $p < 0.05$ (n = 6)	Mean Indirect Effects on the Outcome (Psychological Distress)	No. Of $p < 0.05$ (n = 6)
Regional mobility (*ref.=Always outside the South-East*)				
Always been living inside the South-East	−0.07	0	0.00	0
Moving into South-East	0.45	6	−0.04	6
Moving out of South-East	0.05	0	0.00	0

indirect association was −0.04, and this result was robust across all delta scenarios. This finding emphasises a pathway whereby exposure to a high-opportunity environment during formative years can enhance children's sense of agency, thus promoting long-term mental health.

7. Conclusions

This study offers new insights into how combined residential and social class trajectories in childhood relate to psychological development and health over the life course. We found evidence that early socio-structural instability undermines adolescents' control beliefs and contributes to psychological distress by midlife. These patterns align with the stress process model (Pearlin et al., 1981) and ecological systems theory (Bronfenbrenner, 1979), which point to the compounding effects of environmental disruption and structural disadvantage on emotional development. Downward mobility emerges in our models not merely as a material decline, but as a psychologically disempowering process, particularly when coupled with spatial dislocation. The loss of social status, when embedded in a context of residential uprooting, may instil a sense that their environments are unstable and beyond their control.

Our results introduce important nuance in the dominant portrayals of frequent residential mobility as uniformly detrimental by revealing that its effects are contingent on the direction of social mobility. They disclose the presence of a 'double penalty' in the lives of children who experience both residential instability and social class decline. Our findings consistently show that frequent residential mobility amplifies the negative psychological effects of downward social mobility. On the other hand, they also highlight a potential 'sweet spot', where moderate residential change, when accompanied by upward class mobility, offers adolescents opportunities for growth without the disorientation associated with high mobility. While prior research has consistently linked repeated relocations to poorer psychosocial outcomes in adolescence and adulthood (Dong et al., 2005; Fowler et al., 2016), we suggest that this is the case only for adolescents who move in conjunction with social descent. In contrast, among individuals experiencing social ascent, frequent residential moves are not significantly linked to lower locus of control at age 16 or higher psychological distress at age 34. However, the advantages of upward mobility seem lessened in situations of severe instability, emphasising that the process of mobility – rather than merely its frequency or existence – plays a crucial role in psychological development. This conclusion aligns with Oishi's (2010) socioecological perspective, which suggests that while mobility can enhance adaptability and self-sufficiency, excessive movement may weaken psychological resilience, especially when it disrupts social connections and the continuity of identity. Our results are independent of initial SES, thus supporting Liu's (2020) argument that non-cognitive traits like control beliefs are moulded not only by class background but also by life experiences. Similarly, our findings echo the work of Gale et al. (2008), Murasko (2007), and Elkins and Schurer (2020), which emphasise the life course importance of psychological resources for mental health. In extending this research, we illustrate that control beliefs are not static traits but emergent responses to the socio-structural environments children navigate. They both reflect contextual influences and correspond with long-term outcomes, underscoring the importance of bridging psychological and sociological perspectives in life course research.

We further extend our analysis by exploring mobility through the lens of regional opportunity. Specifically, we examine whether relocation to the South-East of England, a region often characterised as an escalator due to its economic dynamism in the 1970s, yields distinct psychological benefits. We found evidence that adolescents who moved into the South-East throughout childhood exhibit significant gains in locus of control, potentially buffering long-term mental health risks. This regional perspective enhances our comprehension of mobility, viewing it as a process of geographic re-positioning within frameworks of opportunity. By examining the destination of relocations, our analysis emphasises how spatial opportunities contribute to psychological growth.

From a methodological perspective, delta-adjusted inverse probability weighting enabled us to model plausible values based on various missing data assumptions, thus strengthening our inferences. In situations where critical variables were absent due to external disruptions (such as a nationwide strike in 1986), this approach was essential for reducing bias and examining the sensitivity of our results. Importantly, the consistent findings across delta scenarios enhance our confidence that the observed patterns indicate genuine developmental processes rather than mere statistical artefacts. Yet, limitations remain. First, the cohort's historical context means that findings reflect the social and economic conditions of individuals born in 1970, which may limit generalizability to contemporary populations. Second, while we account for many family and individual-level confounders, unmeasured variables (e.g., motivations for moving) may influence both mobility and locus of control. Third, our residential mobility component captures only changes of address, potentially overlooking school transitions that occur independently of a move. The BCS70 captures school changes during secondary education; however, significant data loss at age 16 due to dropout hinders its usefulness. Additionally, there is no equivalent measure for school changes in the primary years. As a result, we were unable to assess the potential impact of school transitions as an additional

risk factor for the development of locus of control or later health outcomes. Fourth, while our delta adjustment strategy improves inference, it still relies on assumptions about the distribution and direction of missingness. Finally, our combined measure of residential and social class mobility captures the accumulation of movement across domains, but it does not fully account for their temporal sequencing or interdependence. For instance, a child may experience upward social mobility early in life and undergo frequent residential moves later, with both processes co-occurring but not necessarily causally linked. In this sense, the measure reflects joint exposure rather than a directional relationship between class and geographic mobility.

Despite these limitations, our findings hold significant implications. They indicate that interventions focused on enhancing youth psychological development should consider not only material disadvantages at a single point in time but also cumulative patterns of instability during childhood. Policies aimed at minimising forced residential relocations, such as stronger tenant protections or better access to affordable housing, could lessen the psychological impact of childhood mobility. Additionally, providing resources to families experiencing downward mobility can help maintain educational consistency, strengthen community ties, and offer psychological support to preserve children's sense of agency. Ultimately, addressing the dual challenges of frequent mobility and class instability could enhance adolescent development and reduce long-term health disparities rooted in early experiences. By highlighting the locus of control as a crucial psychological pathway connecting childhood instability to adult health, this study emphasises the need to incorporate psychological development into sociological discussions about inequality.

CRediT authorship contribution statement

Riccardo Valente: Writing – original draft, Formal analysis, Data curation, Conceptualization. **Sergi Vidal:** Writing – original draft, Funding acquisition, Conceptualization.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssresearch.2025.103272.

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