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Article — Published Version

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Child Development

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Moulton, Vanessa; Goodman, Alissa; Nasim, Bilal; Ploubidis, George B.; Gamaro, Ludovica (2021) : Parental Wealth and Children's Cognitive Ability, Mental, and Physical Health: Evidence From the UK Millennium Cohort Study, Child Development, ISSN 0009-3920, Wiley, Hoboken, Vol. 92, Iss. 1, pp. 115-123, <https://doi.org/10.1111/cdev.13413>

This Version is available at:

<https://hdl.handle.net/10419/233120>

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Parental Wealth and Children's Cognitive Ability, Mental, and Physical Health: Evidence From the UK Millennium Cohort Study

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This article investigates the influence of wealth, a frequently neglected aspect of the economic circumstances of families, on children's development. Using the UK Millennium Cohort Study, it explores whether parental wealth (net total wealth, net housing wealth, net financial wealth, and house value) is associated with children's cognitive ability, mental, and physical health at age 11 ($N = 8,645$), over and above parental socioeconomic status and economic resources, in particular permanent income. Housing wealth was associated with fewer emotional and behavioral problems, independent of the full set of controls. Children's verbal cognition and general health were more strongly associated with family permanent income and socioeconomic characteristics than with wealth.

It is well established that family economic resources matter for children's development. Drawing on two complementary theoretical frameworks—the family stress model and the economic investment model—decades of empirical research have documented the various processes through which children's cognitive skills, socioemotional competences and physical health are indirectly influenced by the money families have (Brooks-Gunn & Duncan, 1997; Duncan, Magnuson, Murnane, & Votruba-Drzal, 2019; Mayer, 1997; Morris & Gennettian, 2003; Yeung, Linver, & Brooks-Gunn, 2002). This literature is largely centered on income, the most fungible economic resource families have to meet children's needs (Gennettian, Castells, & Morris, 2010).

This paper explores the role of another dimension of families' economic resources—wealth. We define wealth as the net value of a family's financial and property assets, and distinguish between financial and housing wealth (HW). Wealth disparities have increased in the last decades (Pfeffer, 2018;

Wolff, 2016), particularly among families with children (Gibson-Davis & Percheski, 2018; Pfeffer, Danziger, & Schoeni, 2013). Previous research suggests wealth can help explain differences in children's developmental trajectories over and above income and other markers of socioeconomic status (SES). In the United States, wealth, particularly financial, has been found to have a small and significant association with school-aged children's cognitive outcomes, especially math test scores (Orr, 2003; Shanks, 2007; Yeung & Conley, 2009). Shanks (2007) also suggests a possible influence on behavioral problems.

Economists consider income as a “flow” of economic resources during a specific time window, such as monthly or yearly, whereas wealth is a “stock” measured at one point in time, which captures both current possessions and past accumulation (Pfeffer & Schoeni, 2016). Wealth and income are positively correlated, but the correlation is far from perfect (OECD, 2015). The two main theoretical paradigms explaining how income influences children's well-being can also be applied to the case of wealth and suggest the distinctive influences wealth may have. Central to the family stress

Vanessa Moulton and Ludovica Gambaro joint lead authors on this work.

The research reported in this article was part of the “Cross-Cohort Research programme: employment, health and wellbeing” led by George B. Ploubidis and funded by the Economic and Social Research Council (ESRC) grant number ES/M008584/1. We thank Laura Gardiner, Heather Joshi, Abigail McKnight, Praveetha Patalay, and Aase Villadsen for helpful comments. Open access funding enabled and organized by Projekt iDEAL.

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0009-3920/2021/9201-0007

DOI: 10.1111/cdev.13413

model is the notion that stress, mental health, and parenting practices mediate the association between income losses and children's outcomes (Conger & Elder, 1994; McLoyd, 1998). Wealth has an obvious insurance function—a precautionary measure that can help manage future uncertainty and thus alleviate stress (Lusardi, Schneider, & Tufano, 2011). Correlational studies of low income families with children suggest that savings can reduce family conflicts and the stress from unexpected outgoings (Grinstein-Weiss, Shanks, & Beverly, 2014; Rothwell & Han, 2010). Other sources of everyday stress relate to the housing and neighborhood conditions that poor children experience (Leventhal & Brooks-Gunn, 2003; Leventhal & Newman, 2010). From this perspective, property wealth, and house value (HV) in particular, can capture more precisely than income the physical quality and location of the home. As children grow older, these environmental factors are likely to become salient for children independently from family processes (Shonkoff & Phillips, 2000).

From an economic perspective, parents with higher income can spend more on enrichment resources and activities fostering children's development (Kaushal, Magnuson, & Waldfogel, 2011). Liquid assets can supplement income in these expenditures, but become crucial for large investments, most importantly the purchase of a family home. House prices are a function of dwelling amenities and neighborhood characteristics, including the quality of local schools (Machin, 2011). Housing wealth thus reflects the ability of parents to choose environments beneficial to their children's success in the long term.

This Study

This paper tests the possibility that wealth is independently associated with children's outcomes, over and above other family economic resources, and socioeconomic characteristics, with specific attention to average long-term income, which we refer to as "permanent income" (Fisher, Johnson, Latner, Smeeding, & Thompson, 2016). We pose three research questions: (1) Is there an association between wealth and children's outcomes over and above other family resources and characteristics? (2) Does the association between wealth and child outcomes depend on the type of wealth? (3) Does the association between wealth and child outcomes depend on the developmental domain considered?

We answer these question in relation to a U.K. representative sample of children age 11. The end

of middle childhood is a good age to test the role of wealth. First, as children become more autonomous and more extensively involved with their peers, the possible advantages that wealth confers are unlikely to be entirely explained by parenting processes, as is the case among preschoolers (Yeung & Conley, 2009). Second, at age 11 children are at the end of elementary school, and we should therefore be able to capture the benefits accruing to children of wealthy parents through higher school quality. We can also take stock of what has happened during childhood, in the same way as our measures of wealth reflect the accumulation process in the preceding years.

We distinguish between financial and HW, two forms of wealth differing in their function and distribution. Housing makes up the largest share of total wealth for most families, whereas financial assets are concentrated at the very top (OECD, 2015). Housing wealth is both an investment good and a consumption good, which makes it difficult to discern the effect of housing wealth as such (Dietz & Haurin, 2003; Pfeffer & Killewald, 2018). We consider developmental outcomes spanning three domains, offering the first systematic comparison of this kind. Although our approach is not designed to estimate causal channels of transmission, considering various types of wealth together with different outcomes may provide insights into possible mediating pathways.

The United Kingdom provides an interesting contrast to the United States. In the U.K. families with children benefit from stronger safety nets than those in the United States (Waldfogel, 2010). Inequalities in wealth across ethnic groups do exist in the United Kingdom (Hills & Cunliffe, 2016), but are not comparable in magnitude and direction to the wealth disadvantage of the African American population (Conley, 1999; Oliver & Shapiro, 1995). In the U.K. wealth is concentrated in housing, as ownership of financial assets is not as common as in the United States (Cowell, Karagiannaki, & McKnight, 2019). Overall, we should expect family wealth to be less consequential for children in the United Kingdom than in the United States.

Method

Participants

We used data from the Millennium Cohort Study (MCS), a cohort study of over 19,000 children born in the United Kingdom in 2000–2002 (Joshi & Fitzsimons, 2016; University of London, Institute of

Education, & Centre for Longitudinal Studies, 2017). We draw on data from the first six waves, conducted when children were 9 months old, and 3, 5, 7, 11, and 14 years old.

At the age 11 survey, information on families' financial assets and liabilities and HV and mortgage was gathered for the first time. Of the 13,287 families interviewed, we kept observations with valid cognitive, mental, and general health outcome measures ($N = 12,462$), and identified two analytic samples. The first included all households, where both housing and financial wealth (FW) were known ($N = 8,645$). The second analytic sample, a subset of the first included households who owned their homes and reported both housing and financial wealth ($N = 5,194$). Results from the second analytic sample are not generalizable to tenants, but allow detecting any association between values of HW, which were mainly positive, and children's outcomes. Differences in the MCS and the two analytic samples are highlighted below.

Having selected cases for which the outcomes and our main independent variable wealth were nonmissing, we imputed any missing items in the covariates (Von Hippel, 2007). We used multiple imputation with chained equations (25 imputed data sets). The imputation model included auxiliary variables and MCS sampling weight, to maximize the plausibility of the "missing at random" assumption (Little & Rubin, 2002). The *svy* command in STATA 15 was applied to take account of disproportionate, stratified clustering in the MCS.

Measures

Outcomes

The three child outcomes were measured at age 11. Children's emotional and behavioral problems were measured using the main respondent's report of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ measures four types of difficulty: hyperactivity, and conduct, emotional, and peer problems (www.sdqinfo.org). Each subscale is measured with five items on 3-point scales (ranging 0–2), totaling a possible 10 for each subscale. An analysis of the sum of the total difficulties score was conducted, followed by a further exploration of the subscales. Cognitive ability was measured using the British Ability Scales (BAS-II) Verbal Similarities which assesses verbal reasoning and verbal knowledge (Hansen, 2014). General health was measured using parental response to "In general would you say the child's health is"

using a rating scale, ranging from 5 *excellent* to 1 *poor*. For ease of comparison, all three children's outcomes were standardized.

Wealth

Household wealth was also measured at the age 11 survey. MCS5 contains four measures of wealth: house value, mortgage, financial savings, and debt.

Net total wealth was taken as the sum of net HW and net FW. *Net HW* was derived from the respondents' self-reported value of their home net of any outstanding mortgages or loan on it. *Net FW* was the value of the households' savings and investments net of any debt. Savings were defined as deposit accounts, Investment Savings Accounts (ISA's), stocks, shares, unit or investment trusts, bonds and gilts, property or land other than the home, while debt included a wide range of loans, overdrafts and outstanding credit cards and hire purchase agreements. Respondents were first asked whether they had any of these assets or debts and then the total amount of saving and the total amount of debt. We checked that the wealth data were of high quality and corresponded well with data from a large representative household survey on wealth in Great Britain (see Appendix S1). The distribution of net total wealth and its components in our full analytic sample confirmed the dominance of HW (see Table S1 in Appendix S2). In contrast, the majority of families had no or negative FW, and fewer than a quarter had financial assets approaching the mean value. For the analysis, natural logarithmic transformation was applied to each of the wealth measures reducing the influence of outliers, normalizing the distributions and simplifying the interpretation of the coefficients.

Covariates

We include in our analysis a rich set of variables which may potentially confound the statistical association between wealth and child outcomes (see Table S2 in Appendix S2).

Income measures were the household weekly income, equivalized to account for household size. *Current income* was taken from the age 11 wave. *Permanent income* averaged income from the all first five waves, when children were 9 months, 3-, 5-, 7-, and 11-year old. Natural logarithms were used for both income measures, allowing comparison of effect sizes with the wealth variables. The correlation matrix of the outcome variables and the wealth

and income variables is reported in Table S3 in the Appendix S2.

To account for the confounding effects of other markers of parental SES, we included: *Household social class*, a seven-fold variable, capturing the highest social class from both mother and partner at age 9 months and age 11 surveys; *Parental education* the highest parental educational qualification achieved over all waves ranging from 1 *a higher degree* to 7 *no qualification*; *Household employment status*, where at least one parent was employed or not at each wave.

Additional parental-level controls were: *Maternal psychological distress* at 9 months measured with nine items of the 24-item Malaise Inventory, ranging from 0 to 9 (Rutter, Tizard, & Whitmore, 1970); *Mother's verbal cognitive ability* from the age 14 survey, derived from a shortened version of the Applied Psychology Unit Vocabulary Test (Closs & Hutchings, 1976); the *average age of both parents* (or, for single parents, the age of that parent) accounted for the longevity of the accumulation of wealth (Hills et al., 2013).

Family structure was captured at birth, where the mother was single, cohabiting or married with the biological father and from age 3 to age 11 by identifying single parents, both biological parents, or one biological and one not at each wave. The *number of siblings* was an ordinal measure ranging from zero to three plus, at age 11. Dummy variables for the nine English *regions* as well as Wales, Scotland, and Northern Ireland were also included (Office for National Statistics, 2017), together with the cumulative *number of home moves* from birth.

Child's age served to control for children's differences within their school year and the timing of their transition to secondary school in particular. *Child's ethnicity* was used instead of parental ethnicity, and was grouped into eight categories: white, mixed, Indian, Pakistani, Bangladeshi, black Caribbean, black African, and other ethnicity as per the U.K.-wide government census classification.

Analytic Approach

We use multiple-regression analysis first using total net wealth, and second including financial and housing wealth separately. When focusing on total wealth, we ran three models. Model 1 included only total wealth giving an indication of whether household wealth was associated with children's outcomes. Adding all covariates, we distinguished between a model with contemporaneous income (Model 2) and one with permanent income (Model

3). Estimates from Models 2 and 3 answered research Question 1, whether wealth was related to children's outcomes over and above family SES. Model 3 was specifically designed to test whether wealth explains any additional variance over and above permanent income. Differences between wealth and income coefficients were formally tested.

In the second stage of the analysis, HW and FW were included separately, alongside permanent income and all covariates. Model 4 was run on the overall analytic sample, and Model 5 on the subsample of homeowners. For this latter subsample, instead of net HW we also report on a measure for HV, thus excluding information on mortgages (Model 6).

To explore whether the association with wealth varied across developmental domains, the analyses previously described were run on children's emotional and behavioral problems, cognition and general health in turn. For robustness we ran further models transforming wealth and income into percentiles instead of logs, with substantive findings unaffected and any differences highlighted in the results section (results available on request).

Results

Comparison between the full analytic sample and the complete MCS sample at age 11 did not indicate any substantial difference (see Table S2 in the Appendix S2). In contrast, home owners were, as expected, a more advantaged subgroup relative to the full analytic sample and MCS overall. Beside their greater HW, home owners had on average higher financial assets, were better educated, more likely to be in professional or managerial occupations and on average had higher incomes.

Children's Emotional and Behavioral Problems

Tables 1 and 2 present the models investigating children's emotional and behavioral problems. Model 1 suggests a strong negative association between net total wealth and childhood emotional and behavioral problems, with a significant coefficient of $-.9$. After accounting for socioeconomic characteristics in Model 2, including current income, net total wealth remains associated with childhood emotional and behavioral problems. In Model 3 the coefficient on net total wealth was $-.13$ SDs, implying that a 10% increase in net total wealth was associated with a decrease of .013 SD's in emotional and behavioral problems, independent

of socioeconomic controls, including permanent income. Although the coefficient on wealth was only marginally significant, it remained stable in our alternative specification, which expressed wealth in percentiles. The net total wealth coefficient was slightly lower in magnitude to that of permanent income, both were equally important in explaining emotional and behavioral problems ($F = .60, p > .10$). These findings suggest that the mechanisms defining the relationship between child emotional and behavioral problems and parental wealth are not the same as those for income or other family socioeconomic indicators.

When HW and FW were treated separately (Table 2, Model 4), the housing component influenced the relationship between total wealth and emotional and behavioral problems in childhood, with a 25th–75th percentile difference of .10 *SDs*. Instead, net FW was not related to children's

Table 1

Influence of Net Total Household Wealth on Children's Emotional and Behavioral Problems: Full Sample (n = 8,645)

	Model 1	Model 2	Model 3
Net total wealth (log)	-.91 (.15)***	-.15 (.06)*	-.13 (.06)*
Current income (log)		-.23 (.05)***	
Permanent income (log)			-.20 (.05)***
Measures included in model			
Covariates	X	✓	✓
Current income	X	✓	X
Permanent income	X	X	✓
Predicted probabilities set at total wealth			
10th percentile	.12	-.01	-.01
25th percentile	.12	-.01	-.01
50th percentile	.01	-.03	-.03
75th percentile	-.13	-.05	-.05
90th percentile	-.29	-.08	-.07
Observations	8,645	8,645	8,645
Adjusted R ²	3.06	16.31	16.36

Note. Standard errors reported in parentheses. Covariates: Child: age and ethnicity, Household: parental age, mothers mental health at Table S1 in Appendix S2, mother's cognition, region, family composition, and employment status at each sweep, number of house moves, number of siblings, Family socioeconomic status: household social class at Tables S1 and S5 in Appendix S2 and education. The 10th, 25th, 50th, 75th, and 90th percentiles of the parental net housing wealth distribution at which the predicted effect for total difficulties are evaluated are: Total wealth: -£2,000, £0, £49,590, £145,500, £265,000; Housing: £0, £0, £50,000, £137,000, £320,000; Financial: -£9,000, -£2,000, £0, £2,900, £20,000.

* $p < .05$. *** $p < .001$.

Table 2

Influence of Housing and Financial Wealth on Children's Emotional and Behavioral Problems: Model Including Covariates and Permanent Income—Full Sample, and Homeowners Subsample

	Model 4 (full sample)	Model 5 (homeowners)	Model 6 (homeowners)
Net housing wealth (log)	-.07 (.02)**	-.10 (.03)**	
Net financial wealth (log)	-.00 (.03)	.02 (.02)	
Housing value (log)			-.12 (.04)**
Permanent income (log)	-.17 (.05)***	-.21 (.07)**	-.17 (.07)*
Predicted probabilities set at housing net wealth (or house value)			
10th percentile	.02	.05	.06
25th percentile	.02	.02	.02
50th percentile	-.03	-.02	-.02
75th percentile	-.08	-.06	-.06
90th percentile	-.11	-.10	-.11
Observations	8,645	5,194	5,194
Adjusted R ²	16.43	12.67	12.80

Note. Standard errors reported in parentheses. Covariates: Child: age and ethnicity, Household: parental age, mothers mental health, region, household structure, Family socioeconomic status: household social class and education. The 10th, 25th, 50th, 75th, and 90th percentiles of the parental net housing wealth distribution at which the predicted effect for total difficulties are evaluated are: For the full sample: Total wealth: -£2,000, £0, £49,590, £145,500, £265,000; Housing: £0, £0, £50,000, £137,000, £320,000; Financial: -£9,000, -£2,000, £0, £2,900, £20,000. For the homeowner subsample: Total wealth: £26,500, £60,000, £117,000, £204,000, £340,000; Housing: £30,000, £60,000, £113,000, £190,000, £300,000; Financial: -£10,000, -£2,000, £300, £7,500, £40,000. House value: £100,000, £130,000, £200,000, £280,000, 400,000.

* $p < .05$. ** $p < .01$. *** $p < .001$.

emotional and behavioral problems, although it was significant when transformed into percentiles. When considering homeowners only (Models 5 and 6), the association between HW and emotional and behavioral problems strengthened, with net FW remaining always insignificant whether entered as log transformation or percentile.

Further analysis investigated particular types of children's emotional and behavioral problems: hyperactivity, and conduct problems, emotional symptoms, and peer problems (results available on request). Higher net total wealth, in particular HW, was associated with fewer peer problems.

Children's Verbal Cognition and General Health

We also investigated the influence of net household wealth on children's verbal cognition and general health (see Tables S4–S7 in the Appendix S2).

For both these outcomes in the overall analytic sample, the association was positive and statistically significant. However, permanent income accounted for the association with verbal cognition, whereas household socioeconomic characteristics accounted for that with children's health.

Neither net housing nor net FW were associated with cognition in the full analytic sample, the relation was better explained by permanent income than wealth. In the subsample of homeowners, both permanent income and HV were marginally related to verbal cognition, although this result was not stable when housing value was transformed in percentiles. Though HW was marginally related to general health in the full analytic sample, permanent income was a better predictor. In the subsample of home owners, neither FW, HW or HV were related to children's health.

Discussion

This paper asked whether parental wealth, measured by the value of financial and property assets, had an association with children's outcomes once other measures of family characteristics and economic resources, and permanent income in particular, were taken into account. We examined three different outcomes: emotional and behavioral problems, verbal cognitive ability, and general health, measured in a large representative sample of 11 year old in the United Kingdom in 2012. In addition to net total wealth, the paper distinguished between different components of family wealth: net FW, net HW and HV. The results on the three outcomes were quite different and varied in relation to the type of wealth, suggesting that discrete mechanisms are involved and illustrating the general usefulness of our approach.

After controlling for a number of child, parent, and household characteristics, our results showed parental wealth was related to children's emotional and behavioral problems. In contrast, no residual association was found between parental wealth and verbal cognitive ability or general health. Our results on cognitive ability were consistent with existing evidence from the United States, which found weak or no association between reading scores and wealth (Orr, 2003; Yeung & Conley, 2009). Unfortunately, lack of data prevented us from examining other cognitive domains such as mathematics, which work from the United States had found to be sensitive to wealth (Orr, 2003; Shanks, 2007; Yeung & Conley 2009). We found

that general health was better explained by household characteristics, with no residual association with parental wealth.

The distinction between different types of wealth helped understand these results. When financial and HW were included separately in the models, we detected an association between HW and children's emotional and behavioral problems (and peer problems in particular). This pattern also emerged among the subsample of homeowners, indicating that differences within positive values of HW mattered too. In contrast, FW was not found to be independently associated with any of the outcomes once permanent income and socioeconomic factors were accounted for.

The finding that HW was more closely associated to children's outcomes than FW can be partly explained by the stark dominance of housing relative to financial assets in the wealth portfolio of families in the United Kingdom, where stock ownership is far less widespread than in the United States. But this result also raises questions as to what exactly HW and housing values capture, given that housing is both an investment and a consumption good. As hypothesized by Pfeffer and Killewald (2018), it could be that HW denotes home environment and neighborhood quality instead of wealth itself. More spacious homes in areas with access to more resources and advantaged populations are likely to be beneficial to children's outcomes. In additional analyses (available upon request) we included a bivariate indicator of neighborhood deprivation to compare HW among families living in similarly not disadvantaged areas, but results remained identical. A precise set of housing and neighborhood measures and variations in property values independent from housing quality would be needed to disentangle the role of housing from that of property wealth. The greater sensitivity of wealth to peer problems relative to other emotional and behavioral problem could indicate that wealth provides resources that indirectly heighten children's acceptance by their peers (Ahl & Dunham, 2017; Shutts, Brey, Dornbusch, Slywotzky, & Olson, 2016).

This paper is among the first for the United Kingdom to examine the possible association between wealth and children's development. Our analysis offers an accurate and systematic description of these association patterns, but nonetheless has its limitations. First, wealth is difficult to measure. However, comparisons between MCS responses and those from a large specialized U.K. survey of wealth and assets provided reassurance

on this account (see Appendix S1). While we acknowledge our FW measure is very likely to be an underestimation of household financial assets for families with high savings, our ordinary least squares (OLS) estimates will not be biased under the plausible assumption that such measurement error does not alter the relative ranking of families.

Second, it could be that the impact of wealth on children's outcomes is nonlinear. While our OLS model cannot test that, we have carried out additional analysis involving wealth deciles, which did not lead to substantially different results in relation to children's emotional and behavioral problems. Third, our measures of wealth are contemporaneous to our outcomes and therefore are not apt to capture how wealth influence arises over a much longer time frame, across multiple generations (Hällsten & Pfeffer, 2017; Pfeffer & Killewald, 2018). Nonetheless, although we measure only parental wealth at one-time-point, as wealth tends to accumulate over time our measure is likely to capture prior family circumstances and years of parental decisions during children's childhood. Fourth, wealth may affect children differently depending on their age. It is plausible to assume, as prior research has confirmed, that family wealth can greatly influence children's opportunities in early adulthood, when financial assistance in the forms of gifts, loans or mortgage guarantees can allow investments in higher education, careers, and housing (Karagiannaki, 2017; Pfeffer & Killewald, 2018). Finally, because of the data and modeling strategy we use, our estimates of the association between wealth and children's outcomes should not be interpreted causally. While more quasi-experimental studies are needed to address problems of omitted variables bias and self-selection (Morris & Genetian, 2003), a major advantage of our approach is the inclusion of a large battery of child, family, and household controls, and of socioeconomic factors including in particular permanent income.

Despite these limitations, this research supports calls to consider wealth as a distinct source of economic advantage. Conceptually, considering wealth alongside income can help extend current theoretical frameworks, highlighting issues of security and control over economic resources. Empirically, wealth can capture aspects of family economic circumstances that are not always reflected by income.

Research on wealth's influences on children is still at its infancy and there are fundamental knowledge gaps about the pathways and mechanisms behind this relationship. Yet the emerging evidence raises questions for policy. In particular, our finding

that HW and property value are likely to contribute to children's emotional and behavioral problems is worrying in a context such as the U.K. one. Children participating in the MCS were among the last cohort of children who predominantly experienced family homeownership and who benefited from the rising house prices in the early 2000s (Bastagli & Hills, 2013). Among children born a decade later, renting is much more common, creating a stark divide between children who benefit from the advantages of HW and those who do not (Social Mobility & Child Poverty Commission, 2013). As HW inequalities increase, it is possible the divergence in children's emotional and behavioral problems could be intensified.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

- Appendix S1.** Wealth Measures
- Appendix S2.** Additional Tables