

Diverging Destinies or Not? How Grandparents Moderate the Effects of Parental Socioeconomic Status on Early Childhood Development

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1 Abstract

In this study, we utilize Millennium Cohort Survey data from the United Kingdom and fixed effects model to explore 1) whether and how the grandparent's social class casually interacts with parents' SES to affect the children's cognitive and behavioral outcomes; 2) how the causal moderation effect of grandparent's class varies across children's development trajectory; and 3) whether the moderating effects of grandparents differ by grandparents' survival and coresidence status. We pay particular attention to whether grandparents' occupation would play a supportive vs. competitive and augmentary vs. complementary role in moderating the effects of parents' SES on child outcomes. Our study makes important contributions to both the multigenerational inequality and child well-being research, by considering the multigenerational status transmission as an interactive process, and how the augmentary and/or complementary role of grandparents would help enlarge or reduce the diverging destinies of children caused by disparities in parental resources.

2 Background

Recent years have witnessed a surge of interest in multigenerational transmission of socioeconomic status (SES) in sociology, demography, and economics (Knigge 2016; Mare 2011; Mare 2014; Solon 2015; Song 2016; Song and Mare 2017; Pfeffer 2014). An increasing number of studies have examined whether grandparents' SES affect their grandchildren's status attainment directly, net of the mediation of parental characteristics (e.g., Song 2016; Zeng and Xie 2014, Chan and Boliver 2013). Driven by the interest in testing whether the grandparent effect is non-Markovian, past research in multigenerational mobility has concentrated on estimating the direct effect of grandparent characteristics net of the parent attributes. However, the multigenerational process of status transmission is interactive, where the grandparents may play either a supportive or competitive role that either supplements or augmentates the effect of the parents and immediate family on the trajectory of the grandchild's development over time (e.g. Daw and Gaddis 2016, Hallsten and Pfeffer 2017). Past research has not yet explored how the grandparent may interact with the trajectory of the parent's intra-generational life-course progression to affect the grandchild's developmental outcomes.

The interactive grandparent role can be either supportive or competitive, augmentary or complementary, depending on the grandparent's resource and availability. For example, grandparent with higher SES and better health may be able to play a supportive role of assisting the parents in child rearing. Whileas lower SES and frail grandparents may have to compete for resource and time with their grandchildren. From a different perspective, if the grandparent role is augmentary, they may amplify the effects of parental resources on child development, yielding cumulative advantages or disadvantages of their grandchildren, especially at either the top or the bottom end of the distribution of the parental SES. In this scenario, children would follow diverging destinies to a larger extent not only depending on their parents' SES disparities (McLanahan 2004), but also depending on their grandparents' characteristics additionally, which has not been considered by previous research.

By contrast, if the grandparent role would be complementary, they may partly offset the inequalities in child development outcomes brought by parental resources disparities, which helps curb the diverging destinies or even contribute to converging trends in child outcomes. However, previous literature has not systemized the different dimensions of conceptualizing the grandparent roles to understand the multigenerational transmission process.

Moreover, grandparent effect is likely to vary over the development trajectories of grandchildren, which requires a careful examination of the age dynamic effects of grandparents' characteristics on grandchildren's development. Past research has mainly focused on adult grandchildren's status attainment, and the majority of them use single-time point measures of the grandchildren's outcomes. Relatively less attention has been paid to the grandparent effect on early development of grandchildren where stratification processes initiate (e.g., Haas 2008). To fill these research gaps, we attempt to examine whether and how grandparents' characteristics (SES, coresidence, alive status) moderate the effects of parental SES on early childhood development, and pay particular attention to the heterogeneity in these moderating effects over development trajectories of grandchildren.

3 Brief Literature Review

3.1 Direct Effect of Grandparents

Past studies have concentrated on the direct effect of grandparent net of the parental attributes on their grandchildren's social economic outcomes, such as education, class, income, health, and mortality. For instance, a majority of studies investigate whether and how the grandparent characteristics affect the grandchildren's education, with the earlier studies reporting no direct grandparent effect (Warren and Hauser 1997; Jaeger 2012), while later works revealing the otherwise (Hallsten 2014; Mollegaard and Jaeger 2015; Song 2016; Wightman and Danziger 2014). Other studies consider the multigenerational transmission of occupational status and/or class, most of which support the existence of a direct grandparent effect on grandchildren's class status, net of parents' social class, wealth, education

and income (Chan and Boliver, 2013; Hallsten 2014; Hertel and Groh-Samberg 2014; Knigge 2016). Apart from these, the strand of literature also has examined the non-Markovian effect of grandparents on the grandchildren’s attainment of income (Warren and Hauser 1997; Jaeger 2012, Lindahl et al. 2015), wealth (Pfeffer and Killewald 2015), longevity (Piraino et al. 2014), and health (Modin et al. 2009).

Past studies, however, have not paid sufficient attention to the earlier development outcomes and well-being of grandchildren. In fact, cross-generational transmission of inequality initiates much earlier in individuals’ life course. Except for a few studies which examined the effect of family background on children’s test scores in the 9th grade (Hallsten 2014; Hallsten and Pfeffer 2017), or at age 18 (Modin and Fritzell 2009), no empirical studies, to our knowledge, have explored how grandparents’ attributes interact with parent’s SES to shape the grandchildren’s development from the early childhood.

3.2 The Moderating Role of Grandparents and Effect Heterogeneity

The multigenerational process of status transmission is interactive, where the lifecourse trajectories of the elderly, the parents and the children overlap and unfold. Beside of the direct effect of grandparents net of parental characteristics, grandparent effect may moderate the effects of parents’ resources on child development. In particular, the moderating role of grandparents could be either supportive or competitive, augmentary or complementary.

More importantly, these roles of grandparents may not be stagnant, but may be dynamic and heterogeneous throughout the development trajectories of grandchildren. For example, during the early childhood of the grandchildren, grandparents are relatively younger and healthier, grandparents are more likely to aid the immediate family in child bearing. As the grandchildren grow older demanding more family inputs, the older and less healthier grandparents probably would compete with their grandchildren for time and resources from the parent generation. Besides, grandparents’ survival and living arrangements may also change as the grandchildren grow up, which might also matter for child well-being. Grandparents may be more likely to coreside with their adult children when the grandchildren

are young. As grandchildren start schooling, they may desire more independence or turn to coreside with another younger grandchild to help (Cherlin 2001, Cherlin and Furstenberg 2009). Moreover, some grandparents may survive to see their grandchildren growing up while others may not (Song and Mare 2016). It is thus important to carefully explore the changing grandparent effects across the different development stages of grandchildren, which is hardly considered by previous studies.

4 Research Questions

In this study, we are briefly concerned with the following research questions:

1. Whether and how grandparents' social class moderates the effects of parents' SES trajectory on the child cognitive and behavioral outcomes?
2. How does the moderating effect of grandparents vary across the trajectories of child development?
3. Do these moderating effects of grandparents' SES differ by their survival status and coresidence?

5 Data, Measurement and Analytical Strategy

5.1 Data and Measurement

We use five waves of data from the British Millennium Cohort Study (MCS), which includes longitudinal data for children who were born in England, Wales, Scotland, and Northern Ireland at the beginning of the millennium. The first MCS was conducted in 2001 and 2002 and included 18,552 children of 9 months old. Additional data were collected when the children were aged 3, 5, 7, 11, 14, and 17 in 2004/5, 2006, 2008, 2012, 2015, and 2018 (Hansen 2014). We use waves 2-6 with information about children's cognitive score and behavioral outcomes.

Our dependent variable $Y_{i,t}$ refers to either the children's cognitive scores or behavioral problems of individual grandchild i at time point t . A number of assessments have been

administered to the MCS children since they were aged 3: The British Ability Scale (BAS) naming vocabulary and the Bracken School Readiness assessments were implemented in wave 2 (at age 3); the BAS naming vocabulary, picture similarity, and pattern construction assessments were implemented in wave 3 (at age 5); the BAS pattern construction, word reading, and NFER (National Foundation for Educational Research) number skills assessments were implemented in wave 4 (at age 7); the BAS verbal similarities, CANTAB (Cambridge Neuropsychological Test Automated Battery) spatial working memory task, and CANTAB-Cambridge gambling task were implemented in wave 5 (at age 11); finally, CANTAB-Cambridge gambling task and word activity were implemented in wave 6 (at age 14). For waves 2-4, we take the average of the standardized scores of all cognitive tests, based on which the rank of each child is constructed within each wave. We construct the rank of each child based on the standardized score of BAS verbal similarities and word activity for waves 5 and 6, respectively. The rank of cognitive score ranges from 0 to 1, with higher value indicating higher level of cognitive development.

Children’s behavioral development is measured by the total difficulties score of Strength and Difficulties Questionnaire (SDQ), which is a behavioral screening questionnaire for 3- to 16-year-olds. The total difficulties score measures 20 items from four subscales: emotional symptoms scale, conduct problems, hyperactivity scale, and peer problem. Each subscale includes five items, with three response categories: 0 = not true; 1 = somewhat true; 2 = certainly true. The range of the total difficulties score is 0-38 in the dataset, with a higher value indicating a larger number of emotional and behavioral problems.

Grandparents’ characteristics include grandparents’ occupation when the main respondent or his/her partner was 14 years old, alive status, and whether coresiding in the same household. The grandparent occupation is time-invariant and is denoted as $G1occupation_k$, which is the main treatment variable that we consider in this paper. The grandparent’s alive status and coresidence status are time-variant and are denoted as $GP_{k,t}$. The parent’s characteristics $Parent_{j,t}$ include time-variant parent attributes such as parent income, occupation, marriage status, age at the interview, and health. The grandchild characteristics

$Child_{i,t}$ includes the grandchild's age, ethnicity and number of siblings in the household.

5.2 Identification Problem

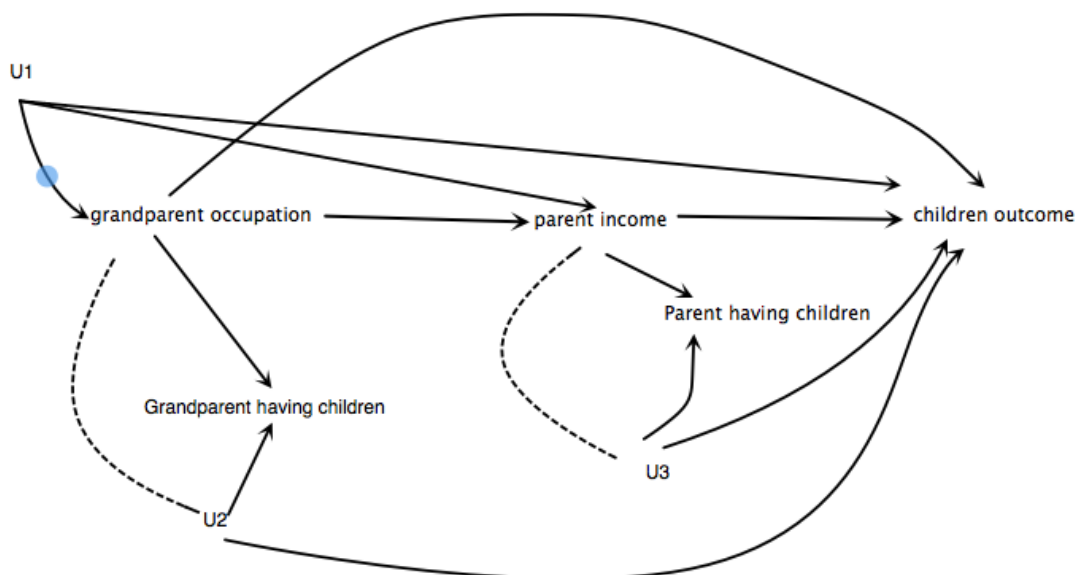


Figure 1: $U1$ indicates potential unobserved confounders of the grandparent occupation and child's outcome, including the grandparent ability, ambition and stable social environment, $U2$ and $U3$ indicate the preference of intergenerational investment vs. self consumption of G1 and G2.

The issue of omitted variable bias and endogenous selection in multigenerational mobility has elicited a tremendous amount of interests among researchers (Breen 2018, Song and Mare 2015). For instance, the unobserved ability and personality of G1 may simultaneously affect G1's occupational attainment as well as G3's development outcomes, which is captured by $U1$ as is shown in Figure 1. Apart from the unobserved grandparent attributes, $U1$ may include the stable social environment such as racial discrimination and neighborhood segregation.

Another typical endogenous selection problem is that essentially all studies on grandparent effect select on having children of both the grandparent and the parent generations, the parents and grandparents are thus not representative of the population of their generations

(Elwert 2013, Breen 2018). For instance, the preference of fertility and investment in the next generation $U2$ and $U3$ versus consumption (Becker and Tomes 1994) may determine individuals' fertility decision as well as the grandchild's developmental outcomes. Although $U2$ and $U3$ do not initially cause the grandparent occupation or the parental income, selecting on the two colliders of $G1havingchildren$ and $G2havingchildren$ could yield spurious associations both between $U2$ and grandparent occupation and between $U3$ and parent income.

Regression analyses (as estimated in the majority of studies) can adjust for such bias only when assuming childlessness is *not* determined by unobserved factors, which is highly unlikely in reality. One solution might be reweighing the sample so that it represents the population (Song and Mare 2015), with a strong assuming that all factors affecting $G1havingchildren$ and $G2havingchildren$ are observed. Fixed effect model (FE) can circumvent such biases from $U1$, $U2$ and $U3$ to the extent that they are determined prior to the birth of the grandchild, and thus are regarded as fixed for child outcomes. The assumption of identification of FE model is that there are no time-variant unobserved confounders determining both grandparents' occupation, parents' attributes, and grandchildren's outcomes. Compared to all sorts of variations of random effect models, such as the growth curve models and multilevel models, FE model allows for a more realistic assumption in which the unobserved time-invariant causes of the grandchild may be correlated with the grandparent occupation and parent's characteristics.

5.3 Model Specification

As stated above, we adopt the fixed effects model to estimate the grandparent moderating effect of the parental characteristics on the grandchild's developmental outcomes, coupled with the main effect of parental characteristics. We allow for the G1's fixed characteristics (occupation when G2 were 14) to modify the effects of G2' time-varying characteristics. Specifically, we specify a model as follow:

$$\begin{aligned}
Y_{i,t} = & \beta_0 + \beta_1 Age_{i,t} + \beta_2 Age_{i,t}^2 + \sum_{t=0}^t \sigma_t Parent_{j,t} + \sum_{t=0}^t \phi_t Parent_{j,t} * G1occupation_k \\
& + \eta_t G1occupation_k + \sum_{t=0}^t \alpha_t GP_{k,t} + \sum_{t=0}^t \gamma_t Child_{i,t} + U_i + \epsilon_{it} \tag{1}
\end{aligned}$$

where i, j, k indicate G3, G2, and G1 respectively. G3's cognitive and behavioral outcomes $Y_{i,t}$ at the time point t is determined by G3's age, G2's time-variant characteristics from the birth of the child to time point t , $Parent_{j,t}$, the interaction of G2's characteristics with G1's occupation $Parent_{j,t} * G1occupation_k$, G3's time-variant characteristics, $Child_{i,t}$, and the unobserved, time-invariant term, U_i , and the residual term, ϵ_{it} . $Parent_{j,t}$ include G2's age, family income, occupation, marriage status, and health. $Child_{i,t}$ involve G3's height and weight. $G1occupation_k$ includes the grandparent's main occupation, and $GP_{k,t}$ includes the grandparent survival and coresidence. Although $G1occupation_k$ is time-invariant itself, we adopt a nonlinear specification to allow its effect to vary across time, as is shown by η_t (Firebaugh et al. 2013). In this way, the term would not drop from the equation. Although we can not identify the main effect of $G1occupation_k$, we can calculate its change over t instead, to illustrate whether the main effect of grandparent occupation enlarge or diminish as the grandchild grows.

We are especially interested in how G1's occupation might moderate the effect of G2's SES on G3's cognitive and behavioral outcomes, reflected by the parameter ϕ_t , and how the moderating effects may depend on G1's survival and coresidence status. To explore whether and how the moderating effect differ by the survival and/or coresidence status, we plan to adopt subsample analysis or include the three-way interaction term $Parent_{j,t} * G1occupation_k * GP_{k,t}$ into the equation. To see whether the moderating effect varies across the grandchild's growth trajectory, we specify the coefficient of ϕ_t , γ_t and σ_t to be flexible across the time axis t to reflect heterogeneous effect over the grandchild's age, as shown in equation 1.

6 Preliminary Results and Next Step

Table 1 reports the descriptive statistics for G3's outcomes and all independent variables. Here we only report the information of parents of the main respondent (parents of the partner have more missing values, which will be dealt with multiple imputation later). Nearly 40 percent of mother of the main respondent (MR) were not working when MR was 14 years old. The percentages of MR's mother in other occupation categories do not differ much, with a slightly higher percentage of mothers being in manual labor work. By contrast, around 31 percent of MR's father were managers and professionals, followed by service worker (25 percent), manual worker (23 percent), not working (18 percent), and a small percentage of them were in administrative and secretarial work. In each MCS wave, around 86 percent of MR's mother and 73 percent of MR's father were alive. On average, less than 5 percent of grandparents coresided in the same household. This percentage may count both paternal and maternal grandparents. The average educational level of MR is high, with nearly 30 percent of them obtaining a higher education degree. During the early period of childhood, nearly 40 percent of MR, the majority of whom are children's biological mother, are not working or never work. The percentage of MR's partner being not working/never work is also higher than 30 percent. More than 70 percent of MR are married. Finally, the self-rated health of MR is pretty high. For G3, around 14 percent-15 percent of them are non-whites, and on average they have one sibling in the household.

[Table 1 About Here]

Figure 2 and Figure 3 show children's cognitive test rank and SDQ by occupation of MR's parents, MR, and partner. Children with grandparents (both MR's father and mother) who were in occupations with higher SES and prestige, such as managers and professionals, have higher cognitive test ranks and lower SDQ. Children with parents (MR and partner) who were managers and professionals also tend to have higher cognitive test ranks and lower SDQ.

[Figure 2 and Figure 3 About Here]

To better compare children from different family backgrounds, we categorize the occupations of G1 and G2 into "upper" (managers and professionals) and "other" (all other occupation categories), which produces four main G1&G2 classifications: upper-upper, upper-other, other-upper, and other-other. Figure 4 and Figure 5 present children's cognitive test rank and SDQ by different G1&G2 classifications. The general pattern is that, children have highest cognitive rank and lowest SDQ among upper-upper category, while have lowest cognitive rank and highest SDQ. Children in other two categories fare in the middle, with those with parents in upper class faring better than those with grandparents in upper class. These bivariate results suggest a moderating effect from grandparents' occupation may exist for child well-being. For the next steps, we plan to employ fixed-effects model to remove unobserved, time-invariant variables and examine whether these patterns still hold.

[Figure 4 and Figure 5 About Here]

7 Reference

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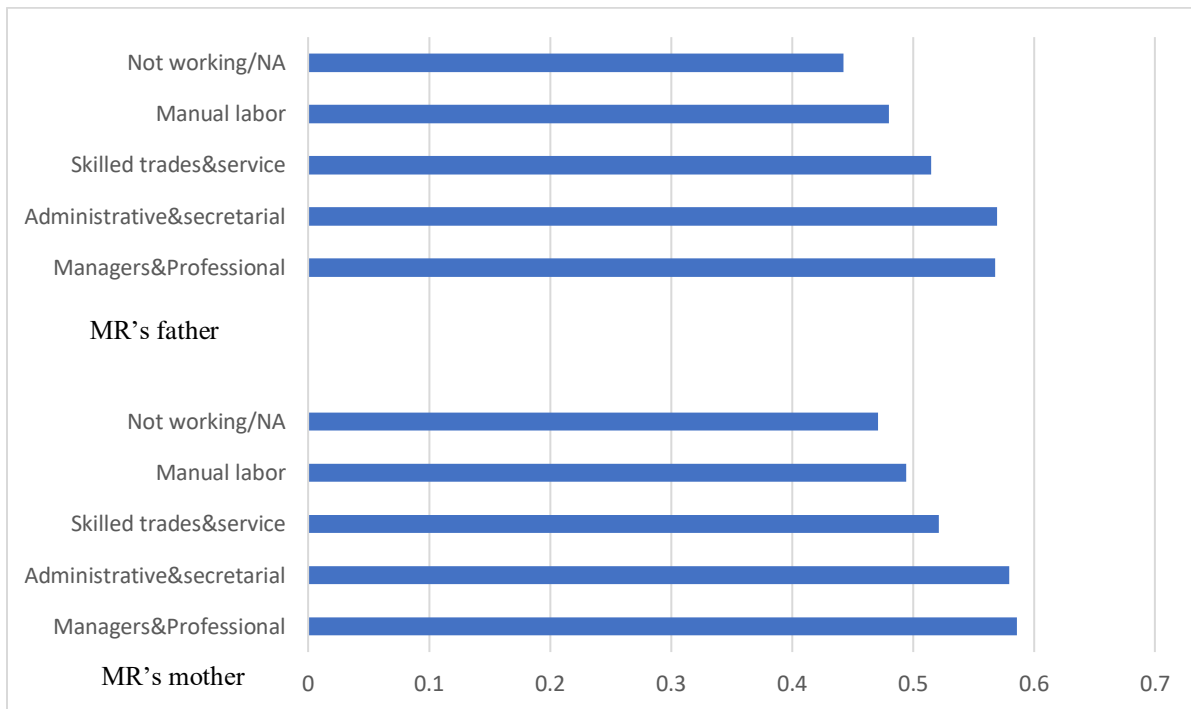


Figure 2a: Children's cognitive test rank, by occupation of MR's parents

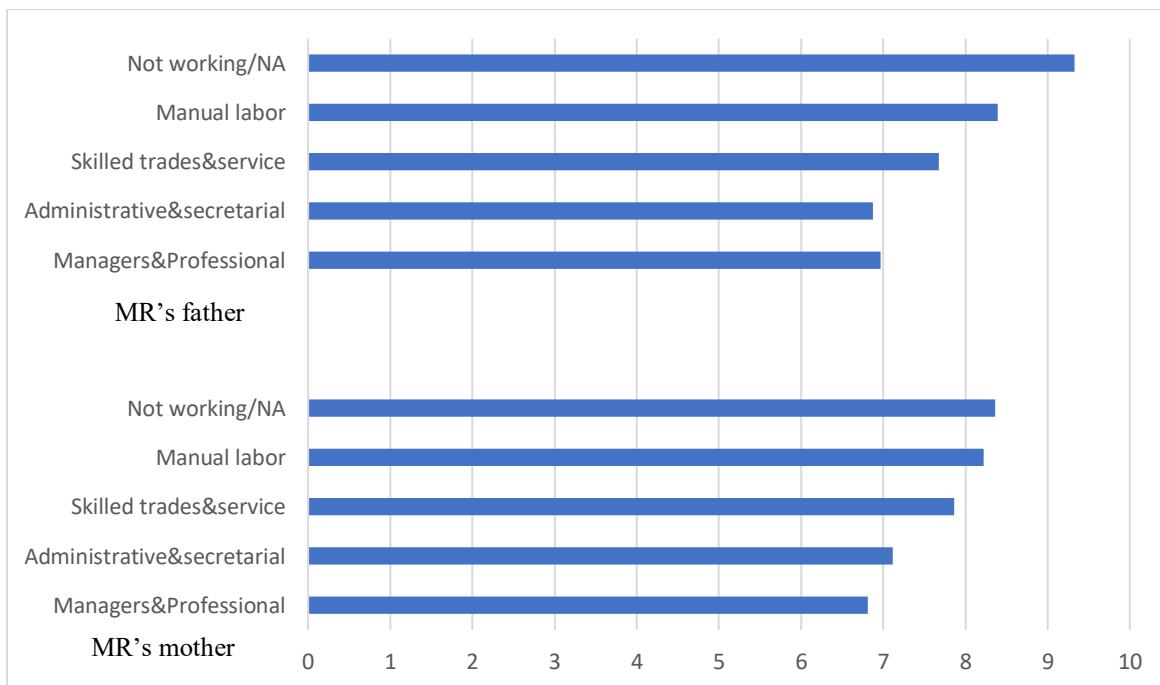


Figure 2b: Children's SDQ, by occupation of MR's parents

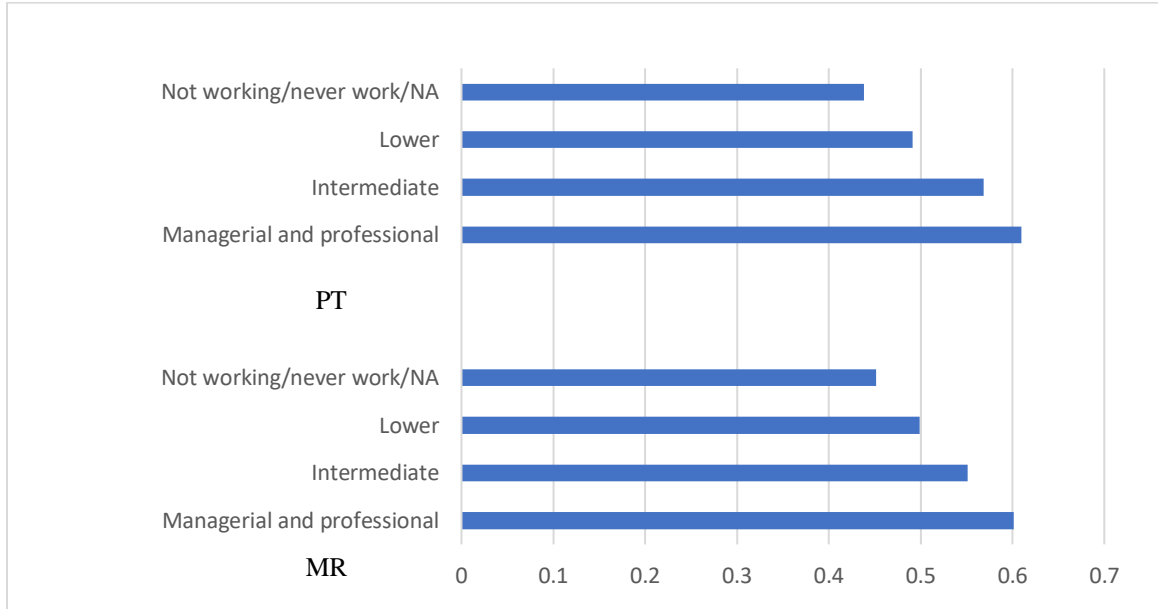


Figure 3a: Children's cognitive test rank, by occupation of MR and PT

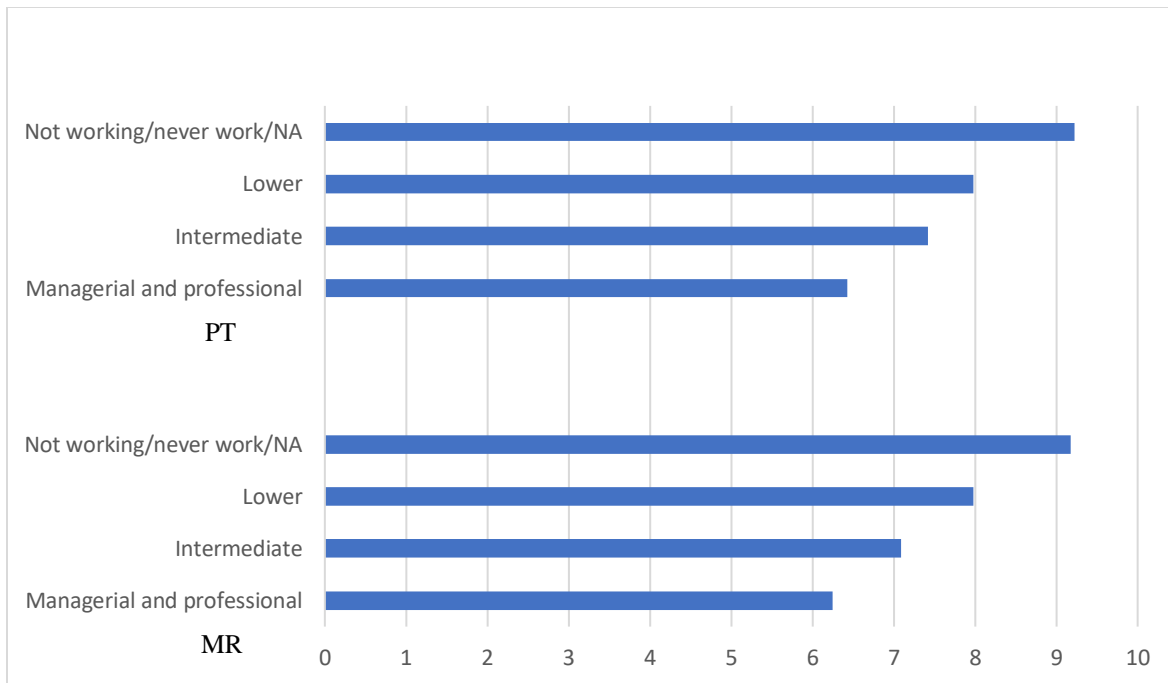


Figure 3b: Children's SDQ, by occupation of MR and PT

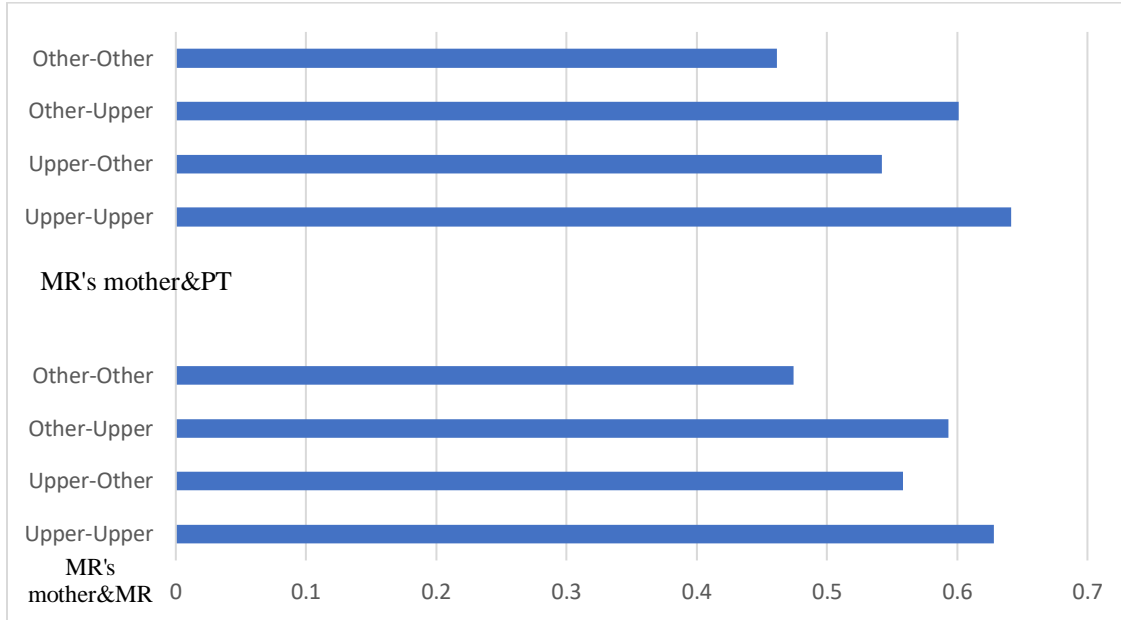


Figure 4a: Children's cognitive test rank, by occupation of MR's mother, MR, and PT.

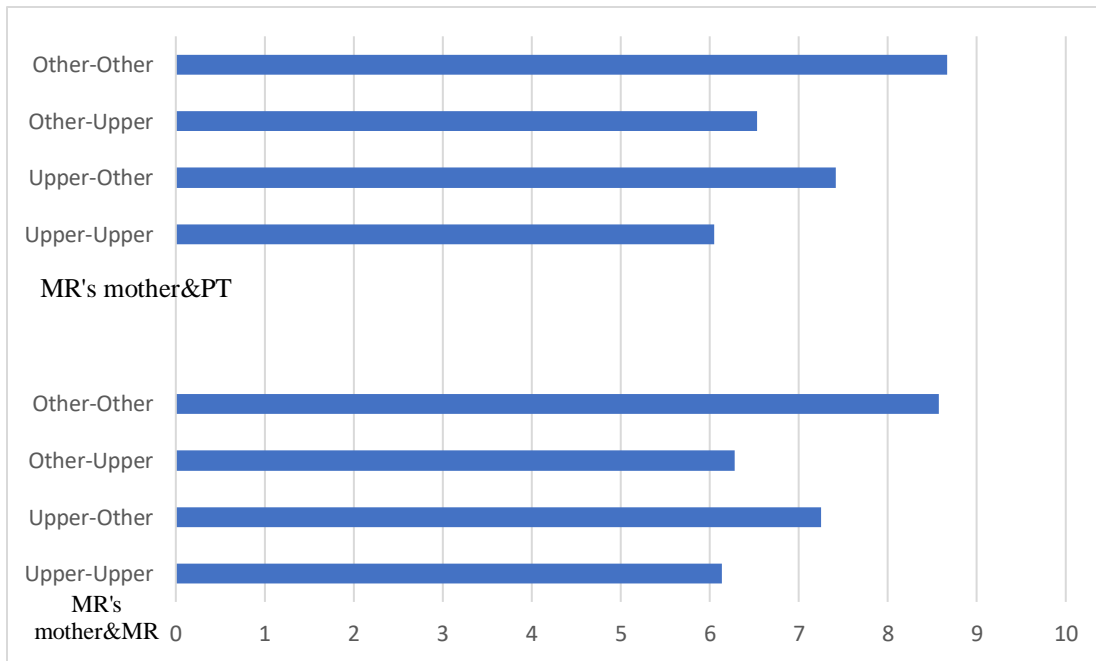


Figure 4b: Children's SDQ, by occupation of MR's mother, MR, and PT.

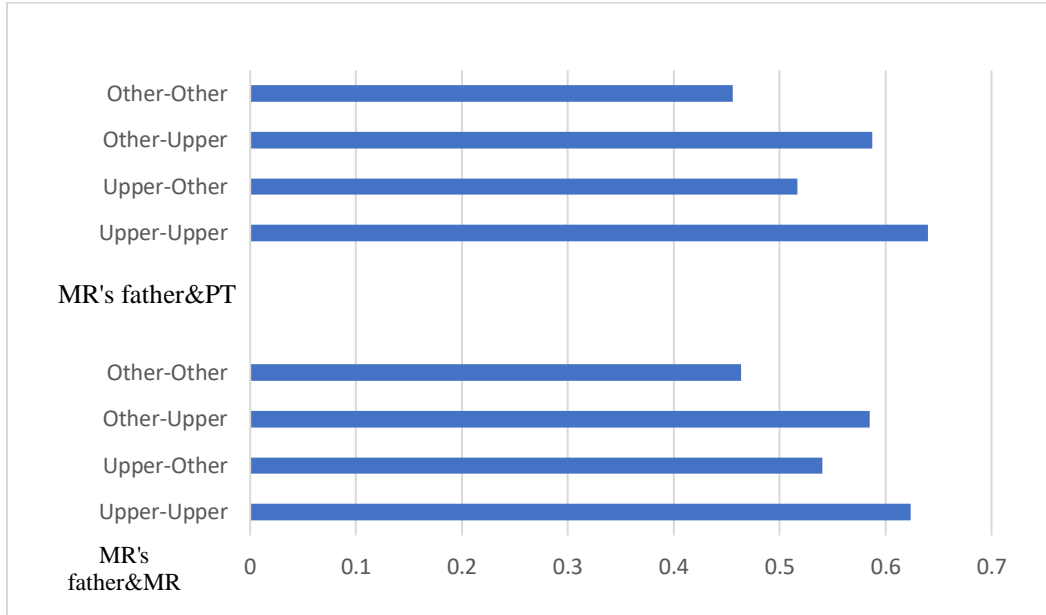


Figure 5a: Children's cognitive test rank, by occupation of MR's father, MR, and PT.

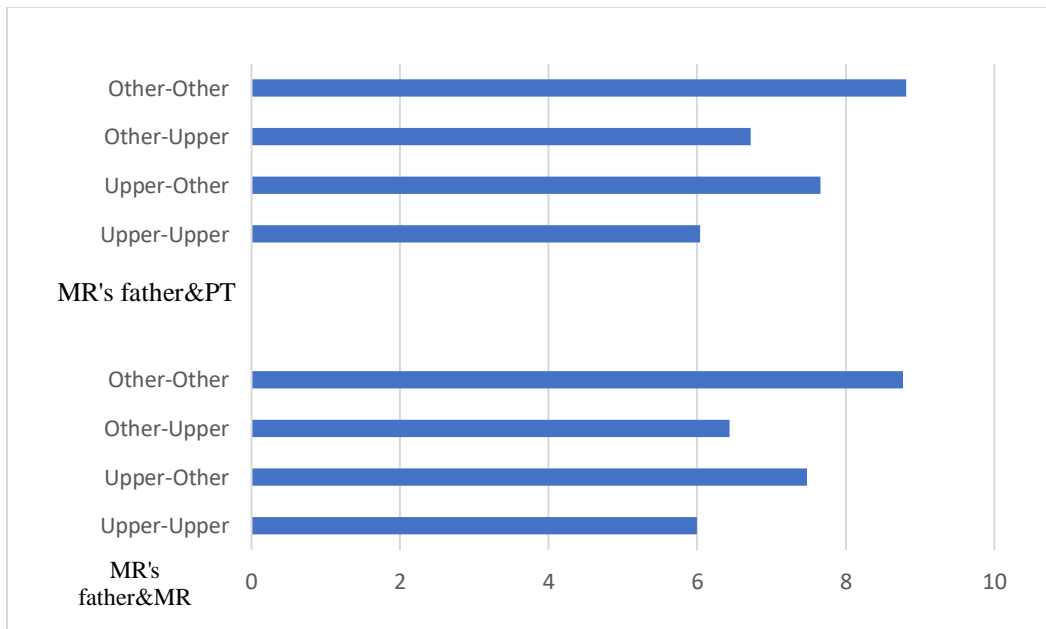


Figure 5b: Children's SDQ, by occupation of MR's father, MR, and PT.

Table 1: Unweighted descriptive statistics, MCS waves 2-6.

Variable	Cognitive		Behavior	
	Mean (%)	S.D.	Mean (%)	S.D.
G3's outcomes				
Cognitive score rank (0-1)	0.51	0.29		
SDQ (0-38)			7.88	5.40
G1's characteristics				
Occupation of MR's mother (%)				
Managerial and professional	14.48		14.80	
Administrative and secretarial	10.84		11.07	
Skilled trades and service	16.50		16.84	
Manual labor	19.75		20.01	
Not working/NA	38.43		37.27	
Occupation of MR's father (%)				
Managerial and professional	30.56		30.80	
Administrative and secretarial	3.72		3.75	
Skilled trades and service	24.94		25.06	
Manual labor	22.87		22.83	
Not working/NA	17.92		17.55	
MR's mother is alive in current wave (%)	85.59		85.83	
MR's father is alive in current wave (%)	72.49		72.88	
Co-residence in the household (%)	4.38		4.12	
G2's characteristics				
Educational level of MR (%)				
Higher education	28.61		29.32	
A level	10.15		10.36	
GCSE A-C	33.31		33.86	
GCSE D-G	9.94		10.03	
Other	17.99		16.43	
Occupation of MR (%)				
Managerial and professional	24.08		24.78	
Intermediate	13.69		14.00	
Lower	23.04		23.26	
Not working/never work/NA	39.19		37.96	
Occupation of PT (%)				
Managerial and professional	29.82		30.52	
Intermediate	4.26		4.32	
Lower	32.97		33.02	
Not working/never work/NA	32.95		32.14	
Annual family income	20219.91	11210.85	20510.14	11189.08
Biological mother is MR (%)	97.54		97.65	
Age of the main respondent	36.33	7.10	36.39	7.09
MR is married	71.92		71.71	
Self-rated health of MR	3.08	0.69	3.09	0.68
G3's characteristics				
Boy	50.65		50.64	
Non-white	15.26		13.58	
Number of siblings in the household	1.00	1.05	0.98	1.03
N of observations	54,691		52,583	
N of children	14,482		14,358	

Note: MR = the main respondent; PT = the partner of the main respondent.