

# Girls like Pink: Explaining Sex-Typed Occupational Aspirations amongst Young Children<sup>†</sup>

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## ABSTRACT

There is a high degree of sex-typing in young children's occupational aspirations and this has consequences for subsequent occupational segregation. Sociologists typically attribute early sex-differences in occupational preferences to gender socialization. Yet we still know surprisingly little about the mechanisms involved in the intergenerational transmission of sex-typical preferences and there is considerable theoretical controversy regarding the role of individual agency in the process of preference formation. This study analyzes the determinants of sex-typed occupational aspirations amongst British children aged between 11 and 15. We specify different mechanisms involved in the transmission of sex-typical preferences and propose an innovative definition of individual agency that is anchored in observable psychological traits linked to self-direction. This allows us to perform a simultaneous test of socialization and agency predictors of occupational sex-typing. We find that parental influences on occupational preferences operate mainly through three distinctive channels: 1) the effect that parental socio-economic resources have on the scope of children's occupational aspirations, 2) children's direct imitation of parental occupations, and 3) children's learning of sex-typed roles via the observation of parental behavior. We also find a strong net effect of children's own psychological predispositions —self-esteem in particular— on the incidence of sex-typical occupational preferences. Yet large differences in the occupational aspirations of girls and boys remain unexplained.

**KEYWORDS:** *Gender Segregation, Occupational Aspirations, Children, Socialization, Agency, Personality Traits, Mechanisms, British Household Panel Survey*

**JEL CODES:** *J13; J16; J24; Z13*

<sup>†</sup> Research for this paper has been supported by the European Centre for Analysis in the Social Sciences, ECASS, the Spanish National Research Council, CSIC and IMDEA-Social Sciences Institute. Platt carried out this research while taking up a Marie Curie Intra-European Fellowship at the Institute for Economic Analysis, IAE-CSIC. She is grateful to the European Commission for funding the Fellowship and the IAE for hosting her.

*“..We are struck by how modest our collective social science accomplishments are after several decades of research directed at explaining occupational sex segregation. Novel approaches to documented supply -and demand side- mechanisms by which segregation is created and maintained are still sorely needed” (Okamoto & England 1999:577).*

*"Redirecting our attention from motives to mechanisms is essential for understanding inequality..." (Reskin 2003:1)*

## **INTRODUCTION**

Even today, most people work in jobs occupied largely by persons of their own sex (see e.g. Chang 2000; 2004; Okamoto and England 1999; Tomaskovic-Devey et al. 2006). Although this is true for both men and women, segregation is more acute for the latter as they tend to concentrate in fewer occupations. Predominantly female occupations offer lower wages and fewer opportunities for career advancement, and hence segregation is often regarded as the main source of women's labor-market disadvantage (see e.g. Petersen and Morgan 1995; Tomaskovic-Devey 1993; Maume 1999). It is therefore not surprising that the study of gender segregation has for long been placed at the very centre of gender stratification research.

Job-allocation processes are the result of the actions and interactions of both firms and workers. Discrimination and social closure explanations of occupational sex segregation focus on the role that employers, managers and male co-workers play in hindering women's access to particular jobs (see e.g. Castilla 2008; Cohen and Huffman 2007; Kmec 2005; Tomaskovic-Devey and Skaggs 2002; Roscigno et al. 2007). However insightful, these demand-side approaches cannot explain the existence of significant sex-differences in gender roles, career preferences and occupational aspirations, not only amongst adults, but also amongst young children who lack labor-market experience (Harper and Haq 2001; Johnson 2001; Marini and Greenberger 1978; Marini et al. 1996; Okamoto and England 1999). When youngsters' own career aspirations are accounted for, the evidence on hiring discrimination is drastically weakened (see e.g. Harper and Haq 2001).

Workers' own preferences therefore matter. Supply-side explanations of occupational sex-segregation focus on the role that workers' own occupational choices play in producing and maintaining segregated outcomes —even in the absence of discriminating employers or exclusionary co-workers. Supply-side theories aim to understand how these gender-specific

choices are formed, shaped and constrained by societal factors, including family structures, social norms, markets and institutions (for a review see Cohen and Huffman 2003).

Sociologists have long stressed the crucial role that socialization processes play in the transmission of sex-specific norms, values and aspirations leading to segregated occupational outcomes (see e.g. Corcoran and Courant 1985; Crompton and Harris 1998a;1998b; England et al. 1994; 2000; Hitlin 2006; Marini 1989; Marini and Brinton 1984; Marini et al. 1996; Okamoto and England 1999). The gender socialization perspective is often seen as the only sociological supply-side alternative to human capital, compensating differentials and sphere specialization models in economics<sup>1</sup> (see e.g. Becker 1985; 1991[1981]; Goldin and Polacheck 1987; Munasinghe et al. 2008; Polachek 1981) as well as to biological and evolutionary explanations (see e.g. Buss 2004[1999]; Kanazawa 2001; Lueptow et al. 2001; Penner 2008). The empirical literature in sociology and economics is plagued with references to socialization, which is too often used as an ex-post recourse to account for residual differences by sex.

Yet despite its prominent role in the explanation of gender differences in job-allocation, the existing theories of socialization are surprisingly vague when it comes to specifying the actual mechanisms involved in the transmission or acquisition of values, tastes and orientations (see Boudon 1996; Breen 1999; Polavieja 2010; Reskin 2003). We still know little about the interplay between human cognition and social interactions (see Ridgeway 1997; Ridgeway and Erickson 2000) as well as about the actual channels and processes involved in the intergenerational transmission of sex-typed preferences. Social-learning models stress that gender roles are acquired through primary socialization processes very early in life (see e.g. Bandura 1977; Cunningham 2001; Okamoto and England 1999), yet there is also evidence that adults adapt their gender attitudes and preferences over their life course in response to various structural constraints (see Corrigall and Konrad 2007; Kroska and Elman 2009; Moen et al. 1997). This implies that gender-differences in preferences, values and orientations to work and family measured in adult life are *to some extent* endogenous to labor-market and housework experiences. Yet little is known about the relative importance of primary socialization versus adult socialization in the formation of preferences (see Cunningham 2001; Moen et al. 1997). Socialization is still largely a black-box in social stratification research.

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<sup>1</sup> For a review of supply-side economic theories see Okamoto and England (1999); Polavieja (2008).

An important criticism to socialization models is that they leave very little room for individual agency in the formation of gendered preferences (see Hakim 1991; 1995; 2000; 2003a; Hays 1994). Catherine Hakim contends that women are basically “self-determined actors”, whose outcomes reflect agency to a much larger extent than “over-socialized” models concede (Hakim 1991:114). Her claim is based on the observation that women’s preferences and orientations to work are internally very heterogeneous and this leads to marked differences in their labor-market outcomes. Yet Hakim takes preference heterogeneity largely as given —i.e. as exogenous to both socialization and labor-market experiences— thus leading to an over-individualized, and hence equally problematic, conception of human behavior<sup>2</sup> (Crompton and Harris 1998a; 1998b).

This paper investigates the degree of gender segregation in the occupational aspirations of British children under 16 and tests for different mechanisms involved in the acquisition of gender-specific occupational preferences. Our primary focus is on parental socialization. We are particularly concerned with identifying and testing different channels of parental influence on children’s occupational preferences. We want to know *how* parental characteristics and parental behavior influence the degree of sex-typing in children’s occupational aspirations. We also aim to assess what is the role of personal agency in the process of preference formation. To this end, we propose a new approach to measuring agency. Drawing on recent developments in behavioral economics and developmental psychology, we expect that individual heterogeneity in work-related preferences is associated with the distribution of certain psychological traits in the population (see e.g. Bowles and Gintis 2002a; Bowles et al. 2001a; 2001b; Heckman et al. 2006). We argue that if agency plays a role in the formation of occupational preferences, we should find an association between psychological characteristics and occupational aspirations. This association, net of parental influences, can be safely interpreted as capturing the role of personal agency, where agency is defined as the effect of measurable personality traits rather than as a residual construct.

We test for different socialization and agency mechanisms using information on parental, relational, and psychological variables for a representative sample of over 3,000 British children aged between 11 and 15. This sample is drawn from waves 4-18 of the British

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<sup>2</sup> Hakim’s preference theory is not about the causes of preference differentiation but rather about “the historical context in which [individual] core values become predictors of behavior” (Hakim 2003:355).

Household Panel Survey (1994-2008). By investigating early gender differences in occupational aspirations, our approach helps to open the black-box of primary gender-role socialization, sheds light on the agency-structure debate and fills an important gap in the sociological literature on gender segregation.

## **THEORETICAL BACKGROUND**

### ***Socialization and transmission mechanisms***

Following Arnett (1995:618) we can define socialization as “the process by which people acquire the behavior and beliefs of the social world—that is, the culture—in which they live”. Social-learning models assume that socialization in gender roles takes place primarily during childhood as children learn from their social context. The most important—but not the only—agent of primary socialization in gender roles is the family (see e.g. Bandura 1977; Cunningham 2001; Hitlin 2006; Lueptow et al. 2001; Marini and Brinton 1984; Okamoto and England 1999; Roberts and Bengston 1999).

But how do families shape children’s occupational aspirations? Drawing on social stratification, social learning and developmental psychology research, we identify three different potential channels of parental influence: 1) parental socio-economic resources 2) parental behavior in the economic and domestic spheres and 3) parental gender ideology. Each of these channels implies different transmission mechanisms and leads to different testable hypotheses that we discuss below.

### *Parental resources and the scope of occupational horizons*

Standard stratification research shows that the educational and occupational attainment of children is highly dependent on parental resources (for a review see e.g. Breen and Jonsson 2005). Parental resources can affect both children’s average academic ability as well as other incentive-enhancing traits, including personality characteristics, values and norms (see Bowles and Gintis 2002a; Jackson et al. 2007; Kohn 1989[1969]; Kohn et al. 1990; see below). Socio-economic background influences on attainment-related capacities are known as primary effects in stratification research (Boudon 1974). Yet parental socio-economic resources can also affect the educational choices of families regardless of children’s own ability. This is because different families face different constraints, risks and opportunities

depending on their own socio-economic resources. Family background effects over and above attainment-related abilities are known as secondary effects (see e.g. Breen and Goldthorpe 1997).

Due to both primary and secondary effects, families with fewer cultural and economic resources tend to have lower attainment aspirations for their offspring and to transmit these aspirations to children themselves (Featherman and Hauser 1978; Hitlin 2006; Teachman and Paasch 1998; for a review see Gamoran 1996). This has interesting implications for the degree of gender-segregation in children's occupational aspirations. Children whose occupational horizons are restricted to low-skilled jobs have fewer gender-integrated possibilities to choose from, simply because low-skilled occupations are more gender segregated than high-skilled ones. Parental influences on children's mobility horizons are thus not gender neutral because they affect the gender composition of children's potential choice-sets. Family socio-economic resources —education in particular— are thus expected to affect the degree of sex-typing in children's occupational aspirations through both primary and secondary stratification effects (H1).

#### *Role-modeling: occupational imitation and sex-role learning*

According to role-model theories children learn about gender roles by observing and emulating the behaviors of their parents (Cunningham 2001:185). We distinguish between two mechanisms of role-modeling: simple imitation and sex-role learning. Imitation responds to children's intrinsic desire *to be as* their parental models. Developmental psychologists have shown that pure imitation mechanisms play a crucial role in infants' sex-role learning (see e.g. Meltzoff and Moore 2002; Tomasello 1999). Today there is growing consensus in developmental psychology that sex-role imitation is probably innate and requires a previous gender identity (see e.g. Martin et al. 2002).<sup>3</sup>

Sex-role learning constitutes a more complex and cognitively-demanding mechanism than sex-role imitation. Children first have to identify gender-role norms by observing parents' own behavior and then learn to comply with these norms. Compliance is stimulated by parental sanctions and rewards, which can be more or less subtle (see Bandura 1977; Moen et al. 1997). This distinction between simple imitation and behavioral learning allows us to

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<sup>3</sup> Learning through imitation has been also observed in animal behavior and it is considered a crucial mechanism of transmission of animal culture (see Sapolsky 2006).

identify two different potential mechanisms linking parental behavior to children's sex-typed aspirations.

The first mechanism is children's *direct imitation* of parental occupations. Direct occupational imitation is expected to be homo-lineal, that is, daughters are expected to aspire to their mothers' occupation, whilst sons are expected to aspire to their fathers' (H2). Direct occupational imitation will lead to sex-typed aspirations amongst daughters/sons insofar as their mothers/fathers work in segregated occupations.

Occupational reproduction through imitation is the simplest form of intergenerational transmission of sex-typed occupational aspirations.<sup>4</sup> However, as children develop their cognitive skills, the importance of pure imitation is likely to decrease. Hence we expect that the influence of occupational imitation as a transmitter of sex-typed aspirations diminishes over time as children age (H2b).

Children can also learn sex-typical behaviors from their parents through observational learning. Parents' occupations outside the household as well as their everyday interactions at home help recreate sex-specific norms of behavior and to spread cultural beliefs about the general competence of men and women in different social spheres (see Ridgeway and Correll 2004; Ridgeway and Erickson 2000). In doing what they do both at home and at work, parents are constantly enacting gender roles —i.e. they are "doing gender" (West and Fenstermaker 1995; West and Zimmerman 1987). Children observe and learn from these gender displays (Cunningham 2001). A traditional distribution of gender roles could therefore promote sex-typical aspirations amongst girls and boys even if such aspirations do not entail copying the exact occupations of their mothers and fathers. What children learn through observation is the sort of occupation that is socially prescribed for their sex (e.g. not hair-dresses for boys, nor truck-drivers for girls) (H3).

#### *Ideological transmission*

Neither occupational imitation nor sex-role learning imply the transmission of any elaborated discourse about gender differences. Children simply imitate or learn from their

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<sup>4</sup> Jonsson et al. (2009) provide evidence of occupational reproduction across generations for the United States, Germany, Sweden and Japan and argue that "much of what shows up as big-class reproduction in conventional mobility analyses is in fact occupational reproduction in disguise" (Jonsson et al. 2009:977).

parents' behavior. But parents can also influence their children by transmitting their own gender ideologies, which in turn can affect children's subsequent family and attainment-related choices (see Davis and Greenstein 2009; Davis and Pearce 2007; Steele and Barling 1996). Previous research has shown that adult children's gender role attitudes are indeed associated with parental gender role-attitudes (Booth and Amato 1994; Cunningham 2001; Kroska and Elman 2009; Moen et al. 1997; Thornton et al. 1983). Ideological transmission of gender attitudes between mothers and daughters has been found even after controlling for their respective family and work experiences (Moen et al. 1997).<sup>5</sup> It is well known that people's attitudes do not always match their actual behaviors (see e.g. Hakim 2003b; Moen et al. 1997). Traditional gender displays can therefore co-exist with "progressive" gender discourses, whilst people's views can be more traditional than their actions. Parental gender ideology could thus constitute a distinctive potential channel of parental influence on young children's sex-typical aspirations (H4).

Gender ideology provides a set of values and attitudes as well as a (largely) coherent narrative about gender differences, which can only be passed on from parents to children through verbal interactions. Acquiring gender ideology thus defined seems therefore a more demanding cognitive task than learning through imitation or observation. This leads us to expect that the effect of parental ideology on occupational aspirations should increase with children's age, as older children have greater cognitive capacity than younger ones (H4b).

### ***The role of agency as personality***

In recent years research in economics and sociology has paid increasing attention to the study of certain psychological dispositions that are shown to be relevant to socio-economic success (see Bowles and Gintis 2002a; 2002b; Heckman and Rubinstein 2001; Heckman et al. 2006; Jackson 2006; for a review see Farkas 2003). Personality traits associated with attainment include perseverance, self-confidence, emotional stability, conscientiousness, leadership, goal-orientation and self-esteem. In research practice, these attributes are often reduced to composite indices<sup>6</sup> that tap on the correlation between personal drive,

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<sup>5</sup> Most of the existing research on ideological transmission focuses however on adult children and hence there is little information about the exact timing of transmission.

<sup>6</sup> Personality traits have been often reduced to two classic dimensions in psychology: locus of control, which measures the extent to which individuals feel in control of their outcomes (see



motivation and feelings of self-worth (see e.g. Carneiro and Heckman 2003; Lee 2009). These psychological attributes fit well with Kohn's definition of self-direction, which he considered to be a crucial factor influencing socio-economic attainment (Kohn 1989[1969]; Kohn et al. 1990).

We believe that individuals in possession of such psychological attributes linked to self-direction are better predisposed to exercise their personal agency and hence we expect them to be more resistant to social pressures. Boys and girls with high levels of self-esteem and motivation should therefore be less likely to aspire to sex-typical occupations than their more conformist counterparts (H5).

#### *How personal are personality traits?*

Research in psychology and neurobiology suggests that personality traits are influenced both by heredity and social environment (see: Bouchard and McGue 2003; Jang et al. 1996; Raevuori et al. 2007). Social scientists have also argued that incentive-enhancing traits such as motivation and self-esteem can be transmitted from parents to children through socialization processes, as mentioned above (Bowles and Gintis 2002a; Jackson et al. 2007; Kohn et al. 1990; Hitlin 2006). The intergenerational transmission of personality traits is now considered to be an important mechanism in the reproduction of social (dis)advantage, since working-class children are more likely to have parents who lack incentive-enhancing traits (see e.g. Bowles and Gintis 2002a; 2002b; Farkas 2003; Lee 2009; Swidler 1986).

We do not dispute these claims about trait transmission —be it through genetic inheritance or socialization. Yet we contend that variation in personality traits has also an intra-psychic component that is not determined by social or biological influences. This component would be responsible for the degree of intrinsic individual variation in psychological traits thus reflecting pure individual heterogeneity. We further argue that the effect of this intrinsic component in both motivation and self-esteem can be estimated empirically using models that control for the parental resources and characteristics possibly involved in the intergenerational transmission of personality. Only the variation in children's degree of

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Rotter 1966), and self-esteem (see Rosenberg 1965). Both dimensions are actually highly correlated and hence they have at times been reduced to one single personality factor in attainment research (see e.g. Carneiro and Heckman 2003; Lee 2009).

motivation and self-esteem that remains after controlling for parental influences can be interpreted as tapping on intrinsic personality differences. By anchoring our concept of agency to these measurable intrinsic personality differences we can deflect the problem of over-individualization —i.e. interpreting individual heterogeneity as a proof of agency— and provide a simultaneous test for socialization and agency mechanisms.

Table 1 summarizes the various channels through which sex-typed occupational aspirations of boys and girls are expected to emerge, the posited mechanisms involved in the formation of occupational preferences, and our consequent hypotheses about observable relationships that will be revealed in the data.

[Table 1 about here]

## **DATA AND METHODOLOGY**

### ***Data Sources***

#### *Panel Survey*

The British Household Panel Survey is a longitudinal study of individuals who were living in private households in Great Britain in 1991. The original sample comprised around 5,500 households with around 10,300 respondent adults. These original sample members are followed over time and re-interviewed each year, along with other members of their households aged 16 and over. Additional samples of households in Wales and Scotland were added in 1999 and a Northern Ireland sample was added in 2001. Data are currently available for all years up to 2008 (or wave 18). Children living in the original 1991 households and children born to original sample members are also part of the core panel and are interviewed once they reach 16, and they are also followed as they move into new households.

In 1994 a youth questionnaire designed for self completion was introduced for children in the panel aged 11-15 and, again, the questionnaire has been administered annually since it was introduced, with the latest data available being from 2008. It is these data collected directly from children under 16 (the Youth Panel) that form the main basis of this paper. We are also, however, able to link information from this youth panel to household and individual adult respondent files in order to relate children's and their parents' responses to each other, to include family context and to apply appropriate weights. Having

contemporaneous self-reported data from both parents and older children provides us with a distinctively rich resource of family information.

As the children themselves age, the information collected in the adult questionnaire administered to them from age 16 can be linked to their childhood responses. Approximately two-thirds of those children who had ever completed a youth questionnaire had also completed at least one adult interview by 2008. However, the majority are still young, with only a small proportion having reached an age when clear adult outcomes can be identified. This is illustrated in Figure 1 that shows the ages and type of interview completed (Youth - Y or Adult - A) by survey year and birth year of the child.

[Figure 1 about here]

Overall just over 5,000 individual children were surveyed through the youth questionnaire over the 15 waves. Of these, 3,748 provided a valid response to the question on occupational aspirations —since this question was not asked in every wave. This forms the basis of our dependent variable. Where respondents provided responses across more than one wave, we have used the latest wave. Similarly, we use the latest response on all the independent variables and carry them forward to the last point at which the respondent is observed within the youth panel. We thus construct a cross-sectional data set from all the potential information across the waves, where age represents the age at which they are last observed —and will in most cases be the age at which they last responded to the question on future occupation. Answers to other variables may have taken place at earlier ages (when they were asked in the survey). An illustration of this structure is given in Figure 2. Variables that we draw on from the youth survey include psychological traits as well as measures of aspirations and attitudes.

[Figure 2 about here]

We also matched in information from co-resident parents of each child using a similar approach. Allowing for missing data or questions not asked of particular children or parents because of the question cycles, our final analysis sample comprises 3,040 children, that is, 81 per cent of those for whom we have valid coded occupational aspirations. These children were aged between 11 and 15 at the last point they were observed, with a small number of 16 year olds resulting from the way that age eligibility was defined for inclusion in the Youth Panel.

In all analyses the data were weighted, using the cross-sectional weight for the last wave at which they were observed to account for non-response in that wave and to take account of the differential weightings for the additional samples. Additionally, standard errors were adjusted for repeat observations in households, that is, more than one child respondent per family.

### *Labour Force Survey*

In order to measure the degree of occupational segregation in children's favored occupations we calculated segregation measures using the UK Labour Force Survey (LFS). We used 28 pooled quarters of the LFS, from the first quarter of 1994 (which corresponds to the start of the BHPS Youth Panel) to the last quarter of 2000. This gives us a pooled nationally representative sample of 673,604 adults of all ages, of whom we have current occupational information for 367,006 across 371 occupations. Using this pooled sample, we calculated the average proportion of women for each three-digit occupation<sup>7</sup> and then matched this information to children's identified job preferences as well as to each parent's job.<sup>8</sup>

### ***Variables***

#### *Dependent variable*

Children's favored occupation was identified by an open question of the form: "What job would you like to do once you leave school or finish your full-time education?" This was coded to three-digit SOC90 occupational codes. The proportion of women typically employed in each of these occupational codes was calculated and matched using the LFS, as explained above. While there was a degree of clustering of children's occupational choices, overall the 1,868 boys for whom we have valid responses identified 122 occupations and the 1,880 girls selected 153 occupations between them.<sup>9</sup> The top twenty choices for each sex are illustrated in Table 2.

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<sup>7</sup> We matched on SOC90 occupational codes, avoiding a series break at the change to SOC2000 in the LFS in 2001.

<sup>8</sup> For parents not currently in paid work, we used information on their last job.

<sup>9</sup> To check that our findings were not driven by a few favored aspirant occupations of boys and girls, for robustness we estimated an alternative specification of our models excluding the favorite

[Table 2 about here]

The average proportion of women in children's aspired occupations is 42 per cent (58 per cent for girls and 23 per cent for boys). The LFS adult population experiences an average of 46 per cent women in their occupations (71 per cent for women, 25 per cent for men). Real life occupations are therefore somewhat more segregated for women on average than aspired occupations are for young girls.<sup>10</sup>

#### *Independent variables*

*Parental resources* are measured by father's educational attainment in a set of discrete categories: university degree and above; A' levels (typically obtained at age 18) and above but less than university; O' levels or CSEs (typically obtained at age 16); less than this or none. There is a high degree of correlation between mothers' and fathers' educational levels and hence only father's education is included in the models. For children with an absent father, we use mother's highest educational qualification instead. Additionally, we use a dummy for absent father to reflect the diminution of parental resources that this implies. In order to better capture possible parental effects on educational expectations and school achievement, a dummy for intention to leave school at 16 is included in the models. While parental educational attainment is not identical with class position, it must be noted that occupational information is included in the measures of fathers' and mothers' occupational segregation, and therefore educational attainment provides a more appropriate indirect measure of socio-economic resources than parental class.

We include several measures for *parental behavior*. The occupational segregation of both mother's and father's occupation is included in a dummy indicating whether the occupation has more than 50 per cent women or not. Alternative specifications of this measure were explored but did not alter the overall findings. Behavior within the home is captured by a measure of the difference between the number of hours housework contributed by fathers and the number of hours contributed by mothers, according to their own report. The question asked took the form: "About how many hours do you spend on housework in an

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five occupations of both boys and girls, in an alternative specification, but this did not alter our results. (Tables available on request).

<sup>10</sup> While this measure of proportion of women was our preferred measure of sex-typing, our results reported below were robust to using the rank of gender concentration as an alternative.

average week, such as time spent cooking, cleaning and doing the laundry?” Taking the difference of parents’ housework hours allows for housework requirements and preferences differing at the household level.

Dummies are computed to reflect whether there is a direct match between children’s aspired occupation and the last occupation of their parents. We use a dummy measuring the incidence of homo-lineal imitation, which is defined as an occupational match between same-sex dyads (i.e. daughters-mothers / sons-fathers). We also compute a dummy measuring the incidence of hetero-lineal imitation (i.e. an occupational match between daughters-fathers / sons-mothers). Finally, another dummy is used to capture whether the mother is currently looking after the home.

*Parental gender ideology* is captured by a scale constructed from the standardized scores on a series of seven statements with which the respondent is asked to agree or disagree (on a five point scale from strongly agree to strongly disagree). The responses are reverse coded as appropriate to ensure that a higher score reflects more traditional views. The seven statements, which have been included in the adult self-completion in alternate waves since wave 1 are: 1) A pre-school child is likely to suffer if his or her mother works; 2) All in all, family life suffers when the woman has a full time job; 3) A woman and her family would all be happier if she goes out to work; 4) Both the husband and wife should contribute to the household income; 5) Having a full-time job is the best way for a woman to be an independent person; 6) A husband’s job is to earn money; a wife’s job is to look after the home and family; 7) A single parent can bring up children as well as a couple. The Cronbach’s alpha for these items is 0.72. Given the high correlation between parental scores (a correlation coefficient of 0.41), we only use mother’s score but regard this as a family level variable. A single indicator that was available for the children in a small number of waves that corresponded to item (6) was significantly correlated with the parental equivalents for both boys and girls, indicating ideological transmission within the family.

*Psychological measures* linked to self-direction are captured through measures of children’s self-defined school motivation and self esteem. School motivation is measured using a composite scale constructed from standardized responses to the following two questions: 1) “How important do you think it is for you to get your GCSE exams? (Standard Grades in Scotland)” and 2) “How much does it mean to you to do well at school?” The former question is measured using a four-point scale ranging from "very important" to "not at all important", whilst the latter is measured using a four-point scale from “a great deal” to

“very little”. The Cronbach’s alpha for the school-motivation composite scale is 0.61. For self-esteem, the children were asked how much they agreed with the statement “I feel I have a number of good qualities”, with four possible options from strongly agree to strongly disagree. A dummy variable was constructed using “Strongly agree” as indicating high self-esteem.<sup>11, 12</sup> Since motivation and other personality traits can be inherited we also measure the conscientiousness of parents, to differentiate the net individual child effect from the contribution of heredity. Following Nandi and Nicoletti (2009), parental conscientiousness is measured using the top quartile of the average of three indicators (reverse coded as appropriate) of the psychological trait of conscientious as measured by agreement or disagreement with the statements: “I see myself as someone who does a thorough job”; “I see myself as someone who tends to be lazy”; “I see myself as someone who does things efficiently”.

In addition, dummies for the wave at which the child is observed and age of child when last observed are included in all models. Age is therefore skewed towards the 15 age range. For most children this is the latest age at which their job aspirations were measured, though in some cases children of younger ages were included because they had not yet reached 15 by wave 18 (for example those born after 1993), or because they or their families dropped out before they reached this age, or because the question was not asked when they reached 15. Dummies are also included for number of siblings and for the presence of an older sibling. These variables, together with the above-mentioned dummy for absent father, capture important elements of family structure. The descriptive statistics for all variables used in the analyses can be found in Table 3.

[Table 3 about here]

## ***Methods***

We estimate a series of Ordinary Least Squares regression models, fitted to our nationally representative sample of young British children aged between 11 and 15. We successively explore those groups of factors hypothesized as shaping children’s chances of aspiring to a

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<sup>11</sup> Our results reported below were robust to using a different operationalization of self-esteem based on a composite index (results available on request).

<sup>12</sup> Interestingly, girls show lower average levels of self-esteem than boys, but higher average levels of school motivation (results available on request).

more or less sex-typical occupation. We pool boys and girls, interacting each variable (except the dummies for wave) with sex to evaluate the complementarity of effects for boys and girls.

## **FINDINGS**

Table 4 below shows the results of our series of regression models on the extent of sex-typing in children's occupational aspirations. Main effects for all variables represent the effect for girls, whereas interacted terms inform us of the difference between such effect and the effect found for boys. This way we can report the degree of significance of the differences found between the sexes. Model 1 is the baseline model, which only includes children's sex interacted with their age, alongside wave dummies. Note that girls are much more likely to aspire to occupations with a high proportion of women than boys, whilst age is not significant for either boys or girls. This model alone explains 28 per cent of the variance.

Model 2 includes age, sex, parental resources and children's educational attainment aspirations measured as their intention to leave/continue school at 16. It also includes controls for family structure. Consonant with our expectations, we find that parental education is associated with the degree of sex-typing in children's occupational aspirations. Girls from low educational backgrounds aspire to occupations with a higher proportion of women than girls with higher educational resources, whilst boys from low educational backgrounds prefer more male-dominated occupations. Parental education thus decreases the degree of sex-typing in children's occupational aspirations.

This is the case even after controlling for children's own educational attainment aspirations. As expected, both boys and girls who plan to leave school at 16 are significantly more likely to aspire to sex-segregated occupations than those who plan to stay on. Children's school attainment aspirations can be interpreted as capturing mostly primary effects of socioeconomic background, including effects on academic ability that we do not observe. It must be noted, however, that the introduction of attainment aspirations in the model only reduces the effect of parental education slightly, which suggests that not only primary, but



also secondary effects influence sex-typing in occupational aspirations by affecting the attainment horizons of children (H1).<sup>13</sup>

Model 3 tests for sex-role modeling mechanisms by adding to the equation homo-lineal and hetero-lineal occupational imitation, the degree of feminization of mothers' and fathers' respective occupations, the distribution of housework between the spouses and a dummy for mothers who look after the home. We find, first of all, that homo-lineal occupational matching is associated with higher levels of sex-typing. Girls (boys) whose occupational aspirations match the exact occupations of their mothers (fathers) are more sex-typical than girls (boys) who do not imitate. This suggests that homo-lineal occupational imitation is indeed a mechanism influencing the degree of gender segregation in occupational aspirations (H2). There are few children who copy the occupations of their parents of the opposite sex (25 in total). Yet in those few instances, hetero-lineal imitation reduces sex-typing for both girls and boys. The question of whether occupational imitation has a differential impact by age is discussed below.

Occupational imitation is not the only mechanism linking parental occupation to the degree of sex-typing in children's occupational aspirations. Model 3 also shows that daughters whose mothers are employed (or were last employed) in segregated occupations hold more segregated occupational aspirations themselves, and this is net of direct occupational imitation. Tests show that the transmission of occupational sex-typing from mothers to daughters is not simply driven by the association between segregation and skills as it is observed for both high and low educated mothers (results available on request). These findings seem consistent with sex-role learning effects as they suggest that girls can learn sex-typical roles from observing their mothers' occupations and translate this role into sex-typical occupational aspirations even if such aspirations do not entail the imitation of mothers' exact occupation. However, we do not find any such effects for boys, nor do we find that fathers' degree of occupational segregation influences either sons' or daughters' occupational aspirations.<sup>14</sup>

When looking within the household, we observe that a traditional distribution of housework tasks between spouses seems to reinforce children's sex-typical occupational

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<sup>13</sup> This interpretation is reinforced in model 5, where we introduce psychological self-direction indicators. Self-direction indicators hardly affect the coefficients on parental education.

<sup>14</sup> Using different specifications of parental gender segregation did not alter these findings.

aspirations, although in this case effects are only observed for boys. The impact of parental distribution of housework on boys' occupational aspirations is actually strengthened when parental gender ideology is controlled for (see model 4). This is again consistent with sex-role learning effects operating through parental behavior in the domestic sphere. Finally, model 3 shows that, net of other behavioral variables, having a mother who looks after the home has no significant impact on children's occupational preferences —although the sign of the coefficients work in the expected direction.

In sum, model 3 offers full confirmation of imitation effects (H2) and partial confirmation of sex-role learning effects (H3). Sex-role learning seems to work differently for girls and boys. Girls appear to be only influenced by the degree of sex-typicality in mothers' last occupation, whilst boys seem only influenced by parental behavior in the domestic sphere.

[Table 4 about here]

Model 4 adds maternal gender ideology in the regression. Although the signs of the coefficients are in the expected direction, effects are not significant. Significance is not achieved even if behavioral indicators are removed from the equation, nor do alternative specifications of gender ideology yield any significant results (for example, using paternal instead of maternal ideology or single indicators instead of the constructed scale). Interactions between parental gender ideology and children's age have also been tested in order to explore whether ideological transmission only exerts a significant effect for older kids. These interaction effects have also been rejected (see model 2 in Table 5 below). This is not to say that ideational transmission does not vary with age, indeed for girls at least the correlation increases with age. Rather, we find that the translation of gender ideology into occupational choices is not realized at older ages any more than it is at younger ages. Overall, we cannot find any significant evidence that parental gender ideology influences the degree of sex-typicality of young children's occupational aspirations. It seems that in shaping these aspirations what parents do both at the public and the domestic spheres matters much more than what they say.

Finally, model 5 tests for agency effects. As explained above, agency effects are measured using two psychological traits linked to self-direction: school motivation and self-esteem. Model 5 shows that the introduction of these two psychological measures reduces the effect of children's educational aspirations, though the variable remains significant nevertheless. This suggests that, as might be expected, psychological differences in self-

direction are associated with children's educational attainment, which, in turn, affects occupational horizons and consequently sex-typing.

Crucially, our self-direction indicators also seem to have a direct influence on the degree of sex-typing of children's occupational aspirations. Girls with high levels of school motivation are likely to aspire to occupations with a lower proportion of women. Yet the effect of school motivation on occupational sex-typing does not seem to be significantly different for boys. Results are much clearer for self-esteem. As expected, we find that the degree of sex-typing in children's occupational aspirations decreases with self-esteem and this is the case for girls and boys alike. Girls with high-levels of self-esteem tend to aspire to occupations with a lower proportion of women, whilst boys with high self-esteem tend to aspire to occupations with a lower proportion of men.

The observed effects for motivation and self-esteem are net of parental education as well as of parental behavior both at the domestic and the occupational spheres. In order to control for other possible inheritance effects, we have further introduced measures of both mothers' and fathers' levels of conscientiousness. Conscientiousness is a well-known psychological dimension, which is potentially heritable. By controlling for parental conscientiousness we can treat motivation as an individual characteristic of the child rather than being confounded with family context or parental socialization. We see that parental scores on conscientiousness are not significant nor do they absorb the effect of motivation or self-esteem. Model 5 therefore controls for educational, occupational, behavioral and (some) psychological parental characteristics. Such a range of parental background controls allows us to interpret the remaining effects of children's motivation and self esteem as capturing truly individual variation in personality characteristics linked to self-direction. This provides us with a psychologically-anchored definition of agency. Our findings are therefore consistent with our expectation that children who are psychologically predisposed to exercise agency —i.e. better prepared to make independent choices— are less likely to aspire to sex-typed occupations (H5).

#### *Aging and socialization effects*

Imitation and ideological transmission constitute respectively the simplest and the most cognitively-demanding socialization mechanisms. Hence we expected that occupational imitation would be more important for younger children (H2b), whilst ideological transmission should be more likely to operate in the case of older children who are

cognitively more mature (H4b). We find empirical support for the former hypothesis but not for the latter.

Model 1 in Table 5 shows the effects of fitting a three-way interaction between age, occupational matching and respondents' sex. In order to have an equal age split, we distinguish between children aged 11 to 14 and children above 14. Note that the coefficient for homo-lineal occupational matching is indeed significantly stronger for the former age group than it is for the latter, although in both cases we find a significant effect. This finding holds for girls and boys alike. Since there is no reason to suspect that children's age is associated with the degree of segregation of their parents' occupations, we can interpret this interaction as meaning that younger kids imitate more than older ones. The importance of occupational imitation as a transmitter of sex-typed aspirations seems to decrease with age, as expected.

By contrast, as noted above, the interaction effect between parental gender ideology and children's age yields non-significant results. Hence we find no support for the hypothesis that ideological influences on aspirations increase with cognitive maturity as children age. It is, however, possible that parental influences decline with age as peer influences take over (Abrams 1989). Unfortunately, our capacity to capture peer influences is very limited, for reasons that we discuss below.

[Table 5 about here]

## CONCLUSIONS

Occupational sex segregation is an enduring feature of Western labor markets that has been strongly implicated in the perpetuation of gender inequality. Analyzing the factors that influence the formation of sex-typical occupational preferences is therefore critical for illuminating our understanding of gender stratification. It is clear that gendered occupational choices begin early, before girls and boys have any experience of the labor market. Moreover, these early choices have real consequences in later life. Even if most people do not realize the specific occupations that they aspired to as children, girls and boys with sex-typed preferences are significantly more likely to end up in sex-segregated occupations as adults than kids with gender-neutral aspirations.

We can follow 1,500 children out of our original sample into their early occupational outcomes. Even though by this stage only a mere six per cent of them work as young

adults in the exact occupation that they aspired to as kids, we find that the degree of sex-typing of their realized jobs is strongly associated with the degree of sex-typing in their occupational aspirations as children. The correlation between concentration of women in chosen and achieved job was over 0.4. This was robust to using a rank of the proportion female in the occupation instead of the distribution (since the distributions differed somewhat) and to restricting the sample to those aged 24 and over only. Early preference formation has therefore real consequences for gender segregation and consequently for expected wages in adult life (see also Rindfuss et al. 1999).

This study has been set out to shed light on the factors that shape the degree of sex-typing in early occupational preferences. We have investigated different channels of parental influence on children's occupational aspirations that are relevant for the transmission of sex-typical preferences, whilst at the same time allowing for the role of individual agency in the process of preference formation. In order to avoid the risk of over-individualization, we have defended a restricted definition of agency that is anchored in observable psychological traits linked to self-direction. This definition turns a hitherto intangible concept into one that is both theoretically grounded and empirically testable. Our analytical strategy has allowed us to estimate simultaneously the relative impact of parental influences and individual psychological traits on the development of sex-typical occupational aspirations in what constitutes an innovative approach to the study of preference formation.

We have identified several distinctive channels of parental influence. A particularly important channel is parental socio-economic resources. We have argued that parental SES affects the degree of sex-typing in occupational preferences by influencing the scope of children's occupational horizons both through primary and secondary stratification effects. The scope of occupational horizons is linked to sex-typing because gender-segregation is higher at lower levels of the skill distribution. This interpretation is highly consistent with our reported findings.

Another crucial channel for gender socialization is parental behavior. We have specified two distinctive mechanisms linking parental behavior to children's occupational preferences: occupational imitation and sex-role learning. Our empirical models show that occupational imitation does indeed act as a channel for the transmission of sex-typed preferences. Children tend to imitate homo-linearly and in so-doing copy gender segregated occupations. This is how occupational reproduction recreates sex-typing. Imitation effects

are stronger for younger kids, whose cognitive skills are less developed, than they are for older ones.

We also find that girls whose mothers work in sex-segregated jobs tend to aspire to sex-segregated occupations themselves, even if such occupations are different from their mothers'. Similarly, boys in families with a traditional division of housework tend to aspire to more traditional male jobs regardless of the actual occupations of their parents. Although these findings are sex-specific, they certainly point in the direction of sex-role learning effects.

Yet, in contrast to our expectations, we have found no evidence linking parental gender ideology to children's occupational preferences, not even amongst older—and hence cognitively more developed—children. This does not necessarily imply that ideological transmission is not taking place—the limited evidence we have suggests it is—but rather suggests that such transmission is not consequential for the formation of sex-typed occupational preferences.

Finally, we have found that psychological predispositions—self-esteem in particular—have a significant impact on children's occupational preferences. Children with high school motivation and high self-esteem are more likely to aspire to less gender-typical occupations, regardless of other family influences. This suggests that agency, understood as self-direction, plays an important role in preference formation. To our knowledge, this is the first study that reports personality influences on children's occupational aspirations.

Yet the single most important predictor of the differentiation of occupational aspirations amongst children is still their own sex and although our models show that there is an interesting structure in the distribution of preferences, their overall contribution to the explanation of segregation in occupational aspirations must be judged only as modest. Children's sex alone accounts for 26 per cent of the variance in occupational aspirations. A full model including primary socialization and agency affects adds a mere 6 percent to this figure. If the full model is fitted separately by sex, it accounts for between 5 and 6 per cent of the variance within each sex. This means that a lot still remains to be explained.

It could be argued that the impact of other socialization agents, such as schools, peers or the mass media could play an important role in explaining part of the variance currently accounted for by children's own sex (Hitlin 2006). Yet this possibility seems particularly

hard to test for the following two reasons. First, we lack measures that tap on these agents of horizontal socialization that are external to the family; and, secondly, the effects of many of these socialization agents —schools and the media<sup>15</sup> in particular— are most probably homogeneous across the population, so we also lack variance.

Given these constraints, perhaps the only way of approaching horizontal socialization effects —the impact of which is expected to affect all children at a given time— is by looking at cohort shifts. Cohort shifts should be expected if there are societal changes that affect the socialization milieu in which all children are embedded, regardless of their own parental and psychological characteristics. Such shifts would include macro-level changes in the labor market —from which children can learn— as well changes in gender attitudes, values and cultural representations. In all these realms, observed trends in advanced Western societies have worked in favor of greater gender equalization (see e.g. Brewster and Padavic 2000; Chang 2000; Lueptow et al. 2001; Meyer 2003; Tomaskovic-Devey et al. 2006; Shu and Marini 1998; Thornton and Young-DeMarco 2001). Our data is consistent with such interpretation as it shows a decline over time (net of other factors) in the tendency for children to prefer occupations with higher proportions of women (See Table 5, model 3).<sup>16</sup> While the interaction effect is not significant, inspection of separate models for boys and girls show that it is a decline in girls' preferences for sex-typed occupations which is driving this shift.<sup>17</sup> Thus, over time, girls' aspirations are moving away from female dominated occupations. However, given the lack of convergence from boys and the modest size of the effect, representing a reduction of around four per cent in the expected proportion female from one decade to the next, even if horizontal socialization pressures for sex-typing are declining over time, it would take many generations before this was reflected in a shift from the current picture of highly segregated aspirations.

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<sup>15</sup> In an attempt to tap on media effects we have tested for the possible impact of TV exposure on sex-typed aspirations. Results were not significant.

<sup>16</sup> This effect was robust to splitting the period at different points.

<sup>17</sup> Tables available from authors on request. It is also worth noting the lower average proportion of women in girls aspired occupations (58% female) compared to their mothers' achieved occupations (71%), whereas boys aspirations are little different from the average gender concentration experienced by their fathers at around 23%. This is congruent with the observed cohort shift for girls in aspirations.

An alternative interpretation for the considerable effect of children's own sex on occupational aspirations —when compared to the relatively modest impact of socialization and agency effects— could be provided by biological and evolutionary explanations of gender difference. A large body of research in evolutionary biology and socio-biology documents sex-differences in a wide range of areas including perception, preferences, competitiveness, risk-aversion and social behavior (see e.g. Crosson and Gneezy 2004; Dekel and Scotchmer 1999; McIntyre and Edwards 2009). Many of the findings gathered in these neighboring fields seem inconsistent with socialization models. For instance, gender differences in social perception have been found already in neonates who by definition have not yet been exposed to social and cultural influences (Connellan et al. 2000). Similarly, female infants with genetic disorders leading to increased androgen production show increased male-typical behavior (Hines and Kaufman 1994; Iijima et al. 2000), whilst sex-typical responses to children's toys have surprisingly been found in nonhuman primates (Alexander and Hines 2002). According to evolutionary explanations, constant gendered differences are based on genetic patterns evolved from adaptation to differing reproductive challenges faced by early males and females in ancestral environments (see Kanazawa 2001; Lueptow et al. 2001). These gender differences could have arisen even before a distinct hominid lineage emerged (Alexander and Hines 2002).

Evolutionary explanations open a new avenue of research that is increasingly complementing social and structural accounts of gender differentiation (see e.g. Penner 2008). However, it is beyond the scope of this paper to go further than offer such accounts as providing a potential starting point for interrogating about the unexplained gap in the occupational preferences of boys and girls. The possible mechanisms through which such 'innate' sex-differences translate into specific occupational choices are not self-evident and would need to be developed, to avoid tautological explanations.

Meanwhile, while we believe we have provided new insights into the correlates of sex-typing in the occupational choices of children, the question of the major differences observed between girls' and boys' occupational preferences remains as intractable as the conundrum of why so many small girls like pink.



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## FIGURE AND TABLES

Figure 1: Illustration of completed interviews by type of interview and age of child by birth year and survey year

Birth year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
1979	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29					
1980	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28					
1981	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27					
1982	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26					
1983	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25					
1984	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24					
1985	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23					
1986	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22					
1987	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21					
1988	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20					
1989	-	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18	A19					
1990	-	-	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17	A18					
1991	-	-	-	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16	A17					
1992	-	-	-	-	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15	A16					
1993	-	-	-	-	-	-	-	-	-	-	Y11	Y12	Y13	Y14	Y15					
1994	-	-	-	-	-	-	-	-	-	-	-	Y11	Y12	Y13	Y14					
1995	-	-	-	-	-	-	-	-	-	-	-	-	Y11	Y12	Y13					
1996	-	-	-	-	-	-	-	-	-	-	-	-	-	Y11	Y12					
1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y11					
Survey year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008					

Figure 2: Example of data set structure

Child ID	Waves observed	Age	Response on occupational choice	Response on VarY	Response on VarZ	Last valid response on occupational choice	Last valid response on varY	Last valid response on varZ	Used for analysis sample?
1	F	11	fireman	Yes	Not asked	Police officer	Yes	always	
1	G	12	fireman	Not asked	sometimes	Police officer	Yes	always	
1	H	13	police officer	Not asked	sometimes	Police officer	Yes	always	
1	I	14	Not asked	Not asked	always	Police officer	Yes	always	
<b>1</b>	<b>J</b>	<b>15</b>	Not asked	Not asked	always	<b>Police officer</b>	<b>Yes</b>	<b>always</b>	<b>X</b>
2	J	11	Not asked	Not asked	Not asked	Actress	Yes	Missing	
2	L	13	Actress	Yes	Not asked	Actress	Yes	Missing	
<b>2</b>	<b>M</b>	<b>14</b>	Actress	Yes	Not asked	<b>Actress</b>	<b>Yes</b>	<b>Missing</b>	<b>X</b>
3	K	12	Nurse	Not asked	Always	Teacher	No	Sometimes	
3	L	13	Nurse	No	Always	Teacher	No	Sometimes	
3	M	14	Teacher	No	Sometimes	Teacher	No	Sometimes	
<b>3</b>	<b>N</b>	<b>15</b>	Teacher	No	Sometimes	<b>Teacher</b>	<b>No</b>	<b>Sometimes</b>	<b>X</b>
4	Q	11	Air pilot	Yes	Not asked	Air pilot	Yes	Always	
<b>4</b>	<b>R</b>	<b>12</b>	Air pilot	Missing	Always	<b>Air pilot</b>	<b>Yes</b>	<b>Always</b>	<b>X</b>

Note : These cases are illustrative only and do not represent genuine respondents and their responses. Bold indicates the information carried through to the analysis sample.



Table 1: Socialization and Agency Effects on Sex-Typed Occupational Aspirations: Channels, Mechanisms and Hypotheses

	<i>Socialization</i>				<i>Agency</i>	
Channels	Parental Socio-Economic Status	Parental Occupation	Parental Domestic Behavior	Parental Gender Ideology	Child Motivation	Child Self-Esteem
Mechanisms	-Reduction of occupational horizons via primary and secondary effects	-Imitation -Sex-role learning	-Sex-role learning	-Ideological transmission	-Increase in the capacity to make independent choices (self-direction)	
Hypotheses	-Low (high) SES increases (decreases) sex-typing in children's occupational aspirations (H1)	-Homo-lineal occupational imitation transmits sex-typing (H2) -Occupational imitation decreases with age (H2b) -Homo-lineal sex-role modeling of parental occupation transmits sex-typing (H3)	- Traditional distribution of housework increases children's sex-typing (H3)	-Traditional gender ideology increases children's sex-typing (H4) -Ideological transmission more likely for older children (H4b)	-Motivation and self-esteem-net of family influences- decrease sex-typing in occupational aspirations (H5)	

Table 2: Top 20 preferred occupations for boys and girls (those chosen by more than 30), by descending order of popularity, and actual jobs of mothers and fathers by prevalence

Girls	Boys	Mothers	Fathers
Actors, stage managers etc.	Athletes, sports officials etc.	Sales assistants	Drivers of road goods vehicles
Hairdressers	Motor mechanics	Cleaners, domestics	Production, works managers
Primary and nursery education teachers	Armed forces	Care assistants & attendants	Service industry managers etc
Solicitors	Police officers	Educational assistants	Other managers & administrators
Vets	Artists, graphic designers etc.	Nurses	Metal work, maintenance fitters
Artists, graphic designers etc.	Computer analysts, programmers	Clerks	Carpenters & joiners
Nursery nurses	Architects	Accounts clerks, book-keepers	Storekeepers & warehousepersons
Beauticians	Plumbers, heating engineers	Other childcare occupations	Gardeners, groundspersons
Nurses	Aircraft flight deck officers	Community & youth workers	Marketing & sales managers
Authors, writers, journalists	Actors, stage managers etc.	Service industry managers	Motor mechanics etc
Police officers	Carpenters and joiners	Primary, nursery teachers	Builders, building contractors
Travel and flight attendants	Chefs, cooks	Other secretarial personnel	Cab drivers & chauffeurs
Medical Practitioners	Secondary education teachers	Filing and record clerks	Building/contract managers
Secondary education teachers	Authors, writers, journalists	Other financial etc managers	Farm owners & managers etc
University teachers	Medical practitioners	Secondary education teachers	Other construction trades
Other childcare occupations	Solicitors	Retail cash & check-out operators	Electricians
Clothing designers	Electricians	Bar staff	All other labourers
Biological scientists	Builders, building contractors	Receptionists	Computer systems etc managers
Other health professionals	Musicians	Counter clerks & cashiers	Police officers
Psychologists	Chartered and certified accountants	Catering assistants	Plumbers, heating engineers

Source: British Household Panel Survey waves 4-18.

Table 3: Descriptive statistics of estimation sample

	mean	sd	min	max	count
Proportion of women	0.42	0.30	0.00	1.00	3040
Wave	13.08	4.16	5.00	18.00	3040
Age	14.52	1.12	11.00	16.00	3040
Absent father	0.22	0.41	0.00	1.00	3040
Total number of siblings	0.99	0.94	0.00	7.00	3040
Older brother	0.27	0.44	0.00	1.00	3040
Older sister	0.23	0.42	0.00	1.00	3040
Parental educational level	1.87	1.32	0.00	4.00	3040
Leave school at 16	0.15	0.36	0.00	1.00	3040
Mother looking after home	0.14	0.35	0.00	1.00	3040
Housework hours difference	12.62	12.98	-53.00	75.00	3040
Mother's occupation >50% women	0.82	0.39	0.00	1.00	3040
Father's occupation >50% female	0.13	0.33	0.00	1.00	3040
Homo-lineal occupational match	0.02	0.14	0.00	1.00	3040
Hetero-lineal occupational match	0.01	0.07	0.00	1.00	3040
Mother's gender ideology	0.00	0.56	-1.85	1.81	3040
School motivation	15.45	7.08	-20.00	20.00	3040
Self esteem	0.32	0.47	0.00	1.00	3040
Conscientious father	0.22	0.42	0.00	1.00	3040
Conscientious mother	0.24	0.43	0.00	1.00	3040

Note: unweighted statistics.

Source: British Household Panel Survey Waves 4-18.

Table 4: Models estimating factors shaping gendered occupational choices of children aged 11-15, UK 1994-2008

	(1) basic	(2) Plus parental resources	(3) Plus behavioral	(4) Plus gender ideology	(5) Plus agency
Boy (reference=girl)	-0.296*** (0.0321)	-0.380*** (0.0434)	-0.315*** (0.0469)	-0.314*** (0.0470)	-0.375*** (0.0532)
Age	-0.00180 (0.00722)	-0.00388 (0.00720)	-0.00407 (0.00718)	-0.00403 (0.00717)	-0.00543 (0.00711)
Boy*age interaction	-0.00458 (0.00868)	-0.00127 (0.00864)	-0.00169 (0.00864)	-0.00171 (0.00863)	0.000335 (0.00860)
Absent father		-0.0873 (0.122)	-0.0931 (0.127)	-0.100 (0.127)	-0.106 (0.126)
Boy*absent father		0.0353 (0.123)	0.0506 (0.129)	0.0551 (0.129)	0.0635 (0.130)
Number of siblings		0.000423 (0.00851)	-0.00339 (0.00882)	-0.00341 (0.00881)	-0.00406 (0.00873)
Boy*siblings		-0.00122 (0.0108)	0.00482 (0.0109)	0.00476 (0.0109)	0.00500 (0.0109)
Older brother		0.00672 (0.0175)	0.00219 (0.0175)	0.00370 (0.0177)	-0.000711 (0.0175)
Boy*older brother		0.0117 (0.0218)	0.0152 (0.0217)	0.0137 (0.0218)	0.0187 (0.0217)
Older sister		0.0101 (0.0181)	0.00884 (0.0180)	0.00973 (0.0180)	0.00878 (0.0179)

Boy*older sister	-0.00192 (0.0230)	-0.000925 (0.0230)	-0.00157 (0.0230)	-0.000301 (0.0230)
Father's education (reference=none)				
Degree or above	-0.129*** (0.0293)	-0.119*** (0.0302)	-0.116*** (0.0303)	-0.111*** (0.0303)
A' levels to degree	-0.101*** (0.0253)	-0.101*** (0.0253)	-0.100*** (0.0254)	-0.0952*** (0.0254)
O' levels and CSEs	-0.0716** (0.0244)	-0.0712** (0.0245)	-0.0714** (0.0244)	-0.0687** (0.0244)
Boy*degree	0.176*** (0.0367)	0.166*** (0.0377)	0.165*** (0.0378)	0.159*** (0.0378)
Boy*A' levels	0.151*** (0.0313)	0.146*** (0.0313)	0.147*** (0.0313)	0.141*** (0.0315)
Boy*O' levels	0.0926** (0.0312)	0.0862** (0.0310)	0.0869** (0.0310)	0.0827** (0.0311)
Intention to leave school at 16	0.105*** (0.0283)	0.103*** (0.0279)	0.103*** (0.0278)	0.0782** (0.0297)
Boy*leave at 16	-0.210*** (0.0319)	-0.202*** (0.0317)	-0.202*** (0.0317)	-0.178*** (0.0337)
Mother looking after home		0.0198 (0.0244)	0.0242 (0.0247)	0.0218 (0.0250)
Boy*home mother		-0.0143 (0.0299)	-0.0174 (0.0302)	-0.0123 (0.0306)

Homo-lineal parental occupational copying	0.140*** (0.0383)	0.140*** (0.0379)	0.153*** (0.0386)
Boy*copying	-0.228*** (0.0536)	-0.229*** (0.0534)	-0.243*** (0.0533)
Heterolineal occupational copying	-0.243*** (0.0654)	-0.248*** (0.0657)	-0.250*** (0.0690)
Boy*heterolineal copying	0.511*** (0.102)	0.516*** (0.102)	0.520*** (0.103)
Mother's occupation>50% women	0.0562** (0.0188)	0.0567** (0.0188)	0.0541** (0.0186)
Boy*mother's occupation>50% women	-0.0639** (0.0247)	-0.0638** (0.0247)	-0.0618* (0.0245)
Father's occupation>50% women	-0.0194 (0.0244)	-0.0177 (0.0244)	-0.0170 (0.0245)
Boy*father's occupation>50% women	0.0290 (0.0317)	0.0272 (0.0318)	0.0276 (0.0319)
Difference in parents' housework hours	0.000243 (0.000706)	0.000278 (0.000706)	0.000330 (0.000711)
Boy*housework difference	-0.00145 (0.000886)	-0.00146 (0.000887)	-0.00150+ (0.000896)
Mother's gender traditionalism		0.0154 (0.0146)	0.0122 (0.0144)
Boy*mother's traditionalism		-0.00921	-0.00431

				(0.0180)	(0.0179)
School motivation					-0.00271* (0.00126)
Boy*school motivation					0.00192 (0.00156)
Self esteem					-0.0468** (0.0177)
Boy*self esteem					0.0756*** (0.0215)
Conscientious father					-0.0112 (0.0196)
Boy*conscientious father					0.00405 (0.0248)
Conscientious mother					0.0173 (0.0173)
Boy*conscientious mother					-0.00923 (0.0220)
Constant	0.625*** (0.0354)	0.692*** (0.0417)	0.649*** (0.0440)	0.647*** (0.0441)	0.708*** (0.0492)
Observations	3040	3040	3040	3040	3040
Adjusted R2	0.280	0.305	0.314	0.314	0.318

Standard errors in parentheses +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: British Household Panel Survey. Estimates are adjusted for sample design and non response and standard errors are adjusted for repeat observations within households.

Models also include wave dummies and a dummy for missing observations on father's occupation (non-significant).

Table 5: Model estimates exploring age interactions and cohort effects

	(1) Copying by age interaction	(2) Gender ideology age interaction	(3) Cohort pre 2004 v 2004 onwards
Boy (reference=girl)	-0.344*** (0.0453)	-0.349*** (0.0453)	-0.378*** (0.0530)
Age			0.00163 (0.00674)
Boy*age interaction			0.000507 (0.00861)
Age 15 plus (reference=aged<15)	0.0236 (0.0198)	0.0212 (0.0195)	
Boy*age 15+ interaction	-0.0378+ (0.0228)	-0.0313 (0.0224)	
Absent father	-0.112 (0.131)	-0.113 (0.130)	-0.123 (0.125)
Boy*absent father	0.0720 (0.133)	0.0698 (0.133)	0.0797 (0.127)
Number of siblings	-0.00232 (0.00865)	-0.00250 (0.00864)	-0.00356 (0.00871)
Boy*siblings	0.00436 (0.0108)	0.00406 (0.0108)	0.00562 (0.0108)
Older brother	0.000276 (0.0175)	0.00129 (0.0174)	-0.00213 (0.0176)
Boy*older brother	0.0180 (0.0216)	0.0170 (0.0216)	0.0210 (0.0216)
Older sister	0.00890 (0.0179)	0.00925 (0.0179)	0.00734 (0.0179)
Boy*older sister	-0.000174 (0.0230)	-0.00101 (0.0230)	0.00308 (0.0230)
Mother looks after home	0.0237 (0.0249)	0.0235 (0.0250)	0.0190 (0.0251)
Boy*housemother	-0.0145 (0.0305)	-0.0144 (0.0306)	-0.00917 (0.0306)
Father's education (reference=none)			
Degree or above	-0.111*** (0.0302)	-0.111*** (0.0303)	-0.113*** (0.0305)



A' levels to degree	-0.0943*** (0.0254)	-0.0940*** (0.0254)	-0.0945*** (0.0255)
O' levels or CSEs	-0.0676** (0.0244)	-0.0683** (0.0244)	-0.0671** (0.0244)
Boy*degree	0.154*** (0.0375)	0.157*** (0.0376)	0.158*** (0.0379)
Boy*A' levels	0.137*** (0.0314)	0.138*** (0.0314)	0.139*** (0.0315)
Boy*O' levels	0.0796* (0.0310)	0.0817** (0.0310)	0.0813** (0.0311)
Intention to leave school at 16	0.0772** (0.0297)	0.0793** (0.0296)	0.0784** (0.0295)
Boy*leave at 16	-0.178*** (0.0337)	-0.179*** (0.0336)	-0.177*** (0.0334)
Homo-lineal occupational copying	0.252*** (0.0516)	0.154*** (0.0397)	0.156*** (0.0389)
Boy*copying	-0.455*** (0.0614)	-0.242*** (0.0541)	-0.237*** (0.0544)
Older and occupational copying	-0.138+ (0.0708)		
Boy, older and occupational copying	0.303*** (0.0878)		
Hetero-lineal copying	-0.261*** (0.0668)	-0.248*** (0.0655)	-0.251*** (0.0722)
Boy*hetero-lineal copying	0.531*** (0.0990)	0.516*** (0.0994)	0.516*** (0.103)
Mother's occupation >50% women	0.0538** (0.0186)	0.0530** (0.0186)	0.0528** (0.0186)
Boy*mother's occupation >50% women	-0.0629* (0.0245)	-0.0612* (0.0245)	-0.0641** (0.0245)
Father's occupation >50% women	-0.0169 (0.0247)	-0.0171 (0.0247)	-0.0157 (0.0244)
Boy*father's occupation >50% women	0.0282 (0.0321)	0.0282 (0.0321)	0.0258 (0.0319)
Hours difference in mother's and father's housework	0.000358 (0.000710)	0.000360 (0.000710)	0.000378 (0.000715)
Boy*housework difference	-0.00155+ (0.000894)	-0.00154+ (0.000895)	-0.00162+ (0.000893)

Mother's Gender Traditionalism	0.0120 (0.0145)	0.0111 (0.0264)	0.0135 (0.0144)
Older and traditional mother		0.00233 (0.0305)	
Boy, older & traditional mother		-0.0165 (0.0386)	
Boy*mother's traditionalism	-0.00636 (0.0179)	0.00603 (0.0328)	-0.00718 (0.0178)
School motivation	-0.00277* (0.00127)	-0.00271* (0.00127)	-0.00276* (0.00126)
Boy*school motivation	0.00204 (0.00157)	0.00194 (0.00156)	0.00210 (0.00156)
Self esteem	-0.0458* (0.0178)	-0.0446* (0.0178)	-0.0489** (0.0178)
Boy*self esteem	0.0739*** (0.0216)	0.0730*** (0.0216)	0.0749*** (0.0216)
Conscientious father	-0.0130 (0.0196)	-0.0129 (0.0196)	-0.0121 (0.0197)
Boy*conscientious father	0.00639 (0.0247)	0.00607 (0.0247)	0.00362 (0.0247)
Conscientious mother	0.0162 (0.0173)	0.0163 (0.0173)	0.0148 (0.0174)
Boy*conscientious mother	-0.00922 (0.0219)	-0.00905 (0.0220)	-0.00601 (0.0220)
Later period (from 2004)			-0.0256* (0.0104)
Constant	0.667*** (0.0437)	0.669*** (0.0437)	0.652*** (0.0432)
Observations	3040	3040	3040
Adjusted R <sup>2</sup>	0.319	0.318	0.316

Standard errors in parentheses +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: British Household Panel Survey. Estimates are adjusted for sample design and non response and standard errors are adjusted for repeat observations within households.