Department of Quantitative Social Science

Nurse or Mechanic? Explaining Sex-Typed Occupational Aspirations amongst Children

Javier Polavieja
Lucinda Platt

DoQSS Working Paper No. 11-07
December 2011

Leading education and social research
Institute of Education
University of London

DISCLAIMER

Any opinions expressed here are those of the author(s) and not those of the Institute of Education. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

DoQSS Workings Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

Department of Quantitative Social Science. Institute of Education, University of London. 20 Bedford way, London WC1H 0AL, UK.

Nurse or Mechanic? Explaining Sex-Typed Occupational Aspirations amongst Children

Javier Polavieja[*], **Lucinda Platt**[‡]

Abstract. There is a high degree of sex-typing in young children's occupational aspirations and this has consequences for adult occupational segregation. Yet we still know surprisingly little about the mechanisms involved in the formation of sex-typical preferences and there is considerable theoretical controversy regarding the relative role of parental socialization and individual agency in this process. This study analyzes the determinants of sex-typed occupational aspirations amongst British children aged between 11 and 15. We develop a model of parental socialization and test for different channels and mechanisms involved in the transmission of sex-typical preferences. We also propose an innovative definition of personal agency that is anchored in observable psychological traits linked to self-direction. 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 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 sex-differences in occupational aspirations remain unexplained.

JEL classification: J13, J16, J24, Z13.

Keywords: Gender Segregation, Occupational Aspirations, Children, Socialization, Personality Traits.

[*]IMDEA-Social Sciences Institute

[†]Institute of Education, University of London

[‡]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. We also thank Michael Biggs, Stephen Jenkins and Tak Wing Chan for their helpful comments. Address correspondence to javier.polavieja@imdea.org

INTRODUCTION

> "*..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 and England 1999:577).
>
> "*Redirecting our attention from motives to mechanisms is essential for understanding inequality...*" (Reskin 2003:1)

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 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;Tomaskovick-Devey and Skaggs 2002; Roscigno, Garcia and Bobbitt-Zeher 2007). However insightful, 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. 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 and sphere specialization models in economics[1] (see e.g. Becker 1985; 1991[1981]; Goldin and Polacheck 1987; Munasinghe, Reif and Henriques 2008; Polachek 1981) as well as to socio-biological and evolutionary explanations of gender differences in both the domestic and the public spheres (see e.g. Buss 2004[1999]; Kanazawa 2001; Lueptow, Garovich-Szabo and Lueptow 2001; Manning et al. 2010; Penner 2008). The empirical literature both in sociology and economics is replete with references to socialization. However, the concept is typically used ex-post as recourse to account for residual differences by sex, rather than being measured or tested directly.

Despite the prominent role that socialization plays in supply-side explanations of gender segregation, the existing theories 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 actual channels and processes involved in the intergenerational transmission of sex-typed preferences, nor more generally about the interplay between human cognition and social interactions (see Ridgeway 1997; Ridgeway and Erickson 2000). Social-learning models stress that gender roles are acquired through primary socialization processes very early in life (see e.g. Bandura 1977; Cunningham 2001a; 2001b; Okamoto and England 1999), yet there is also evidence that adults adapt their gender attitudes and preferences over their life course

[1] For a review of supply-side economic theories see Okamoto and England (1999); Polavieja (2008).

in response to various structural constraints (see Corrigall and Konrad 2007; Johnson 2001; Kroska and Elman 2009; Moen, Erickson and Dempster-McClain 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. Little is known, however, about the relative importance of primary socialization versus adult socialization in the formation of preferences (see Cunningham 2001a; Moen, Erickson and Dempster-McClain 1997). The existing empirical literature on gender-role socialization is marked by a strong focus on the intergenerational transmission of gender attitudes (see e.g. Burt and Scott 2002; Glass, Bengston and Chorn-Dunham 1986; Moen, Erickson and Dempster-McClain 1997; Cunningham 2001b), but considerably less work has been devoted to analyzing the transmission of behavioral patterns, particularly in relation to women's paid work (see, however, van Putten, Dykstra and Schippers 2008). Research has been much more concerned with establishing empirical associations between parents' and children's characteristics than with explaining the mechanisms whereby parental influences operate. Moreover, empirical studies often draw on adult samples to address socialization processes that are thought to take place during childhood. As a result of all these caveats, socialization is still largely a black-box in gender stratification research.

Gender socialization models have also been criticized on theoretical grounds for leaving very little room for individual agency in the formation of preferences (see Hakim 1991; 1995; 2000; 2003a; see also Hays 1994). It has been argued that socialization models portray actors as passive receptors of gender values and norms, and assume that all individuals are equally malleable by social influences. Catherine Hakim has been a particularly prominent figure in leading this criticism. 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. Hakim thus equates agency with preference heterogeneity. Moreover, she assumes that such heterogeneity reflects

individual "core values" that are exogenous to both socialization and labor-market experiences.[2] This makes her argument particularly hard to falsify empirically, since any unexplained variance in any given empirical model can always be attributed to unobserved heterogeneity and hence interpreted as evidence of agency effects (Hitlin and Elder 2007:173). Hakim's conceptualization of agency can therefore lead to an over-individualized, and hence equally problematic, conception of human behavior (Crompton and Harris 1998a; 1998b). In order to shed empirical light on the socialization vs. agency debate, it is essential to find more direct ways of measuring the role of individual agency in preference formation.

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. To this end we propose a model of parental socialization that includes explicit channels and mechanisms that are empirically testable.

We also aim to assess the role of personal agency in the process of preference formation. Hitlin and Elder (2007) argue that current sociological treatments of agency are too abstract to offer guidance for empirical research but can be illuminated by social psychology. They call for anchoring the 'slippery concept' of agency to measurable psychological attributes in future research. We put their recommendation into practice. Drawing on social psychology (see Bandura 1997; 2001) and behavioral economics (see e.g. Bowles and Gintis 2002a; Bowles, Gintis and Osborne 2001a; 2001b; Heckman, Stixrud and Urzua 2006), we expect that individual heterogeneity

[2] 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).

in work-related preferences should be associated with the distribution of certain psychological traits in the population. We argue that if agency plays a role in the formation of occupational preferences, we should find an association between psychological characteristics, particularly those linked to self-direction, 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 self-directing personality traits rather than as a residual construct. Children with high levels of self-direction are expected to be more ambitious in their occupational aspirations as well as less permeable to socialization influences and, as a result, less likely to develop sex-typical aspirations. We measure self-direction using information on children's motivation and self-esteem. To our knowledge, this study provides the first psychologically-anchored test of agency effects in occupational sex-typing.

We test 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 to 18 of the British Household Panel Survey (1994-2008). By investigating early gender differences in occupational aspirations, our approach helps to open the black-box of parental gender-role socialization, sheds light on the agency-structure debate and fills an important gap in the sociological literature on gender segregation.

THEORETICAL FRAMEWORK

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 what is the behavior that is appropriate for their sex. The most important —but not the only— agent of primary socialization in gender roles is the family (see e.g.

Bandura 1977; Cunningham 2001a; 2001b; Hitlin 2006; Lueptow, Garovich-Szabo and Lueptow 2001; Marini and Brinton 1984; Okamoto and England 1999; Roberts and Bengston 1999).

But how do families shape children's occupational aspirations? What are the actual processes, channels and mechanisms involved in the intergenerational transmission of sex-typical occupational preferences? Drawing on social stratification, social learning and developmental psychology, 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 attitudes. 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; Gamoran 1996). 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, we

believe, has interesting implications for the degree of gender-segregation in children's occupational aspirations. Children whose occupational horizons are restricted to low-skilled jobs will have fewer gender-integrated possibilities to choose from, not only because their potential occupational pool is smaller, but also because average levels of sex-segregation are higher at the low-skill tail of the occupational distribution (see e.g. Cotter, Hermsen and Vanneman 2005). Parental influences on children's occupational horizons are thus not gender neutral since 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).

Behavioral 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 (Bandura 1977; Cunningham 2001a; 2001b; van Putten, Dykstra and Schippers 2008). Several empirical studies have found a significant statistical association between the present behavior of daughters and the past behavior of their mothers in areas such as family formation, housework distribution and female labor market participation. This evidence has been interpreted as proof of behavioral role modeling (see e.g. Barber 2001; Cunnigham 2001a; 2001b; van Putten, Dykstra and Schippers 2008). Yet the existing analyses fall short of offering a detailed account of the *mechanisms* involved in the processes of behavioral transmission. It is still unclear *how* role-modeling actually operates. This is partly due to the shortage of data which measures parental behavior contemporaneous with the formation of children's preferences.

In order to shed further light on the socializing influence of parental behavior, we distinguish between two different forms of sex-role modeling: simple *imitation* and *behavioral sex-role learning*. This distinction allows us to identify two different potential mechanisms linking parental behavior to children's sex-typed occupational aspirations.

Imitation responds to children's intrinsic desire *to be as* their parental models. Sex-role imitation is homo-lineal, that is, it is based on children's identification with the same-sex parent. Early theories of sex-role modeling explained same-sex identification using a Freudian psychoanalytical framework (see e.g. Chodorow 1978). Today there is growing consensus in developmental psychology that same-sex identification is probably innate as it requires some form of preexisting gender identity (see e.g. Martin, Ruble and Szkrybalo 2002).[3] Developmental psychologists have shown that a mechanism of pure imitation of same-sex parents plays a crucial role in infants' sex-role learning (see e.g. Meltzoff and Moore 2002; Tomasello 1999).

We propose to test for *direct occupational imitation* as one potential mechanism of occupational socialization. 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'. Direct occupational imitation will lead to sex-typed aspirations amongst daughters/sons insofar as their mothers/fathers work in segregated occupations themselves (H2). Occupational reproduction through imitation could therefore be the simplest form of intergenerational transmission of sex-typed occupational aspirations.[4]

Developmental psychology shows, however, that as children develop their cognitive skills, the importance of pure imitation of parental behavior as a mechanism of sex-role differentiation declines in favor of more complex forms of learning. Hence we also expect that the influence of occupational imitation as a transmitter of sex-typed aspirations diminishes over time as children age (H2b).

---

[3] Learning through same-sex imitation has been also observed in animal behavior and it is considered a crucial mechanism of transmission of animal culture (see Sapolsky 2006).

[4] 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).

Behavioral sex-role learning is the process by which children discover and absorb what the prescribed behavior for their sex is by observing the actions of their parents. This learning process is indeed more complex and cognitively demanding than sex-role imitation. Children first have to identify gender-role norms by examining the behavior of their own parents 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; Marini and Brinton 1984; Moen, Erickson and Dempster-McClain 1997).

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" (Butler 1990; West and Fenstermaker 1995; West and Zimmerman 1987). Children observe and learn from these gender displays (Cunningham 2001a). A traditional enactment of gender roles could therefore promote sex-typical occupational aspirations amongst girls and boys even if such aspirations do not entail copying the exact occupations of their mothers and fathers. What children would learn through observation is rather the type of behavior that is socially appropriate for their sex, including, crucially, occupational roles (e.g. nurses for girls, mechanics for boys). Parental occupational and domestic behavior is thus expected to influence the degree of sex-typicality of children's occupational aspirations regardless of occupational imitation.

More precisely, we expect that girls (boys) whose mothers (fathers) are employed in traditionally female (male) occupations develop more sex-typical occupational aspirations than girls (boys) whose mothers (fathers) are employed in less-traditional jobs (H3a). Similarly, children living in households with a traditional —i.e. gender unequal— distribution of housework are expected to develop more sex-typical occupational aspirations than children living under gender-egalitarian arrangements (H3b).

Attitudinal transmission

Neither occupational imitation nor behavioral sex-role learning implies the transmission of any elaborated discourse about gender differences. Children simply imitate their parents' behavior or learn from it. Yet parents can also influence their children by transmitting their own gender attitudes and values, 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). Empirical research on gender socialization has been marked by a strong focus on attitudinal transmission. Previous research has shown that adult children's gender role attitudes are indeed associated with parental gender role-attitudes (see e.g. Booth and Amato 1994; Burt and Scott 2002; Cunningham 2001; Kroska and Elman 2009; Thornton, Alwin and Camburn 1983). Ideological transmission of gender attitudes between mothers and daughters has been found even after controlling for their respective family and work experiences (Moen, Erickson and Dempster-McClain 1997).[5]

It is well known that people's attitudes do not always match their actual behaviors (see e.g. Hakim 2003b; Moen, Erickson and Dempster-McClain 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 is therefore considered a distinctive potential channel of parental influence on young children's sex-typical aspirations. We expect that parental gender ideology shapes children's occupational preferences by providing explicit (i.e. verbal) guidelines about prescribed occupational behavior (H4).

Gender ideology provides a set of values and attitudes as well as a (largely) coherent narrative about gender differences, which is passed on from parents to children through verbal interaction. Acquiring gender ideology thus defined is therefore a demanding cognitive task. This leads us to expect that the effect of parental ideology on occupational aspirations should increase with children's age, as older children have

[5] 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.

greater cognitive capacity than younger ones and hence are more likely to assimilate their parents' gender ideology (H4b).

Occupational imitation, sex-role learning and ideological transmission are three different and testable mechanisms of parental influence on children's occupational aspirations. By distinguishing between them, our approach provides a richer and more transparent test for occupational socialization than is usually available.

The role of personality traits

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, Stixrud and Urzua 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[6] that tap on the correlation between personal drive, motivation and feelings of self-worth (see e.g. Carneiro and Heckman 2005; 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).

Psychological attributes linked to self-direction could thus make children more ambitious in their occupational aspirations. As explained above, the highest levels of sex-segregation are found in the low-skilled segments of the occupational hierarchy, so psychological influences on occupational ambition are likely to affect the degree of sex-typicality of children's occupational aspirations (see also: Harper and Haq 2001). Children with high levels of motivation and self-esteem will tend to aim 'higher' in the occupational structure —and hence they will face a less sex-typical pool of occupations to choose from— than kids with no such psychological traits. This we call the *ambition* effect of self-direction on occupational preferences[7] (H5a).

---

[6] 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 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. Carreiro and Heckman 2005; Lee 2009).

[7] There is s clear connection between hypothesis H5a and hypothesis H4 but note that parental influences can also operate net of children's occupational ambition through so-called

Yet we also believe that individuals in possession of psychological attributes linked to self-direction should be better predisposed to exercise their personal autonomy and hence to resist socialization pressures irrespective of their occupational ambition. We expect self-esteem to be particularly relevant in enhancing individuals' capacity to make independent choices. This expectation follows directly from Bandura's self-efficacy theory (see Bandura 1997; 2001), which sees individuals' beliefs about their own capabilities as the core psychological determinant of human agency —i.e. human's capacity for action in the face of constraints (see also Hitlin and Elder 2007). Boys and girls with high levels of self-direction, self-esteem in particular, are hence expected to be less likely to aspire to sex-typical occupations simply because they are better equipped to undertake independent actions —and hence more capable of acting against the existing gender norms. This we call the *autonomy* effect of self-direction. Note that if this *autonomy* effect is different from the above-mentioned *ambition* effect, as we expect, it should be observable at different levels of the aspired occupational hierarchy. More autonomous children will be less inclined to choose gender-prescribed occupations whatever their occupational ambition (H5b).

In sum, we expect that children with high levels of self-direction will not only be more inclined to aim higher in their occupation aspirations (ambition effect) but also to choose less sex-typical jobs at all levels of the occupational distribution (autonomy effect). It is through these two distinctive mechanisms that psychological predispositions are expected to affect occupational preference formation amongst children. Accounting for these psychological predispositions constitutes a novel approach to measuring agency effects within a parental socialization framework.

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, Livesley and Vemon 1996; Raevuori et al. 2007). Social scientists have also

---

secondary effects. For an early paper investigating sex-differences in occupational ambition amongst adolescents see Marini and Greenberger (1978).

argued that incentive-enhancing traits such as motivation and self-esteem can be transmitted from parents to children through socialization processes, as explained 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 inherent individual 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 psychological characteristics possibly involved in the intergenerational transmission of personality. Only the variation in children's degree of 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 in 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 the 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. Since different questions are asked in different years, 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, where there was 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[8] and then matched this information to children's identified job preferences as well as to each parent's job.[9]

We also use the LFS to calculate the average wage for each three-digit occupation in the dataset. This provides a measure of the relative position of respondents' aspired occupation in the overall occupational distribution and hence accounts for the vertical dimension of occupational aspirations, which we use to differentiate between the *ambition* and the *autonomy* effects of children's self-direction (see below).

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 using the LFS,

[8] We matched on SOC90 occupational codes, avoiding a series break at the change to SOC2000 in the LFS in 2001.

[9] For parents not currently in paid work, we used information on their last job.

as explained above, and matched to the occupational choice. 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.[10] Figure 3 shows the distribution of aspired occupations for boys and girls. The top twenty choices for each sex are listed in Table 2.

[Figure 3 about here]

[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 girls.[11] Figure 4 shows the Kernel densities for the proportion of women in children's aspired occupations by sex.

[Figure 4 about here]

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

[10] 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 five occupations of both boys and girls but this did not alter our results (tables available on request).

[11] 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.

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 or with missing information on father's education, 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 independent measure of socio-economic resources than parental class.

We include several measures for *parental behavior*. The level of sex-segregation of both mother's and father's (last or actual) occupation is measured using a three-dummy variable that differentiates between sex-atypical, intermediate and sex-typical occupations. The respective cut-off points for these categories were determined on the basis of the observed segregation distributions for adult men and women in the LFS and ensuring comparable sized categories across both sexes.[12] Alternative specifications of segregation measures 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 of 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 average

[12] More precisely, for mothers, sex-atypical occupations are defined as those containing less than 60 per cent women; intermediate occupations are those containing between 60 and 80 per cent women; and sex-typical occupations are those with more than 80 per cent women. For fathers, sex-atypical occupations are defined as those with more than 35 per cent women; intermediate occupations are those containing between 20 and 35 per cent women; and sex-typical are those with less than 20 per cent women. This operationalization allows for an equivalent distribution of observations for both female and male samples (40 per cent sex-atypical, 40 per cent intermediate and 20 per cent sex-typical).

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 and family.

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.[13, 14] 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 order to differentiate empirically between the *ambition* and the *autonomy* effects of children's self-direction, we control for average wages of each aspired occupation.[15] The logic of this test is simple. If the effect of our personality indicators on the degree of sex-typicality in children's occupational preferences disappears after controlling for

---

[13] Our results reported below were robust to using a different operationalization of self-esteem based on a composite index (results available on request).

[14] Interestingly, girls show lower average levels of self-esteem than boys, but higher average levels of school motivation (results available on request).

[15] Note that we only treat average wages as a control for occupational hierarchy and avoid any interpretation of its coefficient in terms of 'effects'. This is because average wages are highly endogenous to the outcome variable.

the average wages in aspired occupations, we should conclude that all the impact of psychological traits linked to self-direction is due to its effect on children's occupational ambition. If, on the other hand, the effect persists after controlling for average wages, we should conclude that self-direction decreases sex-typicality at all levels of the aspired occupational distribution, which is consistent with the autonomy interpretation of personality effects.

In addition to the above, 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]

Method

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 explore those groups of factors hypothesized as shaping children's chances of aspiring to a more or less sex-typical occupation. We pool boys and girls together and interact each variable (except the dummies for wave) with sex. This interaction is essential to our model since the dependent variable measures the proportion of female in children's aspired occupation and hence any effect increasing sex-typicality should be positive for girls (i.e. more women, less men) but negative for boys (i.e. less women, more men). Finally, we introduce the average wage in children's aspired

occupations as a means to control for the vertical dimension of children's occupational preferences.

RESULTS

Table 4 below shows the results of three different regression models on the extent of sex-typing in children's occupational aspirations. In order to facilitate the interpretation of results, each interacted model is presented in two different columns. In the first column the reference category for sex is being a girl, whilst in the second is being a boy. Hence explanatory variables in the first column represent the main effects for girls, whereas in the second column they represent the main effects for boys. This allows for an easy and direct interpretation of sex-differences in the effects of the predictor variables, whilst sparing the need to present the numerous coefficients for interacted terms. 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 children's socio-demographic characteristics, parental influences and personality traits, as well as a range of controls for family structure. In this sense it is a full model. Finally, model 3 adds the average wages of children's aspired occupation as a means to control for occupational hierarchy. Several important findings are worth reporting.

First, consonant with our expectations, we find that parental education is associated with the degree of sex-typing in children's occupational aspirations. Yet this effect seems to be almost entirely driven by girls (see model 2). Girls from low educational backgrounds aspire to occupations with a significantly higher proportion of women than girls with higher educational resources. Interestingly, when we introduce average wages in the aspired occupations, which controls for the vertical dimension of segregation, the effects of parental education are significantly reduced for girls, which is in line with hypothesis 1, whilst they are somewhat reinforced for boys (see model 3).

Note that these effects of parental education are observed 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.[16] Overall, these findings are consistent with the idea that parental socio-economic resources are linked to the degree of sex-typicality of occupational aspirations by affecting the occupational horizons of children (H1), although this hypothesis is only fully supported for girls.[17]

The full model also tests for sex-role modeling mechanisms by including 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 these very 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.

---

[16] The effect of parental education on children's sex-typing is only reduced slightly when both attainment aspirations and self-direction traits are introduced sequentially (results available on request). We interpret this finding as probably suggesting that both primary and secondary effects of parental education influence sex-typing in occupational aspirations — since both self-direction and school attainment aspirations should be correlated with children's academic ability. Yet this is admittedly speculative as only direct measures of ability can fully discriminate between primary and secondary effects.

[17] All the effects of parental education are robust to using mothers' education instead of fathers' (available on request).

Model 2 also shows that daughters whose mothers are (or were last) employed in intermediate and sex-typical occupations hold more sex-typical occupational aspirations than observationally equivalent girls whose mothers are employed in integrated occupations. This effect is net of direct occupational imitation. The association between maternal occupational segregation and daughters' degree of sex-typing holds even after controlling for the average wages of aspired occupations (see model 3). This indicates that the transmission of occupational sex-typing from mothers to daughters is not simply driven by the association between mothers' occupational segregation and the occupational ranking of daughters' aspirations.[18] These findings are therefore consistent with behavioral sex-role learning, as they suggest that girls can learn sex-typical roles from observing their mothers' occupations and translate these roles into sex-typical occupational aspirations even if such aspirations do not entail the imitation of mothers' exact occupation.

We also find —although at the 90 per cent level of confidence only— that boys whose fathers are employed in typically masculine jobs are themselves more likely to aspire to occupations containing a lower proportion of women than boys whose fathers are employed in sex-atypical occupations. This effect for boys is also robust to direct occupational imitation and wage controls (see model 3). Note again that the effect of fathers' occupational segregation on the degree of sex-typicality of their sons' aspirations is significantly weaker than the effect observed between mothers' occupational segregation and their daughters'. Note also that we find no effect of mothers' occupational segregation on their son's aspirations, nor do we find any effect of fathers' occupational segregation on their daughters'. The evidence is therefore consistent with homo-lineal sex-role learning from parental occupations, which is stronger for girls than it is for boys (H3a).

[18] Further tests not shown indicate that the association between maternal occupational segregation and daughters' sex-typing is observed for both high and low educated mothers (results available on request).

When looking within the household, we observe that a traditional distribution of housework tasks between spouses seems to reinforce children's sex-typical occupational aspirations, although in this case effects are only observed for boys. This is an interesting finding as it suggests that parental behavior in the domestic sphere can have sex-role learning effects on children's occupational preferences (H3b). Finally, Table 4 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 coefficient works in the expected direction.[19]

In sum, we find evidence that is consistent with both occupational imitation (H2) and sex-role learning effects (H3). Whilst homo-lineal imitation reinforces sex-typicality for both girls and boys, sex-role learning effects seem to work somewhat differently for each sex (parental occupation effects are stronger for girls, whilst domestic behavior effects are only found for boys).

[Table 4 about here]

Contrary to our expectations, maternal gender ideology has no significant bearing on children's occupational aspirations, although perhaps it should be noted that the signs of the coefficients are in the expected direction. Statistical 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

[19] In an early review on occupational socialization, Marini and Brinton (1984) noted that, although there was evidence —back in 1970s— linking maternal employment to career salience amongst daughters, there was very little evidence that maternal employment increased access to nontraditional jobs. They concluded that "it is likely that the type of employment engaged in by the mother rather than her employment per se is the factor that influences entry into traditionally male occupations by daughters" (1984:211). Our findings are fully consistent with this interpretation.

significant effect for older kids —as expected by hypothesis H4b. These interaction effects have also been rejected (see below). This is not to say that ideational transmission does not take place. Indeed we find a significant association between mothers' and children's gender attitudes in the data, and for girls at least this correlation increases with age (results available on request). But we cannot find any significant evidence that parental gender ideology influences the degree of sex-typicality of occupational aspirations, neither in general nor for older children. 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.

Table 4 also tests for agency effects. As explained above, agency effects are measured using two psychological traits linked to self-direction: motivation and self-esteem. The introduction of these two psychological measures reduces the effect of children's educational aspirations, though the variable remains significant nevertheless (results available on request). 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 —but not boys— with high levels of motivation and both girls and boys with high levels of self-esteem report less sex-typical occupational preferences. Note that these 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. We see that parental scores on conscientiousness are not significant nor do they absorb the effect of motivation or self-esteem. Our empirical models therefore control 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 framework offers a psychologically-anchored definition of agency that can be empirically tested.

We have hypothesized that self-direction traits could influence sex-typicality through two distinctive mechanisms: *ambition* and *autonomy*. By introducing average wages as a control for the hierarchy of children's occupational aspirations, model 4 provides a further test of these mechanisms. Note that the effect of school motivation on occupational sex-typicality disappears entirely when occupational hierarchy is accounted for. This suggests that it is only through occupational ambition that school motivation affects sex-typing in girls' occupational aspirations. Yet model 4 also shows that the effect of self-esteem is resistant to controlling for the average wage of children's aspired occupation. Introducing occupational hierarchy in the model reduces the effect of self-esteem for girls significantly but it does not make it disappear, whilst it has no observable impact for boys. This implies that the influence of self-esteem on children's sex-typical occupational preferences operates at all levels of the aspired occupational hierarchy, a finding which is consistent with the *autonomy* mechanism. Our interpretation of this finding is that children with high self-esteem are better predisposed to exercise their individual agency and hence more capable of acting independently of those social influences that promote the formation of sex-typical preferences (H5b).

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. Model 1 shows that the coefficient for homo-lineal occupational matching is indeed significantly stronger for the former age group than it is for the latter. This interaction effect is observed for both girls and boys. This suggests that young kids tend to imitate segregated occupations more than their older counterparts. The importance of occupational imitation as a transmitter of sex-typed aspirations seems therefore to decrease with age, as expected (H2b).

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 occupational aspirations increase with cognitive maturity as children age. It is, however, possible that all sorts of parental influences decline with age as peer influences take over (Abrams 1989), a process which could counteract the expected effect of increasing cognitive maturity. Unfortunately, our capacity to capture peer influences is very limited, for reasons that we discuss below.

[Table 5 about here]

DISCUSSION

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, Cooksey and Sutterlin 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. We have argued that parental socio-economic resources should affect 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 was expected to be linked to sex-typing because gender-segregation is higher at lower levels of the skill distribution. This interpretation is clearly supported by the evidence in the case of girls. The effect of parental SES for boys is, however, generally weaker and less straightforward to interpret, probably because the distribution of aspired occupations is significantly more dispersed for boys than it is for girls (as it happens with the real occupational distributions for the working population).

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-typical jobs tend to aspire to sex-typical occupations themselves, even if such occupations are different from their mothers'. Similarly, boys whose fathers work in sex-typical jobs display more typical occupational aspirations themselves, although again this effect is weaker for boys than it is for girls. Moreover, boys —but not girls— living in families with a traditional division of housework tend to aspire to more traditionally male jobs regardless of the actual occupations of their parents. All these findings certainly point in the direction of behavioral sex-role learning.

Yet, contrary 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 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. Introducing the average wage of children's aspired occupations as a measure of hierarchy in the empirical models has allowed us to distinguish between two different mechanisms possibly linking our self-direction indicators to sex-typical preferences: ambition and autonomy. We have found that school motivation effects operate only through occupational ambition, whilst the effect of self-esteem on sex-typical aspirations can be explained partly by greater levels of occupational ambition and partly by greater capacity to make independent choices. 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 only 6 percentage points to this figure, which amounts roughly to a 20 per cent increase in the R-square. 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 (Marini and Brinton 1984; Hitlin 2006). Yet this possibility seems particularly hard to test with the existing data 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[20] 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, Garovich-Szabo and Lueptow 2001; Meyer 2003; Tomaskovic-Devey et al. 2006; Shu and Marini 1998; Thornton and Young-DeMarco 2001). Our data is actually 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).[21] 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 most of this shift.[22] Thus,

---

[20] 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.

[21] This effect was robust to splitting the period at different points.

[22] 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'

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.

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 biology, endocrinology and neuroscience attributes documented sex-differences in perception and behavior to genetic and hormonal dimorphism. Many of the findings gathered in these —and other 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; Iijimaa et al. 2000), whilst sex-typical responses to children's toys have surprisingly been found in nonhuman primates (Alexander and Hines 2002; see also Wallen 1996).

Biological and evolutionary explanations open a new avenue of research that is increasingly complementing social and structural accounts of gender differentiation. Their influence is already noticeable in the fields of economics (see e.g. Croson and Gneezy 2004; Dekel and Scotchmer 1999), anthropology (see e.g. McIntyre and Edwards 2009) and sociology[23] (see Bearman and Brückner 2002; Kanazawa 2001;

---

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.

[23] Biological explanations of sex-differences have been particularly controversial in sociology. An illustrative example of this can be found in the heated polemic that followed Udry (2000)

Lueptow, Garovich-Szabo and Lueptow 2001; Penner 2008; Udry 2000). It is beyond the scope of this paper to go further than offer such accounts as providing a potential starting point for interrogating the unexplained gap in the occupational preferences of boys and girls. However, it is important to note that the possible mechanisms through which allegedly 'innate' differences translate into sex-specific occupational choices are far from self-evident and would need to be developed, to avoid tautological explanations (see also Miller and Costello 2001).

Meanwhile, we believe this study has already shown that focusing on the interplay between socialization influences and individual psychological predisposition can yield important analytical pay-offs. We have provided new insights into the correlates of sex-typing in the occupational choices of children. Our findings strongly suggest that both social influences and individual psychological predispositions provide the essential cogs and wheels of preference formation. Yet we still lack a clear understanding of how these pieces are assembled. Taking the study of mechanisms seriously urges us, as sociologists, to increase interdisciplinary exchange and to exploit the growing potential of biosocial resources.

(see Firebaugh 2001; Miller and Costello 2001; Kennelly, Merz and Lorber 2001; Risman 2001; Udry 2001).

REFERENCES

Abrams, Dominic. 1989. "Differential Association: Social Development in Gender Identity and Intergroup Relations during Adolescence." Pp. 59-83 in *Social Identity of Women*, edited by S. Skevington and D. Baker. London: Sage.

Alexander, Gerianne M., and Melissa Hines. 2002. "Sex Differences in Response to Children's Toys in Nonhuman Primates (Cercopithecus Aethiops Sabaeus)." *Evolution and Human Behavior*, 23:467-479.

Arnett, Jeffrey Jensen. 1995. "Broad and Narrow Socialization: The Family in the Context of a Cultural Theory." *Journal of Marriage and Family* 57:617-628.

Bandura, Albert 1977. *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall

—. 1997. *Self-Efficacy: The Exercise of Control*. New York: Freeman.

—. 2001. "Social Cognitive Theory: An Agentic Perspective." *Annual Review of Psychology* 52:1-26.

Barber, Jennifer S. 2001. "The Intergenerational Transmission of Age at First Birth among Married and Unmarried Men and Women." *Social Science Research* 30: 219-247.

Bearman, Peter S. and Hannah Brückner. 2002. "Opposite-Sex Twins and Adolescents Same-Sex Attraction." *American Journal of Sociology* 107:1179-1205.

Becker, Gary S. 1985. "Human-Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3(1):S33-S58.

Becker, Gary S. 1991 [1981]. *A Treatise on the Family*, Enlarged Edition ed. Harvard University Press.

Booth, Alan, and Paul R. Amato. 1994. "Parental Gender Role Nontraditionalism and Offspring Outcomes." *Journal of Marriage and Family* 56:865-877.

Bouchard, Thomas J., and Matt McGue. 2003. "Genetic and Environmental Influences on Human Psychological Differences." *Journal of Neurobiology* 54:4-45.

Boudon, Raymond. 1974. *Education, Opportunity, and Social Inequality*. New York: Wiley.

—. 1996. "The 'Cognitivist Model': A Generalised 'Rational-Choice Model'" *Rationality and Society* 8:123-150.

Bowles, Samuel, and Herbert Gintis. 2002a. "The Inheritance of Inequality." *The Journal of Economic Perspectives* 16:3-30.

—. 2002b. "Schooling in Capitalist America Revisited." *Sociology of Education* 75:1-18.

Bowles, Samuel, Herbert Gintis, and Melissa Osborne. 2001a. "The Determinants of Earnings: A Behavioral Approach." *Journal of Economic Literature* 39:1137-1176.

—. 2001b. "Incentive-Enhancing Preferences: Personality, Behavior, and Earnings." *The American Economic Review* 91:155-158.

Breen, Richard. 1999. "Beliefs, Rational Choice and Bayesian Learning." *Rationality and Society* 11:463-479.

Breen, Richard, and John H. Goldthorpe. 1997. "Explaining Educational Differentials: Towards a Formal Rational Action Theory." *Rationality and Society* 9:275-305.

Breen, Richard, and Jan O. Jonsson. 2005. "Inequality of Opportunity in Comparative Perspective: Recent Research on Educational Attainment and Social Mobility." *Annual Review of Sociology* 31:223-243.

Brewster, Karin L., and Irene Padavic. 2000. "Change in Gender-Ideology, 1977-1996: The Contributions of Intracohort Change and Population Turnover." *Journal of Marriage and Family* 62:477-487.

Burt, Keith and Jacqueline Scott. 2002. "Parent and Adolescent Gender Role Attitudes in 1990s Great Britain." *Sex Roles* 46:239-245.

Buss, David M. 2004 [1999]. *Evolutionary Psychology: The New Science of the Mind*. Boston: Allyn & Bacon.

Butler, Judith. 1990. *Gender Trouble: Feminism and the Subversion of Identity*. New York: Routledge.

Carneiro, Pedro, and James J. Heckman. 2005. "Human Capital Policy." Pp. 77-240 in *Inequality in America. What Role for Human Capital Policy?,* edited by B. M. Friedman. Cambridge, MA: The MIT Press.

Castilla, Emilio. J. 2008. "Gender, Race, and Meritocracy in Organizational Careers." *American Journal of Sociology* 113:1479-1526.

Chang, Mariko Lin. 2000. "The Evolution of Sex Segregation Regimes." *The American Journal of Sociology* 105:1658-1701.

—. 2004. "Growing Pains: Cross-National Variation in Sex Segregation in Sixteen Developing Countries." *American Sociological Review* 69(1):114-37.

Chodorow, Nancy J. 1978. *The Reproduction of Mothering. Psychoanalysis and the Sociology of Gender*. Berkeley: University of California Press.

Cohen, Philip N., and Matt L. Huffman. 2007. "Working for the Woman? Female Managers and the Gender Wage Gap." *American Sociological Review* 72:681-704.

Connellan, Jennifer, Simon Baron-Cohen, Sally Wheelwright, Anna Batki, and Jag Ahluwalia. 2000. "Sex Differences in Human Neonatal Social Perception." *Infant Behavior and Development* 23:113-118.

Corcoran, Mary E., and Paul N. Courant. 1985. "Sex Role Socialization and Labor Market Outcomes." *The American Economic Review* 75(2):275-78.

Corrigall, Elisabeth A., and Alison M. Konrad. 2007. "Gender Role Attitudes and Careers: A Longitudinal Study." *Sex Roles* 56:847-855.

Cotter, David A., Joan M. Hermsen, and Reeve Vanneman. 2005. "Gender Inequality at Work." Pp. 107-138 in *The American People: Census 2000,* edited by R. Farley and J. Haaga. New York: Russell Sage Foundation.

Crompton, Rosemary, and Fiona Harris. 1998a. "Explaining women's employment patterns: 'orientations to work' revisited. *The British Journal of Sociology* 49: 118-136.

—. 1998b. "A Reply to Hakim." *The British Journal of Sociology* 49:144-149.

Croson, Rachel , and Uri Gneezy. 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47:448-474.

Cunningham, Mick. 2001a. "Parental Influences on the Gendered Division of Housework." *American Sociological Review* 66:184-203.

Cunningham, Mick. 2001b. "The Influence of Parental Attitudes and Behavior on Children's Attitudes toward Gender and Household Labor in Early Adulthood." *Journal of Marriage and the Family* 63:111-122.

Davis, Shannon N., and Theodore N. Greenstein. 2009. "Gender Ideology: Components, Predictors, and Consequences." *Annual Review of Sociology* 35:87-105.

Davis, Shannon N., and Lisa D. Pearce. 2007. "Adolescents' Work-Family Gender Ideologies and Educational Expectations." *Sociological Perspectives* 50:249-271.

Dekel, Eddie, and Suzanne Scotchmer. 1999. "On the Evolution of Attitudes towards Risk in Winner-Take-All Games." *Journal of Economic Theory* 87:125-143.

England, Paula, Melissa S. Herbert, Barbara Stanek Kilbourne, Lori L. Reid, and Lori McCreary Megdal. 1994. "The Gendered Valuation of Occupations and Skills: Earnings in 1980 Census Occupations." *Social Forces* 73(1):65-100.

England, Paula, Joan M. Hermsen, and David A. Cotter. 2000. "The Devaluation of Women's Work: A Comment on Tam." *The American Journal of Sociology* 105(6):1741-1751.

Farkas, George. 2003. "Cognitive Skills and Noncognitive Traits and Behaviors in Stratification Processes." *Annual Review of Sociology* 29:541-562.

Featherman, David L., and Robert M. Hauser. 1978. *Opportunity and Change*. New York: Academic Press.

Firebaugh, Glenn. 2001. "The ASR Review Process." *American Sociological Review* 66:619-621.

Gamoran, Adam. 1996. "Educational Stratification and Individual Careers." Pp. 59-74 in *Generating Social Stratification: Toward a New Research Agenda*, edited by Alan C. Kerckhoff. Boulder, CO: Westview.

Glass, Jennifer, Vern L. Bengtson and Charlotte Chorn-Dunham. 1986. "Attitude Similarity in Three-Generation Families: Socialization, Status Inheritance, or Reciprocal Influence?". *American Sociological Review* 51:685-698.

Goldin, Claudia, and Polachek Solomon. 1987. "Residual Differences by Sex: Perspectives on the Gender Gap in Earnings." *The American Economic Review* 77(2):143-151.

Hakim, Catherine. 1991. "Grateful Slaves and Self-Made Women: Fact and Fantasy in Women's Work Orientations." *European Sociological Review* 7:101-121.

—. 1995. "Five Feminist Myths about Women's Employment." *The British Journal of Sociology* 46:429-455.

—. 2000. *Work-Lifestyle Choices in the 21st Century: Preference Theory*. Oxford: Oxford University Press.

—. 2003a. "A New Approach to Explaining Fertility Patterns: Preference Theory." *Population and Development Review* 29:349-374.

—. 2003b. "Public Morality Versus Personal Choice: The Failure of Social Attitude Surveys." *The British Journal of Sociology* 54:339-345.

Harper, Barry, and Mohammad Haq. 2001. "Ambition, Discrimination, and Occupational Attainment: A Study of a British Cohort." *Oxford Economic Papers* 53:695-720.

Hays, Sharon 1994. "Structure and Agency and the Sticky Problem of Culture." *Sociological Theory* 12:57-72.

Heckman, James J., and Yona Rubinstein. 2001. "The Importance of Noncognitive Skills: Lessons from the GED Testing Program." *The American Economic Review* 91:145-149.

Heckman, James J., Jora Stixrud, and Sergio Urzua. 2006. "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior." *Journal of Labor Economics* 24:411-482.

Hines, M., and F. R. Kaufman. 1994. "Androgen and the Development of Human Sex-typical Behavior: Rough-and-Tumble Play and Sex of Preferred Playmates in Children with Congenital Adrenal Hyperplasia (CAH)." *Child Development* 65:1042-1053.

Hitlin, Steven. 2006. "Parental Influences on Children's Values and Aspirations: Bridging Two Theories of Social Class and Socialization." *Sociological Perspectives* 49:25-46.

Hitlin, Steven, and Glen H. Elder. 2007. "Time, Self, and the Curiously Abstract Concept of Agency." *Sociological Theory* 25):170-191.

Iijima, Megumi, Osamu Arisaka, Fumie Minamoto, and Yasumasa Arai. 2001. "Sex Differences in Children's Free Drawings: A Study on Girls with Congenital Adrenal Hyperplasia." *Hormones and Behavior* 40:99-104.

Jackson, Michelle. 2006. "Personality Traits and Occupational Attainment." *European Sociological Review* 22:187-199.

Jackson, Michelle, Robert Erikson, John H. Goldthorpe, and Meir Yaish. 2007. "Primary and Secondary Effects in Class Differentials in Educational Attainment." *Acta Sociologica* 50:211-229.

Jang, K. L., W. J. Livesley, and P. A. Vemon. 1996. "Heritability of the Big Five Personality Dimensions and Their Facets: A Twin Study." *Journal of Personality* 64:577-592.

Johnson, Monica Kirkpatric. 2001. "Change in Job Values During the Transition to Adulthood" *Work and Occupations* 28:315-345.

Jonsson, Janä O., David B. Grusky, Matthew Di Carlo, Reinhard Pollak, and Mary C. Brinton. 2009. "Microclass Mobility: Social Reproduction in Four Countries." *American Journal of Sociology* 114:977-1036.

Kanazawa, Satoshi. 2001. "De Gustibus Est Disputandum." *Social Forces* 79:1131-1162.

Kennelly, Ivy, Sabine N. Merz, and Judith Lorber. 2001. "What is Gender?" *American Sociological Review* 66:598-605.

Kmec, Julie A. 2005. "Setting Occupational Sex Segregation in Motion - Demand-Side Explanations of Sex Traditional Employment." *Work and Occupations* 32:322-354.

Kohn, Melvin L. 1969 [1989]. *Class and Conformity: A Study in Values*. Chicago: University of Chicago Press.

Kohn, Melvin L., Atsushi Naoi, Carrie Schoenbach, Carmi Schooler, and Kazimierz M. Slomczynski. 1990. "Position in the Class Structure and Psychological Functioning in the United States, Japan, and Poland." *The American Journal of Sociology* 95:964-1008.

Kroska, Amy, and Cheryl Elman. 2009. "Change in Attitudes about Employed Mothers: Exposure, Interests, and Gender Ideology Discrepancies." *Social Science Research* 38:366-382.

Lee, Dohoon. 2009. "The Economic Return to Education Revisited: The Role of Cognitive Skills and Socioemotional Traits in Wage Inequality" *Paper presented at the RC-28 2009 Summer Meeting*. Yale University, New Haven.

Lueptow, Lloyd B., Lori Garovich-Szabo, and Margaret B. Lueptow. 2001. "Social Change and the Persistence of Sex Typing: 1974-1997." *Social Forces* 80:1-36.

Manning, John T., Stian Reimers, Simon Baron-Cohen, Sally Wheelwright, and Bernhard Fink. 2010. "Sexually dimorphic traits (digit ratio, body height, systemizing-empathizing scores) and gender segregation between occupations: Evidence from the BBC internet study." *Personality and Individual Differences* 49(5):511-15.

Marini, Margaret M., and Mary C Brinton. 1984. "Sex Typing in Occupational Socialization." Pp. 192-232 in *Sex Segregation in the Workplace: Trends, Explanations, Remedies*, edited by Barbara F. Reskin. Washington, D.C: National Academy Press.

Marini, Margaret M. 1989. "Sex Differences in Earnings in the United States." *Annual Review of Sociology* 15:343-380.

Marini, Margaret M., and Ellen Greenberger. 1978. "Sex-Differences in Occupational Aspirations and Expectations." *Sociology of Work and Occupations* 5:147-178.

Marini, Margaret M., Pi-Ling Fan, Erica Finley, and Ann M. Beutel. 1996. "Gender and Job Values." *Sociology of Education* 69:49-65.

Martin, Carol Lynn, Diane N. Ruble, and Joel Szkrybalo. 2002. "Cognitive Theories of Early Gender Development." *Psychological Bulletin* 128:903-933.

Maume, David J. 1999. "Occupational Segregation and the Career Mobility of White Men and Women." *Social Forces* 77:1433-1459.

McIntyre, Matthew H., and Carolyn Pope Edwards. 2009. "The Early Development of Gender Differences." *Annual Review of Anthropology* 38:83-97.

Meltzoff, A. N., and M. K. Moore. 2002. "Imitation, Memory, and the Representation of Persons." *Infant Behavior and Development* 25:39-61.

Meyer, Lisa B. 2003. "Economic Globalization and Women's Status in the Labor Market." *Sociological Quarterly* 44:351-383.

Miller, Eleanor M. and Carrie Yang Costello. 2001. "The Limits of Biological Determinism." *American Sociological Review* 66:592-598.

Moen, Phyllis, Mary Ann Erickson, and Donna Dempster-McClain. 1997. "Their Mother's Daughters? The Intergenerational Transmission of Gender Attitudes in a World of Changing Roles." *Journal of Marriage and Family* 59:281-293.

Munasinghe, Lalith, Tania Reif, and Alice Henriques. 2008. "Gender Gap in Wage Returns to Job Tenure and Experience." *Labor Economics* 15(6):1296-1316.

Nandi, Alita and Cheti Nicoletti. 2009. "Explaining Personality Pay Gaps in the UK." *ISER Working Paper* 2009-22. Colchester: University of Essex. http://www.iser.essex.ac.uk/publications/working-papers/iser/2009-22.pdf

Okamoto, Dina, and Paula England. 1999. "Is There a Supply Side to Occupational Sex Segregation?" *Sociological Perspectives* 42(4):557-82.

Penner, Andrew M. 2008. "Gender Differences in Extreme Mathematical Achievement: An International Perspective on Biological and Social Factors." *American Journal of Sociology* 114:S138-S170.

Petersen, Trond, and Laurie A. Morgan. 1995. "Separate and Unequal: Occupation-Establishment Sex Segregation and the Gender Wage Gap." *The American Journal of Sociology* 101:329-365.

Polachek, Solomon William. 1981. "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure." *The Review of Economics and Statistics* 63:60-69.

Polavieja, Javier G. 2008. "The Effect of Occupational Sex-Composition on Earnings: Job-Specialisation, Sex-Role Attitudes and the Division of Domestic Labour in Spain." *European Sociological Review* 24:199-213

—. 2010. "Socially-Embedded Investments: Explaining Gender Differences in Job-Specific Skills." *IMDEA Working Papers* No. 2010-12. http://repec.imdea.org/pdf/imdea-wp2010-12.pdf

Raevuori, Anu, Danielle M. Dick, Anna Keski-Rahkonen, Lea Pulkkinen, Richard J. Rose, Aila Rissanen, Jaakko Kaprio, Richard J. Viken, and Karri Silventoinen. 2007. "Genetic and Environmental Factors Affecting Self-Esteem from Age 14 to 17: a Longitudinal Study of Finnish Twins." *Psychological Medicine* 37(11):1625-33.

Reskin, Barbara. F. 2003. "Including Mechanisms in our Models of Ascriptive Inequality." *American Sociological Review* 68:1-21.

Ridgeway, Cecilia L. 1997. "Interaction and the Conservation of Gender Inequality: Considering Employment." *American Sociological Review* 62:218-235.

Ridgeway, Cecilia L., and Shelley J. Correll. 2004. "Unpacking the Gender System: A Theoretical Perspective on Gender Beliefs and Social Relations." *Gender and Society* 18:510-531.

Ridgeway, Cecilia L., and Kristan Glasgow Erickson. 2000. "Creating and Spreading Status Beliefs." *The American Journal of Sociology* 106:579-615.

Rindfuss, R. R., E. C. Cooksey, and R. L. Sutterlin. 1999. "Young Adult Occupational Achievement - Early Expectations versus Behavioral Reality." *Work and Occupations* 26:220-263.

Risman, Barbara J. 2001. "Calling the Bluff of Value-Free Science." *American Sociological Review* 66:605-611.

Roberts, Robert E. L. and Vern L. Bengtson. 1999. "The Social Psychology of Values: Effects of Individual Development, Social Change, and Family Transmission Over the Life Span." Pp. 453–82 in *The Self and Society in Aging Processes*, edited by C. D. Ryff and V. W. Marshall. New York: Springer.

Roscigno, Vincent. J., Lisette M. Garcia, and Donna Bobbitt-Zeher. 2007. "Social Closure and Processes of Race/Sex Employment Discrimination." *Annals of the American Academy of Political and Social Science* 609:16-48.

Rosenberg, Morris. 1965. *Society and the Adolescent Self-Imagine*. Princeton, N.J.: Princeton University Press.

Rotter, Julian B. 1966. "Generalized Expectancies for Internal versus External Control of Reinforcement." in *Applications of a Social Learning Theory of Personality*, edited by Julian B. Rotter, J. Chance, and E.J. Phares. New York: Holt, Rinehart and Winston Inc.

Sapolsky, Robert M. 2006. "Culture in Animals: The Case of a Non-Human Primate Culture of Low Aggression and High Affiliation." *Social Forces* 85:217-233.

Shu, Xiaoling L., and Margaret M. Marini. 1998. "Gender-Related Change in Occupational Aspirations." *Sociology of Education* 71:43-67.

Steele, Jennifer, and Julian Barling. 1996. "Influence of maternal gender-role beliefs and role satisfaction on daughters' vocational interests." *Sex Roles* 34:637-648.

Swidler, Ann. 1986. "Culture in Action: Symbols and Strategies." *American Sociological Review* 51:273-286.

Teachman, Jay D., and Kathleen Paasch. 1998. "The Family and Educational Aspirations." *Journal of Marriage and Family* 60:704-714.

Thornton, Arland, Duane F. Alwin, and Donald Camburn. 1983. "Causes and Consequences of Sex-Role Attitudes and Attitude Change." *American Sociological Review* 48(2):211-27.

Thornton, Arland and Linda Young-DeMarco. 2001. "Four Decades of Trends in Attitudes toward Family Issues in the United States: The 1960s through the 1990s." *Journal of Marriage and Family* 63(4):1009-37.

Tomasello, Michael. 1999. *The Cultural Origin of Human Cognition*. Cambridge, Mass.: Harvard University Press.

Tomaskovic-Devey, Donald. 1993. "The Gender and Race Composition of Jobs and the Male/Female, White/Black Pay Gaps." *Social Forces* 72:45-76.

Tomaskovic-Devey, Donald, Kevin Stainback, Tiffany Taylor, Catherine Zimmer, Corre Robinson, and Tricia McTague. 2006. "Documenting Desegregation: Segregation in American Workplaces by Race, Ethnicity, and Sex, 1966-2003." *American Sociological Review* 71(4):565-88.

Udry, Richard J. 2000. “Biological Limits of Gender Construction.” *American Sociological Review* 65:443-457.

Udry, Richard J. 2001. “Feminists Critiques Uncover Determinism, Positivism and Antiquated Theory.” *American Sociological Review* 66:611-618.

Van Putten, Anne, Perl A. Dykstra and Joop J. Schippers. 2008. “Just like Mom? The Intergenerational Reproduction of Women’s Paid Work”. *European Sociological Review* 24(4):435-449.

Wallen, Kim. 1996. “Nature Needs Nurture: The Interaction of Hormonal and Social Influences on the Development of Behavioral Sex Differences in Rhesus Monkeys.” *Hormones and Behavior* 30:364-78.

West, Candace, and H. Zimmerman Don. 1987. "Doing Gender." *Gender and Society* 1:125-151.

West, Candace, and Sarah Fenstermaker. 1995. "Doing Difference." *Gender and Society* 9:8-37.

FIGURES AND TABLES

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

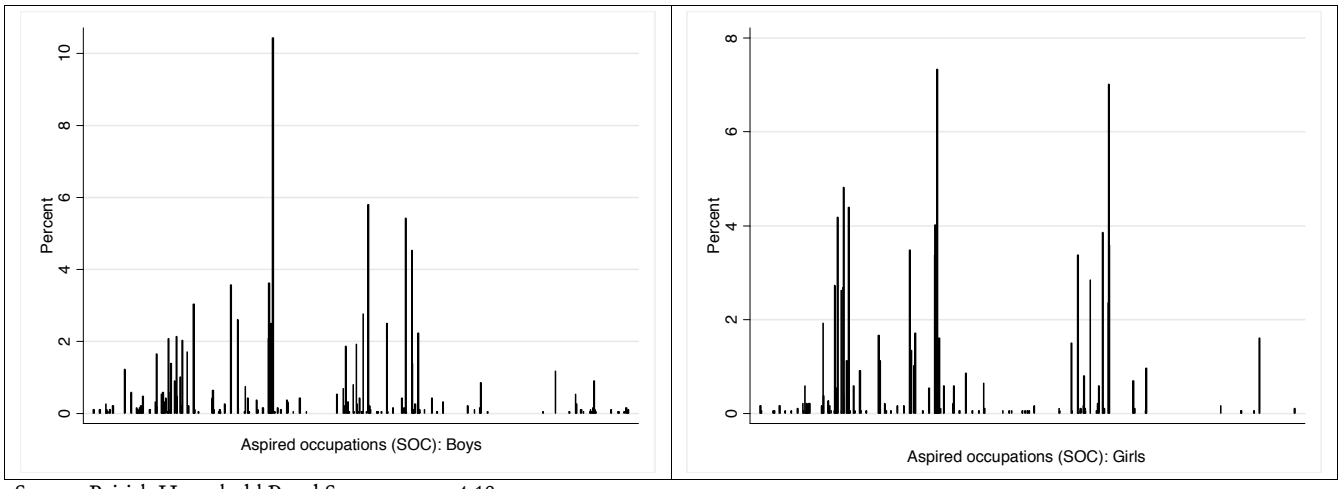
Birth year															
1979	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29
1980	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28
1981	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27
1982	Y12	Y13	Y14	Y15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26
1983	Y11	Y12	Y13	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	Y3	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	
1	**J**	**15**	Not asked	Not asked	always	**Police officer**	**Yes**	**always**	**X**
2	J	11	Not asked	Not asked	Not asked	Actress	Yes	Missing	
2	L	13	Actress	Yes	Not asked	Actress	Yes	Missing	
2	**M**	**14**	Actress	Yes	Not asked	**Actress**	**Yes**	**Missing**	**X**
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	
3	**N**	**15**	Teacher	No	Sometimes	**Teacher**	**No**	**Sometimes**	**X**
4	Q	11	Air pilot	Yes	Not asked	Air pilot	Yes	Always	
4	**R**	**12**	Air pilot	Missing	Always	**Air pilot**	**Yes**	**Always**	**X**

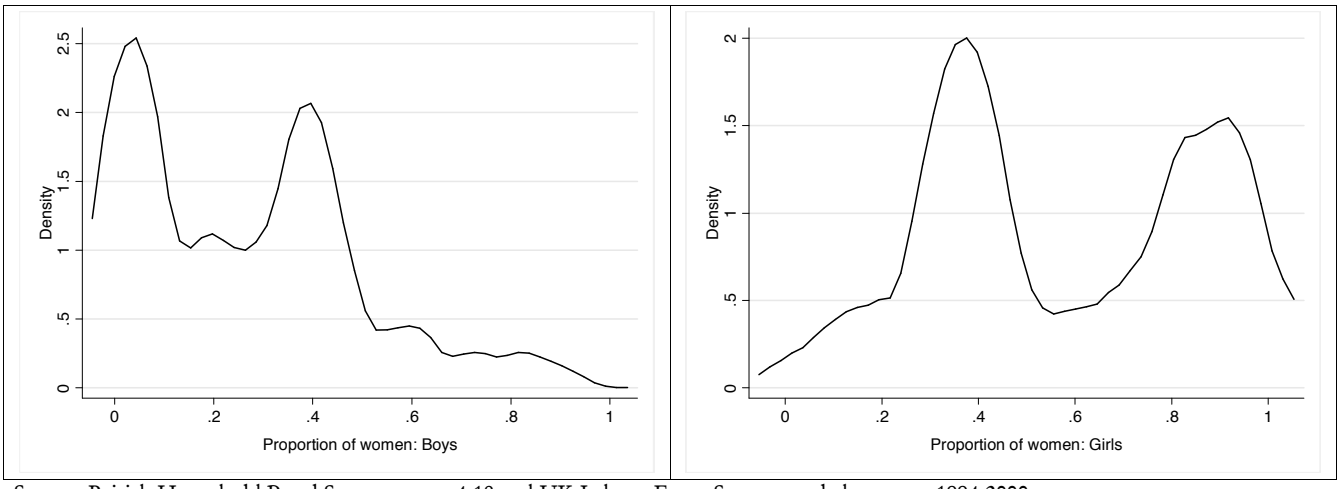
Note : These cases are illustrative only and do not represent genuine respondents and their responses. Bold indicates the information carried through to the analysis sample.

Figure 3: Distribution of aspired occupations, SOC



Source: British Household Panel Survey waves 4-18.

Figure 4: Kernel density distributions of the proportion of women in aspired occupations



Source: British Household Panel Survey waves 4-18 and UK Labour Force Survey pooled quarters 1994-2000.

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

	Socialization				*Personality Traits*	
Channels	Parental Socio-Economic Status	Parental Occupation	Parental Domestic Behavior	Parental Gender Attitudes	Child Motivation	Child Self-Esteem
Mechanisms	-Influences on occupational aspirations via primary and secondary effects	-Imitation -Behavioral sex-role learning	-Behavioral sex-role learning	-Ideological transmission	-Ambition effect: Self-direction lead children to aim higher in the occupational hierarchy by increasing their attainment prospects -Autonomy effect: Self-direction increases the capacity to make independent choices	
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)* *-Sex-typicality in parental occupations increases children's homo-lineal sex-typing (H3a)*	*- Traditional distribution of housework increases children's sex-typing (H3b)*	*-Parents' traditional gender attitudes increase children's sex-typing (H4)* *-Ideological transmission more likely for older children (H4b)*	*- Self-direction traits –net of family influences– increases occupational ambition hence reducing sex-typing (H5a)* *- Self-direction traits –net of family influences– decrease sex-typing in occupational aspirations at different levels of the aspired occupational hierarchy (H5b)*	

57

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 laborers
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.

59

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	13.21	4.15	5.00	18.00	3040
Age	14.51	1.13	11.00	16.00	3040
Absent father	0.23	0.42	0.00	1.00	3040
total number of siblings	0.97	0.92	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	1.85	1.34	0.00	4.00	3040
Leave school at 16	0.15	0.36	0.00	1.00	3040
Mother looking after home	0.13	0.34	0.00	1.00	3040
Housework hours difference	12.68	12.91	-53.00	75.00	3040
Mother occupational segregation	2.23	0.82	1.00	3.00	3040
Father occupational segregation	2.22	0.79	1.00	3.00	3040
Homo-lineal occupational match	0.02	0.14	0.00	1.00	3040
Hetero-lineal occupational match	0.01	0.08	0.00	1.00	3040
Mother's gender ideology	0.00	0.55	-1.85	1.81	3040
School motivation	15.57	7.02	-20.00	20.00	3040
Self esteem	0.32	0.47	0.00	1.00	3040
Conscientious father	0.23	0.42	0.00	1.00	3040
Conscientious mother	0.25	0.43	0.00	1.00	3040

Note: statistics weighted to account for sample design and non-response.
Source: British Household Panel Survey Waves 4-18.

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

	(1)		(2)		(3)	
	Basic		Full model		Plus wage control	
	Base: girl	Base: boy	Base: girl	Base: boy	Base: girl	Base: boy
Boy	-0.296***		-0.357***		-0.688***	
	(0.0321)		(0.0563)		(0.0533)	
Girl		0.296***		0.357***		0.688***
		(0.0321)		(0.0563)		(0.0533)
Age	-0.00180	-0.00638	-0.00540	-0.00566	0.00557	-0.00323
	(0.00722)	(0.00624)	(0.00706)	(0.00611)	(0.00548)	(0.00587)
Father's education (Ref=none)						
University			-0.113***	0.0362	-0.0220	0.0417+
			(0.0307)	(0.0232)	(0.0235)	(0.0228)
A' level			-0.0967***	0.0399*	-0.0414*	0.0422*
			(0.0256)	(0.0192)	(0.0199)	(0.0191)
O' level / CSE			-0.0658**	0.0111	-0.0461*	0.0125
			(0.0242)	(0.0188)	(0.0179)	(0.0187)
Intend to leave school at 16			0.0770**	-0.0993***	-0.0163	-0.108***
			(0.0298)	(0.0159)	(0.0226)	(0.0163)
Mother looking after home			0.0230	0.00868	-0.0186	0.00932
			(0.0250)	(0.0175)	(0.0183)	(0.0175)
Homolineal job matching			0.155***	-0.0883*	0.103***	-0.0987**
			(0.0379)	(0.0349)	(0.0269)	(0.0358)
Heterolineal job matching			-0.248***	0.272***	-0.207**	0.248***
			(0.0689)	(0.0759)	(0.0702)	(0.0742)
Mother job segregation (Ref=atypical)						
Intermediate			0.0718***	-0.00904	0.0438**	-0.0116
			(0.0207)	(0.0166)	(0.0157)	(0.0166)

Typical			0.0616***	0.000327	0.0415**	-0.00206
			(0.0180)	(0.0153)	(0.0141)	(0.0151)
Father's job segregation (Ref=atypical)						
Intermediate			-0.00554	-0.00614	0.00713	-0.00413
			(0.0277)	(0.0218)	(0.0219)	(0.0214)
Typical			-0.0127	-0.0294+	-0.0263	-0.0294+
			(0.0207)	(0.0162)	(0.0160)	(0.0160)
Housework distribution			0.000346	-0.00116*	-0.000108	-0.00121*
			(0.000706)	(0.000541)	(0.000507)	(0.000530)
Mother's gender ideology			0.0141	0.00784	0.00460	0.00469
			(0.0144)	(0.0110)	(0.0111)	(0.0109)
School motivation			-0.00277*	-0.000790	-0.0000756	-0.000416
			(0.00127)	(0.000893)	(0.00108)	(0.000904)
Self-esteem			-0.0473**	0.0294*	-0.0244+	0.0315*
			(0.0177)	(0.0124)	(0.0143)	(0.0123)
Conscientious father			-0.0126	-0.00666	-0.0146	-0.00928
			(0.0196)	(0.0148)	(0.0157)	(0.0147)
Conscientious mother			0.0143	0.00670	0.00138	0.00488
			(0.0174)	(0.0135)	(0.0133)	(0.0134)
Average wage in occupation					-0.0444***	-0.00532**
					(0.00124)	(0.00166)
Absent father			-0.0966	-0.0496	0.00207	-0.0544
			(0.125)	(0.0380)	(0.0391)	(0.0379)
Number of siblings			-0.00471	0.000591	0.00253	0.000773
			(0.00876)	(0.00661)	(0.00675)	(0.00661)
Older brother			-0.00106	0.0178	-0.0219	0.0168
			(0.0175)	(0.0136)	(0.0139)	(0.0135)
Older sister			0.00723	0.00904	-0.00674	0.00648
			(0.0179)	(0.0143)	(0.0141)	(0.0142)
Constant	0.593***	0.297***	0.674***	0.317***	1.054***	0.366***

	(0.0351)	(0.0320)	(0.0495)	(0.0413)	(0.0409)	(0.0448)
Observations	3,040	3,040	3,040	3,040	3,040	3,040
Adjusted R^2	0.280	0.280	0.320	0.320	0.487	0.487

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 education (non-significant).

Table 5: Model estimates exploring age interactions and cohort effects

	(1)		(2)		(3)	
	Occupational imitation and age interaction		Mother's gender ideology and age interaction		Cohort pre 2004 v 2004 onwards	
	Base: girl	Base: boy	Base: girl	Base: boy	Base: girl	Base: boy
Boy	-0.328*** (0.0490)		-0.331*** (0.0490)		-0.361*** (0.0563)	
Girl		0.328*** (0.0490)		0.331*** (0.0490)		0.361*** (0.0563)
Age					0.00178 (0.00670)	0.00165 (0.00543)
Older (fifteen plus)	0.0233 (0.0197)	-0.0158 (0.0155)	0.0210 (0.0194)	-0.0121 (0.0153)		
Later cohort					**-0.0256* (0.0104)**	**-0.0256* (0.0104)**
Father's education (Ref=none)						
University	-0.113*** (0.0307)	0.0329 (0.0231)	-0.113*** (0.0307)	0.0348 (0.0232)	-0.114*** (0.0310)	0.0332 (0.0231)
A' level to degree	-0.0960*** (0.0256)	0.0380* (0.0192)	-0.0959*** (0.0256)	0.0387* (0.0192)	-0.0958*** (0.0257)	0.0394* (0.0192)
O' level & CSE	-0.0647** (0.0243)	0.00933 (0.0187)	-0.0654** (0.0243)	0.0105 (0.0188)	-0.0643** (0.0243)	0.0113 (0.0188)
Intention to leave school at 16	0.0761* (0.0298)	-0.0994*** (0.0158)	0.0781** (0.0298)	-0.0987*** (0.0158)	0.0773** (0.0296)	-0.0976*** (0.0157)
Mother looking after home	0.0248 (0.0249)	0.00850 (0.0174)	0.0246 (0.0250)	0.00834 (0.0175)	0.0201 (0.0250)	0.00908 (0.0174)
Homolineal job matching	0.250*** (0.0533)	-0.196*** (0.0330)	0.155*** (0.0390)	-0.0862* (0.0348)	0.157*** (0.0385)	-0.0802* (0.0365)
Older by job matching	**-0.135+ (0.0711)**	**0.155** (0.0508)**				

Heterolineal job matching	-0.258*** (0.0666)	0.272*** (0.0725)	-0.246*** (0.0655)	0.269*** (0.0736)	-0.248*** (0.0720)	0.265*** (0.0733)

Mother's job segregation (Ref= atypical)						
Intermediate	0.0712***	-0.0100	0.0708***	-0.00971	0.0708***	-0.0116
	(0.0207)	(0.0166)	(0.0207)	(0.0166)	(0.0207)	(0.0167)
Typical	0.0613***	-0.000338	0.0611***	0.00000658	0.0601***	-0.00196
	(0.0179)	(0.0153)	(0.0180)	(0.0153)	(0.0181)	(0.0153)
Father's job segregation (Ref=atypical)						
Intermediate	-0.00428	-0.00639	-0.00301	-0.00574	-0.00523	-0.00533
	(0.0277)	(0.0217)	(0.0278)	(0.0218)	(0.0278)	(0.0216)
Typical	-0.0136	-0.0284+	-0.0131	-0.0300+	-0.0121	-0.0286+
	(0.0207)	(0.0161)	(0.0208)	(0.0162)	(0.0208)	(0.0162)
Housework distribution	0.000379	-0.00119*	0.000380	-0.00118*	0.000394	-0.00123*
	(0.000705)	(0.000540)	(0.000705)	(0.000540)	(0.000710)	(0.000532)
Mother's gender ideology	0.0139	0.00562	0.0137	0.0184	0.0153	0.00624
	(0.0144)	(0.0110)	(0.0264)	(0.0196)	(0.0143)	(0.0111)
Older by mother's gender ideology			**0.00137**	**-0.0160**		
			(0.0303)	**(0.0231)**		
School motivation	-0.00282*	-0.000727	-0.00276*	-0.000765	-0.00281*	-0.000662
	(0.00127)	(0.000896)	(0.00127)	(0.000895)	(0.00127)	(0.000889)
Self esteem	-0.0463**	0.0287*	-0.0451*	0.0290*	-0.0494**	0.0265*
	(0.0178)	(0.0123)	(0.0178)	(0.0123)	(0.0178)	(0.0122)
Conscientious father	-0.0143	-0.00616	-0.0142	-0.00624	-0.0135	-0.00824
	(0.0196)	(0.0148)	(0.0196)	(0.0148)	(0.0197)	(0.0148)
Conscientious mother	0.0132	0.00565	0.0134	0.00586	0.0118	0.00739
	(0.0174)	(0.0135)	(0.0174)	(0.0135)	(0.0175)	(0.0135)
Constant	0.634***	0.305***	0.634***	0.303***	0.655***	0.294***
	(0.0441)	(0.0356)	(0.0441)	(0.0357)	(0.0451)	(0.0349)
Observations	3,040	3,040	3,040	3,040	3,040	3,040
Adjusted R^2	0.320	0.320	0.320	0.320	0.318	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; standard errors are adjusted for repeat observations within households. Models 1-3 control for absent father, N of siblings, R's has an older brother and R's has an older sibling (non-significant), and include a dummy for missing observations on father's education (non-significant) as well as wave dummies.