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Explaining Persisting Gender Inequalities in Aspirations and Attainment: An Integrative Developmental Approach

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ABSTRACT
Major strides have been made regarding educational and occupational opportunities for women. Yet women continue to be paid less than men, even for doing the same task. Furthermore, men and women tend to pursue different subject courses and occupations, with women being under-represented in certain fields, especially science, technology, engineering and maths. This is thus not the time to become complacent. A number of explanations for persisting gender inequalities have been put forward, including gender essentialism, socialisation experiences and the choices men and women make, as well as downright discrimination. In this paper I introduce a integrative developmental approach model of motivated choice and behaviour and take a complex systems view to argue that for a better understanding of and response to persisting gender inequalities one has to take into account multiple influences that occur over the life course. Early experiences in the family and school contexts cumulate to shape self-concepts, choices and behaviours which in turn become part of the gendered social world. Gender differences become apparent in early childhood and are re-created through everyday social relations with significant others as well as by interactions with the wider social context. Small biasing effects can accumulate across different situations and over time, leading to distinct behavioural pathways for men and women who might have similar capabilities and social backgrounds. To instigate change in perceptions and behaviour it is important to raise awareness of existing inequalities, and to foster equality-promoting policies and institutional reform.

KEYWORDS
Gender differences; aspiration; attainment; life course; gender; STEM

Explaining Persisting Gender Inequalities in Aspirations and Attainment: An Integrative Developmental Approach

Understanding gender differences in aspirations and attainment requires the consideration of multiple variables that interact in complex iterative and non-linear ways. The paper introduces an integrative developmental approach system holistic developmental model bringing together assumptions from psychology, sociology and systems theory, offering a framework to address the interdependence and developmental dynamics of relationships between the individual and society. This approach is inspired by my experiences as a clinical and developmental psychologist recognising the direct and indirect effects of socio-economic disadvantage on the development of self-concepts as well as on emotional, behavioural and psycho-social functioning. Gender, class and ethnicity continue to shape socialisation processes as well as access to opportunities and life chances. Recognising the intersections of disadvantages and how they develop over time and in context enables us to develop an alternative way of addressing questions about gender inequality that traditional approaches have not yet resolved.

INTRODUCTION

In this paper I report on the latest findings regarding gender differences in aspirations and attainment, using evidence from experiences at different stages of the life course. The goal is not to review the literature in detail, but rather to highlight findings from previous research that can contribute to our understanding of gender inequalities and how they develop in context, with a particular focus on gender differences in STEM educational and career choices. An integrative developmental–contextual system model is introduced that recognises the multiple influences shaping the gender gap in aspirations and attainment and the dynamics of development. I argue that for a better understanding of and response to persisting gender inequalities one has to take into account multiple causes of influence that occur over the life course. It is not sufficient to focus on any single factor or process, such as individual preferences or choice, owing to the interlinked and dynamic nature of human development that is embedded in a changing socio-historical context. Early experiences in the family and school contexts cumulate to shape self-concepts, choices and behaviours which in turn become part of the gendered social world that impact and mould individual experiences and perceptions. An integrated effort is needed that addresses the complex system of multiple interlinked inequalities that occur at different stages of the life course.

In the first section of the paper I outline an integrative developmental–contextual approach, a complex systems model, for the study of motivation and behaviour. I then discuss different explanations offered to account for persisting gender inequalities in aspirations and attainment and how these inform the model. The developmental processes involved in shaping individual aspirations and attainment are embedded in a wider socio-cultural context, and are linked to socialisation experiences in the family and school contexts, opportunity structures, social

barriers and gender segregation in the labour force. Different factors shape the outlook and experiences of men and women, and their influence can vary for different outcomes or at different stages of the life course. The interplay of these factors reflects cumulative socialisation experiences, calling for a holistic developmental–contextual life-course approach.

COMPLEX SYSTEMS: A DEVELOPMENTAL–CONTEXTUAL APPROACH FOR THE STUDY OF MOTIVATION AND BEHAVIOUR

In order to gain a better understanding of persisting gender inequalities in attainment, it is vital to learn more about the interlinkages between structural constraints and the formation of individual values, attitudes and capabilities. For that reason it is important to examine experiences of attainment, career choices and career development in context and over time. A useful integrative framework for studying gendered pathways and decision making draws on assumptions developed within an ecological systems perspective (Bronfenbrenner, 1979), life course theory (Elder, 1998) and Eccles' socio-cultural expectancy–value model of motivated choice (Eccles, 1987, 1994, 2009). Integrating these approaches can provide a better understanding of the dynamic interplay between social structures and individual preferences, values and expectations over time and in context (Schoon & Eccles, 2014). The integrative complex systems approach is an explicit developmental model, conceptualising the interplay between social structures and individual agency over time, taking into account the multiple and interlinked influences and transactions shaping individual lives. The systemic developmental approach allows us to gain a holistic understanding of the multitude of variables that combine in complex and non-linear ways.

In his ecological systems theory, Bronfenbrenner (1979) emphasises the need for the non-reductionist analysis of individual behaviour requiring the simultaneous description of several spheres of influence, thereby moving beyond simple cause-and-effect explanations of behaviour. His system model is informed by the notion of self-regulating developing systems, which are open to and interact with their environment, which had been advanced by Ludwig von Bertalanffy (1968). Living systems are understood as a unified whole where most levels are interrelated and are characterised by self-activity and historicity. Examining the system in which development takes place, Elder (1998) incorporated the principles of human agency, bi-directional person–environment interactions and historicity in his life-course approach, emphasising the embeddedness of human development in social structures and historical change. The life-course perspective focuses on the role of social structure and the wider macro-economic and political context as a constitutive force in development, while the expectancy–value model formulated by Eccles (2008) examines the underlying psychological (or micro-level) processes in more detail. Eccles' study of achievement-related trajectories and academic motivation and achievement is informed by the life-course approach. Because individuals are nested within complex social systems that include multiple levels of functioning, human development involves complex mediated and moderated processes that operate at many different levels (Eccles, 2008, p. 232). To gain a better understanding of why men and women prefer certain subjects to others, or

why they pursue a particular course of study or work, requires us to take into account multiple factors and how these interact and develop over time and in context.

EXPLAINING PERSISTENT GENDER INEQUALITIES IN ASPIRATIONS AND ATTAINMENT

Explanations of persisting gender differences in career choice and attainment refer to gender essentialism, socialisation theories, outright gender discrimination and political processes.

Gender Essentialism

The assumption of *gender essentialism* is based on the notion that men and women are innately and fundamentally different in their interests and skills (Charles & Bradley, 2009; Ridgeway, 2009). Evolution is understood to have primed women to have different lifestyle preferences from men, and to make different choices. These fundamental differences, such as prioritising families over careers and preferring work that involves people and not things, are supposed to start in the very structure of the human brain (Baron-Cohen, 2003). This view of essential gender differences in the mind does, however, take attention away from continuing gender inequalities that are due to structural discrimination (Fine, 2010; Halpern et al., 2007). Furthermore, assuming that men for example have a higher aptitude in maths or spatial ability than women because of innate, biological factors implies that these differences are fixed and cannot be changed, and that the scarcity of women pursuing maths-related careers is an inevitable fact. There is, however, no consistent evidence of a mean difference in maths ability for men and women [male and female students], and on average women [or female] are performing as well as men [or male students] in maths (Schoon & Eccles, 2014). There are gender differences at the right tail of the maths ability distribution, where men are doing better than women (Halpern et al., 2007), yet this gap is not fixed and is changing over time and across nations, and is dependent on environments and prevailing stereotypes and gendered expectations (Ceci, Ginther, Kahn & Williams, 2014). For example, cross-cultural differences in maths ability are large compared to gender differences within countries. The findings thus suggest influences from the wider socio-historical context and dynamic person x environment interactions.

Developmental Processes

Research addressing the question of the relative contribution of biological and environmental factors in shaping gender differences in cognitive abilities often looks for differences very early in life. It is assumed that the earlier gender differences are identified, the more likely they are to be biological in origin, since newborns have had only little exposure to social interactions. However, the assumption that early gender differences are less affected by environmental effects does not rule out environmental influences. For example, the uterine environment affects the development of the fetus and the role of prenatal environmental factors underlines the interaction between biological and environmental variables, which often become

indistinguishable in their effects (Halpern et al., 2007). Furthermore, developmental timelines for biological processes shaping the timing of puberty and aging are also influenced by the environment. Against this background the empirical evidence suggests that men and women develop equally well regarding early cognitive skills that relate to quantitative thinking and knowledge of objects in the environment (Ceci et al., 2014; Halpern et al., 2007). However, by the end of elementary school, girls tend to be performing better on assessments of verbal abilities, especially if assessments involve writing and language use, while boys excel at certain visual–spatial tasks.

During secondary school, when making their career choices young men and women consider their absolute level of ability less than their profile of abilities and their preferences and values (Eccles, 2009; Wang & Kenny, 2014). Young women tend to be more balanced in their ability profiles than young men (Halpern et al. 2007), opening up more choices, which might be one of the reasons why they are less likely than males to choose mathematics- or science-related courses and careers, even if they are good at maths. Adolescence, however, is also a time when gendered patterns in preferences begin to diverge. For example, examining the predictive power of teenage job aspirations for later entry into science-related occupations in a nationally representative sample, Bagnoli and colleagues found that among boys aspiration to a job in the sciences increases with age, while for girls it increases between ages 11 and 12 but after that it decreases (Bagnoli, Demey & Scott, 2014). Teenage aspirations to become a scientist, in turn, are associated with entry into a science career at age 28, highlighting the importance of early choices, which can have long-term consequences (Bagnoli et al., 2014). Moreover, young women are already aware of the gendered division of paid and unpaid labour and gender inequalities in family-related responsibilities. While boys see careers in science as a positive advantage for their future status as family breadwinners, girls see SET careers as something to embark on before starting a family (Bagnoli et al., 2014). Thus anticipated gender differences in future career opportunities can influence career choices. Furthermore, lifestyle values (i.e. work–family balance) play a role in shaping career decisions and choice of college major, in addition to family background, personal aptitude patterns, academic ability and self-concepts, occupational values and interests (Wang & Kenny, 2014).

The Science Pipeline

Women have made steady progress in recent years in entering STEM courses at university and maths-intensive occupations (Ceci et al., 2014). For example, in the US important gains were made regarding women entering undergraduate STEM degrees. Between 1966 and 2006 the percentage of bachelor's degrees earned by women more than doubled in the biological and agricultural sciences (from 25 to nearly 60%), nearly tripled in chemistry (from 18 to 52%), and quadrupled in physics (from 5 to 21%) (Hill, Corbett & St Rose, 2010). These numbers could even be increased, if attrition especially at the very early stages of the career could be addressed. A disproportionate fraction of qualified women drop out of science careers during the very early stages. For example, a survey of chemistry doctoral students conducted in 2006 by the Royal Society of Chemistry in London found that

more than 70% of first-year female students said that they planned a career in research; by their third year, only 37% had that goal, compared with 59% of males (RSC, 2008). This attrition was explained by factors inherent in the job, lack of passion, or the difficulty of combining work and family life.

The pipeline leakage continues at later career stages, although the leakage depends on the discipline being entered. For example, in the US, in the field of biology women comprised 36% of assistant professors, yet only 27% of tenured faculty (National Research Council, 2010), while in engineering the rate of female tenured faculty is around 10% compared to 25% associate professors. Moreover, women are less likely than men to be deans, directors or department chairs and female scientists earn on average less than male scientists, although there are again differences by disciplines (Ceci et al., 2014).

When studying gender differences in attainment it is thus important to specify the domain under consideration. Gender gaps in attainment are not homogeneous across disciplines. Moreover, selection of a STEM occupation is shaped by early influences, such as one's profile of abilities, individual preferences and choices during adolescence, support from parents, teachers and peers, as well as the wider socio-cultural context in which skills are acquired and manifested. Summarising the most recent available evidence on women in science careers comprising early childhood factors and later experiences, Ceci et al. (2014) argue that the list of potential causes of the under-representation of women in science leaves occupational preferences, participation in advanced science courses during high school, choice of college majors and the impact of children as key explanatory factors.

Socialisation Processes

Over the past 30 years, many researchers have contributed to new insights into the underlying processes associated with gender differences in motivation, attainment and career choice. Among these, Eccles' expectancy–value theory provides one of the most comprehensive theoretical frameworks for studying the psychological and contextual factors underlying both individual and gender differences in maths and science academic motivation, performance and career choice (Eccles, 1987, 1994, 2009). Drawing on insights associated with identity formation, achievement theory and attribution theory, expectancy–value theory conceptualises STEM career pathways as a series of choices and achievements that commence in childhood and adolescence. Achievement-related behaviours such as educational and career choice are influenced by two sets of beliefs: the individual's expectations of success and the importance and value the individual attaches to the various options that are perceived to be available.

These beliefs are shaped by ongoing interactions with the environment and significant others, by socialisation pressures and cultural norms, and by one's interpretations and memories of these experiences, individual capabilities and characteristics. For example, in the preschool context, variations in girls' and boys' experiences with and attitudes to same- and other-sex peers play an important role

in children's peer relationships and stereotyping (Fabes et al., 2014). In elementary school there is evidence to suggest that teachers' gender-stereotypical perceptions of children's abilities may affect their grading practices (Kriesi & Buchmann, 2014), and that teachers' perceptions of ability and effort predict children's ability self-concepts in maths and reading (Upadyaya & Eccles, 2014).

Generally women and girls tend to underestimate their abilities, especially in maths and science, and to have lower expectations of success (Wang & Kenny, 2014). Such gender differences in self-perceptions exist despite the fact that, on average, young women do just as well as young men in maths- and science-related courses. Differences in self-concepts, in turn, can serve as a critical filter regulating interest in and pursuit of different occupations and courses. When individuals feel confident that they can learn and be successful in a particular subject area they are more likely to engage with and persist in the subject, which, in turn, is associated with increased academic achievement and course taking (Eccles & Wigfield, 2002). There is, for example, evidence to suggest that males and female students who believe that most people can be good at maths are more likely to declare a STEM major, taking into account family social background, ethnicity, and academic experiences in high school (Perez-Felkner, McDonald & Schneider, 2014).

Notably, self-perceptions and expectations of success are malleable and not fixed, and can be influenced by interventions or experiences in one's surroundings (Harackiewicz, Rozek, Hulleman & Hyde, 2012; Hulleman & Harackiewicz, 2009; Wang & Degol, 2013). Eccles and her colleagues suggest that teachers, peers and parents can create opportunities for students to engage in a variety of activities, for example through educational experiences, special programmes, etc. which provide them with information and feedback about their competencies and capabilities (Eccles, 1993; Eccles, Early, Frasier, Belansky & McCarthy, 1997; Eccles & Roeser, 2011). These experiences, in turn, accumulate to inform the development of competence beliefs and subjective task values, as well as educational and occupational aspirations and choices.

Regarding decisions to sign up for specific maths and science courses required to continue with science-related courses in post-secondary education, it is important that students, and in particular female students, receive support for their decision from teachers, their friends and their family (Perez-Felkner et al., 2014). In a study of high-achieving men and women who have completed the necessary secondary-school STEM pipeline courses, Perez-Felkner and her colleagues could show that for female students course taking is not sufficient to keep them in the STEM pipeline. Young women need to be engaged in high school and be supported by their family, friends and school staff in order to proceed. These findings again highlight the importance of the wider social context in influencing career decisions.

Gender Discrimination

Experiences of gender discrimination are another explanation for female under-representation in STEM careers. Discrimination has its roots in stereotypes, or judgments about the abilities or attributes of individuals based on their membership

of a social group. Gender stereotypes, for example, comprise widely held beliefs regarding abilities or activities in which men or women are more likely to excel, or activities in which they should or should not participate. For instance, in a randomised double-blind study it could be shown that faculty members rated a male applicant as significantly more competent and hireable than the (identical) female applicant. They also selected a higher starting salary for and offered more career mentoring to the male applicant (Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2013). Looking at actual hiring statistics, however, the assumption of discrimination could not be sustained (Ceci et al., 2014), suggesting that the hiring process, usually involving larger committees, can mitigate the effects of implicit bias among some of the committee members. However, even though overt gender discrimination may not explain female under-representation in science occupations, perceived discrimination stemming from negative stereotypes might. This differentiation between overt and implicit discrimination is also reflected in the distinction between vertical segregation (referring to inequalities in pay or upward mobility) and horizontal differences, referring to the concentration of men and women in specific occupations and/or labour market segments due to gender-specific educational and occupational preferences (Charles, 2011). While vertical segregation has declined, horizontal segregation is more resistant to change.

From a young age, girls tend to be alienated by science. It is not one factor but the confluence of many influences including gender stereotypes, socialisation processes and discrimination that lead women away from an interest or persistence in a science career. Other factors, such as family socio-economic background and ethnicity, also play a significant role, illustrating the intersection of multiple disadvantages in young people's lives. Students from less privileged socio-economic family backgrounds are doing less well in maths than their more privileged peers (Coley, 2002), and are less likely to take maths and science classes during post-secondary education or to enrol in science courses at university (Gorard & See, 2009). Regarding ethnicity, there are variations in attainment by cultural context. For example, in the US context, African American students who have completed the secondary-school pipeline courses are more likely to declare a STEM major in college than their white and Asian peers (Perez-Felkner et al., 2014). The same study by Perez-Felkner and colleagues showed that African American men were more than twice as likely as white and/or Asian males to continue in the STEM pipeline. The odds for declaring a STEM major were lower for Latinos/Hispanics, especially men. However, evidence from the National Center for Education Statistics suggests that in 2009/10 white students obtained 70.5% of all STEM bachelor degrees, while African Americans obtained only 8.3% and Hispanic students only 6.8% (Wang & Degol, 2013). Furthermore, among African Americans 64.3% of women compared to only 35.7% of men obtained a STEM bachelor degree, suggesting a gender gap favouring females.

These findings suggest that for a better understanding of gender differences in STEM participation it is important to consider the multiple socio-cultural factors that can affect self-perceptions, educational and career choices and attainment. Moreover, it is important to focus on discriminatory practices at younger ages when children develop their ability self-concepts and their academic and career interests,

starting even before preschool. Individual decision making and choice has to be understood against the backdrop of socio-cultural constraints and opportunities. Although individuals may choose from among several options, they often do not consider the full range of available options, as they might not be aware of possible alternatives and/or do not have enough (or have inaccurate) information about the options or regarding opportunities of achieving (Eccles, 2008, 2009). Understanding the persisting gender differences in aspirations and attainment requires a broad view of the options available to both men and women and how these are perceived and evaluated at different life stages, and in different socio-cultural and historical contexts.

Political Processes

Major advances have been made regarding educational and occupational opportunities for women following organised feminist pressure for gender equality in the 1960s (England, 2010). The proportion of women in further and higher education has grown persistently and women are overtaking men in their academic motivation and the level of qualifications obtained. Women are now also more strongly attached to the labour market, including women with small children (Schoon, Martin & Ross, 2007). Moreover, women are increasingly represented in professional and managerial jobs, and in some countries women are taking on the role of main breadwinner in the family, indicating a remarkable change in general gender roles (Crompton, 2006; Cunningham, 2008). Yet gender inequalities in the division of labour within the household persist, with women taking on the lion's share of unpaid core household and care responsibilities. Moreover, there is a persistent gender pay gap.

Examining gender differences in socio-economic attainment among men and women born in the first half of the 20th century, McMunn and colleagues could show that non-normative family forms, such as never having lived with a spouse or partner or not having children, were associated with higher socio-economic attainment for women, but with lower attainment for men (McMunn, Webb, Bartley, Blane & Netuveli, 2014). Women who defied the stereotypical pathway of becoming a mother and homemaker were more likely to enter higher education, participate in the labour market and reach professional positions than those who complied with the prevailing norms. They reported worse physical health in older age however, although parenthood was not associated with levels of wellbeing in later life. For these older cohorts of men and women, gender inequality in education and occupation was deeply entrenched, and reduction in gender inequality was not obtained by a gentle shift over the course of the century but was the result of a relatively swift and dramatic social and political change starting in the 1960s.

What does it take to change perceptions and values, and for individuals to engage in political action to instigate change? Exploring young people's beliefs and perceptions of gender equality across 28 countries and their association with willingness to engage in political action, Hoskins and Janmaat (2014) found that willingness to engage in political activity was stronger among young people who believe in gender equality and at the same time perceive reality as not matching up

with their ideal. However, perceptions of gender inequalities are independent of beliefs in gender equality, actual levels of gender equality in the different countries, and economic development. In the different countries, Hoskins and Janmaat (2014) argue that in order to instigate change it is important to raise awareness of existing inequalities, even in highly developed countries. In fact, Sweden, which has taken a leading role regarding gender-equality policy and practice, was the only country where more than 50% of young people combined beliefs about inequality with perceptions of inequality, suggesting higher levels of awareness of gender inequalities than in other countries.

To break the slow pace of cultural change it is necessary to apply external pressure by raising awareness of persisting inequalities and offering alternatives. For example, while women have incentives to move into gender-non-traditional activities and positions, the same does not apply to men. It is not often the case that men are encouraged into fields in which they are under-represented. In the UK, for example, it would take just over 15,000 extra female students to balance the male dominance in all types of engineering, while in subjects allied to medicine, including nursing, the number of extra men needed is close to 30,000 (UCAS, 2014). Encouraging more men to enter female-dominated domains would open a new perspective regarding the valuation of predominantly female activities. Supporting men in taking up subjects where they are under-represented may be just as important a tactic for addressing gender imbalance in STEM as encouraging women into STEM directly. One issue to consider here is that, although wage growth is generally lowest for those who move to a primarily female-dominated occupation, there is evidence from the Swedish register data (2001 and 2003) that the highest wages for both men and women are earned in sex-integrated occupations (Magnusson, 2013). Thus, instead of expecting women to behave like men, it would be beneficial for both sexes if more men could be encouraged to behave like women.

CONCLUSIONS

Without major external forces, such as the feminist movement in the 1960s, cultural climates tend to change slowly. Differences in the status of women, especially regarding career choices, the division of household responsibilities, and differences in paid and unpaid labour are still engrained in our society and continue to play a powerful role in shaping the career development of men and women. Gender differences in aspirations and attainment are always inextricably bound with other societal systems of difference, such as class and ethnicity (Eccles, 2008; Ridgeway & Correll, 2004). The life course is to a considerable degree a personal construction, but also entails selective processes and a sifting and sorting of people into different contexts, where individual lives are continually produced, sustained and changed by the social context they encounter. The aim of this paper is to raise awareness of the complex interplay of individual and structural forces that shape occupational choices and behaviour.

A person’s position in society continues to be assigned to a considerable extent by his or her family’s social position by gender and ethnic background, and is

reinforced through interactions in the family, at school, at work, and in the wider socio-historical context. Early experiences in the family and school contexts cumulate to shape self-concepts, choices and behaviours which in turn become part of the gendered social world. Gender differences become apparent in early childhood and are re-created through everyday social relations with significant others as well as by interactions with the wider social context. Small biasing effects can accumulate across different situations and over time, leading to distinct preferences and behavioural pathways for men and women who might have similar capabilities and social backgrounds. To address persisting gender inequalities it is necessary to understand the multiple and interlinked processes involved. It is not sufficient to focus on or target any single factor or process, such as individual preference or self-concept. Lives are lived in context and over time. A systemic developmental approach that accounts for multiple influences, ranging from the micro- to the macro-level context, allows us to adopt a holistic view and to move towards a better understanding of how different factors are connected and how they influence each other over time.

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