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ARTICLE

A cross-cultural study of children's graphic representations of men- and women-dominated occupations

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Abstract

Occupational gender stereotypes develop from early age and contribute to occupational gender imbalance. Previous research used questionnaires or interviews to investigate children's explicit stereotypes and where drawings have been used, mostly men-dominated occupations have been considered. This study used drawings and interviews to assess implicit stereotypes of both men and women-dominated occupations and whether children's sex, age and cultural background predicted these stereotypes. Two hundred and forty-three 6-to-7-year-olds and 10-to-11-year-olds in Britain and Argentina-encompassing both Global South and Global North perspectives- drew five human figures: (i) person of their choice, (ii) dancer, (iii) nanny (iv) firefighter and (v) pilot. In interviews, children confirmed and justified their gender choices for each drawing. Results indicate gender stereotypes in children from both countries, especially towards women-dominated occupations. Girls exhibited more rigid gender views than boys. These findings suggest widespread and culturally consistent occupational gender stereotypes, potentially limiting children's future job choices.

KEYWORDS

age, children, culture, drawings, gender equality

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Statement of Contribution

What is already known on this subject?

- Occupational gender stereotypes develop early in life, contributing to occupational inequalities.
- Previous research predominantly used questionnaires or interviews to explore children's explicit stereotypes.
- When drawing tasks were used, studies often focused on men-dominated occupations.

What the present study adds?

- We investigated children's stereotypes using drawings and interviews for men and women-dominated occupations.
- Data from Britain and Argentina showed culturally consistent gender stereotypes, particularly in 'women's' jobs.
- Girls' and older children's drawings show rigid gender views; interviews reveal age-based stereotype shifts.

INTRODUCTION

This study investigates children's occupational gender stereotypes in both men and women-dominated occupations and whether children's age, sex[1] and culture predicted children's views. It is important to understand children's beliefs about the relationship between occupations and gender identities (e.g., men as 'suitable' firefighters) as these stereotypes can prevent children from considering a wide range of options when choosing a future career (Arthur et al., 2008; Liben & Bigler, 2002; Masters & Barth, 2022; Vervecken et al., 2013; Weisgram et al., 2010).

Most research on sex differences in children's gender-related perceptions of occupations relies on data from questionnaires and interviews (Baker et al., 2016; Canessa-Pollard et al., 2022; Gettys & Cann, 1981; Levy et al., 2000; Miller & Budd, 1999) and showed mixed results across children's age and sex. For example, Miller and Budd (1999) asked British 8-year-olds, 12-year-olds and 16-year-olds who should do a range of jobs (e.g., police officer and dancer) and found that girls were more open-minded in their perceptions of occupational gender stereotypes than boys. Moreover, although boys persisted with their gender stereotypes across age groups, girls' fixed views decreased from 12 years of age. Twenty years later, these views among British children were still very similar (Canessa-Pollard et al., 2022). However, not all findings have been consistent. Baker et al. (2016) reported that even younger girls—North American 3- to 6.5-year-olds- can show rigid views while young boys believed all genders could perform the occupations presented.

One potential explanation for these contrasting results is that when responding to interviews to measure social attitudes, children may answer questions in a way that they think will please the interviewer (Cann, 1993). Additionally, interviews tend to elicit an explicit understanding of the phenomenon (O'Reilly & Dogra, 2017). Therefore, an interview combined with an alternative task could be beneficial to gather reliable and valid data on children's occupational gender stereotypical beliefs.

[1]We will use the term 'sex' here as this (rather than gender) is the information recorded by the schools who took part in the study, and we did not have parental consent to check with children whether this was in line with their perceived gender. When discussing children's depictions, we will use the term 'gender' instead as these were children's intentional graphic productions, and gender choices were confirmed in interviews.

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Drawing tasks

In the present study, an arts-based methodology was used, as children were asked to draw a person performing a selection of occupations. This has great potential, as participants were not directly being asked about the gender of the person; therefore, they may be less likely to draw a figure of a specific gender to please the researcher. Despite these advantages, most previous studies have only used a drawing methodology to examine children's perceptions of men-stereotyped occupations and activities, including sportsperson (Colley et al., 2005), computer user (Brosnan, 1999), politician (Bos et al., 2021) and scientist (for a review see Miller et al., 2018). This bias in the literature on stereotypes as barriers to girls' and women's engagement with men-dominated occupations may be explained by the efforts made to empower women in recent decades (Halpern et al., 2007). However, men's and boys' engagement with women-dominated occupations have received considerably less attention.

Using drawing-based methodology, children's drawings of men-stereotyped occupations have gathered consistent evidence that children draw more men than women. For instance, Colley et al. (2005) found that most 9-to-11-year-olds' British boys drew men after being requested to 'draw someone who does a lot of sport'. Meanwhile, only about half of 9-year-old girls and about one-third of 11-year-old girls drew women sportspersons.

This tendency to draw men when asked to depict human figures conducting men-dominated occupations contrasts children's general tendency to depict same-gender figures when asked to draw a picture of a person (Wieder & Noller, 1950). This suggests that children's drawings are influenced by occupational gender stereotypes Nevertheless, mixed findings across samples are also prevalent when using drawing methodology. Some studies suggest this is particularly true for boys (Christidou et al., 2016) and that these tendencies increase with age (Miller et al., 2018). However, an interaction between age and sex was found by Colley et al. (2005) and Bos et al. (2021), where girls from 11 years of age were more likely to demonstrate rigid views towards the gender of sportspeople and politicians, respectively, than boys. Moreover, an exploration of children's perceptions of women-dominated professions is still needed, as no previous research has examined the relationship between children's age and sex and their perceptions of both women-dominated and men-dominated occupations using drawing tasks.

Furthermore, little attention has been given to cross-cultural differences in children's occupational gender stereotypes using drawing methodologies, with most studies being conducted in the Global North (Bos et al., 2021; Brosnan, 1999; Colley et al., 2005). When cross-cultural differences were investigated, only drawings of scientists have been considered (Christidou et al., 2016; Farland-Smith, 2009).

It is also worth noting that although drawing tasks can be useful in assessing children's gender occupational stereotypes, children's depictions could either indicate an endorsement of occupational stereotypes (i.e., children's belief in the validity of the stereotype) or they could reveal children's knowledge of gender segregation in real life (Devine, 1989; Farago et al., 2020; Serbin et al., 1993; Signorella et al., 1993; Wood et al., 2021). According to Developmental Intergroup Theory (Bigler & Liben, 2006, 2007), stereotype knowledge develops through repeated exposure to pairings of social categories with traits and behaviours (e.g., 'Women are better babysitters than men'), particularly by the child's carers.

Nevertheless, awareness does not necessarily equate to stereotype endorsement (Devine, 1989). To capture a better understanding of children's perceptions of men-dominated occupations, Samaras et al. (2012) combined drawing methodology with follow-up semi-structured interviews to explore 9-to-11-year-olds' views on scientists. The results revealed that most girls drew women rather than men as scientists, while boys drew men. Nevertheless, interviews showed that children tended to consider science as both a men's and women's profession, suggesting that drawings demonstrated knowledge rather than an endorsement of the gender stereotype for this profession. Meanwhile, Bos et al. (2021) reported that, in line with the decreasing number of women politicians depicted by children with age, participants, particularly girls, showed stereotype endorsement by being less likely to describe politicians using feminine traits when interviewed about their drawings.

From a developmental standpoint and consistent with Developmental Intergroup Theory (Bigler & Liben, 2006, 2007), previous studies showed that while stereotype knowledge tends to increase with

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cultural exposure (Hayes et al., 2018; Serbin et al., 1993; Wood et al., 2021), stereotypical endorsement tends to decrease as children's views become more flexible over time (Trautner et al., 2005; Wood et al., 2021). Nevertheless, the latter depends on the gender differences in their environment (Bigler & Liben, 2006, 2007; Eagly & Wood, 2011). The distinction between knowledge and endorsement is crucial in stereotyping research, as these components have a differential effect on individuals' behaviour (Wood et al., 2021).

The current study

The current research seeks to address fundamental gaps in the existing literature by conducting a cross-cultural investigation into the gender representations in children's drawings of occupations traditionally associated with not just men but also women. It also explores whether factors such as the participant's sex, age and cultural background predict their gender stereotypes.

Since there is general agreement that occupational gender stereotypes tend to be evident by primary school age (e.g., Miller et al., 2018), drawings were completed by children in two age groups: 6-to-7 year-olds and 10-to-11 year-olds. These correspond to the beginning and end of primary school education in the cultures selected for this study.

Children in Britain and Argentina completed the drawings. By including both Global North and Global South perspectives in our study, we aimed to provide a comprehensive and inclusive account of children's development of occupational stereotypes. Despite efforts to promote gender equality in Argentina (Tabbush et al., 2020), national Catholic groups strongly resisted education on gender and sexuality for children, using the slogan 'Con Mis Hijos No Te Metas' ('Do Not Mess with My Children') and claiming it imposed a 'gender ideology' on young children (Gregis Estivalet & Dvoskin, 2022). Furthermore, single-sex schools and gender separation in mixed schools still exist in Argentina, and gender separation has been linked to gender salience in pupils (Wong et al., 2018). In contrast, in the UK, there are few single-sex schools, and segregation based on gender in mixed schools is not allowed under the Equality Act (2010). While the UK might have an advantage in promoting gender equality due to its legal framework, rising sexist behaviours in British schools (Ofsted, 2021), the underrepresentation of girls and women in STEM fields (Science and Technology Committee, 2023) and the decreasing but persistent gender pay gap (Office for National Statistics, 2023) indicate ongoing challenges.

Our research used a drawing-based methodology and follow-up interviews. This is informed by the evidence that using multiple drawing tasks in combination with other techniques provide more detailed and reliable data on children's occupational gender stereotypes (Mason et al., 1991; Symington & Spurling, 1990). Specifically, in our study children were asked to depict a human figure (HF), followed by people from two men-dominated (pilot and firefighter) and two women-dominated (dancer and nanny) occupations. After making these depictions, children took part in a short-structured interview focusing on confirming the gender of the figures drawn and their reason for their gender choices. In accordance with previous research (Bos et al., 2021; Samaras et al., 2012) interviews were used to confirm whether children's drawings reflect stereotype knowledge or endorsement.

In line with previous studies, we have tested the following hypotheses:

1. Women will be more frequently portrayed as dancers and nannies, and men as pilots and firefighters. Meanwhile, children would draw their sex when asked to depict a HF of their choice.
2. Age and sex will predict children's depictions. Nevertheless, due to conflicting evidence about the role of these factors in occupational gender stereotypes, no definitive direction for the expected findings can be stated.
3. Given the different characteristics of educational systems in these cultures, children from Britain would have more flexible views on men and women-dominated occupations than those of children from Argentina.

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4. Children from the younger group will be more likely to justify their gender choices by endorsing stereotypes, while older children will be more likely to justify their depictions by demonstrating stereotype knowledge.

METHOD

Participants

Table 1 shows the demographic information from the participants. Half of the children were recruited from primary schools in Stoke-on-Trent, England and half of them from primary schools in Rosario, Argentina. Both samples were demographically comparable on SES. Headteachers at five schools in the United Kingdom and two schools in Argentina -allowing for a comparison between Global North and Global South perspectives – permitted the research to take place in their schools. Letters to parents/guardians informing them of the research and asking for permission for their child to take part were sent home with all children from these schools who were in the appropriate age groups. For children to take part parents had to return signed consent forms to the schools. Prior to the research, assent was gained from all participating children. Ethical approval for the study was granted by Staffordshire University, United Kingdom.

Materials and procedures

The drawing tasks took approximately an hour to complete and were administered during class time, at the convenience of the participating schools, with the researcher present. Participants were encouraged to make the drawings their own, not to copy or discuss their ideas with others. All children were given five blank sheets of paper and coloured pencils and were instructed to draw: (a) a human figure (HF) of their choice, (b) a person whose job is to dance ('una persona cuyo trabajo es bailar'), (c) a person whose job is taking care of children ('una persona que trabaja cuidando niños') (d) a person who works extinguishing fire ('una persona que trabaja apagando incendios') and (e) a person who flies an aeroplane ('una persona que pilota/maneja un avion') All four occupations are a selection and adaptation of the jobs used by Miller and Budd (1999). The selection was based on occupations that are familiar to children of both age groups and cultures and represent stereotypical traits for women and men. Lastly, unlike Miller and Budd (1999), we only used job descriptions instead of job titles to aid children's understanding and to avoid the use of gendered language (this was important, as Argentinians are Spanish speakers and Spanish is a gendered language).

Participants were instructed to draw a full-body figure in all cases and were given 10 minutes to complete each drawing. Participants were asked to provide a name for the figures they depicted and to write

TABLE 1 Demographic details of the cross-cultural sample ($N = 243$).

		Age		Sex	
Country of residence	**Age group**	**M**	**SD**	**Girls**	**Boys**
Argentina	6–7 years old	6.6	0.3	28	32
	10–11 years old	10.5	0.3	29	31
	Total Arg.			57	63
United Kingdom	6–7 years old	6.8	0.4	33	28
	10–11 years old	10.6	0.3	28	34
	Total UK			61	62
	Total sample			118	125

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it on the drawing. This was done to facilitate the gender coding. All children drew the human figure of their choice first, the order of the remaining drawings was counterbalanced. The reduce potential effects of researchers tried to mitigate the effect of social desirability bias by not watching participants directly while they drew and by highlighting that there were no right or wrong answers.

After completing the drawings, children were interviewed individually by a researcher. In the interview and for each their drawings, children were asked: did you draw a woman, a man or someone else here? (*¿Dibujaste una mujer, un hombre o alguien más acá*?) and why did you draw a (¿Por qué dibujaste un/a) [mention children's choice]? During these short interviews (<10 min) the researcher either wrote down the child's responses verbatim (Argentina sample) or an audio recording was taken for subsequent verbatim transcription (British Sample).

Coding

Two outcome variables were examined: the gender identity depicted in pictures (i.e., woman, man or non-binary), and the justification children provided for the gender portrayed on each drawing in the interviews. Prior to the drawing task and interviews, the cultural background of the child (UK or Argentina) was recorded, and the participant's teachers' provided data on the children's age group (6–7 or 10–11) and sex.

To collect data for the gender identity depicted each drawing was assessed on: Whether a man, a woman had been drawn, or whether the gender was non-binary. In line with previous research (e.g., Jolley et al., 2016) all the drawings, as they tend to require more interpretative work, and 20% of the interviews ($n = 48$) were rated by two coders who were uninformed of the children's personal characteristics. Interrater reliability was high for the outcome variable (i.e., gender depicted: Cohen's $\kappa = 0.947$, (95% CI, 0.91 to 0.98), $p < .001$). Disagreements were resolved by discussion and consensus obtained between the coders. No differences were found between the gender coded and the confirmed gender choices retrieved during the interviews. Figure 1 shows examples of pictures within each occupational category.

Interview transcripts from the Argentinian sample were translated into English by the first author, a native Spanish speaker. All transcripts were coded for possible sources of children's gender choices for each picture. An inductive content analysis was used to generate data-sensitive categories, which, therefore, reflected children's justifications. All the justifications given by the children were collated into single list. The first author and a research assistant then independently grouped these justifications into codes and subsequently broader categories of why specific genders had been chosen for the figures drawn. Once the categories were generated, the data was coded for the presence or absence of each category by the first author and a research assistant. Interrater reliability was high for children justification of the gender depicted across all drawing types (HF of their choice: $\kappa = 0.768$ (95% CI, 0.63 to 1), $p < .001$; dancer, $\kappa = 0.910$, (95% CI, 0.82 to 1) $p < .001$; nanny, $\kappa = 0.937$, (95% CI, 0.85 to 1), $p < .001$; firefighter, $\kappa = 0.940$, (95% CI, 0.94 to 1) $p < .001$; pilot, $\kappa = 0.911$ (95% CI, 0.82 to 1), $p < .001$). Children's verbal responses were subsequently coded into one of four mutually exclusive categories:

a. 'Real Life'—participants used personal experience to justify gender choices. They relied on what they see in the Media, what their family and friends do and like and conclusions about what they observed in their daily life ('I usually see woman nannies in schools', 'My dad is a pilot'), reflecting stereotype knowledge.
b. 'Gender stereotypes'—participants relied on generalized beliefs about gender. They provided stereotypes about a certain gender identity or a reaffirmation of their own sex ('Because girls do other things like not drive the airplane, they serve food and take care of people'; 'Because dancers are girls'), demonstrating stereotype endorsement.
c. 'Equality'—participants suggested that they would have drawn a figure of any gender, as everyone is capable of doing the job. Alternatively, participants justify their choice by the lack of representation

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FIGURE 1 Examples of drawings across occupations. From left to right, top to bottom: a dancer, a nanny, a firefighter and a pilot.

their chosen gender had within the target occupation. ('[Pilot] Girls should have a turn'; 'I wasn't thinking. It could be a boy or a girl, there is no difference').

d. Non-Explanatory—participants did not provide an answer or the answer was vague or irrelevant ('I don't know'; 'He wears brown and red').

Data analysis

First, preliminary analyses were performed to explore the data structure, outliers and missing data. All variables had less than 3% missing data. Since the proportion of missing data is small, and neither patterns in the data nor issues with their distribution were identified, missing data was dealt with by excluding these cases from the data analyses. No outliers were found in the data set.

To examine differences in gender depicted and their justifications, Cochran's Q tests were conducted. Potential associations between the above-mentioned outcome variables and the predictors (i.e., children's sex, age group and culture) were examined using binomial logistic regressions. The gender depicted in the drawings was incorporated as an additional predictor for regression analyses with justifications as an outcome variable.

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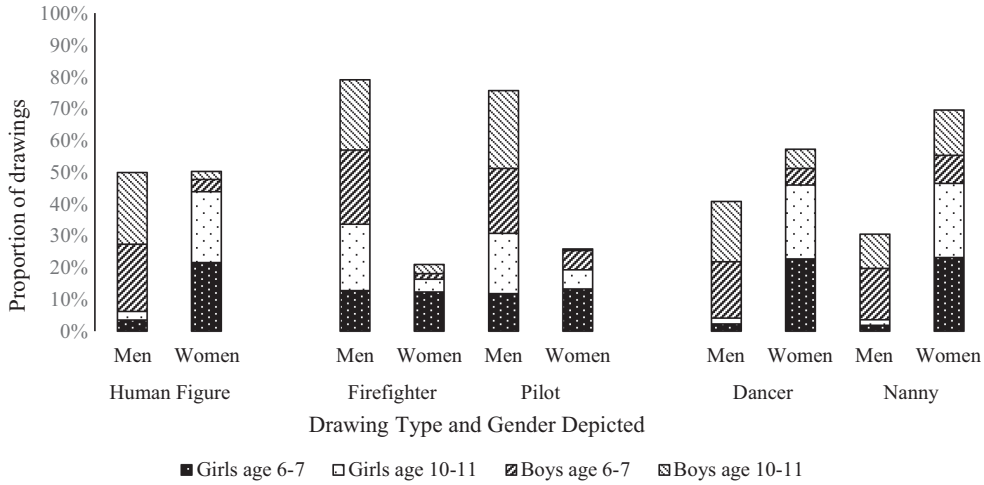

FIGURE 2 Gender depicted in each drawing type by drawers' sex and age. Due to the low samples for 'non-binary' genders, only women and men were considered for the main analyses of this study. Culture has not been included in this figure to simplify the interpretation as cross-cultural differences between groups were not found.

RESULTS

Gender depicted

Figure 2 shows the proportion of drawings of each type which showed men compared to women. A Cochran's Q test assessing within-subject differences revealed a statistically significant difference in the proportion of men and women depicted across drawing types, $\chi^2(4) = 87.406$, $p < .001$. Pairwise comparisons showed that women were more likely to be depicted in drawings of women-dominated occupations rather than men-dominated (all ps $< .001$). Conversely, men were more likely to be depicted for men-dominated occupations than women-dominated (all ps $< .001$). In addition, the proportion of women and men depicted in the HF of their choice drawings differed significantly from the one observed in all occupation drawing types (all ps $< .001$), in line with gender stereotypes (i.e., more women as nannies and dancers while more men for pilots and firefighters). When no specific occupation was depicted, children were more likely to draw a person of their sex.

Five binomial regression analyses, one for each type of human figure drawing, were conducted with gender depicted in the picture as the outcome variable (with drawings of men depicted as reference category) participant's sex, age group and culture as categorical predictors. The omnibus tests of model coefficients revealed that all the models produced had significantly better fit than the baseline models (all ps $< .001$) and the variance predicted ranged from 28% and 55%, except for the Pilot drawing, whose model explained 19% of the variance and the Hosmer-Lemeshow test indicated it did not fit the data well ($p = .02$). An outline of the results for each individual predictor, for each of the five binomial regressions, can be found in Table 2. Sex was a significant predictor of the gender depicted in the drawings with boys being more likely to depict men across all drawing types, while girls varied their gender choices according to gender stereotypes. Age was also a significant predictor in the men-dominated occupations (firefighter and pilot), with 10-to-11-year-olds being more likely to draw men than the 6- to 7- year-olds. For the women-dominated occupations age was only a significant predictor for the drawings of nanny, with again the older children being more likely to depict women. The children's cultural background did not predict the gender depicted for any of the occupations.

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TABLE 2 Pooled results of binomial logistic regressions examining the factors that are linked to the gender depicted in children's drawings.

	Coeff	SE	OR	*p*
1. HF of their choice				
Intercept	−2.239	0.440	0.107	<.001
Children's Sex (boys)	3.984	0.419	53.719	**<.001**
Age (6–7)	−0.110	0.406	0.896	.787
Culture (UK)	0.618	0.419	1.855	.141
2. Dancer				
Intercept	−0.654	0.367	0.520	.075
Children's Sex (boys)	3.556	.434	35.038	**<.001**
Age (6–7)	−0.059	0.396	0.943	.882
Culture (UK)	−0.782	0.402	0.457	.052
3. Nanny				
Intercept	−0.161	0.330	0.625	.851
Children's Sex (boys)	2.786	.428	16.224	**<.001**
Age (6–7)	0.710	0.357	2.033	**.047**
Culture (UK)	−0.683	0.355	0.505	.054
4. Firefighter				
Intercept	−1.836	0.461	0.159	<.001
Children's Sex (boys)	1.941	0.461	6.963	**<.001**
Age (6–7)	−1.478	0.392	0.228	**<.001**
Culture (UK)	0.240	0.384	1.272	.531
5. Pilot				
Intercept	−2.141	0.429	0.118	<.001
Children's Sex (boys)	1.587	0.417	4.891	**<.001**
Age (6–7)	−1.055	0.377	0.348	**.005**
Culture (UK)	0.626	0.370	1.871	.091

Note: Reference categories appear in brackets. Statistical predictors are in bold.

Abbreviations: Coeff, Coefficient; OR, odds ratio; SE, Standard Error.

Justifications for gender depicted

Figure 3 shows the frequencies of justifications provided by children for the gender depicted in their drawings. 'Non-explanatory' answers were excluded from the analysis due to their non-informative nature and 'Equality' answers due to very low samples. A Cochran's *Q* test indicated no statistically significant differences in the proportion of Real Life or Gender Stereotypes justifications for the gender depicted across drawing types, $\chi^2(4) = 5.705$, $p = .222$.

Five binomial regression analyses, one for each type of drawing, were conducted with justification for the gender depicted as outcome variable (with Real-Life justifications as reference category) and gender depicted, participant's sex, age group and culture as categorical predictors. The omnibus tests of model coefficients revealed that only two of the models produced for the justifications (i.e., HF of their choice and Pilot) had significantly better fit than the baseline models (ps < .05). In addition, the variance predicted was low, ranging from 5% to 16% (see Table 3 for full details). Age was a significant predictor in the HF of their choice, Pilot and Nanny drawings. Specifically, younger children were less likely to use Real Life justifications, hence demonstrating knowledge rather than endorsement of stereotypes depicted in their drawings. Sex only predicted justifications in the drawings of firefighters (boys were less

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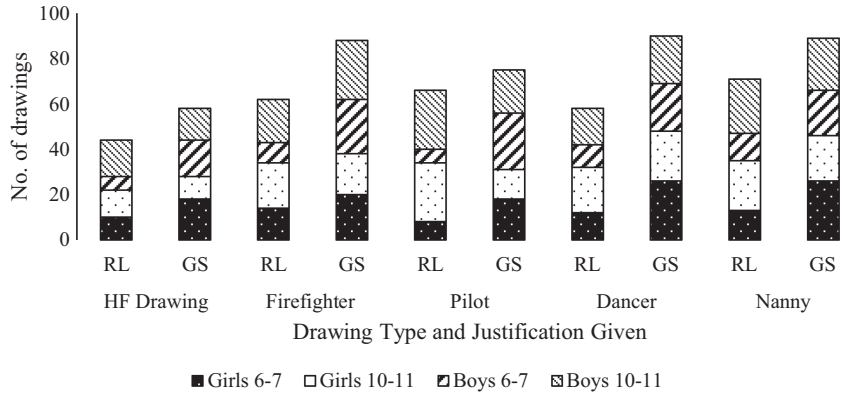

FIGURE 3 Justification for gender depicted in each drawing type by drawers' sex and age. RL, Real Life; GS, Gender Stereotypes. Culture has not been included in this figure to simplify the interpretation as cross-cultural differences between groups were only found for the HF of their choice drawing.

likely to use Real Life justifications), and British children were more likely to justify the gender depicted in the HF of their choice using Real Life justifications.

DISCUSSION

In this research we combined drawing tasks and interviews to investigate differences in the gender depicted, and the justification for the gender depicted across children's drawings of both men and women-dominated occupations. Furthermore, we analysed whether the participant's sex, age and cultural background predicted these choices. Our findings showed that children—young girls in particular—graphically represented the target occupations in line with gender stereotypes. Children's verbal justifications confirmed that these representations reflected an endorsement of gender stereotypes (Gender Stereotype justifications) in the younger age group while they only demonstrated knowledge of gender inequalities (Real Life justifications) in the older group.

In line with our predictions, we have found a gender bias in all drawings. Our results suggested that men were more likely to be depicted in drawings of men-dominated occupations and, reversely, more women were identified in women-dominated occupations. In contrast, when no specific occupation was depicted, children were more likely to draw a figure of their sex. These findings support the notion that children show fixed ideas about gender and occupations in line with previous research (e.g., Brosnan, 1999; Colley et al., 2005; Levy et al., 2000). These occupational gender stereotypes can affect career interests by discouraging individuals from pursuing job opportunities perceived as counter-stereotypical for their gender (Vervecken et al., 2013), in support of Social Role Theory (Eagly, 1987). Considering the link between occupational interests and gender stereotypes alongside the fact that the former tend to remain stable from early adolescence (Masters & Barth, 2022), the negative effect of occupational gender stereotypes can have a lasting influence. Nevertheless, and as it will be discussed more extensively later, children's justifications of gender choices showed that older children in particular were reflecting an awareness and not an endorsement of the gender differences in their environment (Bigler & Liben, 2006, 2007; Masters & Barth, 2022; Wood et al., 2021).

A closer look at the direction of the relationship between participants' sex and the gender depicted across drawing types revealed that boys were more likely to draw men across all drawing types, while girls tended to vary the gender of the figures across conditions in line with gender stereotypes. Boys' persistence to draw men is consistent with previous drawing-based studies (Brosnan, 1999; Colley et al., 2005; Samaras et al., 2012) and Colley et al. also reported that girls' drawings were more likely to depict occupations in line with gender stereotypes. However, these studies only investigated

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TABLE 3 Pooled results of binomial logistic regressions examining the factors linked to the justifications for the gender depicted (real life or gender stereotypes) in children's drawings.

	Coeff	SE	OR	*p*
1. HF of their choice				
Intercept	0.499	0.483	1.647	.301
Gender depicted (men)	0.032	0.467	1.033	.945
Children's Sex (boys)	−0.323	0.466	0.724	.489
Age (6–7)	−1.078	0.470	0.340	**.022**
Culture (UK)	1.048	0.458	2.852	**.022**
2. Dancer				
Intercept	0.571	0.434	1.770	.189
Gender depicted (men)	0.546	0.392	1.727	.163
Children's Sex (boys)	−0.208	0.377	0.813	.582
Age (6–7)	−0.557	0.374	0.573	.136
Culture (UK)	−0.280	0.376	0.756	.457
3. Nanny				
Intercept	1.070	0.488	2.914	.028
Gender depicted (men)	−0.091	0.411	0.913	.825
Children's Sex (boys)	−0.099	0.349	0.905	.776
Age (6–7)	−0.704	0.357	0.495	**.049**
Culture (UK)	−0.610	0.355	0.543	.086
4. Firefighter				
Intercept	1.417	0.485	4.124	.004
Gender depicted (men)	0.348	0.460	1.416	.449
Children's Sex (boys)	−0.857	0.408	0.425	**.036**
Age (6–7)	−0.323	0.411	0.724	.433
Culture (UK)	−0.722	0.409	0.486	.078
5. Pilot				
Intercept	1.181	0.438	3.257	.007
Gender depicted (men)	0.707	0.524	2.027	.178
Children's Sex (boys)	−0.454	0.396	0.635	.251
Age (6–7)	−1.366	0.417	0.255	**.001**
Culture (UK)	−0.124	0.370	1.871	.091

Note: Reference categories appear in brackets. Statistical predictors are in bold.

Abbreviations: Coeff, Coefficient; OR, odds ratio; SE, Standard Error.

men-dominated occupations; hence, the comparisons were limited. Furthermore, it is worth noting that these differential views were elicited by either picture-selection (Christidou et al., 2016) tasks or interviews (Miller & Budd, 1999), suggesting methodological differences. A systematic review of pictorial understanding in children concluded that interview studies only reveal children's explicit knowledge about a subject matter, while drawing tasks can enhance implicit knowledge (Vivaldi et al., 2020). Therefore, it could be that while girls' explicit beliefs show greater flexibility, their implicit beliefs may be more influenced by gender stereotypes.

A deeper examination of the drawings content could provide a better insight into the sex differences in children's drawings. Even though a content analysis of children's drawings was beyond the scope of this study, anecdotical evidence shows a tendency for boys to 'masculinize' women-dominated occupations. For example, some men nannies were depicted as teaching children how to play football and

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men dancers were more likely to be dancing to rock or hip-hop music in boys' drawings, in line with previous studies reporting that children tend to adapt gender counter-stereotypical content to align with their preconceived gender norms (Liben et al., 2001; Weisgram et al., 2010). Supported by the use of art-based methodology, these trends suggest that although children provide evidence of gender stereotypes in different ways, both girls and boys seem to be demonstrating overall gender-congruent views when depicting an array of occupations.

As for the role of age, this factor was shown to predict the gender depicted in children's drawings; specifically, older children were more likely to display gender stereotypes through their depictions than younger children. A metanalysis of the 'Draw-a-Scientist' task showed that older children's drawings tend to depict gender stereotypes more often than younger children (Miller et al., 2018), suggesting that children continue to incorporate fixed ideas about gender roles with age. Our results also align with Colley et al. (2005) and Bos et al. (2021) who reported occupational gender stereotypes towards sportspeople and politicians in drawing tasks from 11 years of age, particularly in girls. Nevertheless, children's interviews showed that younger children are more likely to justify their gender choices by endorsing gender stereotypes compared to the older group. Most children tended to switch from justifying the gender bias in their drawings from using Gender Stereotypes in the younger group ('I don't think girls can put out fires, they're scared') to decisions based on knowledge of gender inequality in Real Life in the older group ('I always see men as pilots'). This developmental change between stereotype endorsement and knowledge is supported by previous studies (Canessa-Pollard et al., 2022; Wood et al., 2021) and Developmental Intergroup Theory (Bigler & Liben, 2006, 2007).

Eagly's Social Role Theory claims that gender stereotypes are tied to social roles in an individual's community and its occupational trends across genders (Diekman & Goodfriend, 2006; Eagly, 1987). According to this theory, stereotypes are flexible to societal changes in gender division of labour. If no change occurs, gender stereotypes remain stable across the lifespan and perpetuate a segregated workforce, which could explain the pervasive gender stereotypes in children's depictions. Nevertheless, it has also been suggested that children manifest gender prejudice differently across development. In young children, prejudice may implicate a more upfront application of gender norms, in line with the rigid justifications provided by the younger group. Meanwhile, in older children, this might be linked to their understanding of status differences across genders, in accordance with Real-Life justifications prevalent in the older age group. This knowledge is much more likely to be moderated by individual differences at later stages in development (Martin & Ruble, 2010).

Finally, culture was not a significant predictor of the gender depicted in children's drawings. Despite the gender gap, there were only minimal differences between the Argentinian and the British sample. This does not support previous research; however, methodological differences could again explain the contrasting results. For instance, Farland-Smith (2009) reported cultural differences in children's drawings of scientists, but their analysis was mainly focused on the *way* these depictions were portrayed (i.e., stereotypical indicators) rather than children's gender choices. Furthermore, many of the differences in stereotypes they described had no connection to gender (e.g., North American children perceiving scientists as people who work with chemicals while Chinese students believe they work with robots). Another possible explanation for the lack of substantial cultural differences is the gender-equality paradox (Breda et al., 2020). Although further research on the role of domestic influences in children's stereotypes is needed, the elimination of traditional gender norms through egalitarian policies in wealthy countries like the UK does not seem to prevent the development of other forms of gender differentiation. This gender paradox could account for the lack of differences between the Global North nation and the Global South nation that has only recently started taking critical steps towards promoting gender equality. It also worth noting that across cultures and due to globalization, children are exposed to similar forms of entertainment which *homogenizes* their cultural experiences (Christidou et al., 2016). Finally, recent research (Shu et al., 2022) argues that some gender stereotypes are consistent across cultural contexts, but they do intersect with other factors such as race. Future research should consider additional social identities that might explain the development of gender stereotypes and use an intersectional approach for their analysis.

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Limitations

Unlike previous research we avoided choosing occupations that children are unlikely to be familiarized with until late primary school (e.g., scientists, see Miller et al., 2018). This allowed us to explore the development of gender stereotypes from 6 years of age. However, a possible limitation of our study relates to the use of job descriptions rather than job labels in our procedure. Although job descriptions were effective in controlling the use of gendered language, particularly when presenting the task to Spanish-speaking children, this might have led some children to assign less professionalism into their depictions. This was particularly true for women-dominated positions, which tended to be represented as hobbies rather than paid jobs. Women-dominated occupations were also more likely to be labelled as 'a person who dances' or 'a person who takes care of children' whereas men-dominated position tended to be labelled by the specific job title. This is crucial because occupation status influences boys' preferences for female-dominated jobs (Teig & Susskind, 2008). Gender perceptions, not biological differences, largely drive gender disparities in career choices (Halpern et al., 2007; Hayes et al., 2018; Kurtz-Costes et al., 2008; Spelke, 2005; Van der Vleuten et al., 2016; Weisgram et al., 2010; Wood et al., 2021), affecting workplace gender segregation (Correll, 2004) and the gender pay gap (World Economic Forum, 2021). Therefore, future research should use jobs with similar salaries and education requirements, as suggested by recent research (Masters & Barth, 2022) and develop interventions to encourage boys' interest in women-dominated occupations.

Furthermore, while representing gender identities that do not conform to the traditional binary categories, we have chosen to use the term 'someone else' (*alguien más*). This umbrella term is utilized as it has been suggested that non-binary identities are not always well understood or acknowledged in adults and that, consequently, children are more likely to grasp the term 'non-binary' and its connotations later in life, through media or other adults in their communities (Salinas-Quiroz & Sweder, 2023). However, we recognize that using our chosen term may inadvertently contribute to the sense of 'otherness' experienced by individuals who do not conform to traditional gender norms (e.g., Bhabha, 1983; Cameron & Stinson, 2019). Recent research has assessed children's evaluation of non-binary identities through matching tasks where human figures were portrayed as violating gender norms for appearance (Riggs et al., 2023). However, gender identity does not always equate to gender expression. Since gender is a non-binary spectrum (Cameron & Stinson, 2019), future work must shed light on children's understanding of non-binary identities and gender expression. Additionally, our cross-cultural examination would have been strengthened by an investigation of children's awareness of their specific cultural contexts and their inequalities, as recent studies argue that an understanding of social inequalities is achieved by adolescence but varies across social groups (Wray-Lake et al., 2022).

Our data were cross-sectional in nature so we are unable to make conclusions about the extent to which the gender stereotypical views of the same children may alter over time. Therefore, longitudinal research is needed to corroborate the developmental trends in children's occupational stereotypes. Furthermore, research looking at how these views may alter as children become adolescents could also provide further insight, particularly as our data was collected at a point where children had not yet transitioned to secondary school.

Conclusions and implications

Our study makes theoretical contributions around occupational gender stereotypes and its predictors while increasing methodological rigour by using more than one data collection method and investigating both female and men-dominated occupations. Our findings highlighted pervasive and culturally consistent occupational stereotypes, which have the potential to restrain children's future career choices and opportunities for professional development. Rigid gender views, particularly towards women-dominated occupations and by girls seem well established in these communities, making it challenging to question them. However, our data has the potential to inform the design of gender-inclusive educational interventions. Interventions

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that emphasize commonalities between gender identities and intra-gender diversity could be particularly beneficial in *drawing the line* against these harmful stereotypes. Furthermore, more work needs to be done to tackle both the undervaluation of women-dominated jobs and the belief that these are inherently linked to 'female' traits so that children consider them despite gender expectations.

AUTHOR CONTRIBUTIONS

Romina A. Vivaldi: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; formal analysis; data curation; project administration. **Sarah E. Rose:** Conceptualization; writing – review and editing; investigation; supervision; visualization.

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CONFLICT OF INTEREST STATEMENT

The authors have no relevant financial or nonfinancial interests to disclose.

DATA AVAILABILITY STATEMENT

The datasets generated and analysed during the current study are not publicly available due to participants not consenting to their data being publicly and freely available. However, they are available from the corresponding author upon reasonable request as consent was given for this.

ETHICS STATEMENT

Approval for the study was gained from the Staffordshire University Ethics Committee, and the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

CONSENT TO PARTICIPATE

Informed written consent was obtained for all individual participants included in the study. In addition, verbal assent was obtained from each child participant prior to their participation.

CONSENT FOR PUBLICATION

Written consent was given for each child's data being used in published work.

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