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Drawing the future: gender and future occupational aspirations of young children in Sweden

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Introduction: Research on young children's occupational aspirations and the factors shaping them is still limited, especially in early interventions addressing gender disparities in high-status fields like STEM.

Methods: This is the first study in Sweden utilizing the Drawing the Future method, surveyed 1,832 children (aged 5–13) from 28 schools in Skåne region of southern, asking them to draw their dream jobs. This exercise was conducted in a classroom setting and facilitated by their class teacher.

Results: Significant gender differences emerged, revealing distinct stereotypical patterns in children's future occupational aspirations and influencing factors. Only three occupations—footballer, doctor, and police officer—were popular among both genders. Girls preferred people- or animal-centered roles, while boys leaned toward jobs involving "things" ($p < 0.001$). Girls felt they could pursue similar careers as boys, but boys showed more skepticism ($p < 0.001$). Influence patterns also varied by gender: 25% of girls were inspired by mothers, while 45% of boys were inspired by fathers ($p = 0.02$). Beyond immediate family, girls often sought career information from acquaintances, while boys turned to media ($p < 0.001$). STEM interest was limited, with "game developer" being the only STEM job on boys' lists. Additionally, a larger proportion of boys ranked STEM subjects among their top 10 favorite school subjects, while girls preferred crafts, art, and English ($p < 0.001$).

Discussion: These findings highlight the need for early, unbiased, evidence-based career interventions and policies to broaden children's awareness of diverse job options and opportunities in the labor market.

KEYWORDS

STEM, education, gender, future, aspirations, children, Sweden

1 Introduction

The concept of aspirations has been explored extensively in various fields (Kuvlesky and Bealer, 1967; Ohlendorf and Kuvlesky, 1968; Duncan et al., 1968; Lewin, 1936; Gardiner and Goedhuys, 2020), yet research specifically focused on young children's aspirations remains limited (Ohlendorf and Kuvlesky, 1968). Most studies have concentrated on the aspirations of teenagers and adolescents, particularly regarding their future dreams, educational goals, and career ambitions (Gardiner and Goedhuys, 2020; Moulton et al., 2015).

1.1 The importance of children's future occupational aspirations and the influencing shaping them

Aspirations refer to the ambitions, goals, or desired outcomes that an individual aims to achieve through personal effort (American Psychological Association, 2015). Unlike expectations, which are more realistic or likely outcomes, aspirations represent what someone hopes to achieve (Bozzato, 2020; Khattab, 2015; La Ferrara, 2019). They are a driving force in shaping an individual's life path, influencing achievements, well-being, and societal participation beyond just socioeconomic background and innate ability (Gardiner and Goedhuys, 2020; Lekfuangfu and Odermatt, 2022). Aspirations provide direction and meaning, forming the foundation for setting life goals, planning, and orienting one's efforts toward achieving them (Seginer, 2009).

Understanding children's aspirations is crucial for insights into social mobility, educational attainment, occupational goals, and socioeconomic positioning. These aspirations reflect an individual's expectations for their future, shaped by their social context, upbringing, and the opportunities available to them.

From a sociological perspective, aspirations are seen as proxies for human choice in educational and occupational attainment, thus influencing socioeconomic outcomes and social mobility (Lewin, 1936; Ray, 2006; Robeyns, 2016; Appadurai, 2004). They offer a window into how individuals perceive and navigate their social environment and available opportunities (Appadurai, 2004).

Psychologists, on the other hand, link aspirations to psychological well-being, emphasizing how they drive behavior and social interactions (Moulton et al., 2015). Aspirations are also considered a form of capability, connected to concepts like self-efficacy (Bozzato, 2020; Bandura, 1977), locus of control (Rotter, 1966), and value-expectancy beliefs (Eccles, 2009). They can reflect intrinsic values, such as personal growth and community contribution, or extrinsic values, like wealth and fame (Deci and Ryan, 2000).

In the field of health sciences, there has been limited focus on children's aspirations, despite growing recognition of how childhood social influences affect future health and well-being. Notably, a gap between early aspirations and actual achievements in adulthood has been negatively associated with subjective well-being in early adulthood, although this effect tends to diminish later in life (Lekfuangfu and Odermatt, 2022).

Children often have well-formed ideas about their future careers (Seginer, 2009; Organisation for Economic Co-operation and Development (OECD), 2020; Chambers et al., 2018), but these aspirations are also shaped by their social context, upbringing, and the opportunities available to them (Bourdieu, 1986; Bandura, 1977). Research shows that parents' socioeconomic status and their own aspirations play a significant role in shaping their children's future goals (Lekfuangfu and Odermatt, 2022). In addition to parental influence, broader social factors, such as gender stereotypes and public policies, also impact children's aspirations (Gardiner and Goedhuys, 2020; Chambers et al., 2018; OECD Report, 2020; Baker et al., 2014; Stoet and Geary, 2022).

By the age of seven, children begin to internalize gender stereotypes, often avoiding activities or interests that are not traditionally associated with their gender (Stoddart and Turiel, 1985). Parents can unconsciously reinforce these stereotypes through the leisure activities they encourage for their daughters and sons (Cooper et al., 2009). Moreover, gender stereotypes related to intellectual brilliance or "cleverness" emerge early, with girls more likely to attribute academic success to hard work rather than innate ability (Bian et al., 2017). The impact of these early perceptions and behaviors on children's future occupational aspirations remains underexplored.

1.2 Children's future aspirations, gender, and related policies in Sweden

In Sweden, promoting gender equity is a fundamental goal of the state-funded educational system, beginning as early as preschool (Skolverket, 2023). The national curriculum explicitly states that children's opportunities and experiences should not be influenced by gender. School leadership, teachers, and support staff are all tasked with ensuring that gender equity is upheld in the educational environment. However, despite these policies, the national school inspection agency has identified several shortcomings in the implementation of these goals (Skolinspektion, 2020).

1.3 Global trends of children's future occupational aspirations

Gender differences are well-documented in high-status career aspirations, particularly in STEM (Science, Technology, Engineering, Mathematics) fields (Su and Rounds, 2015), yet there remains a reluctance to address these disparities from an early age. While these gender differences are evident across many labor market trends, especially in fields requiring advanced education, the connections between early childhood aspirations and eventual occupational outcomes are not thoroughly explored (Su and Rounds, 2015).

Understanding young children's aspirations and the factors that shape them is crucial for developing early, evidence-based policy interventions aimed at countering gender stereotypes and breaking cycles of intergenerational social inequality. Such interventions could have far-reaching benefits, contributing to the development of human capital, promoting sustainable socioeconomic growth, improving population health, and enhancing global competitiveness (Gardiner and Goedhuys, 2020; Lekfuangfu and Odermatt, 2022; Ray, 2006; Robeyns, 2016; Appadurai, 2004).

1.4 Importance of research to address young children's future occupational aspirations

Research on occupational aspirations has predominantly focused on adolescents (Kuvlesky and Bealer, 1967; Gardiner and Goedhuys, 2020; Moulton et al., 2015), leaving a gap in our understanding of younger children's aspirations (Ohlendorf and Kuvlesky, 1968). Longitudinal research indicates that students who do not express STEM related aspirations at age 10 are unlikely to develop STEM aspirations by the age of 14, consequently limiting children to pursue science subjects (Archer et al., 2013).

An international literature review on careers education indicates that career learning should begin in primary school and continue

TABLE 1 Characteristics of study variables by gender.

Study variable	All	Girls (*N* = 933)	Boys (*N* = 892)	*p*-value*
Age (mean, SD)	9.04 (1.7)	9.05 (1.7)	9.04 (1.7)	0.247
	Percent [number; % (*N*)]	Percent [number; % (*N*)]	Percent [number; % (*N*)]	
Do you want to study further after high school? (yes)	42.8% (780)	50.4% (351)	43.7% (367)	<0.001
I can do any job I want when I become an adult (yes)	69.4% (1272)	72.3% (660)	69% (606)	0.523
There will be plenty of jobs to choose from when I become an adult (yes)	73.6% (1349)	77.4% (702)	73.4% (642)	0.011
Girls and boys can do same jobs (yes)	85% (1558)	90.6% (830)	82.3% (722)	<0.001
It is good to learn English, mathematics and natural sciences for the future (yes)	81.7% (1497)	84.3% (770)	82.1% (722)	0.267
It is important to study for future jobs (yes)	80.9% (1482)	87.3% (792)	78.6% (685)	<0.001
Speak only Swedish at home (yes)	73.9% (1354)	73.3% (684)	74.3% (663)	0.256
Speak more than one language at home (yes)	10.9% (200)	13.0% (121)	8.7% (78)	0.015

p-value* differences between girls and boys, based on the Pearson Chi-square test, with the exception of age which is based on ANOVA test.

through adulthood, however high-quality research on future aspirations and what influences a young person at early age is limited (Archer et al., 2013).

To help bridge this gap, we employed the Drawing the Future (DTF) method to explore young children's future occupational aspirations and what influences them. In this study, the DTF method is applied for the first time in Sweden.

Drawing the Future is a research-based tool developed by the UK-based Education and Employers charity. This tool has been used to assess the occupational aspirations of over 20,000 children aged 6–11 years across 19 countries (Chambers et al., 2018). The DTF tool used in this study explores young people's aspirations and what influences them based on corresponds a sociological perspective (Lewin, 1936; Ray, 2006; Robeyns, 2016; Appadurai, 2004).

The general aim of this study was to explore and understand children's future occupational aspirations and the factors shaping them, with a particular focus on gender differences. This research seeks to identify children's views on school, their occupational goals, and the key influences guiding these choices, as well as examining gender-based differences in perceptions and aspirations. By analyzing these aspects, the study aims to inform strategies for promoting diverse and equitable access to STEM and other careers from an early age.

Research questions:

1 What are children's perceptions of school and their future occupations?
2 What are their occupational aspirations, particularly in relation to STEM fields?
3 Who influences their choice of occupational aspirations?
4 How do these perceptions and aspirations differ between genders?

2 Study materials and methods

2.1 Study participants, description and recruitment

A total of 1,832 children aged 5–13 years, enrolled in primary school (grades 1–5), participated in the study. These children were students at 28 schools across 14 municipalities in the Skåne region of southern Sweden.

2.2 Participants characteristics

A total of 1832 children in grades 1–5, aged 5 to 13 years completed the drawing activity, from 28 schools within 14 municipalities in region Skåne. The schools were predominantly public. The mean age of the participants were 9.04 years (standard deviation 1.7). No differences in age were observed by gender (Table 1) as indicated by the ANOVA tests.

Self-reported gender among participating children was 50.9% (N = 933) girls, 48.7% (N = 892) boys and 0.04% (N = 7) other gender. 74% stated that they only spoke Swedish, while 11% indicated that they spoke more than one language (Table 1).

2.3 Recruitment

Recruitment of the study participants study began with an invitation sent to the principals of 466 primary schools across 33 municipalities in the Skåne region. The invitation outlined the study's purpose and methodology, emphasizing that participation was voluntary. To ensure ethical compliance, three levels of consent were required: first from the teachers of the participating classes, then from the parents of the children in those classes, and finally from the children themselves. Parents and children were asked to notify the teacher, either verbally or in writing, if they chose not to participate. Due to privacy regulations, the researchers did not have access to data on the reasons for non-participation.

2.4 Drawing the future methodology

The study utilized the DTF method, which involved a drawing activity accompanied by a short questionnaire (Chambers et al., 2018). The template featured a large drawing space on one side and simple questions with open-answer fields or fixed-choice options on the front and back.

Drawing plays a pivotal role in the DTF methodology by leveraging the advantages of visual expression, providing a robust approach for young children to articulate their future aspirations. Research shows that drawing not only helps children "tell a better story," but also supports them in recalling who or what has influenced their dreams and ambitions (Hughes et al., 2016).

Drawing is also proven effective in encouraging self-expression among children who are typically shy, allowing them to voice their opinions freely without feeling pressured by researchers or teachers (Chambers et al., 2011). Furthermore, studies highlight that drawing enables children to engage with adults on their own terms, such as choosing not to maintain direct eye contact, which can help them feel more comfortable during interactions (Einarsdottir et al., 2009).

Teachers were instructed to refrain from giving any advice or guidance on what children should draw. This approach aims to minimize the risk of unintentionally influencing or biasing children's responses.

Thus, DTF methodology is considered an effective approach for exploring children's future occupational aspirations. As a universal activity that is engaging and enjoyable, it fosters inclusivity and minimizes the need for advanced verbal or written skills, making it accessible to a diverse range of children (Chambers et al., 2018).

2.5 Data collection

The data was collected by the respective class teachers in each school.

The study utilized the DTF method, which involved a drawing activity accompanied by a short questionnaire. Pupils completed a double-sided template, which was a Swedish translation and slight modification of the internationally used DTF template (Chambers et al., 2018). The template featured a large drawing space on one side and 15 simple questions with open-answer fields or fixed-choice options on the front and back (see Figure 1).

2.6 Data collection procedures

Before the activity, teachers were provided with copies of the template for their students, along with the following instructions:

1 Distribute one double-sided template to each student.
2 Encourage students to express their own ideas and thoughts. Teachers and staff were asked not to guide or influence what the students should draw or write.
3 Instruct students to draw a picture of the job they would like to have in the future. If they choose to draw more than one job

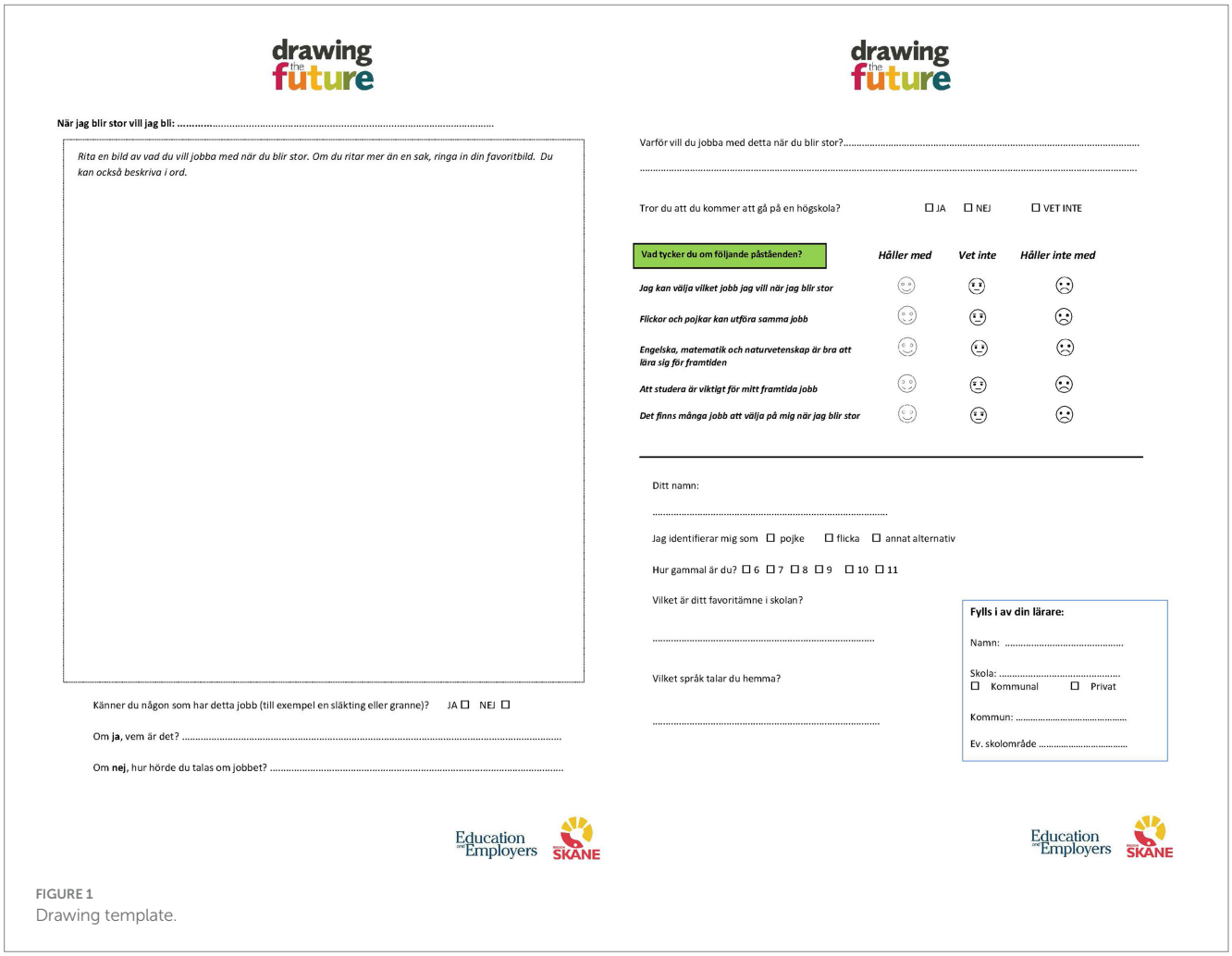

FIGURE 1
Drawing template.

TABLE 2 Favourite subject by gender.

Subject	All percent [%; number (*N*)]	Girls percent [%; number (*N*)]	Boys percent [%; number (*N*)]
Mathematics	25.8% (472)	21.9% (204)	29.8% (266)
Sports	20% (366)	14.8% (138)	25.3% (226)
Handicraft	10.5% (192)	13.5% (126)	7.4% (66)
Art	9.4% (172)	13.3% (124)	5.3% (47)
English	7.3% (134)	8.8% (82)	5.7% (51)
Swedish	5.9% (108)	7.3% (68)	4.5% (40)
Social sciences	5% (92)	5% (45)	5% (47)
Natural sciences	3.8% (70)	3.4% (32)	4.1% (37)
Musik	2.5% (45)	3.1% (29)	1.8% (16)
Break	1.5% (27)	2.2% (20)	0.8% (7)

p-value < 0.001, differences between girls and boys.

(up to a maximum of three), ask them to circle their top choice. Students may add text to their drawings if they wish.

4 Ask students to answer the questions on the template to the best of their ability. Teachers or staff could explain any concepts in the questions if needed.

The children guided by their respective class teachers were given 15–30 min in the classroom to complete the drawing activity and answer the subsequent questions. Once finished, the drawings were collected, digitized, and assigned a unique school identifier code.

Data collection took place over two periods: a 2-month phase ending in January 2023, and a 4-month phase concluded in December 2023. The initial phase served as a pilot to test the feasibility and validity of the method in a Swedish context.

2.7 Statistical analysis procedures

Information from the digitized drawings was systematically extracted into a structured database, capturing the children's stated occupational ambitions, age, gender, school, municipality, and responses to the accompanying questions. To facilitate comparison, closely related occupational ambitions (e.g., "football player" and "football professional") were standardized in an additional column. These standardized occupational ambitions were then coded according to the Swedish Standard Classification of Occupations 2012 (SSYK 2012; Statistics Sweden, 2012), which aligns with the International Standard Classification of Occupations 2008 (ISCO-08).

Descriptive statistical summaries were generated for all quantitative data, providing an overview of key characteristics and trends within the dataset. Sub-group analyses were conducted based on gender, age, languages spoken, and the primary language spoken at home. Pearson Chi-square tests (Agresti, 2002) were used to assess the statistical significance of observed differences between genders. For continuous variables such as age, ANOVA tests were applied. *p*-values below 0.05 were considered statistically significant.

For open-ended responses, a text analysis was performed using Voyant Tools, a specialized web application, to identify and compile key phrases and words (Sinclair and Rockwell, 2016). The IBM SPSS Statistics 30.0.0 software was used to perform the analyses.

2.8 Ethical considerations

The study was approved by the Swedish Ethical Review Authority (Dnr 2023–02198-01).

To maintain anonymity, the school administration was responsible for collecting, digitizing, and coding the completed drawings. The researchers accessed the anonymized digital drawings through a secure research data management server, which facilitated the creation of the dataset for analysis. All identifying information was removed during the analysis process to ensure that individual drawings and responses could not be traced back to specific students or classes. The study adhered to a four-tier consent process, ensuring that participation was both voluntary and fully informed.

3 Results

3.1 What are children's perceptions of school and their future occupations?

3.1.1 Favourite subjects at school (chi square tests)

Children most often chose mathematics (26%) and sports (20%) as favourite subjects, followed by handicraft, art and languages (Table 2). Mathematics (30%), sports (25%) and natural sciences (4.1%) were more favourite for boys than for girls (22, 15 and 3.4% respectively) Handicraft (13,5%), art (13,3%), English (8.8%) and music (3.1%) were more often favoured by girls than boys (7.4, 5.3, 5.7 and 1.8% respectively; $p < 0.001$).

3.2 Outlook for the future (chi square tests)

Children demonstrated a positive outlook for the future, regardless of gender or language spoken at home. 69% believed that

TABLE 3 Fifteen top choices of future jobs for both girls and boys.

Future Job	Frequency	Percent
Footballer	254	13.9%
Police	114	6.2%
School teacher	85	4.6%
Doctor	84	4.6%
Youtuber	86	4.7%
Hairdresser	78	4.3%
Veterinarian	70	3.8%
Animal caretaker	40	2.2%
Artist	32	1.7%
Pre-school teacher	27	1.5%
Hockey player	26	1.4%
Truck driver	25	1.4%
Horse instructor	24	1.3%
Pilot	22	1.2%
Dentist	20	1.1%
Soldier	20	1.1%

TABLE 4 Top 10 choices of future jobs for girls and boys.

Girls	Boys
Hairdresser	Footballer
Teacher	Youtuber
Veterinarian	Police
Doctor	Hockey player
Police	Gamer
Footballer	Pilot
Animal caretaker	Soldier
Preschool teacher	Car mechanic
Artist	Doctor
Riding instructor	Game developer

p-value < 0.001.

they can do any job they want when they become adults. However, more girls (77%) than (73%) boys believed that there would be plenty of jobs to choose from ($p = 0.011$; Table 1).

Both girls (84.3%) and boys (82.1%) thought that is good to learn English, mathematics and natural sciences for the future jobs. Differences by gender were not statistically significant ($p = 0.267$).

More girls (87%) than boys (79%) believed that it was important to study for future jobs ($p < 0.001$). Boys (82%) were less likely than girls (91%) to believe that girls could do the same job as boys ($p < 0.001$; Table 1).

3.3 What are children's occupational aspirations, particularly in relation to STEM fields?

Children drew 409 unique occupations that they wished to have in future (Table 3). These contained 125 of the possible 429 Swedish SSYK classifications. Footballer (13.9%) and police officer (6.2%) were the most often drawn occupations. Of the most drawn occupations, 4.7% were STEM-related (youtuber).

There were significant gender differences among children's future occupational aspirations (Table 4). Only three jobs (footballer, medical doctor, and police officer) were among the 10 most drawn occupations for both boys and girls. Game developer was the only STEM-related occupation in the 10 drawn by boys, and none were listed in the top 10 drawn by girls.

Motives for children's drawn occupations, expressed in open field text responses, were varied and many. The top five motives were (to have/it is) fun, to help others, to earn money, fondness of animals, and to care for people.

3.4 Who influences children's choice of future occupational aspirations?

38.9% of the children had a personal relation to someone that had the occupation they drew, and this was more common among girls than boys (Table 3). The father and other male relatives had more influence on children's choice of future profession than mothers and other female relatives. This applied to both those who speak Swedish and those who speak other languages at home. Results also show that girls are more influenced by their mothers and boys by their fathers regarding choosing future jobs (Table 5).

Media/online sources (20%) was the most dominating influential source after parents, while the school played only a minor role (2.8%; Table 5). Girls more often were inspired about their drawn occupation through friends/relatives (21%) and school (8%), while boys were influenced by Media/online sources (50%; Table 5).

3.5 How do these perceptions and aspirations differ between genders? (chi square tests)

Results show clear gender differences with stereotypical patterns among the children's job ambitions. Only a handful of occupations (footballer, medical doctor, and police officer) were chosen by both boys and girls to a reasonably similar extent. ($p < 0.001$; Table 3).

Girls were more influenced by their mothers and boys more by their fathers when it comes to choice future profession. The father and other male relatives generally have a greater influence on children's choice of future occupation than mothers and other female relatives ($p < 0.001$; Table 5). Girls more often receive information about the profession they wished to have through acquaintances/relatives or school, while boys more often receive information through media/online sources ($p < 0.001$; Table 5).

Girls think they can do the same jobs as boys, while boys are somewhat more often hesitant about this ($p < 0.001$; Table 1).

Regarding favorite subjects at school, a larger percentage of boys respond that they like sports, mathematics and natural sciences, while a larger proportion of girls answer that they like crafts, pictures and English ($p < 0.001$; Table 2).

Regarding preferences for further studies after high school, the desire is stronger among girls than in boys ($p < 0.001$; Table 2).

TABLE 5 Who influences children's future job aspirations? Do you know anyone personally that does the job you have chosen for the future?

	Total Percent [%; number (*N*)]	Girls Percent [%; number (*N*)]	Boys Percent [%; number (*N*)]
Do you know anyone personally that does the job that you have drawn/chosen? (yes)	38.9% (695)	41.8% (370)	38.9% (325)
p value = 0.046, differences between girls and boys.			

If you know anyone personally, who is that person?			
Which person (s) do you know?	All Percent [%; number (*N*)]	Girls Percent [%; number (*N*)]	Boys Percent [%; number (*N*)]
Mother	5.9% (109)	25.1% (91)	5.6% (18)
Father	10.5% (192)	13.3% (48)	45.1% (144)
Another woman relative	4.1% (76)	12.9% (41)	9.7% (35)
Another man relative	4.7% (87)	14.4% (52)	11% (35)
Family friends	3.7% (67)	8.6% (31)	11.3% (36)
Teacher/school	3.8% (80)	17.1% (62)	2.5% (8)
Other	4.4% (80)	11.9% (43)	11.6% (37)
Total respondents	37.2% (681)	53.2% (362)	46.8% (319)
p value < 0.001, differences between girls and boys.			

If you do not know anyone personally that has the job that you have chosen, how did you get to know about that job?			
Other sources	All Percent [%; number (*N*)]	Girls Percent [%; number (*N*)]	Boys Percent [%; number (*N*)]
Family friends	8.7% (160)	20.6% (92)	15% (66)
School	2.8% (51)	8.3% (37)	3.2% (14)
Media/online sources	20% (366)	32.7% (146)	49.9% (35)
Other (unspecified)	17.1% (313)	24.6% (140)	38.3% (171)
Total respondents	48.6% (890)	53.2% (362)	46.8% (319)
p value < 0.001, differences between girls and boys.			

4 Discussion

This study is the first in Sweden to investigate young children's perceptions and choices of future occupations, as well as the factors influencing these choices, using the internationally established Drawing the Future methodology in a large cohort.

4.1 Novel findings

The findings reveal that children remain optimistic about their future career possibilities, regardless of gender or the language spoken at home. Notably, one in 10 children believe they can pursue any career they desire as adults, showcasing a wide range of ideas regarding their future aspirations. We also found that children's choices are significantly influenced by their families and people they know, with fathers being twice as likely as mothers to shape these choices. Clear gender stereotypes emerged among the top 10 occupational aspirations, alongside statistically significant gender differences in sources of inspiration and interest in STEM-related careers. There was a distinct gender orientation in the most frequently drawn occupations: girls were more likely to choose roles involving working with people or animals, while boys gravitated towards jobs involving "things."

4.2 Our findings in relation to previous studies

These findings align with other research showing that women tend to prioritize altruistic values, such as helping others, when expressing career aspirations, whereas men are more likely to value power and economic reward (Weisgram et al., 2010). These gender differences are evident even in childhood (Blakemore et al., 2009). By age seven, children begin to understand and adopt gender stereotypes, often avoiding gender-atypical play (Stoddart and Turiel, 1985), which is reflected in their future career choices.

Moreover, other studies indicate that parents unconsciously contribute to gender socialization through activities they encourage for girls and boys, respectively (Cooper et al., 2009). The study also highlights the growing influence of non-relational sources of inspiration, with 60% of children, including about half of the boys, drawing inspiration from

media and online sources. This suggests a new paradigm of influence is emerging in society, driven by the increasing use of internet-related media at younger ages (Shychuk et al., 2022; Bozzola et al., 2022). Similar trends are being observed in other countries participating in Drawing the Future studies (Chambers et al., 2018), though not to the same extent as in this study.

The results neither strongly confirm nor contradict previous research suggesting that a realistic future orientation develops around the age of nine (Deci and Ryan, 2000), or that young children's aspirations tend to be unrealistically ambitious. While some studies have shown that children identify with adult workers and are influenced by their parents' occupations (Robeyns, 2016; Gottfredson, 2002; Hartung et al., 2005; Whiston and Keller, 2004), it appears that mechanisms of social learning, role modeling, and the transmission of values and expectations may increasingly be shaped by non-relational sources such as media and online content.

Gender differences in how children perceive their ability to achieve their ambitions are subtle but distinct. Girls' heightened interest in pursuing post-secondary education, along with the importance they place on academic achievement for future careers, may contribute to their growing confidence in attaining the same occupations as males, if they choose. Although previous research has shown that girls often have higher educational and occupational aspirations than boys (Schoon et al., 2007; Mello, 2008), this is frequently counterbalanced by lower levels of self-confidence in their abilities, particularly in traditionally male-dominated fields (Bandura, 1977; Sullivan, 2009).

On the other hand, boys' slightly greater skepticism about the value or necessity of certain levels of education is reflected in current statistics on post-secondary education enrollment (Platt and Parsons, 2017). To address these patterns, early intervention policies targeting younger children may be an effective starting point.

4.3 New contributions of this study to the existing evidence

The presence of gender stereotypes among young children in Sweden is surprising, given the nation's longstanding commitment to gender equality in early education and its top 10 ranking in international gender equality indices (World Economic Forum, 2023). This finding underscores the need to address children's career choices from an early age, as doing so is crucial for fostering positive socio-economic and public health outcomes related to equity (UN Women, 2020; Organisation for Economic Co-operation and Development (OECD), 2018).

Notably, children's future occupational aspirations in Sweden show a limited focus on STEM fields. Among the top 10 most drawn careers, "game developer" was the only STEM-related occupation, and it appeared solely on the boys' lists. Although a larger proportion of boys than girls listed STEM subjects as their favorites in school, the results do not clearly link these preferences to their career aspirations.

Some findings from this Swedish study align with international research, though often among different age groups. For instance, a large-scale study of 473,260 adolescents across 80 countries found that boys in every region were more likely to aspire to "things-oriented" or STEM careers, while girls tended to prefer "people-oriented" professions (Stoet and Geary, 2022).

In England, popular career choices among adolescents include sports, medicine, and becoming a YouTuber—results that are similar to those observed in Sweden. However, children in England show greater interest in STEM careers, though with similarly pronounced gender differences (OECD Report, 2020).

Interestingly, these gender differences tend to be more pronounced in countries with higher levels of women's empowerment, likely reflecting broader patterns of wealth and economic equality (Stoet and Geary, 2022). Globally, however, aspirations in STEM fields generally follow traditional gender roles, reinforcing the need for targeted interventions to break down these stereotypes 50).

There is a clear and pressing need for more research into early childhood aspirations and their long-term impact on adult life satisfaction, achievements, wellbeing, and societal participation (Bozzato, 2020; Salmela-Aro and Nurmi, 1997; Tuominen-Soini et al., 2008; Barcaccia et al., 2023). Such research is essential to inform policy interventions aimed at fostering positive outcomes.

4.4 Strengths and limitations of this study

This is the first unique study in Sweden to explore young children's future occupational aspirations and what influences them. This study utilizes the Drawing the Future (DTF) methodology, which provides valuable insights into children's early ambitions and inspirations.

The advantage of the DTF includes being a universal activity of drawing which is engaging and enjoyable. It fosters inclusivity and minimizes the need for advanced verbal or written skills, making it accessible to a diverse range of children (Chambers et al., 2018).

The drawing activity utilized in the DTF method has several advantages which include visual expression, providing a robust approach for young children to articulate their future aspirations. This helps children "tell a better story" and also supports them in recalling who or what has influenced their dreams and ambitions (Butler et al., 1995; Chambers et al., 2018). Drawing is also proven effective in encouraging self-expression among children who are typically shy, allowing them to voice their opinions freely without feeling pressured by researchers or teachers (Chambers et al., 2011). The drawing activity enables children to engage with adults on their own terms, such as choosing not to maintain direct eye contact, which can help them feel more comfortable during interactions (Einarsdottir et al., 2009). This minimizes the risk of unintentionally influencing or biasing children's responses from the teachers.

Our study demonstrates novel finding related to the future of work, STEM and young children's perceptions. These provide key insights in policies and interventions that engage children and planning related to labor market needs.

This study has a cross -sectional design which does not provide information on how current inspirations translate into long-term occupational roles.

We did not have information on other sociodemographic characteristics (such as, socioeconomic status, parental professional status, household characteristics, siblings), which could have created a plausible bias in the observed results.

Additionally, we did not have the data on functional variations nor reading/writing capabilities of the participants. However, according to the Swedish school curriculum, children by the age of 6 years should be able to read and write (Skolverket, 2024). Furthermore, the DTF methodology involves an inclusive drawing activity that allows children to express themselves regardless of their abilities to read or write (Chambers et al., 2018).

5 Conclusion

This research study holds substantial value for both research and practice by offering insights and actionable frameworks that bridge academic understanding with real-world applications.

This study presents a comprehensive, multi-dimensional approach to understanding children's aspirations and early motivation by integrating sociological, psychological, and behavioral perspectives. This enriched theoretical framework offers a solid foundation for future research into the impact of early education on societal outcomes, paving the way for studies that explore how young people's aspirations align with labor market demands. The DTF method—combining both qualitative and quantitative data—demonstrates a rigorous approach to examining aspirations and behavior, setting a potential standard for future methodologies in educational psychology and related disciplines. Urgently, there is a need for more research on how early childhood aspirations influence long-term outcomes, such as life satisfaction, achievement, well-being, and social engagement. Such insights could inform policies aimed at fostering positive trajectories from youth through adulthood (Bozzato, 2020; Salmela-Aro and Nurmi, 1997; Tuominen-Soini et al., 2008; Barcaccia et al., 2023; Flouri and Panourgia, 2012; Forrester et al., 2022).

The findings offer practical guidance for policymakers and educators, emphasizing the need for early, evidence-based interventions to address socioeconomic and gender disparities. Policy measures aimed at shaping future aspirations often come too late (Gardiner and Goedhuys, 2020; McKinsey Report, 2023; World Economic Forum, 2020), typically introduced during adolescence or later. Our results highlight the critical importance of early career counseling, confidence-building practices, and fostering an environment supportive of diverse ambitions. Applying these insights enables practitioners to craft policies and programs that nurture ambition, potentially reduce future unemployment, improve mental health outcomes, and contribute to sustainable development.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Swedish Ethical Review Authority (Dnr 2023–02198-01). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

SW-A: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing, Resources. MR: Data curation, Formal analysis, Investigation, Validation, Writing – review & editing. KS: Data curation, Investigation, Validation, Writing – review & editing. TN: Data curation, Investigation, Validation, Writing – review & editing. NC: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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