



**UiT** The Arctic University of Norway

Department of Psychology

## **Men's Underrepresentation in Communal Occupations**

A Social-Developmental Approach

Marte Olsen

A dissertation for the degree of Doctor of Philosophy - August 2023

## Table of Contents

<b>Acknowledgements</b> .....	<b>III</b>
<b>List of papers</b> .....	<b>IV</b>
<b>Abstract</b> .....	<b>V</b>
<b>Introduction</b> .....	<b>1</b>
The Persisting Gender Gap in the Workforce .....	3
The Development of Gender Roles .....	7
The Development of Gendered Occupational Aspirations.....	13
The Developmental Theory of Occupational Aspirations.....	13
The Model of Achievement-Related Choices .....	18
An Integrated Framework of Gendered Occupational Aspirations.....	19
Consequences of Gender Roles on Educational and Occupational Outcomes .....	21
<b>Research Aims</b> .....	<b>25</b>
<b>Summary of Methods</b> .....	<b>28</b>
Samples .....	28
Design and Analytical Strategy .....	30
Measures.....	32
Ethical Considerations and Open Science.....	33
<b>Summary of Results</b> .....	<b>35</b>
Paper I .....	35
Paper II .....	36
Paper III.....	37
<b>Discussion</b> .....	<b>38</b>

Summary of Key Findings .....	38
<b>Theoretical Implications .....</b>	<b>45</b>
Practical Implications .....	47
Limitations and Methodological Considerations .....	51
<b>Conclusion.....</b>	<b>57</b>
<b>References .....</b>	<b>58</b>
<b>Appendices .....</b>	<b>76</b>
Appendix A: Paper I – Published Article.....	76
Appendix B: Paper II – Published Paper.....	91
Appendix C: Paper III – Submitted Paper.....	101

## **Acknowledgements**

First and foremost, I would like to thank my wonderful supervisor, Sarah Martiny. We have worked together ever since my bachelor thesis, and your constant support, advice and encouragement has meant the world to me throughout this journey. I would also like to thank my second supervisor, Kjærsti Thorsteinsen, as well as all of our collaborators on the papers in this dissertation; Elizabeth Parks-Stamm, Maria Olsson, Marie Kvalø, Melanie Steffens and Ingvild M. H. Lund. I am so grateful for all of your work and support!

This project started during my time in the Student Research Program (Forskerlinje) at the Department of Psychology. I would like to thank the FL-committee for the amazing opportunity to develop as a researcher and gain the confidence to work independently with research projects during my time in the Master's program, as well as the opportunity to finalize this dissertation after graduating from the Master's program.

I also need to thank all of my family and friends for putting up with me during this time. To my parents, my brother and all the rest of my family, I still don't think you really understand what I have been working on for the past few years, but I so appreciate your unwavering support regardless. And to my partner, Sigurd, thank you for all of your support and encouragement, for keeping me grounded during this journey and for always believing in me.

## List of papers

**Paper I.** Olsen, M., Olsson, M. I. T., Parks-Stamm, E. J., Kvalø, M., Thorsteinsen, K., Steffens, M. C., & Martiny, S. E. (2022). What do I want to be? Predictors of communal occupational aspirations in early to middle childhood. *International Journal of Behavioral Development, 46*(6), 528–541. <https://doi.org/10.1177/01650254221121842>

**Paper II.** Olsen, M., Parks-Stamm, E. J., Thorsteinsen, K., & Martiny, S. E. (2023). Salary and power: How occupational status affects children’s occupational aspirations. *Journal of Experimental Child Psychology, 232*, 105667. <https://doi.org/10.1016/j.jecp.2023.105667>

**Paper III.** Olsen, M., Parks-Stamm, E. J., Lund, I. M. H, & Martiny, S. E. (2023). Who cares? Effects of gendered self-perceptions on dropout intentions in communal studies. Manuscript in revision in *Journal of Community and Applied Social Psychology*.

## **Abstract**

This dissertation addresses psychological factors that contribute to the underrepresentation of men in communal occupations (i.e., occupations associated with communal traits, e.g., nurse), based on the theoretical perspectives from the developmental theory of occupational aspirations (Gottfredson, 1981) and the model of achievement-related choices (Eccles et al., 1983). The underrepresentation of men in communal occupations is an important but underexamined aspect of gender inequality in the workforce, as there is an increasing need for workers in communal fields, and there are important individual and societal benefits of communal engagement for men. As the gender gap in the workforce is reflected in the gendered occupational aspirations of young children, we investigated this issue by using a social developmental approach. We conducted four empirical studies and report the results in three papers. In Paper I of this dissertation, we investigated the factors influencing communal occupational aspirations in early-to middle childhood and found that children's communal occupational aspirations were associated with their occupational gender stereotypes, their gendered self-perceptions and perceived status of communal occupations. In Paper II, as a follow up to the results regarding occupational status in Paper I, we conducted an experimental study and found evidence for a causal link between occupational status and occupational aspirations among both male and female elementary school children. However, additional correlational analyses showed that boys reported more agentic self-perceptions, which were related to a stronger valuation of occupational status. Lastly, in Paper III, we investigated the influence of the gendered self-concept and perceived fit on the sense of belonging and dropout intentions of students in communal degree programs and found that male students have more agentic self-perceptions than female students, which was associated with less perceived fit and less sense of belonging, as well as higher dropout intentions from their communal degree program. The consistent effects of gendered self-perceptions as well

as the causal effects of occupational status on occupational aspirations indicate that future interventions that aim to increase men's communal occupational aspirations should emphasize how communal occupations can afford agentic values, as well as promoting the status of communal occupations.

## Introduction

Ever since the second wave of feminism emerged in the 1960's, challenging traditional gender roles and promoting workplace equality have been a point of focus in feminist research and among activists and politicians. These efforts have led to substantial improvements in gender equality, especially in Western countries (i.e., Europe and the US). For example, despite being a persisting issue, the gender wage gap has decreased somewhat, where in the US, the gender wage gap was 35% in 1982 compared to 18% in 2022 (Aragão, 2023). Women are also equally represented in higher education, even surpassing men in some countries according to a report by UNESCO and Times Higher Education (2022). When it comes to gender equality in the labor market, women have increasingly entered traditionally male-dominated agentic occupations (e.g., engineering, law; Bureau of Labor Statistics as cited in Croft et al., 2015). However, the same changes in occupational choices have not been observed among men - men are persistently underrepresented in traditionally female-dominated communal work (e.g., nursing, early education; Teigen & Reisel, 2017; Utdanning.no, 2020). Despite this persisting gendered skewedness in the labor market, this is an underexamined topic in research, as most research is focused on investigating female occupational aspirations toward agentic occupations (England, 2010; Croft et al., 2015). Several researchers have argued that this lack of empirical investigation into communal occupational aspirations is caused by a general devaluation of communal work (e.g., Block et al., 2018; Block et al., 2019; England, 2010). As it was phrased by Paula England: “...*there has been little cultural or institutional change in the devaluation of traditionally female activities and jobs, and as a result, women have had more incentive than men to move into gender-nontraditional activities and positions.*” (England, 2010, p. 150). Indeed, both men and women have been found to believe that communal occupations have less societal worth than agentic occupations (Block et al., 2018). However, communal work is crucial for



societies There is a growing need of qualified workers especially within healthcare, as the increasingly aging population will put a strain on welfare systems (WHO, 2020).

Additionally, a lack of diversity in workforces can be negative, especially within healthcare. It can be beneficial for patients in both psychological and somatic healthcare to have care providers from their own social group (e.g., gender group), as they might feel more understood and supported in their needs (Fink et al., 2020; Seidler et al., 2022). These issues highlight the need for more research on the development of aspirations toward communal occupations, to understand the psychological mechanisms related to men's underrepresentation in communal occupations.

Therefore, the present dissertation will examine social and developmental factors that drive this persisting issue of men's underrepresentation in communal work. This dissertation contains three separate papers that aim to investigate causes of men's underrepresentation in communal work, both looking at developmental factors in childhood that contribute to shaping occupational aspirations, as well as social mechanisms that cause young men to disregard communal work. The studies included in the present dissertation have all been conducted in Norway, which is ranked as the second most gender egalitarian country in the world (World Economic Forum, 2023). Norway is regarded as a social democratic country with strong public welfare programs. This includes programs that are important promoters of gender equality, including subsidized childcare for children below school age and approximately one year of paid parental leave where each parent is entitled to 15 weeks of leave, whilst the rest can be freely distributed between the parents. Approximately 67% of women between the ages of 15-75 are employed (Statistisk Sentralbyrå [SSB], 2020). However, more than twice as many women than men work part time in Norway (Gram, 2022). There is also a small but persisting gender wage gap across occupations, as the average monthly wage for women was 88% of the average monthly wage for men in 2019 (SSB,

2020). Additionally, women earn on average 8.6% less than men in the same job (Penner et al., 2023). Additionally, there is a clear uneven gender distribution within many occupations in Norway, where men are particularly underrepresented in communal occupations. For example, approximately 20% of engineers and 4.5 % of pilots are female (Utdanning.no, 2020), whilst 16% of nurses and 10% of preschool teachers are male (SSB, 2021a; 2021b). Men are also clearly overrepresented in leadership in the private sector, whilst women are overrepresented in leadership positions in the public sector (Teigen & Reisel, 2017). We therefore explore the issue of men's underrepresentation in communal roles in a society that is generally regarded as having high levels of gender equality, whilst still having a gender segregated labor market. In the following literature review, I will present the issue of men's underrepresentation in communal work, whilst explaining how the development of gender roles in childhood is related to occupational aspirations and choices in adulthood.

### **The Persisting Gender Gap in the Workforce**

To attempt to explain why we observe large gender gaps in the workforce of highly gender egalitarian countries such as in Norway, Blackburn and colleagues (2001) introduced two different dimensions of gender segregation in the workforce: vertical gender segregation and horizontal gender segregation. Vertical gender segregation refers to women and men typically having different occupations where women's occupations are associated with lower status than men's occupations. Horizontal gender segregation refers to women and men typically having different occupations, where the occupations typically held by men and women are relatively comparable in status. This gender segregation is shown in women's overrepresentation in communal occupations, in contrast with men's overrepresentation in agentic occupations. Blackburn and colleagues (2001) argued that vertical gender segregation was the only dimension that reflected an inequality in society, as a presence of high vertical gender segregation would mean that women are at a relative disadvantage compared to men in

the status of their occupations. Therefore, according to Blackburn and colleagues (2001), horizontal gender segregation would simply reflect the tendency for men and women to choose different occupations, where women prefer communal occupations whilst men prefer agentic occupations (i.e., occupations associated with agentic traits, e.g., engineer). However, the presence of a large horizontal gender gap in the workforce is still problematic and a signal of inequality within a society (Levanon & Grusky, 2016). For one, horizontal gender segregation is closely linked with vertical gender segregation, as communal female-dominated occupations are often associated with lower income levels (for data from Norway see SSB, 2023). This is one explanation why, as longitudinal data suggests, this horizontal gender gap is getting smaller within typically male-dominated agentic occupations but is not changing within the typically female-dominated communal occupations (Croft et al., 2015). Men therefore have little to gain from moving into communal occupations (England, 2010). There are also societal consequences of horizontal gender segregation in communal fields. As more women are moving into agentic occupations whilst few men are moving into communal occupations, this could create a lack of workers in communal fields. This is particularly problematic as there is a growing need for workers within many communal fields, especially within healthcare. The World Health Organization (2020) estimates that there will be a lack of 18 million healthcare workers worldwide by 2030, meaning that a reducing interest from both men and women in communal occupations is a global issue. Additionally, there are both social and psychological benefits for men who pursue communal occupations. As previously mentioned, societal benefits for men's engagement in for example healthcare is that male patients can be provided care from healthcare workers from their own gender group, which has been found to be beneficial in both somatic and psychological treatment (Fink et al., 2020; Seidler et al., 2022). It has also been found that having male nurses in a workplace can create more inclusive working environments that can benefit both their colleagues and their patients

(Mao et al., 2020). There are also benefits of men engaging in early education, as children with male elementary school teachers may benefit from having more diverse role models by reducing their stereotypic beliefs (Gosse, 2011; Mancus, 1992; McGrath & Sinclair, 2013). There are also personal benefits for men who engage in communal behaviors, as men who engage in communal behavior have been found to be happier, have fewer depressive symptoms, and have better relationships with their partners and their children (Bauer & McAdams, 2010; Le et al., 2012; Le et al., 2018). Promoting male engagement in communal behavior therefore has benefits both on an individual and a societal level.

Low interest in communal occupations may also be a sign that gender inequality exists even within countries that are ranked as highly gender egalitarian. In times of women gaining more rights and more power in society, the self-descriptions of women have become more masculine whilst women were perceived as increasingly competent and intelligent compared to men by the public (Donnelly & Twenge, 2017; Eagly et al., 2020). This development of women perceiving themselves as more masculine is reflected in women's increasing pursuit of agentic occupations (Croft et al., 2015). Yet, the same change in men's self-descriptions or in the stereotypes associated with men has not been observed. On the contrary, men's self-descriptions as masculine or feminine did not change from 1974 to 2012 (Donnelly & Twenge, 2017). Additionally, men were perceived as equally agentic from 1946 to 2018 by the American public, whilst women were perceived as increasingly competent (Eagly et al., 2020). Since we observe that women are increasingly interested in agentic occupations, this is in contrast with the argument that horizontal gender segregation is caused by intrinsic differences in interests between men and women. Additionally, as both women's self-descriptions and the gender stereotypes related to women have changed over the past decades (Eagly et al., 2020), we observe that the gender norms for women have become increasingly flexible, whilst there is little evidence for change in the gender norms for men. There might be

several reasons why this is the case. For example, research suggest that manhood is seen as something precarious that can be lost (in contrast to womanhood which is viewed as innate and biological), where a man who behaves in a way that conflicts with the masculine ideal face negative responses in the form of backlash (e.g., Bosson et al., 2009; Vandello & Bosson, 2013; Vandello et al., 2008). To avoid such backlash or to regain their manhood if they feel as if they are perceived as feminine, research has shown that men adjust their behavior to make sure that they are viewed in line with the masculine ideal and that their masculinity is restored (for a review see Vandello & Bosson, 2013). Therefore, men might avoid engaging in communal behavior as a way to maintain their “manhood”. However, even though men who do not behave in line with the gender norms for men might face backlash (e.g., Moss-Racusin et al., 2010), it appears that men also overestimate the rigidity of male gender norms. Indeed, one study found that men underestimated other men’s acceptance of men having communal traits, where men who were confronted with other men’s actual normative beliefs altered their own self-descriptions in a more communal direction (Van Grootel et al., 2018). Therefore, the effect of masculinity norms on men’s disengagement can be due to a worry of being perceived in a non-masculine manner which might not actually reflect reality.

We thus see that there are several social psychological mechanisms that constrain men to a masculine ideal. Additionally, there has been a much larger effort made to increase women’s interests for agentic occupations (e.g., occupations within STEM), whilst there has hardly been any similar effort in increasing men’s interests in communal occupations (e.g., occupations within HEED; Block et al., 2019; Croft et al., 2015). Previous research regarding the occupational gender gap has also focused on women’s underrepresentation in male-dominated domains (Croft et al., 2015). Generally, people show a tendency to show more support for action to include women in STEM than for action to include men in HEED (Block et al., 2019). As communal work is so important both on a societal and personal level, this

undervaluation and lower prioritizing of research on communal work is an undeniable issue. Therefore, there is a need for more empirical work regarding the psychological causes of men's underrepresentation in communal roles.

Importantly, the observed gender gap in the workforce is already reflected in gendered occupational aspirations of children from a young age (e.g., Trice & Rush, 1995). This means that boys tend to aspire more toward male-dominated agentic occupations, whilst girls tend to aspire more toward female-dominated communal occupations. Longitudinal studies also indicate that occupational aspirations in childhood and adolescence are closely related to occupational choices and outcomes in adulthood (e.g., Hoff et al., 2022; Low et al., 2005; Mello, 2008; Schoon & Polek, 2011). For example, a 12-year longitudinal study from the US found that adolescents' occupational interests predicted their career outcomes (Hoff et al., 2020). Additionally, a study from the UK found that career aspirations at age 16 predicted career attainment in the age range of mid 30's (Schoon & Polek, 2011). These findings highlight how the early development of gender roles shape young children's occupational aspirations, which reinforces the gendered occupational choices in adulthood. In the following literature review, I will therefore outline how gender roles develop in childhood and how these gender roles shape children's occupational aspirations.

### **The Development of Gender Roles**

To understand the causes of men's underrepresentation in communal roles, we first need to examine how gender roles develop in childhood. Children become aware of the differences between men and women from an early age. For example, infants are able to discriminate between male and female faces from they are 9 months old (Fagot & Leinbach, 1993). Gender differences in the behaviors of boys and girls are clearly observed throughout childhood. For example, children show preference for gender-typed toys from they are around 18 months old (Caldera et al., 1989) and show preference for same-sex playmates by age 3

(Fabes et al., 2009). Children begin to develop an understanding of sex constancy by age 4, meaning that they understand that sex is a (somewhat) permanent state (Zmyj & Bischof-Köhler, 2015). This leads to an understanding of the importance of their gender as a social category that in many ways shape their social identity. In this way children learn that their gender is an important social category from an early age and base their own behavior and developing identity on gender norms.

This early emergence of gender differences in behavior has been explained by some researchers to be caused by evolution and by biological differences between boys and girls. When approaching the issue from an evolutionary angle, some argue that the differences in behavior between boys and girls are caused by ancestral sex roles, specifically by the male dominion over women (e.g., Archer, 1996; Tay et al., 2019). However, these evolutionary theories have been criticized for lacking a sound empirical basis (see Bussey & Bandura, 1999, p. 680). There are other biological perspectives on the causes of gendered behavior that has shown stronger empirical evidence. For example, Berenbaum and colleagues (1992, 1995, 2018) found in several studies that prenatal androgens can affect children's interest in gendered activities, as girls who were exposed to high levels of androgens have been found to be more interested in typically male-typed activities. Even so, most social psychological researchers agree that these potential biological differences are enhanced by social influences, such as a gendered socialization of children.

According to social role theory (Eagly, 1987; Eagly & Wood, 2011) biological differences interact with socially constructed gender role beliefs and socialization, thus creating a larger divide between the genders. This theory posits that observing men and women occupying different roles, for example in the workforce, is the cause for observed gender differences in behavior. Observations of women caring for children or treating patients as nurses lead to the shared notion that women are intrinsically caring, whilst observations of

men fighting wars or working in manual labor lead to the shared notion that men are intrinsically tough. This is a process called *correspondent inference*, meaning that people believe that external characteristics correspond with internal characteristics (Gawronski, 2004). Thus, the observation of men and women in different roles in the society lead to the development of shared gender roles in a society. Children are thus taught these gender roles to prepare them for their future gendered roles in society, both from direct influence from their parents or other important adults in their lives, or by observation and imitation of important role models (e.g., parents, teachers; Morgenroth et al., 2015). These relationships have been found in several studies, where for example mothers' employment was found to be related to their children's gender-egalitarian attitudes (e.g., Riggio & Desrochers, 2005), and teachers use of gender as an important social category in the classroom (e.g., by categorizing children into groups based on gender) led to stronger gender stereotypes among the children (Hilliard & Liben, 2010). Importantly, social role theory recognizes the biological influences on the behavior of boys and girls (e.g., prenatal androgens), and states that gendered socialization therefore does not act on a "blank slate". The theory thus posits that these socialized gender roles are internalized into gender identities. As boys are mainly socialized into being assertive and competitive, whilst girls are mainly socialized into being caregivers and to be kind, studies investigating children's self-concepts find that children typically endorse goals in line with gender norms, where girls endorse communal goals whilst boys endorse agentic goals (Block et al., 2018; Ojanen et al., 2005).

Children learn about gender roles from several sources. According to social learning theory (Bandura, 1977; 1986), there are three main sources of social learning: parents, peers, and media. Parents are naturally an important source of information about gender roles for children, as they are the most important adults in the children's lives and often function as role models for their children. The importance of parents as role models for gendered attitudes



and behavior has been shown in several previous studies, which has found consistent links between parent's gender attitudes and their children's gender attitudes (Crouter et al., 2007; Cunningham, 2001; Davis & Willis, 2010; Fulcher et al., 2008; Kvalø et al., 2021; Tenenbaum & Leaper, 2002). Additionally, children with parents who encourage sex-typed play develop gender labelling skills earlier than other children (Fagot & Leinbach, 1989). Even though children share similar gender role attitudes with their peers (Rubin et al., 2007), there is less empirical evidence for the effect of peers on children's gendered attitudes and behavior. However, there is empirical evidence for the effect of media on children's gendered attitudes and behavior, in line with social learning theory. For example, a study by Lamer and colleagues (2022) found that even a small nonverbal favoring of gender-stereotypical TV characters in TV programs caused girls to feel pressure to act more feminine.

Gender roles are learnt through socialization, but children are also intrinsically motivated to align their behavior with what is expected of their social groups. This cognitive mechanism is explained in gender schema theory (Bem, 1981; Martin & Halverson, 1981). According to this theory, children organize the information they attain about social categories into mental schemas that represent their understanding of the content of the social categories. Therefore, as children observe men and women, they collect this information and organize it into their mental schemas for men and women. Thus, according to gender schema theory, a young girl who primarily observes women in caring roles will develop the belief that being caring is an important part of being a woman. Therefore, the occupational gender gap within a society influences children's beliefs about the roles of men and women. Importantly, children use these gender schemas as a framework for their own behaviors. According to gender schema theory, children are motivated to behave in line with their beliefs for their own social groups to avoid cognitive dissonance. Therefore, the young girl who believes that all women are caring, will be motivated to act caring as a way of fitting in with her social gender group.

In this way, this theory highlights how children actively construct their own understanding of gender, which can lead to the reinforcement of gender-typed behavior. Additionally, social-cognitive theory (Bussey & Bandura, 1999) posits that children are active learners of gendered information. Bussey and Bandura criticized gender schema theory, among other things, for not addressing the contextual nature of gendered behavior or being able to explain the asymmetry in gendered behavior of boys and girls. Social-cognitive theory explains these phenomena by stating that children do not simply act in accordance with everyone they observe of the same sex. Rather, they actively choose whose behavior to emulate, and choose the behavior that they believe will produce their desired outcome. Therefore, the gendered behavior can be contextual based on what the child believes is appropriate for the specific situation, based on their observations and their own previous experiences. In line with this, a study by Leszczynski & Strough (2008) found that adolescent boys and girls rated themselves as more feminine when working on a task with a female peer than with a male peer. Additionally, men have been found to rate themselves as more feminine whilst in the presence of women than with men, whilst both men and women rate themselves as more masculine whilst in the presence of men (Mehta & Dementieva, 2017). These studies illustrate how men and women express gendered behavior differently in different contexts. Additionally, social-cognitive theory emphasizes that children's gender roles are internalized as they grow older, where behavior is thus guided by children's personal gendered standards as opposed to worry for external social sanctions. In line with this, several studies have found links between children's gendered self-concepts and their gendered behaviors. For example, a study by Bussey & Bandura (1992), which was one of the empirical works that lay the basis for social-cognitive theory, found that older children self-regulated their behavior based on their own gendered self-concepts, whilst the same was not found for younger children.

As previously mentioned, the gender roles of women appear to have become more flexible over time as more women self-describe in terms of agentic traits, the gender stereotypes about women appears to include more agentic traits, and women are increasingly pursuing agentic occupations (Donnelly & Twenge, 2017; Eagly et al., 2020). Despite this, a similar flexibility in the gender roles of men has not been observed. This is also the case when it comes to the gendered socialization of boys and girls. This is illustrated in a qualitative study by Kane (2006), where parents were asked about their responses to gender nonconformity in their preschool children. The findings indicate that parents are much more accepting of gender nonconformity among their daughters than among their sons. Similar findings have resulted from quantitative work. For example, a large study from the US found that adults viewed stereotype-violating children as more unlikable than stereotype-conforming children, and this effect was strongest for stereotype-violating boys (Sullivan et al., 2018). Therefore, even young children face backlash from adults when expressing stereotype-violating behavior or attitudes. Young boys in particular also face backlash from their peers, as children have been found to evaluate boys with feminine appearances more negatively than girls with masculine appearances (Blakemore, 2003). Therefore, the difference in the gendered socialization of boys and girls likely plays an important role in creating a more flexible gender identity for girls than for boys.

As outlined in this section, there are several factors that influence the development of gender roles in childhood. There is some evidence for some biological influences that cause differing behavior between boys and girls. However, children are also socialized into different gender roles by their parents and other important adults in their life, their peers, and the media. Importantly, children are also intrinsically motivated to behave in line with gender norms as a way of avoiding punishment and cognitive dissonance, as well as to gain a sense of belonging with their gender group. Children's beliefs about gender also influence their

beliefs about the types of occupations that is appropriate and accessible to them in the future. In this way, the development of gender roles in childhood is a key factor in maintaining a gendered workforce. In the following section, I will therefore outline the impact of gender roles on children's occupational aspirations.

### **The Development of Gendered Occupational Aspirations**

The development of gender roles in childhood impacts children's beliefs about the occupations that will be accessible and desirable to them in their future, thus shaping the development of their occupational aspirations. Children have been found to report gender-typed occupational aspirations by age 4, where boys aspire more toward occupations perceived to be agentic (e.g., truckdriver, police officer, fire fighter) whilst girls aspire more toward occupations perceived to be communal (e.g., nurse, teacher; Levy et al., 2000; Serbin et al., 1993; Trice & Rush, 1995; Weisgram et al., 2010). As previously mentioned, longitudinal research has also found occupational aspirations in childhood and adolescents to be related to educational and occupational choices in adulthood (e.g., Low et al., 2005; Hoff et al., 2022). Therefore, it is crucial to understand how occupational aspirations are developed in childhood in order to explain the observed occupational gender gap.

Several theories have attempted to explain this development of occupational aspirations in childhood. I will now give an overview of two prominent theories in this field, namely the developmental theory of occupational aspirations (Gottfredson, 1981) and the model of achievement-related choices (Eccles et al., 1983), and review empirical literature related to these theories.

#### ***The Developmental Theory of Occupational Aspirations***

One of the most prominent theories is the developmental theory of occupational aspirations by Linda Gottfredson (1981; 2002). This theory was first published in 1981 and was subsequently revised in 2002. One key concept in this theory is the self-concept. The self-

concept is one's view of oneself that encompasses for example people's view of their personality, gender, values and their place in society. Additionally, the theory posits that occupations are viewed relatively similarly in a cultural context, meaning that, for example, people in a given country share a similar perception of the characteristics of a nurse. These shared images of occupations can be organized along different dimensions, for example on sex type (ranging from feminine to masculine) and prestige, into a shared cognitive map of occupations. This cognitive map is then used to identify which occupations are most attractive and compatible for individuals. This happens in a process of circumscription and compromise. Circumscription refers to the process where the acceptable occupational alternatives are narrowed into a smaller subset of occupations, which is called the zone of acceptable alternatives. Compromise, however, refers to the process where some preferable alternatives are disposed of in favor of less compatible alternatives, which are viewed as more accessible. Often times, the most preferable occupation might be unavailable, as a teenager who aspires to be a doctor might realize that they do not have the grades to gain admission to the necessary degree program and thus decide to pursue nursing instead.

This theory outlines four stages of circumscription that spans from early childhood until early adulthood. According to this theory, children first begin to understand what it means to be an adult at ages 3-5 years, and thus begin to imagine their own future careers. Children thus begin to construct their zone of acceptable alternatives, where they now rule out fantasy occupations in favor of real occupations. As children begin to develop an understanding of gender roles, as outlined previously in this dissertation, their perceptions of the occupations that are available and appropriate for them shifts, which occurs from ages 6-8 years according to this theory. Children in this age group are often very concerned with acting in line with their gender group, and thus begun to exclude occupations that are viewed as gender incongruent from their zone of acceptable alternatives. In the third stage, children

begin to develop an understanding of the abstract concepts of socioeconomic status (SES) and ability, which leads to children excluding occupations from their zone of acceptable alternatives based on their perceptions of their own SES and abilities (e.g., intellectual or physical abilities) from ages 9-13 years. By adolescence, children have developed their self-concept, namely their view of who they are in terms of abilities, interest, personality, and their place in society. In this stage, adolescents attempt to identify which of the remaining occupations within their zone of acceptable alternatives that they most would like to pursue and that is accessible to them. Thus, the adolescents judge how well these occupations fits with their self-concept. Importantly, the development of the self-concept includes internalizing the aspects that were important for circumscription of occupations in the earlier stages, namely gender roles, social class and abilities. By this stage, these aspects have become internalized as a part of the child's own identity, therefore the gender difference we observe in occupational aspirations can be explained by differences in interests and values. Finally, one important aspect of the developmental theory of occupational aspirations is that it highlights the fact that compromises often must be made when choosing one's future occupation (Gottfredson, 2002). Often, there is no acceptable option available that is a fit both for your gender, level of prestige, or interests. This theory states that, when faced with a compromise regarding an occupational choice, occupations that match your interests, personality and abilities will be sacrificed first, then occupations that is a match in prestige. Occupations that are a match for your gender are the last to be sacrificed. This is because gender is a more important and salient aspect of your self-concept. Therefore, people are more reluctant to choose occupations that are viewed as inappropriate for their gender compared to occupations that are viewed as too high/low in status or that does not match personal interests and personality. However, this aspect of the theory has been criticized, as several studies have found that occupations matching one's gender was sacrificed before occupations that matched

interests and/or prestige level (e.g., Hekseth et al., 1990; Junk & Armstrong, 2010; Leung & Plake, 1990).

Several studies have investigated the factors that Gottfredson (1981) propose are important predictors of occupational aspirations in childhood. Importantly, longitudinal research has provided support for the proposed stagewise development of occupational aspirations (e.g., Helwig, 2001). The proposed observed gender difference is prevalent already from age 4, in line with this theory (Trice & Rush, 1995; Weisgram et al., 2010). The effect of gender stereotypes has also been found repeatedly, especially relating to young boys' occupational aspirations. For example, a study among US children (ages 9-11) found that boys showed less interest in female-dominated occupations if they had gender stereotypical beliefs about occupations (Masters & Barth, 2022). Generally, negative stereotypes relating to one's gender groups performance in school subjects (e.g., boys are bad at reading, girls are bad at mathematics) have been found to be related to worse performance in tests when the student's gender is made salient (i.e., stereotype threat; e.g., Galdi et al., 2014; Hartley & Sutton, 2013). Prolonged exposure to stereotype threat can lead to a chronic disidentification with the school subject and influence intentions to pursue further education within the subject (Woodcock et al., 2012). Therefore, regular exposure to stereotype threat can for example lead to a girl choosing to not pursue further mathematics education and thus not pursue a career in STEM. In this way, the development of gender stereotypes in childhood can be a powerful factor in shaping occupational outcomes.

When it comes to the influence of own SES and occupational prestige, several studies have investigated the relationship between these factors and occupational aspirations. Importantly, a longitudinal study from the US found that parental SES influenced the development of occupational aspirations in adolescents (Cochran et al., 2011). Additionally, adolescent girls with high SES reported more high-status agentic occupational aspirations

than adolescent girls with low SES (Hannah & Kahn, 1989). Thus, children's SES appears to influence their occupational aspirations somewhat. Another important aspect is the general higher status of many male-dominated agentic occupations compared to female-dominated communal occupations. Children as young as 3 years old have been found to believe that men make more money than women, thus showing that children have an understanding of the gendered division of occupational status (Levy et al., 2000). In line with this, some studies have found that boys tend to aspire more toward high-status occupations than women (e.g., Hayes et al., 2018; Mendez & Crawford, 2002). However, some studies also find that girls tend to aspire more toward high-status occupations than boys (e.g., Korlat et al., 2022b; Schoon & Polek, 2011; Wicht et al., 2022). One study conducted among Austrian adolescents (ages 11-15) found that girls tended to aspire more toward high-prestige occupations than boys. Although, this relationship was mediated by agentic self-descriptions, where boys who described themselves as more agentic aspired more towards prestigious occupations. Another study found that occupational status increased girls' aspirations toward masculine occupations (Teig & Susskind, 2008). When considering that women increasingly view themselves as agentic and that more women enter agentic occupations, it appears that girls have a wider zone of acceptable alternatives when it comes to both the sex-type and prestige dimensions. Empirical findings indicate that this zone within high-prestige occupations is larger for girls than for boys (e.g., Mendez & Crawford, 2002), as it is more acceptable for girls to have a typically agentic occupation than for boys to have a typically communal occupation. Girls therefore are able to choose from both communal high-status occupations (e.g., doctor, veterinary) and from agentic high-status occupations (e.g., lawyer, engineer). However, Gottfredson (2002) have pointed out that the observed high-status occupational aspirations of young girls might also be caused by more high-status communal occupations (e.g., doctor) being visible to children compared to high-status agentic occupations (e.g., lawyer), thus



providing girls with more high-status occupations to aspire toward. Indeed, a study among secondary school students in Germany found that girls' higher-status occupational aspirations reflect their specific vocational interests, not a general tendency for girls to prefer higher-status occupations than boys (Wicht et al., 2022). Even so, as there are few experimental studies investigating gender differences in the effect of occupational status on occupational aspirations (for exceptions see Hayes et al., 2018; Weisgram et al., 2010), the potential gendered effects of occupational status on occupational aspirations remain unclear.

Lastly, Gottfredson's theory posits that aspect of the self-concept (e.g., self-perceptions, interests, values) influence occupational aspirations from adolescence and onward, as the self-concept is not fully developed until this time. In line with this, studies have found that communal values predict aspirations toward communal occupations among adults (Diekmann et al., 2010; Weisgram et al., 2010). However, previous empirical research has found that children show gender differences in their values from a young age, where boys report less communal values and goals than girls, whilst girls report less agentic values and goals than boys (Block et al., 2018; Ojanen et al., 2005). This gender difference in values was also found to be related to children's occupational aspirations (Block et al., 2018). However, as the self-concept is proposed to only influence occupational aspirations from adolescence, this is a generally underexamined relationship among younger children.

### ***The Model of Achievement-Related Choices***

Another important theory that aims to explain occupational aspirations is the model of achievement-related choices (Eccles et al., 1983; 1994). This theory does not explain the development of occupational aspirations throughout childhood, but it illustrates the social and cognitive processes that influence what occupation individuals choose. This theory explains achievement-related choices (e.g., educational and occupational choices) to be determined by the individuals' expectations for success and the value that individuals place on the options

available. These factors are influenced by the individuals' relatively stable characteristics, such as their gender and personality, and by the cultural environment around the individual, such as gender role stereotypes and family demographics. The theory thus posits that gender-role stereotyped socialization can lead to men and women placing different values on achievement-related options. This corresponds to the observed difference in occupational values between men and women, where women report more family-oriented communal values, whilst men report more status-related agentic values (Abele & Spurk, 2011; Eccles et al., 1999). Values associated with occupations are important factors in the career choices of young adults (Weisgram et al., 2011). Additionally, occupational values have also been found to influence the occupational aspiration of children and adolescents. For example, a study from the US found that adolescent girls endorsed altruistic values significantly more than adolescent boys (Weisgram et al., 2010). This study also found descriptively that boys endorsed power values more than girls, and that power values was significantly related to interest in masculine occupations (e.g., airline pilot, lawyer). Even in young children (ages 6-14 years), boys endorse agentic values more than girls, which is related to boys having more interest in a career compared to having a family in the future (Block et al., 2018). Altruistic occupational values were also found to be related to women's choice of an education within the more communal-oriented part of STEM (health, medical and biological sciences) versus the more agentic-oriented part of STEM (mathematical, physical, engineering and computer sciences; Wegemer & Eccles, 2019). Occupational values therefore appear to be an important factor that influence agentic versus communal occupational aspirations both in childhood and adulthood.

### ***An Integrated Framework of Gendered Occupational Aspirations***

The research presented in the present dissertation is primarily based on the developmental theory of occupational aspirations (Gottfredson, 1981; 2002) and the model of

achievement-related choices (Eccles et al., 1983; 1994). As the labor market is still largely horizontally gender segregated even in egalitarian contexts (Croft et al., 2015; Teigen & Reisel, 2017; Utdanning.no, 2020), children observe men and women in different occupational roles. As posited by social role theory, the observation of men and women in different occupational roles shapes children's gendered behavior, as their observations leads to the conclusion that women are more caring (i.e., communal) whilst men are more tough (i.e., agentic). As children are motivated to behave in line with their gender group, as was emphasized in gender schema theory (Bem, 1981; Martin & Halverson, 1981), girls behave in a more communal manner whilst boys behave in a more agentic manner. Children also use this information about men and women's occupations to exclude occupations that are viewed as incongruent with their gender, as posited by the developmental theory of occupational aspirations. The developmental theory of occupational aspirations highlights how children develop a range of acceptable occupational alternatives by going through stages of circumscription throughout childhood. As children begin to develop an understanding of more abstract concepts such as status, they exclude occupations that are viewed as either too high or too low in status. As male-dominated agentic occupations are mostly associated with higher status than many female-dominated communal occupations, which even young children appear to be aware of (Levy et al., 2000), this is an indication that boys are more likely than girls to exclude communal occupations.

Gottfredson's developmental theory of occupational aspirations states that aspects of the self-concept such values are an important factor that predicts occupational choice from adolescence, which is in line with Eccles' model of achievement-related choices. However, as empirical work has found that values (e.g., altruistic values, prestige values) influence occupational aspirations even in middle childhood (Weisgram et al., 2010), we argue that the development of the gendered self-concept occur in time with the development of occupational

aspirations. This means that aspects of the gendered self-concept, such as values or gendered self-perceptions, influence occupational aspirations earlier in childhood than posited by these theories, but are subject to change during the process of circumscription outlined in the developmental theory of occupational aspirations.

Lastly, one important point that is made by Linda Gottfredson in her revision of the developmental theory of occupational aspirations (2002) is that experience with an education or an occupation can cause a reconsideration of one's occupational choice in adulthood, leading to a new round of compromise where occupations in the zone of acceptable alternatives are reconsidered. As this theory also states that people are most reluctant to choose occupations that are incongruent with one's gender, an experience with feeling a lack of fit between one's gender group and an education or occupation is likely to trigger such a reconsideration of one's occupational choice. Thus, this perceived lack of fit might lead to increased dropout rates among women in agentic fields and among men in communal fields.

### **Consequences of Gender Roles on Educational and Occupational Outcomes**

Despite the psychological barriers created by gender norms, some women choose to pursue an education in an agentic field and some men choose to pursue an education in a communal field. In Norway in 2022, approximately 21% of registered engineering students were female, whilst approximately 14% of registered nursing students were male (Direktoratet for Høyere Utdanning og Kompetanse, 2022). Additionally, students who choose to pursue an education within a gender incongruent field appear to be overrepresented in the dropout statistics. For example, one nursing degree program in Norway found that their dropout rates for women were around 20%, whilst their dropout rates for men were 50% (Nedregård & Abrahamsen, 2018). Therefore, even for those few who decide to pursue an education in a gender incongruent field, they face further obstacles after entering the educational program.

As mentioned above and outlined in a revision of the developmental theory of occupational aspirations (Gottfredson, 2002), occupational aspirations sometimes change after gaining experiences in a field. A chosen occupation or degree program might have appeared to be a good choice and thus been chosen as the occupational aspirations among all of the occupations in the zone of acceptable alternatives. However, with experience the chosen occupations may come to appear incongruent with the individual's self-concept, thus leading to disengagement and reconsideration of other occupations within the zone of acceptable alternatives. A theoretical explanation of the psychological process that leads to this perceived incongruence of certain occupations comes from person-environment (PE) fit theory (see Caplan & Van Harrison, 1993). PE fit was defined by Kristof-Brown and colleagues (2005) as "the compatibility between an individual and a work environment that occurs when their characteristics are well matched.". Therefore, people will perceive greatest compatibility between themselves and their chosen education or occupation if the environment matches their self-concept (e.g., interests, values). Importantly, these aspects of the self-concept are thought to be developed from the internalization of gender norms, as outlined in the developmental theory of occupational aspirations, leading to women having a more communal self-concept whilst men have a more agentic self-concept (Gottfredson, 1981). However, as previously mentioned, women's reported self-concept has become increasingly agentic, whilst men's self-concept is relatively unchanged (Donnelly & Twenge, 2017). Therefore, it is more likely that a man will feel a stronger mismatch between his own self-concept and the environment in a communal degree program than a women would feel in an agentic degree program.

Another theoretical framework that builds on PE fit theory that can be used to understand men's disengagement with communal occupations and education is the SAFE model (Schmader & Sedikides, 2017). This model states that people strive for three types of

environmental fit; self-concept fit, goal fit and social fit. Importantly, the model states that culturally embedded gender stereotypes influence how we perceive ourselves to fit with our environment in these three categories, as well as influencing how we view our abilities and interest for the environment. According to this theoretical model, a man with a very agentic self-concept would likely perceive a self-concept lack of fit between himself and the prototypical (communal) nurse. Additionally, if the man has agentic goals (e.g., status and power), the man will likely perceive a goal lack of fit between his agentic goals and the goals that nursing stereotypically offers. Lastly, if the man perceives that only women are nurses and that the social environment for nurses is “feminine”, the man will likely perceive a social lack of fit between his social needs and what the nursing occupation has to offer. In addition to the effects of the different types of fit, gender role beliefs might also influence the man’s view of his own nursing abilities and interests, making him think that he is not capable of or interested in engaging in communal roles. These factors combined thus determine if the man chooses a communal education or career, and if they persist and thrive in their chosen communal role.

PE fit theory (see Caplan & Van Harrison, 1993) and the SAFE model (Schmader & Sedikides, 2017) states that a perceived lack of fit between the work environment and the individual’s self-concept can lead to both a psychological and physical disengagement from the work environment. This has been found in empirical studies, where for example students who perceive a good fit between their self-concept and their university’s norms showed a stronger sense of belonging to the university (Menkor et al., 2021). Students who reported higher perceived fit with university norms also showed reduced dropout intentions (Suhlmann et al., 2018). In addition, students who felt increased perceived fit with their college over time also reported less dropout intentions (Schmitt et al., 2008). Lastly, meta-analyses have consistently found that PE fit was related to intentions to quit your job, where those who has

less perceived fit with the work environment has stronger intentions to quit (Kristof-Brown et al., 2005; Verquer et al., 2003). Interestingly, men in typically masculine occupations (i.e., occupations associated with masculine behavior, e.g., military) who perceived themselves to be less masculine than the prototypical members of their occupation reported reduced occupational identification and motivation, which was associated with intentions to leave the occupation (Peters et al., 2015). As mentioned previously, fit between values and the perceived goal affordance of occupation is important in determining occupational aspirations, according to the model of achievement-related choices (Eccles et al., 1983). There therefore appears to be a similar mechanism that is explained in the PE fit theory. However, whilst the model of achievement-related choices explains how fit between values and perceived goal affordance influence occupational aspirations and occupational choices, the PE fit theory highlights how a lack of fit between the individual's self-concept and the work environment can cause dropout among individuals who have already chosen their occupation or education.

Unfortunately, very little research has been conducted that investigates the PE fit of men in communal degree programs. There has however been some research conducted on the perceived fit between women and agentic degree programs. Women are more likely than men to drop out from degree programs in STEM, which have been linked to women's lower self-efficacy and perceived fit with STEM (Koch et al., 2022). This can also be related to the research related to communal goal interventions presented earlier, where communally oriented women reported less interest in agentic degree programs (Diekman et al., 2010), but reported more interest in agentic degree programs if it was presented as being congruent with communal goals (Weisgram & Diekman, 2017). Therefore, it appears that the fit between an occupation and the individual's interests and values are important factors in preventing dropout. More research is however needed to investigate the links between men's agentic values and their dropout intentions from communal degree programs and occupations.

## Research Aims

The superordinate goal of this thesis is to investigate social and developmental psychological factors that influence men's underrepresentation in communal occupations. As outlined previously, this is an underexamined aspect of the persisting horizontal gender gap in the labor market. It is therefore necessary to examine the factors influencing this underrepresentation, as increasing the representation of men in communal occupations has both personal and societal benefits (e.g., Seidler, 2022; Le et al., 2018). We examine this issue in the relatively gender egalitarian cultural context of Norway. Both cross-sectional and experimental methods were used to investigate this issue in four studies. The findings from the four studies are presented in three papers: the findings from Study 1 and Study 2 were published in Paper I, the findings from Study 3 were published in Paper II, and the findings from Study 4 were written up in Paper III which is in revision at the time of the submission of this dissertation.

The aim of Paper I was to investigate the effects of gender, gender stereotypes, the self-concept (i.e., self-perceptions) and perceived occupational status on children's occupational aspirations, based on Gottfredson's (1981) developmental theory of occupational aspirations. The effects of these factors on the occupational aspirations of children in early- to middle childhood has been previously underexamined in empirical work. Therefore, we investigated this in two studies among both preschool children and elementary school children. Based on the developmental theory of occupational aspirations, we predicted that (1) girls would aspire more toward communal occupations than boys, (2), girls would aspire more toward communal occupations the more strongly they endorse communal occupational gender stereotypes, whilst boys would aspire less toward communal occupations the more strongly they endorse communal occupational GST, (3) children with more communal self-perceptions would aspire more toward communal occupations, and (4) children who believe you make a



lot of money in communal occupations would aspire more toward communal occupations.

The hypotheses were preregistered on the Open Science Framework (OSF; Study 1:

[https://osf.io/cq3zf/?view\\_only=5cc42135af034628a932665247f59f2a](https://osf.io/cq3zf/?view_only=5cc42135af034628a932665247f59f2a); Study 2:

[https://osf.io/g2j8a/?view\\_only=1cb13e9d03b743dead99d2ad9e5868fc](https://osf.io/g2j8a/?view_only=1cb13e9d03b743dead99d2ad9e5868fc)).

The results of the second study provided evidence for the predicted relationship between perceived occupational status and children's communal occupational aspirations among elementary school children. Therefore, the aim of Paper II was to experimentally test the effects of two subdimensions of status (salary and power) on occupational aspirations in middle childhood. In addition, we investigated the relationship between agentic self-perceptions and occupational values related to status in this study correlationally. We predicted that (1) children would aspire more toward occupations associated with high salary than with low salary, and (2) children would aspire more toward occupations associated with high power than with low power. We also predicted that (3) the effect of salary and power on children's aspirations would be stronger for boys than for girls. Lastly, we predicted that (4) children's levels of agentic self-perceptions would mediate the relationship between their gender and their values toward salary and power in their imagined future occupations.

Hypotheses 1, 2 and 3 were preregistered on OSF

([https://osf.io/35nfc/?view\\_only=d10bb0cdc8d44a8ca9b8dfebdc8f7015](https://osf.io/35nfc/?view_only=d10bb0cdc8d44a8ca9b8dfebdc8f7015)).

The first two papers investigated factors that influence occupational aspirations in childhood. However, we were also interested in how psychological mechanisms influence male students who have already entered communal degree programs. As previously mentioned, male students in communal degree programs (e.g., nursing) seem to have higher dropout rates than their female fellow students. Therefore, the aim of Paper III was to experimentally investigate the effects of stating that communal traits are necessary for success in communal occupations on the sense of belonging and dropout intentions of male and

female students in communal degree programs. Additionally, we investigate the effects of the student's communal self-perceptions on the relationships between students' gender, their perceived fit, sense of belonging and dropout intentions. We predicted that, when being told that communal traits are crucial for success in communal occupations, male students – but not female students – report (1) reduced perceived fit and (2) reduced sense of belonging with their communal degree program. Additionally, we predicted that male students would report less communal self-perceptions, which would be related to lower perceived fit with their communal degree program, which would be related to (3) less sense of belonging with their degree program and (4) higher dropout intentions. Hypotheses 1 and 2 were preregistered on OSF ([https://osf.io/bv35q/?view\\_only=b25f6b3ade844684a619c768391b8a2d](https://osf.io/bv35q/?view_only=b25f6b3ade844684a619c768391b8a2d)).

## Summary of Methods

To investigate the social and developmental causes of men's underrepresentation in communal occupations, we conducted four quantitative studies. Two studies were correlational, whilst two were primarily experimental. The materials and methods employed in the four studies are described in the following section.

### Samples

#### *Study 1*

Study 1 was conducted in the municipality of Tromsø in Northern Norway. Data was collected from preschool children (ages 4-6 years) in childcare centers. This age group was selected because we were interested in investigating factors influencing occupational aspirations in early childhood. Data was also collected from their parents and from their preschool teachers, but analyses using this data is not included in this project. Participants were recruited by contacting childcare centers and asking permission to conduct our study in their childcare center. After gaining permission, we distributed consent forms to the parents of the children in the childcare centers. 177 children participated in the data collection. After excluding participants who revoked consent during testing, had technical issues, or did not following instructions, we ended up with a sample of 159 children (84 boys, 75 girls;  $M_{age} = 5.51$ ,  $SD = 0.37$ ).

#### *Study 2*

Study 2 was conducted as an online questionnaire that was distributed to Norwegian elementary school children (ages 6-13 years) in the early summer of 2020. This study was primarily about the effects of the COVID-19 pandemic on elementary school children and their parents, but the questionnaire also included questions related to gender role attitudes, which are the measures used in the present project. Participants were recruited through

contacting elementary schools and through social media. We contacted schools from all over Norway to ask them to distribute the link to an online questionnaire to the parents of the children at their schools. The parents were asked to fill in an online questionnaire, and then have their children fill in another online questionnaire. We collected data from 273 parents and 98 children. In the present work, we do not use the data collected from the parents in our analyses. After excluding children who reported that they did not understand the questionnaire, we ended up with a sample of 96 children (48 boys, 48 girls;  $M_{age} = 9.44$ ,  $SD = 1.91$ ).

### ***Study 3***

Study 3 was an experimental study conducted among elementary school children in the city of Tromsø in 2021. Data was collected in schools during school hours. Participants were recruited by contacting local elementary schools. We contacted five schools and were given permission from three schools to conduct our study in their school (60% acceptance rate). We then contacted the teachers at the classes with students in our target age range (ages 7-11). We chose this age range to ensure that the participating children would be able to understand the questions and would be able to sit through the entire questionnaire. We were given permission from 11 teachers to conduct our study in their class. We then distributed consent forms to the parents of the children in the participating classes and scheduled the data collections with the teacher. 139 children participated in the data collection. After excluding participants who did not have good Norwegian skills and did not seem to understand the questions, those who reported that they did not read the questions carefully, those who had technical difficulties, and children who did not identify as either male or female, we ended up with a sample of 127 children (59 boys, 68 girls,  $M_{age} = 9.37$ ,  $SD = 1.19$ ).

### ***Study 4***

Study 4 was an experimental study conducted among adult students in communal degree programs in 2022. Data was collected using an online questionnaire, where participants were recruited using social media and by contacting the administrators of communal degree programs in Norway. We collected data from 445 students. After excluding participants who did not provide their consent twice, did not meet the attention check criteria, did not report identifying as either male or female, did not report studying for a communal occupation, did not report studying at a Norwegian university or college, or did not fill in at least 50% of the questionnaire, we ended up with a sample of 298 participants (66 male, 232 female;  $M_{age} = 25.32$ ,  $SD = 6.08$ ).

## **Design and Analytical Strategy**

### ***Cross-Sectional Designs***

Study 1 and Study 2 were both conducted using a cross-sectional design, meaning that both studies were observational and were conducted at only one time point. In both studies, the data was analyzed by conducting regression analyses, as well as by using Hayes' (2017) Process macro in SPSS to investigate moderating and mediating relationships.

It is important to note that even though Study 3 and Study 4 were primarily experimental, both studies included self-reported measures that were used in correlational analyses in Paper II and Paper III.

### ***Experimental Designs***

Study 3 was conducted using a 2x2 within-participants design with gender as a between-participants factor. 12 novel occupations were manipulated by being described as earning a very small or very large salary (low salary vs. high salary) and being described as giving very little or very much power to the workers (low power vs. high power). Children received this information about each of the 12 occupations and were then asked to indicate

their aspiration to each occupation. The condition of each occupation was randomized between participants, meaning that each child was presented with three occupations per condition (high salary/high power; high salary/low power; low salary/high power; low salary/low power). By using this experimental design, we were able to measure the causal effects of salary and power on children's occupational aspirations. We used novel occupations as children would not have any preconceived notions about the salary or power level associated with these occupations. Additionally, the children would not have any preconceived notions about the novel occupations being associated with men or women. Therefore, this experimental design allows for a measure of the unique effect of status on children's occupational aspirations. To analyze the data from Study 3, we used a repeated measures ANOVA, where salary and power were included as within-subjects factors with two levels each. Gender was included as a between-subjects factor to investigate potential gender differences on the effects of the experimental manipulation.

Study 4 was conducted using a 2 (salience of communal vs. salience of neutral traits) x 2 (female vs. male) between-participants experimental design. Participants were presented with a short fictional news article about the traits needed to succeed in communal occupations. The experimental group were given an article that said that communal traits, such as being compassionate, warm, and supportive, are particularly important for success in communal occupations. The control group were given an article that said that neutral traits, such as being engaged, effective and reliable, are particularly important for success in communal occupations. After this manipulation, participants answered a questionnaire that measured their perceived fit and sense of belonging with their communal degree program, as well as their dropout intentions from their communal degree program. To analyze the data from Study 4, we conducted regression analyses and used Hayes' (2017) Process macro in SPSS to investigate moderating and mediating relationships.

## Measures

Several of the same measures were used across the four studies included in this thesis. The measures were modified to be appropriate for the samples in each respective study. Table 1 provides an overview of the different measures used across the four studies.

**Table 1**

*Overview of Self-Reported Measures*

Measure	Study	Scale	Reference
Communal Occupational Aspirations	Study 1	3-point Likert scale	
	Study 2	5-point Likert scale	
Communal and Agentic Self-Perceptions	Study 1	3-point Likert scale	
	Study 2	5-point Likert scale	
	Study 3	5-point Likert scale	
	Study 4	7-point Likert scale	Kosakowska-Berezecka et al., 2022
Occupational Gender Stereotypes	Study 1	3-point Likert scale	
	Study 2	5-point Likert scale	
	Study 3	5-point Likert scale	
Perceived Salary	Study 2	5-point Likert scale	
Occupational Values	Study 3	5-point Likert scale	Weisgram et al. 2010
Perceived Fit	Study 4	7-point Likert scale	Schmitt et al., 2008
Sense of Belonging	Study 4	7-point Likert scale	Good et al., 2012
Dropout Intentions	Study 4	7-point Likert scale	Hardré & Reeve, 2003

*Note.* Where no reference is stated, the measure was developed for the respective study.

As can be seen from the overview in Table 1, the length of the scales was modified for each study. In Study 1, where the participants consisted of preschool children from the ages of

4 to 6 years, we used 3-point Likert scales. In Study 2 and Study 3, where the participants consisted of elementary school children, we used 5-point Likert scales. These modifications were made as research suggests that young children have problems with differentiating between many scale points but using 5-point Likert scales can be appropriate for children over the age of 6 if questions are relatively simple (Mellor & Moore, 2013). Lastly, in Study 4 which consisted of adult participants, we used 7-point Likert scales, which is common practice when conducting research with adult participants.

### **Ethical Considerations and Open Science**

We obtained ethical approval for all studies from the internal ethical committee at the Department of psychology at UiT the Arctic University of Norway. Additionally, all studies were registered at the Norwegian Agency for Shared Services in Education and Research (Sikt), which provides assessment of the processing of personal data in research projects in Norway.

Participants were asked to give their informed consent to participate in the studies presented in the present dissertation. In the case of Study 1, 2 and 3, where the participants were children, parents were asked to give informed consent for their children to participate in the studies. Children were also asked to give consent and were able to withdraw their consent at any time, without giving any reason. In Study 1, 2 and 3, the participants were assigned a code that was saved with their data. In this way, participants were able to withdraw their consent at a later time and have their data deleted. The codes were deleted after a specified time, after which the data was saved anonymously, and the participants were not able to withdraw consent any longer. The children in Study 1 and Study 3 received a small gift as a reward for their participation. As Study 2 was conducted online, it was not possible to offer a gift to the participating children in that case.



In Study 4, which was conducted among adult students, participants were informed of their rights as participants and gave their informed consent to participation in the study. All of the data was stored anonymously, so there was no possibility of revoking consent and having data deleted after the completion of the questionnaire. The participants were offered to partake in a lottery of three gift cards of NOK500 each. Participants who wanted to partake in the lottery were directed to a separate questionnaire where they submitted their e-mail address. The list of e-mails was stored separate from the data from the study. The list of e-mails was deleted after the lottery was conducted.

All of the studies were conducted in line with open access recommendations. The hypotheses tested in the studies were preregistered on the Open Science Framework, where the data was also uploaded after publication of the papers. All papers were also published open access. The data for all studies were published openly on the Open Science Framework.

## Summary of Results

### Paper I

*What do I want to be? Predictors of communal occupational aspirations in early to middle childhood.*

In Paper I, we aimed to investigate which factors that influence occupational aspirations among children in early to middle childhood. We used data from Study 1 and Study 2 to investigate this. We found gender differences in communal occupational aspirations only among the elementary school children,  $B = 0.44, p = .026$ . We found an interaction between participants' gender and communal occupational GST on their communal occupational aspirations among the preschool children,  $B = 0.79, p = .002$ , as well as among the elementary school children,  $B = -0.91, p = .095$ , and also when combining the data from the two studies,  $B = 0.45, p < .001$ . This means that girls who reported high levels of communal occupational GST reported more aspirations toward communal occupations, whilst boys who reported high levels of communal occupational GST reported less aspirations toward communal occupations. Additionally, we found that children's communal self-perceptions mediated the relationship between gender and communal occupational aspirations in the combined sample. This means that boys reported less communal self-perceptions than girls,  $B = 0.40, p = .002$ , and that those with less communal self-perceptions also aspired less toward communal occupations,  $B = 0.17, p = .006$ . There was no direct effect of gender on communal occupational aspirations in this model,  $B = 0.12, p = .328$ , but the indirect effect was significant,  $B = 0.07, 95\% \text{ CI} = (0.02; 0.13)$ . Lastly, we found a positive association between the children's perceived status of communal occupations and their aspirations toward communal occupations,  $B = 0.35, p = .028$ . This means that both boys and girls aspired more toward communal occupations if they believed that communal occupations were associated with a high salary.

## **Paper II**

*Salary and power: How occupational status affects children's occupational aspirations.*

In Paper II, we aimed to experimentally test the found relationship from Paper I between occupational status and occupational aspirations in middle childhood. We found that elementary school children aspired more toward occupations associated with high salary than with low salary,  $F(1, 124) = 10.97, p = .001$ , and high with high power than with low power,  $F(1, 124) = 5.07, p = .026$ . There was no gender difference in this effect, meaning that boys and girls equally aspired more toward high-status occupations. Correlational analyses of the self-reported measures using Model 4 in Hayes (2017) Process Macro found that agentic self-perceptions mediated the relationship between gender and occupational values related to status. This means that boys in trend reported more agentic self-perceptions than girls,  $B = -0.24, p = .065$ , and that those with more agentic self-perceptions reported stronger valuation of salary ( $B = 0.06, p = .007$ ), power ( $B = 0.51, p < .001$ ), but only in trend for prestige ( $B = 0.19, p = .060$ ). There was no significant direct or indirect effect of gender on any of the occupational values related to status.

### **Paper III**

*Who cares? Effects of gendered self-perceptions on dropout intentions in communal studies.*

In Paper III, we aimed to experimentally investigate the applied implications of men's lower communal self-perceptions on their sense of belonging and dropout intentions in communal degree programs. Our experimental manipulation showed no effects on students perceived fit, sense of belonging or dropout intentions. However, we found a multiple mediating effect of communal self-perceptions and perceived fit on the relationship between students' gender and their dropout intentions. This means that male students had less communal self-perceptions,  $B = 1.01, p < .001$ , which was related to lower perceived fit with their communal degree program,  $B = 0.57, p < .001$ . This lower perceived fit was related with a lower sense of belonging,  $B = 0.48, p < .001$ , and higher dropout intentions,  $B = -0.80, p < .001$ . There were no direct effects of gender on sense of belonging or dropout intentions, but there were significant indirect effects of gender on sense of belonging ( $B = 0.27, 95\% \text{ CI } [0.16; 0.41]$ ) and on dropout intentions ( $B = -0.45, 95\% \text{ CI } [-0.67; -0.28]$ ) through communal self-perceptions and perceived fit.

## **Discussion**

This dissertation investigated the factors that influence occupational aspirations and attainment throughout childhood and into early adulthood. Specifically, the dissertation aims to explore the underexamined topic of men's underrepresentation in communal occupations. This was explored in four studies, with samples ranging from preschool aged children to young adults. The large age range across the four studies allows us to investigate this important topic in a developmental manner, where several important developmental phases of occupational aspirations are examined. In the first two studies conducted among preschool and elementary school children, we investigated the relationships between communal occupational aspirations and several factors identified as important predictors of occupational aspirations by the developmental theory of occupational aspirations (Gottfredson, 1981). The third study followed up on the interesting findings from Study 2 regarding the effect of occupational status on communal occupational aspirations by experimentally investigating the effects of occupational status on occupational aspirations among elementary school children. Lastly, the fourth study investigated the relationships between young adults' gendered self-perceptions and their perceived fit with their communal degree programs, and how these factors influence their sense of belonging with their degree program and their dropout intentions.

### **Summary of Key Findings**

#### ***The Effect of Gender and Gender Stereotypes***

We investigated gender differences and the effects of gender stereotypes on communal occupational aspirations among preschool children in Study 1 and among elementary school children in Study 2. Our findings showed no significant gender difference in communal occupational aspirations among the preschool children in Study 1, but we did find this gender difference among the elementary school children in Study 2. As Gottfredson's developmental

theory of occupational aspirations (1981) states that gender differences in occupational aspirations emerge from around age 4, the lack of a gender difference in this study might be due to the young age of the sample (ages 4-6). It might be that some of the younger children in the sample have not yet developed an understanding of gender roles. However, when we combined the data from the two studies and ran the analyses controlling for the age of the participants, we again found no gender differences in communal occupational aspirations. It is important to note that there was a small descriptive gender difference in communal occupational aspirations among the preschool children in Study 1. It could therefore be that the found gender difference in Study 2 can be explained by developmental factors that cause the intensification of gender differences in communal occupational aspirations among the older elementary school children. According to Gottfredson's developmental theory of occupational aspirations (1981), children in the first stage of the development of occupational aspirations (ages 3-5) show gender differences in occupational aspirations, but this gender difference is primarily based on modelling the same-sex adults in their lives. In the subsequent stage (ages 6-8), the gender difference in occupational aspirations is increasingly caused by the development of gender role beliefs. It is likely that gender norms cause stronger gender differences that simply mimicking same-sex adult behavior, thus explaining the stronger gender difference occupational aspirations in Study 2. However, as we see that there is no significant gender difference when combining the data from the two studies and running the model including all our independent variables, other factors such as gender stereotypes and the gendered self-concept likely account for most of the observed gender difference in communal occupational aspirations.

Indeed, we found effects of the interaction between children's gender and their communal occupational gender stereotypes in both Study 1 and in Study 2, as well as when we combined the data from the two studies. Therefore, children who have stronger communal

occupational gender stereotypes appear to be motivated to behave in line with these stereotypes. This means that girls with stronger communal occupational gender stereotypes aspire more toward communal occupations, whilst boys with stronger communal occupational gender stereotypes aspire less toward communal occupations. Therefore, children appear to adjust their occupational aspirations to align with their beliefs about what is appropriate for their gender at an even younger age than what was originally proposed by the developmental theory of occupational aspirations (Gottfredson, 1981). There is empirical evidence that children have an awareness of gender stereotypes at a younger age, as children show knowledge of which toys are stereotypically associated with their gender from they are two years old (Serbin et al., 2001) and show some awareness of which activities are stereotypically associated with men and women (see Levy & Fivush, 1993). It is however important to note that the mean age of the sample in Study 1 was 5 ½ years, as most of the participating children were between five and six years old. Therefore, our participants in Study 1 are quite close to the age where Gottfredson (1981) proposes that internalized gender roles begin to influence occupational aspirations. Additionally, the occupations that were used to measure children's communal occupational aspirations (i.e., preschool teacher and nurse) are occupations that children have regular exposure to in childhood. As these occupations are female-dominated, they have likely mainly observed women working in these occupations. Thus, children would likely develop occupational gender stereotypes related to these occupations at an earlier age than other occupations that they have less exposure to (e.g., lawyer, secretary).

### ***The Effect of Occupational Status***

We investigated the effect of occupational status on elementary school children's occupational aspirations in Study 2 and Study 3. In the cross-sectional Study 2, we tested the effects of perceived status (i.e., the children's beliefs about the salary level of occupations) on

children's aspirations toward communal occupation. We found that children who believe you make a lot of money in communal occupations also aspire more toward communal occupations. We found no interaction between child gender and perceived occupational status, meaning that both boys and girls aspired more toward communal occupations if they believed that you make a lot of money in communal occupations. However, due to the cross-sectional nature of this study, we were not able to make conclusions regarding the directionality of the relationship. It might be that children who aspire toward communal occupations generally have a positive view of communal occupations, thus believing that you earn a lot of money in these occupations. Additionally, we only measured the effect of one aspect of status, namely perceived salary. Therefore, to extend our research on the effect of occupational status on children's occupational, we decided to experimentally investigate the effect of two aspects of occupational status (i.e., salary and power) on occupational aspirations in Study 3.

In Study 3, we found causal effects of two aspects of occupational status (i.e., power and salary) on children's occupational aspirations. This effect was not moderated by child gender, meaning that the occupational aspirations of boys and girls were equally influenced by occupational status, which contradicts some previous research on the effects of status on occupational aspirations in children (Hayes et al., 2018; Mendez & Crawford, 2002). This could be due to the use of novel occupations that were not associated with any gender in our study. Most studies that measure the effect of occupational status on occupational aspirations either measure aspirations toward real occupations or use images or text that associate novel occupations with a gender group (e.g., Hayes et al., 2018; Liben et al., 2001). Using real occupations could lead to children's reported aspirations being influenced by previous knowledge about the gender distribution of the occupations or other factors such as interest and values. When including information about the gender of workers in novel occupations, the children's reported aspirations will likely be influenced by their gender role beliefs, which



means that the studies cannot say anything about the “pure” influence of occupational status on children’s aspirations. However, as we also did not find any gender difference in the effect of occupational status on communal occupational aspirations in Study 2, where we used real communal occupations that children were familiar with (i.e., nurse and preschool teacher), this lack of a gender difference might be due to the gender egalitarian, Norwegian context of the study. As the studies were conducted in Norway, where there is very little vertical gender segregation in the labor market, especially in the public sector (51% of leaders in the public sector are women; Teigen & Reisel, 2017), children might have a more gender egalitarian perspective relating to occupational status compared to in other less egalitarian countries (e.g., the US).

As previous studies have found gender differences in children’s occupational values (e.g., Weisgram et al., 2010), we decided to include a correlational second part of Study 3 where we measured (among other variables) children’s occupational values toward three aspects of occupational status (i.e., money, power and prestige). This was to further explore children’s perceptions of occupational status in middle childhood. Additionally, we measured children’s agentic self-perceptions, to investigate if children’s gendered self-concepts were related to their occupational values. When investigating the mediating effect of children’s agentic self-perceptions on the relationship between their gender and their occupational status values, we found that boys tended to report more agentic self-perceptions than girls, which was related to more occupational status values. We measured occupational values by asking the children to imagine their future occupation, and then report how important salary, power and prestige was to them in their future occupation. It therefore seems that when asking children to imagine their future occupation, aspects of their gendered self-concept might have influenced their reporting of their occupational status values. According to construal level theory, abstract imagining can lead to increased salience of stereotypes (McCrea et al., 2012;

Trope & Liberman, 2003). As asking children to imagine their future occupation will likely lead children to use their abstract imagination, this would therefore lead to relying on stereotypes in their imaginations, according to construal level theory. In this way, boys (who generally report more agentic self-perceptions) imagined their future considering their agentic self-perceptions and the agentic stereotype associated with men, thus reporting more occupational status values than girls. This could explain why we did not find a gender difference when simply asking children to report their aspirations toward occupations described as affording high vs. low status, as this question did not require children to imagine their future. Our findings therefore indicate that when disregarding children's internalized gender norms about occupational status, boys and girls equally want occupations that are related to high status. However, when framing the question in a way that makes the children imagine their own future, children's awareness of what is socially expected of their gender might become more salient, thus leading to more gender-congruent responses.

### ***The Effect of Gendered Self-Perceptions***

In all studies included in this dissertation, we included a measure of the participants' gendered self-perceptions. Among the preschool and elementary school children in Study 1 and Study 2, we consistently found that children who reported more communal self-perceptions also aspired more toward communal occupations. In addition, we found mediating effects of communal self-perceptions on the relationship between children's gender and their communal occupational aspirations among the preschool children in Study 1 and when combining the data from both studies. This means that girls reported more communal self-perceptions than boys, and those who reported more communal self-perceptions also aspired more toward communal occupations. This mediating effect was only found in trend in Study 2 among the elementary school children. This could be due to a power issue, as we only had 96

participants in Study 2 compared to 159 participants in Study 1. This is supported by the fact that we did find this mediating effect when combining the data from Study 1 and Study 2.

As mentioned previously, we investigated if children's agentic self-perceptions would mediate the relationship between children's gender and their occupational status values in Study 3. We found support for this effect, meaning that viewing oneself as agentic was related to more occupational status values. Lastly, in Study 4, we found that communal self-perceptions mediated the relationship between the participant's gender and their perceived fit with their communal degree program, their sense of belonging with their degree program, and their dropout intentions from their degree program. This means that female students in communal degree programs reported more communal self-perceptions, which was related to stronger perceived fit and sense of belonging with the communal degree program, as well as less dropout intentions. In sum, we see that gendered self-perceptions are consistently an important factor in explaining the gender differences in occupational aspirations and values throughout childhood, as well as being a factor that could explain men's higher dropout rates in communal degree programs. This is despite the fact that aspects of the gendered self-concept, such as self-perceptions, were proposed to only influence occupational aspirations from adolescence according to the developmental theory of occupational aspirations (Gottfredson, 1981; 2002).

### ***The Effect of Perceived Fit***

In the first three studies, we investigated the relationships of several factors with occupational aspirations in early- to middle childhood. However, as Gottfredson points out in her theory of the development of occupational aspirations (2002), career plans can change after gaining experience in a field. If the occupation of choice is not perceived as congruent with the individuals' self-concept, this can trigger a reevaluation of the occupations in the zone of acceptable alternatives. Therefore, we investigated the psychological factors that

could trigger intentions to leave communal degree programs among male and female students in Study 4. We did not find any effects of the experimental manipulations of the traits described as being necessary for success in communal occupations, as our manipulation was likely not salient enough to induce any effects in the student's perceived fit, sense of belonging or dropout intentions. However, we found correlational relationships between participants perceived fit with their communal degree program with their sense of belonging with their degree program as well as with their dropout intentions from their degree program. This finding indicates that, in line with PE fit theory (see Caplan & Van Harrison, 1993) and the SAFE model (Schmader & Sedikides, 2017), the perceived fit with the work or study environment is an important influence on individuals' sense of belonging with the work or degree program, as well as on the individuals' intentions to drop out or quit. As mentioned in the previous section regarding the communal self-concept, in line with previous research, men generally reported less perceived fit with their communal degree program than women, which was mediated by communal self-perceptions. This means that men's generally lower levels of communal self-perceptions could explain the higher dropout rates from communal degree programs among men. Men's lack of communal self-perceptions might cause men to feel less fit with communal degree programs, where communal characteristics are often emphasized as being important for success in their chosen occupation. This shows that, in line with Gottfredson's theorizing, a perceived incongruence between individual's self-concept and their chosen occupational aspiration can trigger a reconsideration of the chosen aspiration, thus leading to dropping out of the chosen degree program.

### **Theoretical Implications**

Our findings were generally in line with the theoretical basis for the studies, with a few exceptions relating to the developmental theory of occupational aspirations (Gottfredson, 1981; 2002). For one, we find an interaction between child gender and their communal

occupational gender stereotypes among the preschool children in Study 1, meaning that girls with high levels of communal occupational gender stereotypes aspire more toward communal occupations, whilst boys with high levels of communal occupational gender stereotypes aspire less toward communal occupations. As previously outlined, Gottfredson's developmental theory of occupational aspirations proposes that gender stereotypes only influence occupational aspirations from the second stage in her theory, from around the age of 6. This is because, according to her theory, children have not developed their own gender stereotypes at this stage, and that possible gender differences in occupational aspirations are due to modelling of important same-sex adults (e.g., family members). Our findings contradict this, as we find relationships between occupational gender stereotypes and occupational aspirations in children as young as four years old. Future research should explore this relationship between occupational gender stereotypes and occupational aspirations experimentally in early adulthood, perhaps by manipulating the gender of workers associated with novel occupations and subsequently measuring occupational aspirations. Similar studies have been implemented among children in middle childhood (e.g., Liben et al., 2001), which could be adapted to a younger sample.

Secondly, we have consistently found relationships between one aspect of the gendered self-concept, namely self-perceptions, and occupational aspirations throughout childhood. According to the developmental theory of occupational aspirations (Gottfredson, 1981; 2002), aspects of the self-concept such as interests, values and self-perceptions only influence occupational aspirations from adolescence, as children do not look inward to their internalized self-concept until this time to evaluate the occupations in their zone of acceptable alternatives. However, we find (small) gender differences even in preschool children's communal self-perceptions, which are related to their occupational aspirations. It therefore appears that aspects of the self-concept do influence occupational aspirations during the

circumscription phase in the development of occupational aspirations, not only during the period of compromise in adolescence and early adulthood. We can assume that children's gendered self-concept may change over time as they develop understandings of more abstract concepts related to their occupational aspirations (e.g., status; Gottfredson, 1981; 2002). However, as this is an underexamined aspect of occupational aspirations in childhood, more research should be conducted to inform the future application of the developmental theory of occupational aspirations.

### **Practical Implications**

Overall, this dissertation contributes to the underexamined field of the social and developmental causes of men's underrepresentation in communal occupations. One of the key findings of the present research is the overarching effects of gendered self-perceptions on occupational aspirations, even among children in early childhood. This, I would argue, indicates that gender roles are internalized from an early age, which leads to differing perceptions of the self and of one's future opportunities among boys and girls. According to the developmental theory of occupational aspirations, this internalization of gender roles does not begin to influence occupational aspirations until adolescence (Gottfredson, 1981). Our findings thus contradict this, indicating that efforts need to be made when it comes to encouraging a gender egalitarian socialization of children in order to promote a less gendered workforce in the future. Qualitative research has highlighted how both parents and educators treat boys and girls differently (Gansen, 2019; Kane, 2006; Meland & Kaltvedt, 2017). One observational qualitative study conducted in a Norwegian preschool found that girls were expected to be caring and well-behaved, whilst boys were praised for being strong and not penalized for being loud to the same extent as girls (Meland & Kaltvedt, 2017). Additionally, another observational qualitative study from the U.S. found that boys and girls were disciplined differently for engaging in the same behavior (Gansen, 2019). Parents have also

reported penalizing gender non-conforming behavior in their children, especially in their young boys (Kane, 2006).

Preventing the development of gendered self-perceptions by changing the way parents and teachers interact with children is a stupendous challenge and something that might meet pushback from many. We should therefore also consider more tangible efforts that can be made to increase boys' interest in communal occupations. Several interventions already exist that aim to combat the gendered development of occupational aspirations. One popular category of interventions is role model interventions, which is based on the idea that showing children a person from their gender engaging in counter-stereotypical behavior will lead to children believing that they can also engage in this type of behavior (Morgenroth et al., 2015). Several role model interventions have been implemented with the aim to encourage girls and young women to pursue a career in STEM (e.g., Little Miss Geek, WISE Campaign) and much research has been dedicated to investigating the effect of role models on the career aspirations of girls (e.g., Bigler & Liben, 1990; Liben et al., 2001). Yet, there is a lack of research on the effect of counter-stereotypical role models on the career aspirations of boys. According to a review by Croft and colleagues (2015), a lack of male role models in communal roles is one of the barriers that prevent men from engaging in communal roles. Some research has been conducted on the effect of male preschool and elementary school teachers on young children's gender stereotyped beliefs. For example, children from schools with only female teachers were found to report more occupational gender stereotypes about teachers than children from schools with both male and female teachers (Mancus, 1992). Even so, the relationship between male teachers in early education and young boys' communal occupational aspirations remains unclear due to lack of empirical investigation. Our findings indicate that there is a relationship between children's occupational gender stereotypes and their occupational aspirations. This indicates that implementing role model interventions that

might reduce these gender stereotypes could lead to increased communal occupational aspirations among young boys. However, the effect of role model interventions also appears to be limited. As outlined in a review by Olsson & Martiny (2018), there are several factors that influence the effect of exposure to counter-stereotypical role models. Role model interventions appear to have some effect on children's gender stereotypes (e.g., Karniol & Gal-Disegni, 2009; Leblebicioglu et al., 2011), but the change in stereotypes is not followed by a change in behavior (Bigler, 1999). Factors such as lack of similarity, the distortion of counter-stereotypical information and subtyping of counter-stereotypical role models all contribute to weaken the effects of role model interventions. Therefore, despite the popularity of role model interventions, other interventions should be explored that might have a stronger behavioral effect.

One such intervention that has shown promising effect on behavior is communal goal intervention. This intervention was developed based on the observation that women perceive that STEM careers are less likely to afford communal goals (e.g., working with others, helping others), which are goals that are particularly valued by women (Diekmann et al., 2010). Therefore, increasing the perceived communal goal affordance in STEM can be used as a way to increase women's interest in a career in STEM. This has proven to be effective, as the National Academy of Engineering in the US saw an increase from 19% to 24% in the enrollment of women engineering students after redesigning recruitment materials to highlight cooperation with others and the social impact in engineering (Yowell & Sullivan, 2011). Additionally, framing a science career as being congruent with family life increased the interest in a science career for family-oriented women (Weisgram & Diekmann, 2017). By following this line of thinking, one way to increase boys' and men's interest in communal occupations is by emphasizing how typically communal occupations can afford agentic goals. This is supported by our finding that men in communal degree programs that report more



agentic self-perceptions show less sense of belonging and perceived fit with their degree programs, and also have more dropout intentions. One way to reduce men's lower fit and sense of belonging with communal degree programs and education could therefore be to highlight the ways in which agentic traits are important in communal occupations (e.g., being structured and efficient, having the scientific skills needed to handle medicine). We also found that elementary school boys reported more agentic occupational values than girls, which means that showing how communal occupations could be congruent with these values might increase their communal occupational aspirations. As, to my knowledge, no intervention that frames careers within healthcare and early education as being congruent with agentic goals has not been conducted, future research should explore this potential method of increasing male interest in communal occupations.

Another important finding in the present research are the consistent and strong effects of occupational status on aspirations, which importantly was found among both boys and girls. This was found among elementary school children, meaning that the occupational aspirations of children as young as 6 years old appear to be influenced by occupational status. Many communal occupations are perceived as being lower status than agentic occupations, as well as actually paying a lower salary than agentic occupations that require a similar education (e.g., England et al., 2002; SSB, 2023). As some studies suggest that status is something that is more important to young boys than to girls in their future occupations (Hardie, 2015; Hayes et al., 2018; Lapan & Jingeleski, 1992), increasing the status of communal occupations could be an important point of focus for increasing boys' communal occupational aspirations. In our studies, we did not find this gender difference in the valuation of occupational status, which shows that increased status of communal occupations could increase communal occupational aspirations in both boys and girls. In Study 3, the effect of salary on children's occupational aspirations was particularly strong, indicating that

increasing the salary of communal occupations could be an important factor in increasing communal occupational aspirations. Thus, increasing the status of communal occupations might make communal occupations more attractive for both boys and girls.

According to the developmental theory of occupational aspirations, when making compromises regarding which occupation to pursue, people will sacrifice occupations that match their interests before they sacrifice gender congruent occupations and occupations that are a match for their preferred status level (Gottfredson, 2002). Therefore, as communal occupations are both viewed as low status as well as typically female occupations, even boys with communal interest would sacrifice communal occupations over other occupations that are viewed as a better fit for their gender as preferred status level. According to this theoretical reasoning, increasing the status of communal occupations by raising the salary of these occupations would lead to a stronger motivation for boys to choose a communal occupation. In line with this argument, a way of encouraging boys to pursue a communal education could be to provide a monetary benefit for male students in communal degree programs. This has been implemented, as Coventry University in the UK provides scholarships of £30,000 to some men who study nursing at their university (Coventry University, 2017). The effect of such financial interventions has not to my knowledge been empirically tested, but such monetary benefits could act as a motivation to persist against the potential psychological distress of going against occupational gender norms.

### **Limitations and Methodological Considerations**

There are some limitations to the research presented in this dissertation that need to be discussed. Firstly, two of the four studies presented in this dissertation were solely cross-sectional, whilst correlational analyses were conducted as part of all studies. It is therefore not possible to draw causal conclusions regarding the effect of occupational gender stereotypes or self-perceptions on occupational aspirations, or regarding the effects of perceived fit on sense

of belonging and dropout intentions. It could be possible that boys who aspire more toward communal occupations develop less communal occupational gender stereotypes, as a way to “justify” their own aspirations. We are not able to disentangle the directionality of these effects with the present data and therefore can only make interpretations based on theoretical perspectives (e.g., the developmental theory of occupational aspirations [Gottfredson, 1981; 2002]; social role theory [Eagly 1987]) and based on previous empirical work. However, based on our consistent findings as well as previous research the conclusion that occupational gender stereotypes and gendered self-perceptions predict communal occupational aspirations seems reasonable. To further establish the directionality of the effects, future research should investigate the effects of these factors on occupational aspirations using experimental and longitudinal designs.

Secondly, in Study 4, we aimed to experimentally manipulate the gendered traits associated with communal degree programs. Namely, we implemented an experimental manipulation where the experimental group was told that being compassionate, warm and supportive (i.e., communal traits) was important for success in communal occupations, whilst the control group was told that being engaged, effective and reliable (i.e., neutral traits) was important for success in communal occupations. However, we found no significant effects of this manipulation, though the effect was in the predicted direction where men in the experimental condition reported slightly less perceived fit and sense of belonging than men in the control condition and women in either condition. As our sample of male participants was very small ( $n = 66$ ), which negatively affected the statistical power of the study. Since men make up a minority in communal degree programs and in communal occupations, it can be difficult to recruit enough male participants when conducting research related to communal roles. However, since men’s underrepresentation in communal roles is an important but underexamined topic, future research should make even more efforts to recruit larger samples

of male participants to make sure that high-powered analyses can be run to identify which factors that influence male engagement in communal degree programs and occupations.

The studies presented in this dissertation were conducted in a highly egalitarian context, namely in Norway. This can be both a strength and a limitation of the research. On the one hand, we would expect that, for example, the found effects of occupational gender stereotypes on occupational aspirations might be even stronger in less egalitarian countries where such gender stereotypes are more widespread. However, one issue with this reasoning is the fact that even highly gender egalitarian countries have a highly gender divided labor market (i.e., high horizontal gender segregation). One explanation for this phenomenon is that it is caused by gender essentialist beliefs, combined with a self-expressive value system that encourages people to choose their future occupations based on their gendered self-concept (Charles & Bradley, 2009). Some argue that gender essentialist beliefs (i.e., the belief that gender differences are driven by intrinsic and “natural” causes) become more widespread in highly gender egalitarian contexts where there is still a strong occupational gender gap (Charles & Bradley, 2009; England, 2010; Levanon & Grusky, 2016). As there are no perceived structural barriers from women’s engagement with male-dominated agentic occupations or men’s engagement with female-dominated communal occupations, the “innate natural differences” between men and women are used as an explanation for the occupational gender gap. This explanation thus disregards the psychological barriers that prevent people from pursuing a gender incongruent occupation, such as the factors investigated in the present dissertation. It is therefore an erroneous simplification to say that findings relating to gendered occupational occupations in highly gender egalitarian countries will translate directly to less egalitarian countries. One must therefore be cautious when generalizing the findings from the present dissertation to other cultural contexts.

One other limitation of the studies presented in this dissertation are some of the measures used in the studies. For one, we measure occupational aspirations in Study 1 and Study 2 by asking children how much they would like to have certain occupations when they grow up and ask them to answer on a Likert scale. One could argue that this is not an accurate measure of children's actual occupational aspirations, and that this measure simply tells us something about how much they do or do not aspire toward a handful of communal occupations. It could be the case that the participants do actually have quite strong aspirations toward occupations that are viewed as communal, but that we did not include these occupations in our measurement. Another way of measuring occupational aspirations is by using an open-ended question, where the answers could be coded in terms of agency and communion (e.g., Korlat et al., 2022b). This would be a more accurate measure of actual aspirations. However, this method would pose issues when conducting studies with young children, which was the case for both Study 1 and Study 2 of this dissertation. Children as young as preschool age might report fantasy occupations, as some would still be in the stage of development outlined by the developmental theory of occupational aspirations where they are learning what real adult occupations are. Additionally, having elementary school children self-report their occupational aspiration in an online questionnaire would likely lead to many unusable answers, due to spelling errors or misunderstandings of the question. Therefore, I believe that our chosen method of using a predetermined scale for measuring occupational aspirations was a good choice for our study design, but it would be ideal to have included more communal occupations to capture a wider range of children's communal occupational aspirations. Future research might benefit from using a combination of open-ended questions and predetermined scales as a way to ensure the validity and the reliability of the measures of occupational aspirations in children.

There are similar issues related to our measures of communal and agentic self-perceptions across all studies. Some argue that using preconceived scales will not give an accurate portrayal of the participants actual self-descriptions, as asking how much someone identifies with certain traits can be a cue for memory search and thus influencing the participants' responses (e.g., Brinthaupt & Erwin, 1992). An alternative method for measuring the gendered self-concept can be to ask participants for their spontaneous self-descriptions, which could then be coded in terms of agency and communality (e.g., Korlat et al., 2022a). However, as mentioned earlier regarding measurement of occupational aspirations using open-ended questions, I would argue that having preschool and elementary school children reporting their own self-perceptions might cause challenges in terms of writing skills and their understanding of the question. Such a method might however be well-suited for use with adolescents and young adults.

Lastly, as we aimed to investigate the social and developmental factors that influence occupational aspirations, one important limitation of the present work is the lack of an adolescent sample in any of the studies in this dissertation. Adolescence is an important period when it comes to the development of occupational aspirations. Adolescents are fast approaching the time to make occupational choices, and their school grades often influence their future educational possibilities. However, due to the importance of this developmental period, most previous research on the development of occupational aspirations has been conducted on adolescents or young adults. For this reason, the majority of the studies in this dissertation are focused on the development of occupational aspirations in early- to middle childhood. The present dissertation would however have benefitted from the additional inclusion of a study with an adolescent sample to provide an overview of the development of occupational aspirations from early childhood to early adulthood. Future research should therefore investigate the relationships of gender stereotypes, occupational status, the gendered

self-concept with occupational aspirations in adolescence, to provide a thorough overview of the effects of these factors throughout childhood. We are presently in the process of collecting data on occupational values in an adolescent sample, which will hopefully provide important insights into the relationships between adolescents gendered self-concepts and their occupational values.

## **Conclusion**

The issue of men's underrepresentation in communal occupations has been underexamined, despite the benefits of men's engagement in communal behavior on both an individual and a societal level. The research presented in this dissertation aimed to bridge this gap in knowledge by investigating communal occupational aspirations throughout childhood and into young adulthood. There are two main findings in the present doctoral research. First, children appear to internalize gender norms from an early age, which then seems to consistently influence on occupational aspirations throughout childhood as well as influencing the perceived fit and sense of belonging with communal degree programs in early adulthood, leading to increased dropout intentions among male students. Second, we find both correlationally and experimentally that occupational status is an important variable that affects occupational aspirations even among young children. These findings highlight that there are few incentives for men to defy their internalized gender norms to pursue communal occupations as they are generally lower in status than agentic occupations. Measures to increase male interest in communal occupations should therefore focus on raising the actual and perceived status of communal occupations, whilst also highlighting how communal occupations can afford both communal and agentic goals and values.



## References

- Abele, A. E., & Spurk, D. (2011). The dual impact of gender and the influence of timing of parenthood on men's and women's career development: Longitudinal findings. *International Journal of Behavioral Development, 35*(3), 225-232.  
<https://doi.org/10.1177/0165025411398181>
- Aragão, C. (2023). Gender pay gap in U.S. hasn't changed much in two decades. *Pew Research Center*. <https://www.pewresearch.org/short-reads/2023/03/01/gender-pay-gap-facts/>
- Archer, J. (1996). Sex differences in social behavior: Are the social role and evolutionary explanations compatible? *American Psychologist, 51*(9), 909-917.  
<https://doi.org/10.1037/0003-066X.51.9.909>
- Bauer, J. J., & McAdams, D. P. (2010). Eudaimonic growth: Narrative growth goals predict increases in ego development and subjective well-being 3 years later. *Developmental Psychology, 46*(4), 761–772. <https://doi.org/10.1037/a0019654>
- Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review, 88*, 354-364. <http://doi.org/10.1037/0033-295X.88.4.354>
- Berenbaum, S. A. (2018). Beyond pink and blue: The complexity of early androgen effects on gender development. *Child Development Perspectives, 12*(1), 58-64.  
<https://doi.org/10.1111/cdep.12261>
- Berenbaum, S. A., & Hines, M. (1992). Early androgens are related to sex-typed toy preferences. *Psychological Science, 3*(3), 203-206. <https://doi.org/10.1111/j.1467-9280.1992.tb00028.x>
- Berenbaum, S. A., & Snyder, E. (1995). Early hormonal influences on childhood sex-typed activity and playmate preferences: Implications for the development of sexual

- orientation. *Developmental Psychology*, 31, 31–42. <https://doi.org/10.1037/0012-1649.31.1.31>
- Bigler, R. S. (1999). Psychological interventions designed to counter sexism in children: Empirical limitations and theoretical foundations. In W. B. Swann, Jr., J. H. Langlois, & L. A. Gilbert (Eds.), *Sexism and stereotypes in modern society: The gender science of Janet Taylor Spence* (pp. 129–151). American Psychological Association. <https://doi.org/10.1037/10277-006>
- Bigler, R. S., and Liben, L. S. (1990). The role of attitudes and interventions in gender-schematic processing. *Child Development*, 61(5), 1440–1452. <https://doi.org/10.1111/j.1467-8624.1990.tb02873.x>
- Blackburn, R. M., Brooks, B., & Jarman, J. (2001). The vertical dimension of occupational segregation. *Work, Employment and Society*, 15(3), 511-538. <https://doi.org/10.1177/09500170122119138>
- Blakemore, J. E. O. (2003). Children’s beliefs about violating gender norms: Boys shouldn’t look like girls, and girls shouldn’t act like boys. *Sex Roles*, 48, 411-419. <https://doi.org/10.1023/A:1023574427720>
- Block, K., Gonzalez, A. M., Schmader, T., & Baron, A. S. (2018). Early gender differences in core values predict anticipated family versus career orientation. *Psychological Science*, 29(9), 1540–1547. <https://doi.org/10.1177/0956797618776942>
- Block, K., Croft, A., De Souza, L., & Schmader, T. (2019). Do people care if men don’t care about caring? The asymmetry in support of changing gender roles. *Journal of Experimental Social Psychology*, 83, 112-131. <https://doi.org/10.1016/j.jesp.2019.03.013>

- Bosson, J. K., Vandello, J. A., Burnaford, R. M., Weaver, J. R., & Wasti, S. A. (2009). Precarious manhood and displays of physical aggression. *Personality and Social Psychology Bulletin*, 35(5), 623-634. <https://doi.org/10.1177/0146167208331161>
- Brinthaupt, T. M., & Erwin, L. J. (1992). Reporting about the self: Issues and implication. In T. M. Brinthaupt & R. P. Lipka (Eds.), *The self: Definitional and methodological issues* (pp. 137-171). State University of New York Press.
- Bussey, K. & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review*, 106(4), 676-713. <https://doi.org/10.1037/0033-295X.106.4.676>
- Caldera, Y. M., Huston, A. C., & O'Brien, M. (1989). Social interactions and play patterns of parents and toddlers with feminine, masculine, and neutral toys. *Child Development*, 60(1), 70-76. <https://doi.org/10.2307/1131072>
- Caplan, R. D., & Van Harrison, R. (1993). Person-environment fit theory: Some history, recent developments, and future directions. *Journal of Social Issues*, 49(4), 253-275. <https://doi.org/10.1111/j.1540-4560.1993.tb01192.x>
- Charles, M., & Bradley, K. (2009). Indulging our gendered selves? Sex segregation by field of study in 44 countries. *American Journal of Sociology*, 114(4), 924-976. <https://doi.org/10.1086/595942>
- Cochran, D. B., Wang, E. W., Stevenson, S. J., Johnson, L. E., & Crews, C. (2011). Adolescent occupational aspirations: Test of Gottfredson's theory of circumscription and compromise. *The Career Development Quarterly*, 59(5), 412-427. <https://doi.org/10.1002/j.2161-0045.2011.tb00968.x>
- Coventry University. (2017). *University Tackles Nursing Gender Gap with First Bursary for Men*. Retrieved from <https://www.coventry.ac.uk/primary-news/university-tackles-nursing-gender-gap-with-first-bursary-for-men/>

- Croft, A., Schmader, T., & Block, K. (2015). An underexamined inequality: Cultural and psychological barriers to men's engagement with communal roles. *Personality and Social Psychology Review, 19*(4), 343–370.  
<https://doi.org/10.1177/1088868314564789>
- Crouter, A. C., Whiteman, S. D., McHale, S. M., Osgood, D. W. (2007). Development of gender attitude traditionality across middle childhood and adolescence. *Child Development, 78*(3), 911-926. <https://doi.org/10.1111/j.1467-8624.2007.01040.x>
- Cunningham, M. (2001). The influence of parental attitudes and behaviors on children's attitudes toward gender and household labor in early adulthood. *Journal of Marriage and Family, 63*(1), 111-122. <https://doi.org/10.1111/j.1741-3737.2001.00111.x>
- Davis, S. N., & Wills, J. B. (2010). Adolescent gender ideology socialization: Direct and moderating effects of fathers' beliefs. *Sociological Spectrum, 30*(5), 580-604.  
<https://doi.org/10.1080/02732173.2010.496106>
- Diekmann, A. B., Brown, E. R., Johnston, A. M., & Clark, E. K. (2010). Seeking congruity between goals and roles: A new look at why women opt out of science, technology, engineering, and mathematics careers. *Psychological Science, 21*(8), 1051–1057.  
<https://doi.org/10.1177/0956797610377342>
- Direktoratet for høyere utdanning og kompetanse (2022). *Database for statistikk om høyere utdanning*. Retrieved May 23rd, 2023, from <https://dbh.hkdir.no/tall-og-statistikk/statistikk-meny/kjonn>
- Donnelly, K., & Twenge, J. M. (2017). Masculine and feminine traits on the Bem Sex-Role Inventory, 1993-2012: A cross-temporal meta-analysis. *Sex Roles: A Journal of Research, 76*(9-10), 556-565. <https://doi.org/10.1007/s11199-016-0625-y>
- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Lawrence Erlbaum.

- Eagly, A. H., & Wood, W. (2011). Social Role Theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 458-476). Sage Publications Ltd. <https://doi.org/10.4135/9781446249222.n49>
- Eagly, A., Nater, C., Miller, D. I., Kaufmann, M., & Sczesny, S. (2020). Gender stereotypes have changed: A cross-temporal meta-analysis of U.S. public opinion polls from 1946 to 2018. *American Psychologist*, 75(3), 301-315. <https://doi.org/10.1037/amp0000494>
- Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J., & Midgley, C. (1983). Expectancies, values and academic behaviors. In Spence, J. T. (ed.), *Achievement and Achievement Motives*. W. H. Freeman, San Francisco.
- Eccles, J. S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. model of achievement-related choices. *Psychology of Women Quarterly*, 18(4), 585-609. <https://doi.org/10.1111/j.1471-6402.1994.tb01049.x>
- Eccles, J. S., Barber, B., & Jozefowicz, D. (1999). Linking gender to educational, occupational, and recreational choices: Applying the Eccles et al. model of achievement-related choices. In W. B. Swann, Jr., J. H., Langlois, & L. A. Gilbert (Eds.), *Sexism and stereotypes in modern society: The gender science of Janet Taylor Spence* (pp. 153-192). American Psychological Association. <https://doi.org/10.1037/10277-007>
- England, P., Budig, M., & Folbre, N. (2002). Wages of virtue: The relative pay of care work. *Social Problems*, 49(4), 455-473. <https://doi.org/10.1525/sp.2002.49.4.455>
- England, P. (2010). The gender revolution: Uneven and stalled. *Gender & Society*, 24(2), 149-166. <https://doi.org/10.1177/0891243210361475>
- Fabes, R. A., Martin, C. L., & Hanish, L. D. (2009). Children's behaviors and interactions with peers. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Handbook of peer interactions, relationships, and groups* (pp. 45-62). The Guilford Press.

- Fagot, B. I., & Leinbach, M. D. (1989). The young child's gender schema: Environmental input, internal organization. *Child Development*, *60*(3), 663–672.  
<https://doi.org/10.2307/1130731>
- Fagot, B. I., & Leinbach, M. D. (1993). Gender-role development in young children: From discrimination to labeling. *Developmental Review*, *13*(2), 205-224.  
<https://doi.org/10.1006/drev.1993.1009>
- Fink, M., Klein, K., Sayers, K., Valentino, J., Leonardi, C., Bronstone, P., Wiseman, P. M., & Dasa, V. (2020). Objective data reveals gender preferences for patients' primary care physician. *Journal of Primary Care & Community Health*, *11*.  
<https://doi.org/10.1177/2150132720967221>
- Fulcher, M., Sutfin, E. L., & Patterson, C. J. (2008). Individual differences in gender development: Associations with parental sexual orientation, attitudes, and division of labor. *Sex Roles*, *58*(5), 330-341. <https://doi.org/10.1007/s11199-007-9348-4>
- Galdi, S., Cadinu, M., & Tomasetto, C. (2014). The roots of stereotype threat: When automatic association disrupts girls' math performance. *Child Development*, *85*(1), 250-263. <https://doi.org/10.1111/cdev.12128>
- Gansen, H. M. (2019). Push-ups versus clean-up: Preschool teachers' gendered beliefs, expectations for behavior, and disciplinary practices. *Sex Roles*, *80*, 393-408.  
<https://doi.org/10.1007/s11199-018-0944-2>
- Gawronski, B. (2004). Theory-based bias correction in dispositional inference: The fundamental attribution error is dead, long live the correspondence bias. *European Review of Social Psychology*, *15*(1), 183–217.  
<https://doi.org/10.1080/10463280440000026>

- Good, C., Rattan, A., & Dweck, C. S. (2012). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology, 102*(4), 700-717. <https://doi.org/10.1037/a0026659>
- Gosse, D. (2011). Race, sexual orientation, culture and male teacher role models: "Will any teacher do as long as they are good?" *The Journal of Men's Studies, 19*(2), 116-137. <https://doi.org/10.3149/jms.1902.116>
- Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology, 28*(6), 545-579. <https://doi.org/10.1037/0022-0167.28.6.545>
- Gottfredson, L.S. (2002). Gottfredson's theory of circumscription, compromise, and self-creation. In D. Brown (Ed.), *Career Choice and Development* (pp. 85-148). San Francisco: Jossey-Bass.
- Gram., K. H. (2022). *Likestillingsutfordringer i deltidsarbeid og utdanningsnivå*. <https://www.ssb.no/befolkning/likestilling/statistikk/indikatorer-for-kjonnlikestilling-i-kommunene/artikler/likestillingsutfordringer-i-deltidsarbeid-og-utdanningsniva>
- Hannah, J-A. S., & Kahn, S. E. (1989). The relationship of socioeconomic status and gender to the occupational choices of grade 12 students. *Journal of Vocational Behavior, 34*(2), 161-178. [https://doi.org/10.1016/0001-8791\(89\)90012-2](https://doi.org/10.1016/0001-8791(89)90012-2)
- Hardie, J. H. (2015). Women's work? Predictors of young men's aspirations for entering traditionally female-dominated occupations. *Sex Roles, 72*(7-8), 349-362. <https://doi.org/10.1007/s11199-015-0449-1>
- Hardré, P. L., & Reeve, J. (2003). A motivational model of students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology, 95*(2), 347-356. <http://dx.doi.org/10.1037/0022-0663.95.2.347>

- Hartley, B. L., & Sutton, R. M. (2013). A stereotype threat account of boys' academic underachievement. *Child Development, 84*(5), 1716-1733.  
<https://doi.org/10.1111/cdev.12079>
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis; A regression-based approach* (2<sup>nd</sup>. Ed.). Guilford Publications.
- Hayes, A. R., Bigler, R. S., & Weisgram, E. S. (2018). Of men and money: Characteristics of occupations that affect the gender differentiation of children's occupational interests. *Sex Roles, 78*(11-12), 775–788. <https://doi.org/10.1007/s11199-017-0846-8>
- Hekseth, B., Elmslie, S., & Kaldor, W. (1990). Career compromise: An alternative account to Gottfredson's theory. *Journal of Counseling Psychology, 37*(1), 49-56.  
<https://doi.org/10.1037/0022-0167.37.1.49>
- Helwig, A. A. (2001). A test of Gottfredson's theory using a ten-year longitudinal study. *Journal of Career Development, 28*(2), 77-95.  
<https://doi.org/10.1177/089484530102800201>
- Hilliard, L. J., & Liben, L. S. (2010). Differing levels of gender salience in preschool classrooms: Effects on children's gender attitudes and intergroup bias. *Child Development, 81*(6), 1787–1798. <https://doi.org/10.1111/j.1467-8624.2010.01510.x>
- Hoff, K. A., Chu, C., Einarsdóttir, S., Briley, D. A., Hanna, A., & Rounds, J. (2022). Adolescent vocational interests predict early career success: Two 12-year longitudinal studies. *Applied Psychology, 71*(1), 49-75. <https://doi.org/10.1111/apps.12311>
- Junk, K. E., & Armstrong, P. I. (2010). Stability of career aspirations: A longitudinal test of Gottfredson's theory. *Journal of Career Development, 37*(3), 579-598.  
<https://doi.org/10.1177/0894845309350921>



- Kane, E. W. (2006). "No way my boys are going to be like that!": Parents' responses to children's gender nonconformity. *Gender & Society*, 20(2), 149-176. <https://doi.org/10.1177/0891243205284276>
- Karniol, R., & Gal-Disegni, M. (2009) The impact of gender-fair versus gender-stereotyped basal readers on 1st-grade children's gender stereotypes: A natural experiment. *Journal of Research in Childhood Education*, 23(4), 411-420. <https://doi.org/10.1080/02568540909594670>
- Koch, A. J., Sackett, P. R., Kuncel, N. R., Dahlke, J. A., & Beatty, A. S. (2022). Why women STEM majors are less likely than men to persist in completing a STEM degree: More than the individual. *Personality and Individual Differences*, 190. <https://doi.org/10.1016/j.paid.2022.111532>
- Korlat, S., Foerst, N. M., Schultes, M.-T., Schober, B., Spiel, C., & Kollmayer, M. (2022a). Gender role identity and gender intensification: Agency and communion in adolescents' spontaneous self-descriptions. *European Journal of Developmental Psychology*, 19(1), 64-88. <https://doi.org/10.1080/17405629.2020.1865143>
- Korlat, S., Schultes, M.-T., Schober, B., Spiel, C., & Kollmayer, M. (2022b). Gender typicality and prestige of occupational aspirations in adolescents: The relevance of agency and communion. *Journal of Career Development*, 50(2), 405-424. <https://doi.org/10.1177/08948453221100744>
- Kosakowska-Berezecka, N., Bosson, J. K., Jurek, P., Besta, T., Olech, M., Vandello, J. A., Bender, M., Dandy, J., Hoorens, V., Jasinskaja-Lahti, I., Mankowski, E., Venäläinen, S., Abuhamdeh, S., Agyemang, C. B., Akbas, G., Albayrak-Aydemir, N., Ammirati, S., Anderson, J., Anjum, G., ... Zadkowska, M. (2022). Gendered self-views across 62 countries: A test of competing models. *Social Psychological and Personality Science*. <https://doi.org/10.1177/19485506221129687>

- Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*, *58*(2), 281-342.  
<https://doi.org/10.1111/j.1744-6570.2005.00672.x>
- Kvalø, M., Olsen, M., Thorsteinsen, K., Olsson, M. I. T., & Martiny, S. E. (2021). Does the stereotypicality of mothers' occupation influence children's communal occupational aspirations and communal orientation? *Frontiers in Psychology*, *12*.  
<https://doi.org/10.3389/fpsyg.2021.730859>
- Lamer, S. A., Dvorak, P., Biddle, A. M., Pauker, K., & Weisbuch, M. (2022). The transmission of gender stereotypes through televised patterns of nonverbal bias. *Journal of Personality and Social Psychology*, *123*(6), 1315-1335.  
<https://doi.org/10.1037/pspi0000390>
- Lapan, R. T., & Jingeleski, J. (1992). Circumscribing vocational aspirations in junior high school. *Journal of Counseling Psychology*, *39*(1), 81-90. <https://doi.org/10.1037/0022-0167.39.1.81>
- Le, B. M., Impett, E. A., Kogan, A., Webster, G. D., & Cheng, C. (2012). The personal and interpersonal rewards of communal orientation. *Journal of Social and Personal Relationships*, *30*(6), 694–710. <https://doi.org/10.1177/0265407512466227>
- Le, B. M., Impett, E. A., Lemay Jr, E. P., Muise, A., & Tskhay, K. O. (2018). Communal motivation and well-being in interpersonal relationships: An integrative review and meta-analysis. *Psychological Bulletin*, *144*(1), 1-25.  
<https://doi.org/10.1037/bul0000133>
- Leblebicioglu, G., Metin, D., Yardimci, E., & Cetin, P. S. (2011). The effect of informal and formal interaction between scientists and children at a science camp on their images of scientists. *Science Education International*, *22*(3), 158-174.

- Leszczynski, J. P., & Strough, J. (2008). The contextual specificity of masculinity and femininity in early adolescence. *Social Development, 17*(3), 719-736.  
<https://doi.org/10.1111/j.1467-9507.2007.00443.x>
- Leung, S. A., & Plake, B. S. (1990). A choice dilemma approach for examining the relative importance of sex type and prestige preferences in the process of career choice compromise. *Journal of Counseling Psychology, 37*(4), 399-406.  
<https://doi.org/10.1037/0022-0167.37.4.399>
- Levanon, A., & Grusky, D. B. (2016). The persistence of extreme gender segregation in the twenty-first century. *American Journal of Sociology, 122*(2), 573-619.  
<https://doi.org/10.1086/688628>
- Levy, G. D., & Fivush, R. (1993). Scripts and gender: A new approach for examining gender-role development. *Developmental Review, 13*(2), 126-146.  
<https://doi.org/10.1006/drev.1993.1006>
- Levy, G. D., Sadovsky, A. L., & Troseth, G. L. (2000). Aspects of young children's perceptions of gender-typed occupations. *Sex Roles, 42*(11), 993–1006.  
<https://doi.org/10.1023/A:1007084516910>
- Liben, L. S., Bigler, R. S., & Krogh, H. R. (2001). Pink and blue collar jobs: Children's judgements of job status and job aspirations in relation to sex of worker. *Journal of Experimental Child Psychology, 79*(4), 346–363.  
<https://doi.org/10.1006/jecp.2000.2611>
- Low, K. S. D., Yoon, M., Roberts, B. W., & Rounds, J. (2005). The stability of vocational interests from early adolescence to adulthood: A quantitative review of longitudinal studies. *Psychological Bulletin, 131*, 713–737. <https://doi.org/10.1037/0033-2909.131.5.713>.

- Mancus, D. S. (1992). Influence of male teachers on elementary school children's stereotyping of teacher competence. *Sex Roles, 26*, 109-128.  
<https://doi.org/10.1007/BF00289753>
- Mao, A., Wang, J., Cheong, P. L., Van, I. K., & Tam, H. L. (2020). Male nurses' dealing with tensions and conflicts with patients and physicians: A theoretically framed analysis. *Journal of Multidisciplinary Healthcare, 13*, 1035-1045.  
<https://doi.org/10.2147/JMDH.S270113>
- Martin, C. L., & Halverson, C. F. (1981). A schematic processing model of sex typing and stereotyping in children. *Child Development, 52*(4), 1119-1134.  
<https://doi.org/10.2307/1129498>
- Masters, S., & Barth, J. (2022). Do gender conformity pressure and occupational knowledge influence stereotypical occupation preferences in middle childhood? *Frontiers in Education, 6*. <https://doi.org/10.3389/educ.2021.780815>
- McCrea, S. M., Wieber, F., & Myers, A. L. (2012). Construal level mind-sets moderate self- and social stereotyping. *Journal of Personality and Social Psychology, 102*(1), 51-68.  
<https://doi.org/10.1037/a0026108>
- McGrath, K., & Sinclair, M. (2013). More male primary-school teachers? Social benefits for boys and girls. *Gender and Education, 25*(5), 531-547.  
<https://doi.org/10.1080/09540253.2013.796342>
- Mehta, C. M., & Dementieva, Y. (2017). The contextual specificity of gender: Femininity and masculinity in college students' same- and other-gender peer contexts. *Sex Roles, 76*, 604-614. <https://doi.org/10.1007/s11199-016-0632-z>
- Meland, A. T., & Kaltvedt, E. H. (2019). Tracking gender in kindergarten. *Early Child Development and Care, 189*(1), 94-103.  
<https://doi.org/10.1080/03004430.2017.1302945>

- Mello, Z. R. (2008). Gender variation in developmental trajectories of educational and occupational expectations and attainment from adolescence to adulthood. *Developmental Psychology, 44*, 1069-1080. <https://doi.org/10.1037/0012-1649.44.4.1069>
- Mellor, D., & Moore, K. A. (2013). The use of Likert scales with Children. *Journal of Pediatric Psychology, 39*(3). <http://doi.org/10.1093/jpepsy/jst079>
- Mendez, L. M. R., & Crawford, K. M. (2002). Gender-role stereotyping and career aspirations: A comparison of gifted early adolescent boys and girls. *Journal of Secondary Gifted Education, 13*(3), 96-107. <https://doi.org/10.4219/jsge-2002-375>
- Menkor, M., Nagengast, B., Van Laar, C., & Sassenberg, K. (2021). The fit between dignity self-construal and independent university norms: Effects on university belonging, well-being, and academic success. *European Journal of Social Psychology, 51*(1), 100-112. <https://doi.org/10.1002/ejsp.2717>
- Morgenroth, T., Ryan, M. K., & Peters, K. (2015). The motivational theory of role modeling: How role models influence role aspirations' goals. *Review of General Psychology, 19*(4), 465-483. <https://doi.org/10.1037/gpr0000059>
- Moss-Racusin, C. A., Phelan, J. E., & Rudman, L. A. (2010). When men break the gender rules: Status incongruity and backlash against modest men. *Psychology of Men & Masculinity, 11*, 140-151. <https://doi.org/10.1037/a0018093>
- Nedregård, O., & Abrahamsen, B. (2018). *Frafall fra profesjonsutdanningene ved OsloMet* (OsloMet Rapport 2018 8). Oslo Metropolitan University. <https://skriftserien.oslomet.no/index.php/skriftserien/article/view/121/114>
- Ojanen, T., Grönroos, M., & Salmivalli, C. (2005). An interpersonal circumplex model of children's social goals: Links with peer-reported behavior and sociometric status.

*Developmental Psychology*, 41(5), 699–710. <https://doi.org/10.1037/0012-1649.41.5.699>

Olsson, M. I. T., & Martiny, S. E. (2018). Does exposure to counterstereotypical role models influence girls' and women's gender stereotypes and career choices? A review of social psychological research. *Frontiers in Psychology*, 9, 2264.

<https://doi.org/10.3389/fpsyg.2018.02264>

Penner, A. M., Petersen, T., Hermansen, A. S., Rainey, A., Boza, I., Elvira, M. M., Godechot, O., Hällsten, M., Henriksen, L. F., Hou, F., Mrčela, A. K., King, J., Kodama, N., Kristal, T., Křížková, A., Lippényi, Z., Melzer, S. M., Mun, E., Apascariței, P., ...

Tufail, Z. (2023). Within-job gender pay inequality in 15 countries. *Nature Human Behavior*, 7, 184-189 <https://doi.org/10.1038/s41562-022-01470-z>

Peters, K., Ryan, M. K., & Haslam, S. A. (2015). Marines, medics, and machismo: Lack of fit with masculine occupational stereotypes discourages men's participation. *British Journal of Psychology*, 106(4), 635-655. <https://doi.org/10.1111/bjop.12106>

Riggio, H. R., & Desrochers, S. (2005). The influence of maternal employment on the work and family expectations of offspring. In D. F. Halpern & S. E. Murphy (Eds.), *From work-family balance to work-family interaction: Changing the metaphor* (pp. 177-196). Lawrence Erlbaum Associates Publishers.

Rubin, K. H., Bukowski, W. M., & Parker, J. G. (2007). Peer Interactions, Relationships, and Groups. In Eisenberg, N., Damon, W., & Lerner, R. M. (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 571-645). John Wiley & Sons, Inc..

Schmader, T. & Sedikides, C. (2017). State authenticity as fit to environment: The implication of social identity for fit, authenticity, and self-segregation. *Personality and Social Psychology Review*, 22(3), 228-259. <https://doi.org/10.1177/1088868317734080>

- Schmitt, N., Oswald, F. L., Friede, A., Imus, A., & Merritt, S. (2008). Perceived fit with an academic environment: Attitudinal and behavioral outcomes. *Journal of Vocational Behavior*, 72(3), 317-335. <https://doi.org/10.1016/j.jvb.2007.10.007>
- Schoon, I., & Polek, E. (2011). Teenage career aspirations and adult career attainment: The role of gender, social background and general cognitive ability. *International Journal of Behavioral Development*, 35(3), 210-217. <https://doi.org/10.1177/0165025411398183>
- Seidler, Z. E., Wilson, M. J., Kealy, D., Oliffe, J. L., Ogradniczuk, J. S., & Rice, S. M. (2022). Men's preferences for therapist gender: Predictors and impact on satisfaction with therapy. *Counselling Psychology Quarterly*, 35(1), 173-189. <https://doi.org/10.1080/09515070.2021.1940866>
- Serbin, L. A., Powlishta, K. K., Gulko, J., Martin, C. L., & Lockheed, M. E. (1993). The development of sex typing in middle childhood. *Monographs for the Society for Research in Child Development*, 58(2), 1-98. <https://doi.org/10.2307/1166118>
- Serbin, L. A., Poulin-Dubois, D., Colburne, K. A., Sen, M. G., & Eichstedt, J. A. (2001). Gender stereotyping in infancy: Visual preferences for and knowledge of gender-stereotyped toys in the second year. *International Journal of Behavioral Development*, 25(1), 7-15. <https://doi.org/10.1080/01650250042000078>
- Statistisk sentralbyrå (2023). Lønn. <https://www.ssb.no/arbeid-og-lonn/lonn-og-arbeidskraftkostnader/statistikk/lonn>
- Statistisk sentralbyrå (2021a). *Helse- og sosialpersonell*. <https://www.ssb.no/arbeid-og-lonn/sysselsetting/statistikk/helse-og-sosialpersonell>
- Statistisk sentralbyrå (2021b). *Ansatte i barnehage og skole*. <https://www.ssb.no/utdanning/barnehager/statistikk/ansatte-i-barnehage-og-skole>

- Statistisk sentralbyrå (2020). *Dette er Norge 2020*. <https://www.ssb.no/befolkning/artikler-og-publikasjoner/attachment/430969?ts=1756a0b4970>
- Suhlmann, M., Sassenberg, K., Nagengast, B., & Trautwein, U. (2018). Belonging mediates effects of student-university fit on well-being, motivation, and dropout intentions. *Social Psychology, 49*, 16-28. <https://doi.org/10.1027/1864-9335/a000325>
- Sullivan, J., Moss-Racusin, C., Lopez, M., & Williams, K. (2018). Backlash against gender stereotype-violating preschool children. *PLoS ONE, 13*(4), e0195503. <https://doi.org/10.1371/journal.pone.0195503>
- Tay, P. K. C., Ting, Y. Y., & Tan, K. Y. (2019). Sex and care: The evolutionary psychological explanations for sex differences in formal care occupations. *Frontiers in Psychology, 10*. <https://doi.org/10.3389/fpsyg.2019.00867>
- Teig, S., & Susskind, J. E. (2008). Truck driver or nurse? The impact of gender roles and occupational status on children's occupational preferences. *Sex Roles, 58*, 848-863. <https://doi.org/10.1007/s11199-008-9410-x>
- Teigen, M., & Reisel, L. (2017). *Kjønnsbalanse på toppen? Sektorvariasjon i næringsliv, akademia, offentlig sektor og organisasjonsliv* (Rapport 2017:11). Institutt for samfunnsforskning. [https://www.regjeringen.no/contentassets/d4497c6f79394330a42c887ddcbbcd20/rapport\\_11\\_17\\_web.pdf](https://www.regjeringen.no/contentassets/d4497c6f79394330a42c887ddcbbcd20/rapport_11_17_web.pdf)
- Tenenbaum, H. R., & Leaper, C. (2002). Are parents' gender schemas related to their children's gender-related cognitions? A meta-analysis. *Developmental Psychology, 38*, 615-630. <https://doi.org/10.1037/0012-1649.38.4.615>
- Times Higher Education & UNESCO-IESALC (2022). *THE Report: Gender Equality: How global universities are performing*. [https://www.iesalc.unesco.org/wp-content/uploads/2022/03/SDG5\\_Gender\\_Report-2.pdf](https://www.iesalc.unesco.org/wp-content/uploads/2022/03/SDG5_Gender_Report-2.pdf)



- Trice, A. D., & Rush, K. (1995). Sex-stereotyping in four-year-olds' occupational aspirations. *Perceptual and Motor Skills*, *81*(2), 701–702.  
<https://doi.org/10.2466/pms.1995.81.2.701>
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*(3), 403-421. <https://doi.org/10.1037/0033-295X.110.3.403>
- Utdanning.no (2020). *Likestilling i arbeidslivet*. <https://utdanning.no/likestilling>
- Vandello, J. A., B, J. K., Cohen, D., Burnaford, R. M., & Weaver, J. R. (2008). Precarious manhood. *Journal of Personality and Social Psychology*, *95*(6), 1325-1339.  
<https://doi.org/10.1037/a0012453>
- Vandello, J. A., & Bosson, J. K. (2013). Hard won and easily lost: A review and synthesis of theory and research on precarious manhood. *Psychology of Men & Masculinity*, *14*(2), 101-113. <https://doi.org/10.1037/a0029826>
- Van Grootel, S., Van Laar, C., Meeussen, L., Schmader, T., & Sczesny, S. (2018). Uncovering pluralistic ignorance to change men's communal self-descriptions, attitudes, and behavioral intentions. *Frontiers in Psychology*, *9*, 1344.  
<https://doi.org/10.3389/fpsyg.2018.01344>
- Verquer, M. L., Beehr, T. A., & Wagner, S. H. (2003). A meta-analysis of relations between person-organization fit and work attitudes. *Journal of Vocational Behavior*, *63*(3), 473-489. [https://doi.org/10.1016/S0001-8791\(02\)00036-2](https://doi.org/10.1016/S0001-8791(02)00036-2)
- Wegemer, C. M., & Eccles, J. S. (2019). Gendered STEM career choices: Altruistic values, beliefs, and identity. *Journal of Vocational Behavior*, *110*, 28-42.  
<https://doi.org/10.1016/j.jvb.2018.10.020>
- Weisgram, E. S., Bigler, R. S., & Liben, L. S. (2010). Gender, values, and occupational interests among children, adolescents, and adults. *Child Development*, *81*(3), 778-796.  
<https://doi.org/10.1111/j.1467-8624.2010.01433.x>

- Weisgram, E. S., Dinella, L. M., & Fulcher, M. (2011). The role of masculinity/femininity, values, and occupational value affordances in shaping young men's and women's occupational choices. *Sex Roles*, 65(3), 243-258. <https://doi.org/10.1007/s11199-011-9998-0>
- Weisgram, E. S., & Diekmann, A. (2017). Making STEM «Family friendly»: The impact of perceiving science careers as family-compatible. *Social Sciences*, 6(2), 61. <https://doi.org/10.3390/socsci6020061>
- Wicht, A., Miyamoto, A., & Lechner, C. M. (2022). Are girls more ambitious than boys? Vocational interests partly explain gender differences in occupational aspirations. *Journal of Career Development*, 49(3), 551-568. <https://doi.org/10.1177/0894845321991665>
- Woodcock, A., Hernandez, P. R., Estrada, M., & Schultz, P. W. (2012). The consequences of chronic stereotype threat: Domain disidentification and abandonment. *Journal of Personality and Social Psychology*, 103(4), 635-646. <https://doi.org/10.1037/a0029120>
- World Economic Forum. (2023). *Global Gender Gap Report 2023*. [https://www3.weforum.org/docs/WEF\\_GGGR\\_2023.pdf](https://www3.weforum.org/docs/WEF_GGGR_2023.pdf)
- World Health Organization (2020). Global strategy on human resources for health: Workforce 2030.
- Yowell, J. L., & Sullivan, J. F. (2011). Who should be an engineer? *Bridge*, 41(2), 23-29.
- Zmyj, N., & Bischof-Köhler, D. (2015). The development of gender constancy in early childhood and its relation to time comprehension and false-belief understanding. *Journal of Cognition and Development*, 16(3), 455-470. <https://doi.org/10.1080/15248372.2013.824881>

## **Appendices**

### **Appendix A: Paper I – Published Article**

# What do I want to be? Predictors of communal occupational aspirations in early to middle childhood

Marte Olsen<sup>1</sup> , Maria I. T. Olsson<sup>1,2</sup>, Elizabeth J. Parks-Stamm<sup>3</sup>, Marie Kvalø<sup>1</sup>, Kjærsti Thorsteinsen<sup>1</sup>, Melanie C. Steffens<sup>4</sup> and Sarah E. Martiny<sup>1</sup>

International Journal of  
Behavioral Development  
1–14

© The Author(s) 2022



Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/01650254221121842

journals.sagepub.com/home/ijbd



## Abstract

Research investigating occupational aspirations in childhood is scarce. In addition, most research on occupational aspirations has focused on increasing the number of women in agentic jobs. In the present work, we investigate factors associated with communal occupational aspirations in two studies with young children (Study 1: 159 children [84 boys, 75 girls],  $M_{\text{age}} = 5.51$  years,  $SD = 0.37$ ; Study 2: 96 children [48 boys, 48 girls];  $M_{\text{age}} = 9.44$  years,  $SD = 1.91$ ). We found gender differences in communal aspirations only among the older children. In both samples, as well as when combining the two samples, the stronger the communal occupational gender stereotypes children reported, the less boys (and the more girls) aspired toward communal occupations. In the combined sample, communal self-perceptions mediated the relationship between child gender and occupational aspirations. Finally, the perceived status of the occupations was positively associated with communal aspirations among older children.

## Keywords

Occupational aspirations, childhood, communal self-perceptions, perceived status, gender, gender stereotypes

Gender inequality in the workplace begins in childhood, as researchers agree that the development of occupational aspirations (i.e., a set of preferences regarding future occupational roles and activities, see Lent et al., 1994) is a lifelong process from infancy through childhood, adolescence, and adulthood (e.g., Gottfredson, 1981; Hartung et al., 2005). Despite this, existing research on the predictors of occupational aspirations has often focused on adolescents and young adults rather than children (see Hartung et al., 2005). This is problematic as many psychological factors that lead individuals to rule out certain roles or fields as unsuitable (e.g., occupational gender stereotypes) develop in early childhood (Gottfredson, 1981). Because this exclusion of certain fields may influence occupational choices later in life and therefore contribute to occupational segregation and gender inequality in society, it is important to understand the predictors of occupational aspirations in early and middle childhood.

In addition, previous work on occupational aspirations has mostly focused on predictors of high-status agentic occupational aspirations (e.g., leadership roles) with the goal of increasing the number of women in male-dominated fields (Croft et al., 2015). This has been partly successful. For example, research from the United States shows an increase in women entering agentic fields between 1995 and 2013 (Bureau of Labor Statistics as cited in Croft et al., 2015). Interestingly, however, hardly any change has been observed in the number of men entering communal occupations (i.e., occupations associated with communal behaviors and

traits such as being warm and caring, e.g., nurse, childcare center teacher; Bureau of Labor Statistics as cited in Croft et al., 2015). Increasing the number of men in communal roles, including communal occupations and domestic work, is important because research shows that being communally oriented has personal benefits, as men who engage in communal behavior have been found to be happier and have better relationships with their partners and children (e.g., Bauer & McAdams, 2010; Le et al., 2012). There are also societal benefits to men who engage in communal work, as having male nurses in a health care unit has been found to provide different perspectives and inclusive groups which can lead to better treatment for patients (Mao et al., 2020). In addition, men's participation in the home is essential for women to be able to pursue agentic, high-status occupations (Croft et al., 2019). Thus, to address occupational segregation

<sup>1</sup> UiT The Arctic University of Norway, Norway

<sup>2</sup> Inland Norway University of Applied Sciences, Norway

<sup>3</sup> University of Southern Maine, USA

<sup>4</sup> University of Koblenz and Landau, Germany

## Corresponding author:

Marte Olsen, Department of Psychology, Research Group Social Psychology, UiT The Arctic University of Norway, PO Box 6050, Langnes, Tromsø 9037, Norway.

Email: marte.olsen@uit.no

based on gender it is important to understand not only factors that predict agentic occupational aspirations, but also communal occupational aspirations. Therefore, based on key theories of gender role development, the present research investigates factors that are associated with young children's communal occupational aspirations.

## The Development of Occupational Aspirations in Childhood

In 1981, Gottfredson introduced a developmental theory of occupational aspirations, which states that children's self-concept (i.e., their description and evaluation of themselves, contributing to their sense of identity, VandenBos, 2015) and occupational gender stereotypes (i.e., preconceived attitudes about a particular occupation and about people who are employed in that occupation, Lipton et al., 1991) are the main factors that influence their occupational aspirations throughout childhood. These factors are more or less impactful at different stages of development. When children reach adolescence or early adulthood and need to choose which occupation to pursue, they base their choice on the fit between their self-concept—including views about themselves, their gender, and so on—and their stereotypical view of the occupation (Gottfredson, 1981). This means that occupations that are viewed as appropriate for the person's gender as well as a good fit for the person's values and goals are considered. Importantly, Gottfredson also states that children exclude occupations throughout childhood that they view to be a poor match based on their self-concept and their gender stereotypes. These occupations will then rarely be revisited as an option in adolescence and early adulthood. In line with this reasoning, longitudinal research shows that vocational interest (i.e., individual preferences for certain types of work; Harmon et al., 1994) remain reasonably stable from age 12 years to age 40 years.<sup>1</sup> Whereas in adolescents (12–17 years), the stability was already moderately high, it increased even further in early adulthood (22–29 years). This indicates that individuals' interest in occupations remain relatively unchanged from late childhood into adulthood, such that the decisions children make in early to middle childhood tend to influence their occupational choices later in life (Low et al., 2005).

In addition to Gottfredson's (1981) work, other theoretical approaches could provide explanations for gender differences in occupational aspirations starting at a young age (e.g., Eagly & Karau, 2002; Martin et al., 2002). Gender schema theory, for instance, states that children are motivated to behave in accordance with their gender schemas (i.e., cognitive network of information about gender), as they seek cognitive consistency between their beliefs about gender and their own gender-related behavior (Martin et al., 2002). Accordingly, if a boy perceives that only women are nurses, he will not aspire to be a nurse. Furthermore, another prominent theory, role congruity theory, proposes that individuals who act in accordance with the norms associated with their social group will be evaluated positively, and those who do not will face negative evaluations (Eagly & Karau, 2002). This means that a girl who aspires toward a communal occupation (such as nursing) may receive positive feedback, whereas a boy who aspires toward a communal occupation may be evaluated negatively. Both gender schema theory and role congruity theory thus predict that individuals will be motivated to behave in accordance with gender norms,

in line with Gottfredson's (1981) theorizing. These theories have guided empirical research on the predictors of children's occupational aspirations (e.g., Block et al., 2018; Helwig, 2001; Weisgram et al., 2010). However, little research has investigated whether these aspirations develop in line with the developmental stages proposed in the theory by Gottfredson (1981) or whether they develop earlier in childhood, as most research on occupational aspirations has been conducted on adolescents and young adults. Therefore, the focus of our research is on investigating how children's gender stereotypes and (gendered) self-concept influence communal occupational aspirations in early to middle childhood. In addition, we will investigate whether perceptions of status are associated with children's communal occupational aspirations as proposed by Gottfredson (1981).

## The Impact of Gender and Gender Stereotypes on Children's Occupational Aspirations

According to Gottfredson (1981), children begin to base their occupational preferences on the occupations they view as suitable for their gender at around 6–8 years old. Gottfredson (1981) also states that occupational aspirations can be gender-typed from an earlier age, but at this earlier point in children's development this gender typing is caused by children modeling adult role models rather than acting in line with their own gender stereotypes. Gender stereotypes also play a crucial role in gender schema theory (Martin et al., 2002); however, this theory proposes that children's understanding of their own and others' gender is developed at an earlier age, as children begin to develop gender schemas as soon as they are able to observe differences between genders. According to this view, the content of children's gender schemas (e.g., whether they are stereotypical or not) will determine whether children's occupational aspirations are gender-typed or not.

Evidence for gender-typed preferences and behavior in early childhood has been found in many empirical studies. For example, children have been shown to prefer gender-congruent toys by age 2 years (Serbin et al., 2001), like novel gender-neutral attractive toys less when they are labeled as being toys for the other gender at ages 4–6 years (Martin et al., 1995), and prefer gender-typed toys at ages 4–7 years (Spinner et al., 2018). A longitudinal study also found that children's gender-typed play behavior increased as their gender labeling skills developed (Fagot & Leinbach, 1989).

Concerning occupational aspirations, some research shows that by age 4 years, boys are more likely to aspire to agentic occupations, whereas girls are more likely to aspire to communal occupations (Levy et al., 2000; Trice & Rush, 1995; Weisgram et al., 2010), which indicates that, in line with Gottfredson (1981), gender differences in occupational aspirations can be observed in early childhood. In addition, a study conducted in Canada (Serbin et al., 1993) found that, among children between 5 and 12 years old, boys preferred masculine activities and occupations (e.g., sawing, police officer, fire fighter) more than girls, and that girls preferred feminine activities and occupations (e.g., sewing, feeding baby, teacher) more than boys. A recent study conducted in Switzerland (Pässler & Hell, 2020) also found gender differences in vocational interests among children in middle childhood (ages 10–11 years). Taken together, research indicates that children's gender stereotypes may begin to impact

their behavior and their occupational aspirations in early to middle childhood. However, because of the limited number of empirical studies investigating the effect of gender stereotypes on children's communal occupational aspirations, more research on this is needed (for the same argument, see McMahon & Watson, 2008).

### *The Impact of the Self-Concept on Children's Occupational Aspirations*

Importantly, when considering the role of gender stereotypes on occupational aspirations, children's self-concept in line with such stereotypes should be taken into account. According to Gottfredson (1981), children's self-concept begins to influence their occupational aspirations from about 14 years of age. Children's self-concept consists of internal factors, such as values, goals, and self-perceptions, as well as external factors such as socioeconomic status (SES). The internal factors of children's self-concept are developed partially based on children's exposure to gender norms, so that children's interests and goals are in line with expectations for their gender. There has been mixed evidence for Gottfredson's claim that the internal aspects of the self-concept only begin to influence children's occupational aspirations in adolescence. In line with Gottfredson's claim and role congruity theory (Eagly & Karau, 2002), research has found that, among adults, more communal values and goals predict higher communal occupational aspirations (Diekmann et al., 2010; Weisgram et al., 2010). However, recent evidence suggests that values and goals already matter for young children's aspirations: boys report less communal values and goals than girls, and girls report less agentic values and goals than boys (Block et al., 2018; Ojanen et al., 2005). It was further found that both agentic and communal values mediate the relationship between gender and family orientation, where those with higher agentic values report a lower family orientation and those with higher communal values report higher family orientation (Block et al., 2018). Taken together, gender differences in the internal aspect of children's self-concept are visible in early to middle childhood and the self-concept seems to influence occupational aspirations earlier than previously thought. One important aspect of children's self-concept is their self-perceptions, which include how much children view themselves as preferring communal behaviors (e.g., helping, being with others) or agentic behaviors (e.g., being assertive, competitive). We therefore aim to extend earlier research by investigating whether communal self-perceptions mediate the relationship between gender and occupational aspirations in young children.

### *The Impact of Perceived Occupational Status on Children's Occupational Aspirations*

In addition to the influence of gender stereotypes and gendered self-concepts, Gottfredson (1981) proposes that by the age of 9–13 years the child's social class, the perceived status of the occupation, and the child's perception of their ability to pursue the occupation emerge as important factors in shaping their occupational aspirations. However, research shows that the perceived status of occupations might also influence children's occupational aspirations at an earlier age, as young children

(ages 5–10 years) who endorsed agentic occupational values (i.e., valuing jobs involving making important decisions and earning more money) were shown to aspire more toward agentic male-dominated occupations and less toward communal female-dominated occupations (Weisgram et al., 2010). Similarly, 11-year-old children believed that novel jobs portrayed with male workers had a higher status than the same jobs portrayed with female workers, as the children thought the jobs portrayed with male workers were higher paid, more difficult, and more important (Liben et al., 2001). This illustrates that children in this age group have some understanding of status and power differences and that some children value high status when imagining their future occupations.

One important aspect of an occupation's status is the salary that a person working in these occupations receives. Indeed, children between 3 and 7 years old believed that men generally earn more money than women, especially in agentic, high-status occupations (Levy et al., 2000). Although Weisgram et al. (2010) did not find an effect of salary on the occupational aspirations of children or adolescents, Hardie (2015) found that the lower perceived median income in communal occupations predicted adolescent boys' lower communal occupational aspirations. Also examining this question of the role of salary, two experimental studies presented children between the ages of 6 and 11 years with novel occupations that were described as high in one of four values, where money was one of the values (Hayes et al., 2018). In the first experiment, boys showed greater interest than girls in occupations that were described as having a high salary, but the findings were not replicated in the second experiment. Taken together, earlier research on this topic is inconclusive, with some studies showing that young children consider power and status in their occupational aspirations (Liben et al., 2001; Weisgram et al., 2010), but others not corroborating an effect of perceived salary (Weisgram et al., 2010). Therefore, we extend existing research and explore the role perceived salary plays in the occupational aspirations of children.

## **The Present Research**

The present research was conducted in Norway. Although Norway is one of the most gender egalitarian countries in the world (World Economic Forum, 2020), there is still a significant gender gap in the Norwegian workforce, where women make up only 20% of engineers and 34% of leaders (Utdanning, 2014). In addition, men make up only 16% of nurses and 10% of childcare center teachers in Norway (Statistisk Sentralbyrå [SSB], 2021a, 2021b). Thus, further research on the factors that influence communal occupational aspirations in children is needed.

In the present work, we investigate factors that shape children's communal occupational aspirations in early to middle childhood by conducting two studies: one among preschool children in childcare centers, and one among elementary school children. We not only investigate the role of children's gender and gender stereotypes, but we extend earlier research by also testing whether the perceived status of the occupation and the children's communal self-perceptions relate to their occupational aspirations. We operationalize perceived status of an occupation as the salary the children believe a person working in this occupation receives.

We formulated the following hypotheses. First, girls will aspire more toward communal occupations than boys (H1). In addition, children's endorsement of gender stereotypes related to communal occupations will interact with their gender (H2), that is, girls will aspire more toward communal roles the more strongly they endorse gender stereotypes whereas boys will aspire less toward communal roles the more they endorse gender stereotypes. Communal self-perceptions (H3) and perceived salary for communal occupations (H4) will be positively related to communal occupational aspirations. Finally, the relationship between children's gender and their communal occupational aspirations will be mediated by their communal self-perceptions (H5). H1, H2, H3, and H5 were pre-registered on the Open Science Framework (OSF) (Study 1: [https://osf.io/cq3zf/?view\\_only=5cc42135af034628a932665247f59f2a](https://osf.io/cq3zf/?view_only=5cc42135af034628a932665247f59f2a); Study 2: [https://osf.io/g2j8a/?view\\_only=1cb13e9d03b743dead99d2ad9e5868fc](https://osf.io/g2j8a/?view_only=1cb13e9d03b743dead99d2ad9e5868fc)) and tested in both studies. H4 was a non-preregistered exploratory hypothesis and only tested in Study 2 (see Supplemental Materials for additional preregistered analyses). To increase readability, we present the hypotheses of Study 1 and Study 2 in a slightly different order from the preregistrations. In the following, we will first present the data of the two studies analyzed separately and then report combined analyses to increase statistical power and test the robustness of the observed effects.

## Study 1: Childcare Centers

The first study was conducted in childcare centers in Northern Norway in 2018 and investigated how gender, communal occupational gender stereotypes (CGST), and communal self-perceptions influence the communal occupational aspirations of children in early childhood. This study was conducted among preschool children in childcare centers because of the limited research on occupational aspirations in this age group. As the majority of children in Norway (93.4% in 2021) attend childcare centers, this represents the typical experience for Norwegian children.

## Method

**Transparency and Openness.** The project was registered at the Norwegian Center for Research Data (<https://www.nsd.no/en>) which approved the planned data collection (ref. nr. 5209). In addition, we received approval from the internal board for research ethics at the first author's institution (date of approval: 30.07.2017). All data and syntax of analyses are available at OSF ([https://osf.io/5cr3u/?view\\_only=1f03932d91a0436dbdeb0c7144247d7d](https://osf.io/5cr3u/?view_only=1f03932d91a0436dbdeb0c7144247d7d)). All four hypotheses that we preregistered were formulated directionally. Therefore, when testing these hypotheses, we set the criterion for significance to a value of  $p = .10$ .

**Pilot Studies.** To ensure the reliability, validity, and understandability of the material, four pilot studies were conducted: two with adults and two with children. In the first two studies, we aimed to determine which occupational roles and behaviors Norwegians most strongly associate with agency and communality, respectively. We asked Norwegian adults ( $N=28$ ) to report descriptive gender stereotypes for a range of occupations/roles (e.g., "What percentage of preschool teachers in Norway are male?"). The participants reported their answers on a 100-point Likert-type

scale that ranged from 0% to 100%. We also asked participants to report descriptive gender stereotypes for behaviors (e.g., "I associate comforting others with . . ."). Participants reported their answers on a 7-point Likert-type scale that ranged from *Only women* (scored as 1) to *Only men* (scored as 7). The behaviors and roles that were stereotyped as either female (i.e., mean score  $< 50\%$  and  $< 4$ ) or male (i.e., mean score  $> 50\%$  and  $> 4$ ) were then included in a second pilot study. In the second pilot, we aimed to double check the appropriateness of the chosen occupational roles and behaviors. For this, we presented Norwegian adults ( $N=37$ ) with definitions of communion and agency and then asked them to rate the extent to which they associated the stereotypically female and male roles and behaviors with communion and agency, respectively. Participants reported their answers on a 7-point Likert-type scale (1 = *not at all* to 7 = *very much*).

A third and fourth pilot study were conducted with preschool children. The aim of the third pilot study was to assess children's ability to understand and engage with the study materials. From the items the children ( $N=8$ , ages 4–6 years) understood, we selected for the main study the behaviors and roles from the earlier pilot studies that were most associated with women and communion or men and agency. In a fourth pilot study, the experimenters assessed the study length and observed children's ( $N=8$ , ages 4–6 years) ability to concentrate, as well as their ability to understand and use a 3-point smiley face Likert-type scale (see Supplementary Materials). This pilot study showed that 4- to 6-year-old children were able to maintain concentration for the duration of the study (i.e., approximately 15–20 min) and understood the use of the 3-point smiley face Likert-type scale.

**Participants and Procedure.** Participants were recruited by contacting the administrators of childcare centers in the local region, asking for permission to conduct our study in their childcare center. Approximately 40% of the contacted childcare centers agreed to participate in the study. When permission was granted, we distributed consent forms to the parents in the childcare centers. The consent forms signed by the parents were collected before the data collection. In total, we collected data from 177 children from 20 different childcare centers in northern Norway in 2018. Eleven participants were excluded from the analyses due to revoking consent during testing ( $n=7$ ), technical issues ( $n=3$ ), or not following instructions ( $n=1$ ). We also excluded all children younger than 4.5 years old ( $n=7$ ). Children who did not want to participate or revoked consent during testing were taken back to the rest of their group in the childcare center by one of the adults present during testing. Our final sample consisted of 159 participants (84 boys, 75 girls) between the ages of 54 and 75 months ( $M=5.51$  years,  $SD=0.37$ , missing age for two boys), which corresponds to an age range of 4–6 years. Most of the parents of the children (58.6%) reported having an income of between NOK (Norwegian Kroner) 460,000–1,200,000 and most (78.4%) reported having a higher education.<sup>2</sup> The median income in Norway in 2021 was NOK 550,000 (SSB, 2021c), and 36% of the population above the age of 16 years had a higher education in 2021 (SSB, 2021d). This means that in terms of income and education, the present sample had relatively similar (if not slightly higher) SES than the average Norwegian family. No a-priori effect size could be determined, but a sensitivity analysis for a linear regression with four predictors (CGST, self-perceptions, interaction between CGST and

gender) conducted for a sample of 159 indicated that a medium effect of  $f^2 = .10$  can be detected at a power of .95.

Participants were tested in groups of up to four by two experimenters, one taking the role of the interviewer (i.e., reading the instructions aloud to participants) and one the role of the secretary (i.e., taking notes and assisting participants if needed). For each testing, one female and one male experimenter were present, as well as a teacher from the childcare center. The interviewer asked the questions to the children, and the children answered using 3-point Likert-type scales on a tablet using the software OpenSesame. All questions were asked in Norwegian. The children received a sticker as a reward for participating. A detailed description of the procedure can be found in the Supplemental Materials.

**Measures.** All of the materials can be found in the Supplemental Material in both English and Norwegian. All of the measures were developed by the project group for this study. The items were developed in Norwegian and have been translated to English for this article (see Supplemental Material for the original and translated items). Children's responses were recorded using two different kinds of scales. A 3-point smiley Likert-type scale was used to measure the extent to which children aspired toward a set of communal occupations and their preferences toward communal behaviors.<sup>3</sup>

**Communal Occupational Aspirations.** Children's communal occupational aspirations were measured by showing the children a picture relating to an occupation while telling them about the occupation, then asking the children how much they aspire toward the occupation. The questions were phrased: "Would you like to be a [communal occupation] when you grow up?" The children answered on a 3-point Likert-type scale (1 = *not at all*, 2 = *some*, 3 = *very much*). Children were asked to report aspirations toward three different communal occupations (i.e., nurse, childcare center teacher, stay-at-home parent;  $\alpha = .62$ ). Due to relatively low reliability (and an even lower one in Study 2), we decided to remove stay-at-home parent. The remaining items showed a significant correlation,  $r(158) = .28, p < .001$ . Analyses including this item can be found in the Supplemental Material.

**Communal Self-Perceptions.** To measure the extent to which children perceive themselves as communal the experimenter told children that "I will now read short stories about some children I know. It is your job to tell me whether this child sounds like you." Four items assessed the extent to which participants identified with communal behaviors by asking the children: "I know a child who likes to [communal behavior]. Does this sound like you?" (i.e., help others who are upset, be close to others, hug others, comfort others who are upset). The children answered on a 3-point Likert-type scale (1 = *not at all*, 2 = *some*, 3 = *very much*). The scale was illustrated with three different emoticons, from a sad face for the first point to a very happy face for the third point (see Supplemental Material). The scale showed acceptable reliability ( $\alpha = .71$ ).

**Communal Occupational Gender Stereotypes.** The children were then asked to report gender stereotypes for the same three communal roles (i.e., nurse, childcare center teacher, stay-at-home parent). Children were instructed by the experimenter to "tell me who you think can do this job." For example, "Who do you think can be a nurse?": Children could answer either "only

women", "only men" or "both women and men", where the options were presented as three corresponding illustrations of men and women. Following the procedure for computing a variable for gender stereotyping of communal roles by Spinner and colleagues (2018), the responses only boys or both boys and girls were coded as 0, since these answers do not represent traditional gender stereotypes for communal occupations. Responding only girls was coded as 1 as it represents traditional female gender stereotypes. A summed total score was calculated for each participant (range 0–3), with higher numbers indicating more gender stereotyping (the stay-at-home parent item removed). The two remaining items (nurse, childcare center teacher) are significantly correlated,  $r(158) = .19, p = .019$ .

**Demographic Measures.** Among others information about the children's age (in years), gender (0 = boys and 1 = girls), and bilingualism were also obtained.

## Results

Descriptive statistics of all measures and bivariate correlations are presented in Table 1.

**Factors Associated with Children's Communal Occupational Aspirations.** To test which factors influence communal occupational aspirations (H1–H3), we conducted a multiple regression analysis with age (covariate), CGST, the interaction between communal occupational gender stereotypes and gender, and communal self-perceptions as independent variables.<sup>4</sup> All interactions of age and gender with the independent variables were also tested but were found to be non-significant and were, therefore, not included in the model presented below, with the exception of the preregistered interaction between communal occupational gender stereotypes and gender. All analyses including all covariates and interactions can be found in the Supplemental Material.<sup>5</sup>

The results of the regression analysis can be found in Table 2. The effect of gender on communal aspirations was not significant, which indicates that girls did not aspire more toward communal roles than boys did (contrary to H1). In line with H2, the interaction between communal occupational gender stereotypes and gender on communal occupational aspirations was significant,  $B = 0.79, t(150) = 3.10, p = .002, 90\%$  confidence interval (CI) = [0.37, 1.21]. Boys showed a decrease in communal occupational aspirations with increased communal occupational gender stereotypes,  $B = -0.35, t(78) = -1.76, p = .082, 90\%$  CI = [-0.68, -0.02], whereas girls showed a significant increase in communal occupational aspirations with increased communal occupational gender stereotypes,  $B = 0.44, t(70) = 2.73, p = .008, 90\%$  CI = [0.17, 0.72]. We also found the predicted significant relationship between communal self-perceptions and communal occupational aspirations,  $B = 0.24, t(150) = 2.56, p = .011, 90\%$  CI = [0.08, 0.39], indicating that the more children see themselves as communal, the more they aspire toward communal occupations, in line with H3.

**Do Communal Self-Perceptions Mediate the Relationship Between Gender and Communal Occupational Aspirations in Children?** To assess the extent to which gender influences aspirations via communal self-perceptions in children (H5), we conducted a mediation analysis using Hayes' Process macro (2017; Version 3.4.1, Model 4, 10,000 bootstrap samples). Gender was entered as the



**Table 1.** Study 1: Descriptive Statistics and Correlations Between Measures for Girls and Boys.

	N	M	SD	1	2	3	4
1. Age (in years)	82/75	5.50/5.52	0.37/0.38	1			
2. Communal occupational gender stereotypes <sup>a</sup>	84/74	0.19/0.28	0.40/0.48	-0.08/-0.17	1		
3. Communal self-perceptions <sup>b</sup>	84/74	2.22/2.49	0.62/0.55	-0.01/0.18	0.05/-0.07	1	
4. Communal aspirations <sup>c</sup>	84/75	1.70/1.89	0.71/0.68	-0.10/-0.12	-0.12/0.32**	0.29**/0.04	1

Note.  $n = 159$ ; statistics before/is for boys, after/is for girls; gender coding: boys = 0, girls = 1.

<sup>a</sup>Measured as the number of stereotypical responses from 0 (No stereotypical responses) to 3 (Only stereotypical responses).

<sup>b</sup>Scale ranged from 1 (Not at all) to 3 (A lot).

\*\* $p < .01$ .

**Table 2.** Regression Analysis With Communal Occupational Aspirations as the Outcome (Study 1;  $n = 156$ ).

Variable	B	90% CI		$\beta$	$t$	$p$
		LL	UL			
Age	-0.20	-0.44	0.05	-0.10	-1.33	.186
Gender	-0.04	-0.25	0.16	-0.03	-0.35	.726
Communal occupational gender stereotypes	-1.14	-1.84	-0.43	-0.70	-2.67	.008
Communal self-perceptions	0.24	0.08	0.39	0.20	2.56	.011
Gender $\times$ Communal Occupational Gender Stereotypes	0.79	0.37	1.21	0.84	3.10	.002

Note. DV = communal occupational aspirations; gender coding: boys = 0, girls = 1; CI = confidence interval; LL: lower limit; UL: upper limit.

predictor (X), communal aspirations as the outcome (Y), and communal self-perceptions as the mediator (M). Age was included in the analysis as a covariate. Gender predicted communal self-perceptions,  $B = 0.27$ ,  $p = .005$ , 90% CI = [0.11, 0.44], which, in turn, predicted communal aspirations,  $B = 0.22$ ,  $p = .020$ , 90% CI = [0.07, 0.38]. A bias-corrected bootstrap CI for the indirect effect was above zero,  $B = 0.06$ , 90% CI = [0.01, 0.12]. Gender did not predict communal aspirations independent of the mediator ( $B = 0.15$ ,  $p = .198$ , 90% CI = [-0.04, 0.33]). This indicates that girls reported higher levels of communal self-perceptions than boys, which, in turn, was associated with higher communal aspirations. This finding is in line with H5 and suggests that children's communal aspirations are internally regulated via their communal self-perceptions. Thus, girls may ultimately be more likely to aspire toward communal roles because they are more likely than boys to identify as communal.

## Study 2: Elementary Schools

The aim of the second study was to test if we would replicate the findings of Study 1 in a sample with older children (in elementary schools). As researchers agree that occupational aspirations develop throughout childhood (Gottfredson, 1981; Hartung et al., 2005), we investigated if the predictors of occupational aspirations would influence older children differently than younger children. In addition, we extended Study 1 by exploring another predictor of occupational aspirations in middle childhood from Gottfredson's theory, namely occupational status. We operationalize the perceived status of an occupation as the salary the children believe a person working in this occupation receives.

The second study was conducted in elementary school, in Norway ranging from Class 1 to Class 7, that all children are required to attend. Thus, by conducting the study among elementary school children, we hoped to get a sample that would reasonably represent Norwegian children in this age group.

## Method

**Transparency and Openness.** The project was registered at the Norwegian Center for Research Data, which approved of the planned data collection (ref. nr. 164246). In addition, we received approval from the internal board for research ethics at the first author's institution (ref. nr. 2017/1912). All data and syntax of analyses are available at [https://osf.io/5cr3u/?view\\_only=1f03932d91a0436dbdeb0c7144247d7d](https://osf.io/5cr3u/?view_only=1f03932d91a0436dbdeb0c7144247d7d). As outlined earlier, all four preregistered hypotheses were directional. Therefore, when testing these hypotheses, we set the criterion for significance to a value of  $p = .10$ .

**Participants and Procedure.** This study was part of a larger research project mainly focused on investigating parents' and children's well-being during the COVID-19 pandemic (Kvalø et al., 2021; Martiny et al., 2021; Thorsteinsen et al., 2021, 2022). The study was conducted in June 2020. The study consisted of two questionnaires: one online questionnaire for parents and one online questionnaire for their children. Only the data from the children's questionnaire are used in these analyses. Elementary school children were recruited by contacting the principals at elementary schools all over Norway and asking them to forward information about the study and the link to the online survey to the parents of the children at their school. We also recruited using an advertisement on Facebook, asking parents of elementary children to participate in the study. After the parents completed their survey, they were asked to give their consent for their children to participate in the children's questionnaire. If they provided consent, they received the link to the children's questionnaire. The children were also asked to give their consent to participate at the beginning of the survey. We collected data from 273 parents and 98 (35.9%) of their children between June 8 and June 29. No reward was offered to the children who participated in the questionnaire, but the parents had the opportunity to participate in a lottery where they could win one out of five gift cards worth NOK 500.

Two children were excluded from analysis as they stated that they did not understand the questions in the questionnaire. Our final sample consisted of 96 elementary school children (48 boys, 48 girls) between the ages of 6 and 13 years ( $M=9.44$ ,  $SD=1.91$ , age missing for six children). Most of the parents of the children (54.3%) reported having an income of between NOK 460,000 and 1,200,000, which includes the median income in Norway in 2021 of NOK 550,000 (SSB, 2021c). This means that in terms of income, the present sample had relatively similar (if not slightly higher) SES than the average Norwegian family. We did not ask children or their parents to report which school the child attends, but we did ask parents to report their municipality. There are 358 municipalities in Norway, and our 96 participants are distributed across 40 municipalities. A sensitivity analysis for a linear regression with five predictors (gender, CGST, self-perceptions, status,  $CGST \times$  gender) given  $N=96$  indicated that a moderate effect size of  $f^2=.19$  at a power of .95 could be detected.

**Measures.** The study was conducted using a child-friendly online questionnaire in Norwegian (Bokmål). The questionnaire was pilot tested on a small sample of elementary school children prior to the data collection to assess children's understanding of the questions and the study length. Parents were instructed to help their children with the questionnaire without influencing their responses. To enable young children and children who had difficulties reading to participate, all instructions, items, and scale ranges were audiotaped. Children could therefore choose whether they wanted to read the instructions and items or whether to listen to them. In addition, most of the scale ranges were illustrated with images (e.g., smileys, thumbs up). The measures were adapted from Study 1, with the exception of perceived salary, which was developed by the project group for this study. The items were developed in Norwegian and have been translated to English for this article (see Supplemental Material for the original and translated items). The items and illustrations can be found in the Supplemental Material in English and Norwegian in the order in which they were assessed. The audio files (in Norwegian) are available on OSF: [https://osf.io/4frk2/?view\\_only=b59c6a912a7b488b8b822228c494d52f](https://osf.io/4frk2/?view_only=b59c6a912a7b488b8b822228c494d52f).

**Communal Occupational Aspirations.** Children's communal occupational aspirations were measured by asking the children how much they aspire toward three communal occupations (based on Study 1; nurse, childcare center teacher, stay-at-home parent). The questions were phrased: "How much do you want to be a [communal occupation]?" Then the children answered on a 5-point Likert-type scale (1=*not at all*, 2=*a little*, 3=*some*, 4=*quite much*, 5=*very much*). The scale was illustrated with five different emotions, from a sad face for the first point to a very happy face for the fifth point (see Supplemental Material). Because the scale did not have satisfactory reliability ( $\alpha=.53$ ), the item with the lowest correlations was excluded (stay-at-home parent). The other two occupations correlated strongly,  $r(95)=.50$ ,  $p<.001$ , and therefore were combined to form a scale.<sup>6</sup>

**Communal Occupational Gender Stereotypes.** Children's gender stereotypes about communal occupations were measured by asking the children who they believed could work in the three communal occupations: "Who do you think can be a [communal occupation]?" (i.e., nurse, childcare center teacher,

stay-at-home parent). The children answered on a 5-point Likert-type scale (1=*only men*, 2=*mostly men*, 3=*both men and women*, 4=*mostly women*, 5=*only women*). The scale was illustrated with a group of people with corresponding proportions of men or women. The occupations included were the same as in the communal occupational aspirations scale (nurse, childcare center teacher, stay-at-home parent). As the scale again did not have satisfactory reliability ( $\alpha=.52$ ), the item with the lowest correlation with the other variables (stay-at-home-parent) was removed. The two remaining items correlated strongly,  $r(95)=.54$ ,  $p<.001$ .

**Perceived Salary.** Children's beliefs about the salary associated with the three communal occupations were also assessed. The children were asked how much money they believe people working in the three communal occupations make: "How much money do you think a [communal occupation] makes?" (i.e., nurse, childcare center teacher, stay-at-home parent). They answered on a 5-point Likert-type scale (1=*very little*, 2=*little*, 3=*some*, 4=*much*, 5=*very much*). The scale was illustrated with money piles of increasing size. As reliability was again low ( $\alpha=.53$ ), stay-at-home parent was removed from the scale; the other two items were strongly correlated,  $r(95)=.52$ ,  $p<.001$ .

**Communal Self-Perceptions.** Communal self-perceptions were measured by asking the children how much they liked to engage in three communal behaviors: "Do you like to [communal behavior]?" (i.e., be with other children, comfort other children who are sad, help other children when they are in pain). The children answered on a 5-point Likert-type scale (1=*not at all*, 2=*a little*, 3=*some*, 4=*much*, 5=*very much*). The scale was illustrated with five different emotions, from a sad face for the first point and a very happy face for the fifth point (see Supplemental Material). The scale showed a good reliability ( $\alpha=.83$ ).

**Demographic Measures.** Children were also asked to report their age (in years), gender (0=boys, 1=girls), bilingualism, and if they were born in Norway or not.

## Results

The descriptive statistics of all the relevant measures and the correlations between them can be found in Table 3.

**Factors Associated With Children's Communal Occupational Aspirations.** To investigate H1–3, we used the same procedure as in Study 1. The interactions of age and gender with the independent variables—except for communal occupational gender stereotypes—were tested and were found to be non-significant and were therefore not included in the final model. All analyses including all covariates can be found in the Supplemental Materials.

The results of the regression analysis can be found in Table 4. The analysis showed the predicted main effect of gender on communal occupational aspirations,  $B=0.44$ ,  $t(83)=2.27$ ,  $p=.026$ , 90% CI=[0.12, 0.76]. As predicted, girls ( $M=1.99$ ,  $SD=1.14$ ) reported higher communal occupational aspirations than boys ( $M=1.39$ ,  $SD=0.63$ ; H1). In line with H2, the interaction between communal occupational gender stereotypes and gender on communal occupational aspirations was also significant,  $B=-0.91$ ,  $t(83)=-1.69$ ,  $p=.095$ , 90% CI=[-1.81, -0.01]. Boys showed a descriptive decrease in communal occupational aspirations with

**Table 3.** Study 2: Descriptive Statistics and Correlations Between Measures for Girls and Boys.

	N	M	SD	1	2	3	4	5
Age	45/44	9.38/9.50	1.99/1.86	1				
Communal occupational gender stereotypes <sup>a</sup>	47/48	3.16/3.15	0.33/0.40	0.12/0.12	-.1			
Perceived salary <sup>b</sup>	47/48	3.17/3.39	0.57/0.76	-0.12/-0.04	-0.35*/0.00	1		
Communal self-perceptions <sup>c</sup>	47/48	4.14/4.39	0.85/0.84	0.08/-0.27	-0.15/-0.44**	0.14/0.43**	1	
Communal aspirations <sup>c</sup>	47/48	1.39/1.99	0.63/1.14	-0.26/-0.01	-0.28/0.11	0.19/0.42**	0.22/0.17	1

Note.  $n=96$ ; statistics before/is for boys, after/is for girls; gender coding: boys = 0, girls = 1. All other scales ranged from 1 to 5, with the exception of age.

<sup>a</sup>Scale ranged from 1 (*Only men*) to 5 (*Only women*).

<sup>b</sup>Scale ranged from 1 (*Very little*) to 5 (*Very much*).

<sup>c</sup>Scale ranged from 1 (*Not at all*) to 5 (*Very much*).

\* $p < .05$ ; \*\* $p < .01$ .

**Table 4.** Regression Analyses With Communal Occupational Aspirations as the Outcome (Study 2;  $n = 89$ ).

	B	90% CI		$\beta$	t	p
		LL	UL			
Age	-0.04	-0.12	0.05	-0.08	-0.78	.436
Gender	0.44	0.12	0.76	0.23	2.27	.026
Communal occupational gender stereotypes	0.46	-0.16	1.08	0.18	1.24	.220
Communal self-perceptions	0.23	0.03	0.43	0.21	1.91	.059
Gender $\times$ Communal Occupational Gender Stereotypes	-0.91	-1.81	-0.01	-0.23	-1.69	.095

Note. DV = communal occupational aspirations; gender coding: boys = 0, girls = 1. CI = confidence interval; LL: lower limit; UL: upper limit.

increased communal occupational gender stereotypes,  $B = -0.45$ ,  $t(41) = -1.63$ ,  $p = .111$ , 90% CI = [-0.91, 0.01], whereas girls did not show an increase in communal occupational aspirations with increased communal occupational gender stereotypes,  $B = 0.56$ ,  $t(40) = 1.12$ ,  $p = .268$ , 90% CI = [-0.28, 1.41]. Finally, the main effect of communal self-perceptions on communal occupational aspirations was significant  $B = 0.23$ ,  $t(91) = 1.91$ ,  $p = .059$ , 90% CI = [0.03, 0.43], and pointed in the predicted direction, with higher communal self-perceptions predicting greater aspirations toward communal occupations (H3).

**Exploratory Analysis.** To test the additional hypothesis (H4) about the effect of perceived salary on communal occupational aspirations, we ran the multiple regression analyses again separately and included perceived salary as a predictor. The effect of perceived salary was significant,  $B = 0.35$ ,  $t(82) = 2.23$ ,  $p = .028$ , 90% CI = [0.09, 0.60]. Specifically, children who believed a person makes a lot of money in communal occupations aspired more toward communal occupations.

**Do Communal Self-Perceptions Mediate the Relationship Between Gender and Communal Occupational Aspirations in Children?** Finally, to test the mediation model (H5), we used Hayes' Process macro (Model 4; 10,000 bootstrap samples). Gender was included as the predictor (X), communal occupational aspirations as the outcome (Y), and communal self-perceptions as the mediator (M). Age was included in the model as a covariate. Gender predicted communal occupational aspirations independently of communal self-perceptions ( $B = 0.44$ ,  $p = .025$ , 90% CI = [0.12, 0.77]). However, gender did not significantly predict children's level of communal

self-perceptions ( $B = 0.26$ ,  $p = .162$ , 90% CI = [-0.05, 0.56]). Children's communal self-perceptions significantly predicted their communal occupational aspirations and the results pointed in the predicted direction ( $B = .19$ ,  $p = .091$ , 90% CI = [0.01, 0.38]). However, a bias-corrected bootstrap CI for the indirect effect included zero ( $B = 0.05$ , 90% CI = [-0.01, 0.12]). This means that girls had descriptively, but not significantly more communal self-perceptions than boys, and children with more communal self-perceptions also aspired more toward communal occupations.

## Analyses With the Combined Data

To investigate the predictors of communal occupational aspirations in childhood with more statistical power, we combined the data from Study 1 and Study 2. This resulted in a sample of 246 children between the ages of 4 and 13 years. A sensitivity analysis for a linear regression with four predictors (gender, CGST, self-perceptions, CGST  $\times$  gender) given  $N = 246$  indicated that a small effect size of  $f^2 = .07$  at a power of .95 could be detected. The variables were z-standardized as the variables were measured with a 3-point Likert-type scale in Study 1 and a 5-point Likert-type scale in Study 2. Age was included as a covariate in the analyses.

To investigate H1-3, we conducted a multiple regression analysis where we included CGST, and communal self-perceptions as main effects. We also included the interaction between gender and communal occupational gender stereotypes and between age and gender since we only found a main effect of gender in Study 2. Communal occupational aspirations was the

**Table 5.** Regression Analyses With Communal Occupational Aspirations as the Outcome for the Combined Data of Study 1 and Study 2 ( $n=245$ ).

	B	90% CI		$\beta$	t	p
		LL	UL			
Age	-0.18	-0.54	0.18	-0.16	-0.81	.417
Gender	0.12	-0.09	0.32	0.06	0.93	.351
Communal occupational gender stereotypes	-0.63	-0.96	-0.31	-0.64	-3.22	.001
Communal self-perceptions	0.20	0.10	0.30	0.21	3.24	.001
Gender $\times$ Communal Occupational Gender Stereotypes	0.45	0.24	0.65	0.72	3.62	<.001
Gender $\times$ Age	0.05	-0.18	0.28	0.07	0.35	.729

Note. DV = communal occupational aspirations; gender coding: boys = 0, girls = 1. CI = confidence interval; LL: lower limit; UL: upper limit.

dependent variable. The results of the regression analysis can be found in Table 5. Contrasting H1, the analyses did not reveal a significant main effect of gender on communal occupational aspirations ( $B=0.12$ ,  $t(238)=0.93$ ,  $p=.351$ , 90% CI=[-0.09, 0.32]). The interaction between age and gender was also not significant ( $B=0.05$ ,  $t(238)=0.35$ ,  $p=.729$ , 90% CI=[-0.18, 0.28]). However, in line with H2, the interaction between communal occupational gender stereotypes and gender on communal occupational aspirations was significant ( $B=0.45$ ,  $t(238)=3.62$ ,  $p<.001$ , 90% CI=[0.24, 0.65]). Boys' communal occupational aspirations significantly decreased with increased communal occupational gender stereotypes ( $B=-0.19$ ,  $t(123)=-2.32$ ,  $p=.022$ , 90% CI=[-0.32, -0.05]), whereas girls' communal occupational aspirations significantly increased with increased communal occupational gender stereotypes ( $B=0.25$ ,  $t(114)=2.62$ ,  $p=.010$ , 90% CI=[0.09, 0.41]). Finally, in line with H3, the effect of communal self-perceptions on communal occupational aspirations was significant ( $B=0.20$ ,  $t(238)=3.24$ ,  $p=.001$ , 90% CI=[0.10, 0.30]), meaning that higher communal self-perceptions were related to greater aspirations toward communal occupations.

### Mediation Analysis

Next, we conducted a mediation analysis using Hayes' Process macro (Model 4; 10,000 bootstrap samples). The mediating effect of communal self-perceptions on the relationship between children's gender and their communal occupational aspirations can be found in Figure 1. Gender was significantly associated with communal self-perceptions ( $B=0.40$ ,  $p=.002$ , 90% CI=[0.19, 0.61]), with girls reporting higher communal self-perceptions than boys. Communal self-perceptions, in turn, were positively associated with communal occupational aspirations ( $B=0.17$ ,  $p=.006$ , 90% CI=[0.07, 0.27]). A bias-corrected bootstrap CI for the indirect effect did not include zero ( $B=0.07$ , 90% CI=[0.02, 0.13]), supporting H5. Gender did not significantly predict communal aspirations independent of the mediator ( $B=0.12$ ,  $p=.328$ , 90% CI=[-0.08, 0.33]).

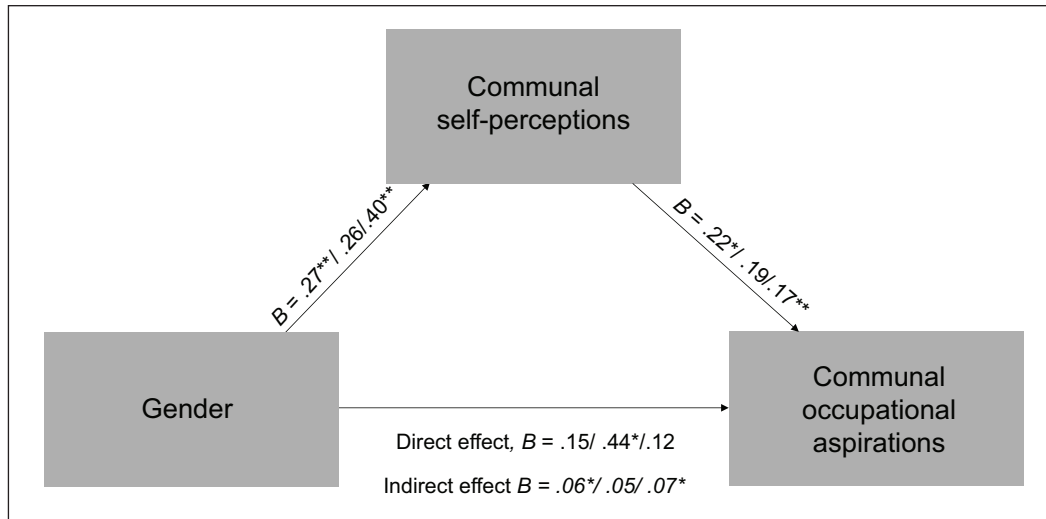
### Additional Study Testing the Prototypicality of the Communal Occupations

To test the validity of the two communal occupations that we chose to use in the two studies presented above (nurse and

preschool teacher), we asked 139 (62 girls, 72 boys;  $M_{age}=9.34$ ,  $SD=1.18$ ) Norwegian children to report which occupations they viewed as communal in an open-ended question in an additional study. The question was phrased as such: "In some jobs it is important to be kind, to take care of other people, to be friendly, and to be caring. Can you think of any jobs where this is important?" Results showed that 45.6% of the occupations that the children spontaneously named were occupations within health care including nurse and doctor and 24.1% were occupations involving childcare, such as preschool teacher and schoolteacher. There was no other category of occupations that was named more often. This indicates that children in Norway view these two occupations as prototypical communal occupations. The full overview of occupations that children reported can be found in the Supplemental Materials.

### General Discussion

The present research investigated the development of communal occupational aspirations in childhood. The aim was to identify factors that influence occupational aspirations in early and middle childhood. We investigated the effects of children's CGST, communal self-perceptions, and perceived salary on their communal occupational aspirations. Concerning the main effect of gender (H1), whereas no difference between boys' and girls' communal occupational aspirations was observed in the younger sample (Study 1), girls did aspire more to communal occupations than boys in the older sample (Study 2). When combining the two samples, we did not find a main effect of gender on children's communal occupational aspirations when including gender as a main effect in the regression while controlling for other variables. There thus seems to be a non-robust main effect of gender that disappears when controlling for other psychological variables that are related to children's concept of gender such as gender stereotypes. This finding is not in line previous empirical findings (Levy et al., 2000; Trice & Rush, 1995; Weisgram et al., 2010) or with Gottfredson's (1981) theorizing, according to which gender differences in occupational aspirations emerge in early childhood. However, Gottfredson (1981) attributes this gender difference to children's desire to model adults in their life, meaning that societal gender norms are not internalized until middle childhood. Simply modeling adults might not be as strong a motivation as adhering to one's own internalized norms, which could explain why we observe a stronger gender difference in communal occupational aspirations in middle childhood than in early childhood.



**Figure 1.** Mediating effect of communal self-perceptions on the relationship between gender and communal occupational aspirations in Study 1 ( $n = 156$ ), Study 2 ( $n = 89$ ), and with Combined data ( $n = 245$ ).

Note. \* $p < .05$ ; \*\* $p < .01$ ; Statistics are presented as such: Study 1 / Study 2 / Combined data.

In addition, the different results between our participants in early childhood and middle childhood could be due to developmental factors, such as children's ability to understand gender constancy (Kohlberg, 1966). According to Kohlberg's stages of gender development, gender constancy (i.e., the understanding that sex is permanent across situations and over time) is developed by about age 6 or 7 years, which would mean that our sample of children in early childhood (i.e., ages 4–6 years) will have a less developed concept of gender constancy than our sample of children in middle childhood (i.e., ages 6–13 years). However, later empirical work has found signs of gender constancy from age 4 years, which would contradict this explanation (Bussey & Bandura, 1992). Another explanation for the different results between our participants in early childhood and middle childhood might be due to differences of how gender is used to organize groups in childcare centers and elementary schools. Although there is little research on this topic in Norway, we speculate that one important aspect might be differences in the extent to which children in each age group are routinely labeled and organized in group based on their gender. As children in childcare centers are mixed in age, a common way to label and organize children into groups is by age. In elementary schools, however, children are in the same class as their age group, which can lead teachers to categorize and organize children based on gender instead of their age. Extensive research has found that using gender as a label and as a way to group children can increase children's gender stereotypes, which could explain why we observe a stronger gender difference in occupational aspirations among the older children (Bigler, 1995; Hilliard & Liben, 2010; Patterson & Bigler, 2006).

Interestingly, both studies provide evidence for the role of communal occupational gender stereotypes in communal occupational aspirations. We found a significant interaction between gender and communal occupational gender stereotypes in both Study 1 and Study 2, which replicated in the combined data set. This means that in line with role congruity theory (Eagly & Karau, 2002) and gender schema theory (Martin et al., 2002) children seem to want to behave in line with existing gender stereotypes.

This is also in line with Gottfredson's developmental theory of occupational aspirations, which states that occupational gender stereotypes influence children's occupational aspirations from age 6 years. Results of analyses of all three samples (Study 1, Study 2, and combined data) showed that communal occupational gender stereotypes influenced the communal occupational aspirations of both boys and girls. The more traditional communal occupational gender stereotypes girls reported, the more they aspired toward communal occupations, whereas the more traditional communal occupational gender stereotypes boys reported, the less they aspired toward communal occupations. With the present data, it is not possible to differentiate between different underlying motivations of this effect. More research is needed to disentangle whether this effect is driven by children's desire to achieve cognitive consistency as predicted by gender schema theory, the desire to avoid negative consequences from others as predicted by role congruity theory, or by a combination of these two motives. This finding is nevertheless important since past research has mostly focused on the relationship between gender stereotypes and occupational aspirations in adolescents and young adults (Cundiff et al., 2013; Garriott et al., 2017), with a lack of empirical evidence in younger children (Hartung et al., 2005).

In addition, results of both studies and the combined samples showed that children's gendered self-concepts in terms of their communal self-perceptions were related to communal occupational aspirations (H3) and results from Study 1 and the combined sample showed that these self-perceptions mediated the relationship between child gender and occupational aspirations (H5). We believe the present results, together with the evidence from Block et al. (2018), suggest that Gottfredson's (1981) prediction that self-concepts do not play a role in young children's occupational aspirations may need to be reconsidered. The fact that young girls and boys already differ in their communal self-perceptions might explain why boys become less likely to aspire toward communal roles than girls the older they get, as children who view themselves in line with gender stereotypes might over time develop more rigid internalized beliefs about gender roles and, thus, aspire

more toward gender congruent occupations. This would mean that a boy who does not view himself as communal might develop stronger beliefs that boys should not be communal and will, therefore, aspire less toward communal occupations. However, as the effect of self-perceptions on occupational aspirations in young children has been underexamined, further research should explore this possible alternative development of occupational aspirations in childhood.

Finally, in Study 2, we found that the perceived salary of the communal occupation was related to children's aspirations toward communal occupations, even when controlling for other important factors, supporting our exploratory H4. This means that the more money children believe a person makes in a specific communal occupation, the more they aspire toward this occupation. This result supports previous findings showing that the occupational aspirations of young children in middle childhood are influenced by power and status (Liben et al., 2001; Weisgram et al., 2010). The finding is also consistent with Gottfredson's developmental theory of occupational aspirations, which states that the occupational aspirations of children between the ages of 9 and 13 years are influenced by the status of the occupations. This is also in line with previous empirical findings that occupational status influences young children's occupational aspirations (Hayes et al., 2018; Liben et al., 2001; Weisgram et al., 2010). When planning interventions to increase engagement in communal occupations, researchers and decision makers might, therefore, consider the status of occupations, and particularly the perceived salary of communal occupations. Previous interventions have focused on using role models to influence children's occupational aspirations (see Olsson & Martiny, 2018); however, if the present pattern is robust, this may not be enough. Even at a young age, children need to perceive communal occupations as being desirable, which means that increasing the status of communal occupations should be included in interventions to increase communal occupational aspirations. Our findings suggest that factors previously thought to only influence children at an older age, like occupational status, do relate to children's aspirations already at elementary school age. Therefore, more work should be done to investigate predictors of occupational aspirations at different stages in childhood, especially as this has been underexamined in previous research.

An important predictor of children's occupational aspirations that we decided to not include in the present work is SES. Gottfredson's (1981) developmental theory of occupational aspirations states that SES influences the perceived accessibility of occupations, and thereby shapes occupational aspirations. This is supported by empirical work, which has found that SES is an important factor that influences the occupational aspirations of children, where children with higher SES aspire more toward more prestigious occupations (Cochran et al., 2011; Hannah & Kahn, 1989). The only measure of SES we included in both studies was parents' income. When looking at the distribution of parental income, most parents (58.6% in Study 1 and 54.3% in Study 2) report earning a salary of between NOK 460,000 and 1,200,000. The median salary in Norway in 2021 was NOK 550,000 (SSB, 2021c), meaning that our sample earned approximately the median Norwegian salary. We also have a measure of parental education in Study 1, for which 78.4% of parents report having a higher education. 36% of the population in Norway above the age of 16 years had a higher education in 2021 (SSB,

2021d). Our samples therefore mostly consist of children with moderate to high SES. In our opinion, it does not seem likely that SES strongly influenced the present results, particularly since Norway is a country with relatively low economic inequality (OECD, 2022) and the majority of children attend the same (public) school until grade 10 (age 13 years). However, further research should explore the role of SES in children's occupational aspirations in detail.

The focus of the present work is on social psychological influences, including gender norms and status. Researchers from an evolutionary perspective, however, argue that the gender difference in communal occupations is due to women's stronger motivation to form interpersonal affiliations and men's stronger motivation to attain prestige, as well as the ancestral sex roles that lead men to be oriented toward things while women are oriented toward people (see Tay et al., 2019). In addition, researchers from a biological perspective argue that there is evidence for a biological influence on children's engagement in gendered activities and interests. For example, prenatal androgens have an effect on interests and engagement in gendered activities, with girls who are exposed to high levels of androgens in early life have been found to be more interested in male-typed activities (Berenbaum, 2018; Berenbaum & Hines, 1992; Berenbaum & Snyder, 1995). In line with social role theory (Eagly, 1987), biological differences between women and men might contribute to observed differences in women's and men's' (communal) behavior and self-perceptions. At the same time, in line with social role theory (Eagly, 1987), we argue that these potential biological differences may be exaggerated by (rigid) gender norms in society. With the present work, we are not able to distinguish between these potential sources for the observed gender differences in children's communal occupational aspirations.

### Limitations

The present work makes important contributions regarding the development of communal occupational aspirations in young children. However, a first limitation that needs to be addressed is the cross-sectional design of both studies, which makes it impossible to draw causal conclusions. Whereas a causal interpretation of the present findings regarding gender and communal self-perceptions is in line with role congruity theory (Diekmann et al., 2017), the direction of the effects of perceived status remains unclear. As we argued based on the theoretical approach by Gottfredson (1981), it may be that perceived status affects young children's occupational aspirations. However, it is of course possible that children ascribed more salary to occupations that they perceive as more interesting and desirable. More (experimental) research is, therefore, needed to investigate this causal link, for example, by manipulating the ascribed status of (unknown) occupations.

As a second limitation, the original scales for communal occupational aspirations and the perceived salary of communal occupations referred to three occupations: stay-at-home parent, nurse, and preschool teacher. We used these three items in Study 2 because they had shown satisfactory reliability in Study 1. However, in the sample of older children, stay-at-home parent did not correlate highly with the other two communal occupations, perhaps because older children understand that staying at home is not an occupation. Another problematic issue with the

stay-at-home-parent item is that in Norway about 75% of the fathers take parental leave during the first year of their child's life (Engvik & Pettersen, 2021). Even though women in Norway take longer parental leave this means that Norwegian children often observe men and women in this role. This might explain why the used scale did not show high reliability in both studies and we had to exclude this item from both studies to ensure consistency between the analyses. In an additional study, we showed that Norwegian children perceive nurses and preschool teachers as typical communal occupations. At the same time, further research should make sure to use scales that consist of more items and show a higher reliability. Finally, there is a need for longitudinal studies that investigate how predictors of occupational aspirations in children develop throughout childhood.

## Conclusion

The present study addresses an underexamined but important question, namely factors that contribute to children's communal occupational aspirations that may ultimately explain men's underrepresentation in communal roles. The tendency for boys to identify less with communal behaviors than girls at an early age and in an egalitarian context is noteworthy. The relationship between gender, communal self-perceptions, and communal occupational aspirations suggests that girls and boys enter different career trajectories from early childhood on. Therefore, interventions seeking to increase communal self-perceptions in young boys are needed. When planning these interventions researchers and practitioners should consider also focusing on raising the perceived and real status of communal occupations.

## Data availability statement

The data and analytical code are publicly available on OSF: [https://osf.io/5cr3u/?view\\_only=1f03932d91a0436dbdeb0c7144247d7d](https://osf.io/5cr3u/?view_only=1f03932d91a0436dbdeb0c7144247d7d)

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## ORCID iD

Marte Olsen  <https://orcid.org/0000-0001-6494-1692>

## Supplemental Material

Supplemental material for this article is available online.

## Notes

- Vocational interests are similar to occupational aspirations, but the term vocational interest is most often used in trait-focused research (e.g., Holland, 1997), whereas the term occupational aspirations is most often used in developmental research (e.g., Gottfredson, 1981).
- Parents of the children in Study 1 were asked to fill out a questionnaire. They were asked about their gender attitudes, the distribution of childcare and housework in their household, gender essentialist beliefs, and demographic information about themselves and their child ( $N=87$  parents responded to the questionnaire).
- Children first recorded their implicit gender stereotypes (in an auditory Stroop task) and their perceptions of one of their childcare center teachers, but these results are not included in this report.
- A multilevel linear analysis was conducted for Study 1, to account for the possible multilevel structure of children within each participating childcare center. The results were similar to the linear regression analyses reported in the article, with the exception that gender was a significant predictor in the multilevel analysis. However, the  $\chi^2$  change between the linear model and the multilevel model was not significant, meaning that including variability in intercepts in our model does not improve model fit. We therefore report the results of the multilevel linear model in the Supplemental Materials.
- Other variables collected as covariates include gender of experimenter and exposure to gender incongruent role models. Multiple regression analyses including these variables can be found in the Supplemental Materials.
- Stay-at-home parent was removed as an item in the following scales in both Study 1 and Study 2: communal occupational aspirations, communal occupational gender stereotypes, and perceived salary for communal occupations. Removing this item did not change the results of the analyses. Analyses including stay-at-home parent as an item in the scales can be found in the Supplemental Materials.

## References

- Bauer, J. J., & McAdams, D. P. (2010). Eudaimonic growth: Narrative growth goals predict increases in ego development and subjective well-being 3 years later. *Developmental Psychology, 46*(4), 761–772. <https://doi.org/10.1037/a0019654>
- Berenbaum, S. A. (2018). Beyond pink and blue: The complexity of early androgen effects on gender development. *Child Development Perspectives, 12*(1), 58–64. <https://doi.org/10.1111/cdep.12261>
- Berenbaum, S. A., & Hines, M. (1992). Early androgens are related to sex-typed toy preferences. *Psychological Science, 3*(3), 203–206. <https://doi.org/10.1111/j.1467-9280.1992.tb00028.x>
- Berenbaum, S. A., & Snyder, E. (1995). Early hormonal influences on childhood sex-typed activity and playmate preferences: Implications for the development of sexual orientation. *Developmental Psychology, 31*, 31–42. <https://doi.org/10.1037/0012-1649.31.1.31>
- Bigler, R. S. (1995). The role of classification skill in moderation environmental influences on children's gender stereotyping: A study of the functional use of gender in the classroom. *Child Development, 66*(4), 1072–1087. <https://doi.org/10.2307/1131799>
- Block, K., Gonzalez, A. M., Schmader, T., & Baron, A. S. (2018). Early gender differences in core values predict anticipated family versus career orientation. *Psychological Science, 29*(9), 1540–1547. <https://doi.org/10.1177/0956797618776942>
- Bussey, K., & Bandura, A. (1992). Self-regulatory mechanisms governing gender development. *Child Development, 63*(5), 1236–1250. <https://doi.org/10.2307/1131530>
- Cochran, D. B., Wang, E. W., Stevenson, S. J., Johnson, L. E., & Crews, C. (2011). Adolescent occupational aspirations: Test of Gottfredson's theory of circumscription and compromise. *The Career Development Quarterly, 59*(5), 412–427. <https://doi.org/10.1002/j.2161-0045.2011.tb00968.x>

- Croft, A., Schmader, T., & Block, K. (2015). An underexamined inequality: Cultural and psychological barriers to men's engagement with communal roles. *Personality and Social Psychology Review, 19*(4), 343–370. <https://doi.org/10.1177/1088868314564789>
- Croft, A., Schmader, T., & Block, K. (2019). Life in the balance: Are women's possible selves constrained by men's domestic involvement? *Personality and Social Psychology Bulletin, 45*(5), 808–823. <https://doi.org/10.1177/0146167218797294>
- Cundiff, J., Vescio, T. K., Loken, E., & Lo, L. (2013). Do gender-science stereotypes predict science identification and science career aspirations among undergraduate science majors? *Social Psychology of Education: An International Journal, 16*(4), 541–554. <https://doi.org/10.1007/s11218-013-9232-8>
- Diekmann, A. B., Brown, E. R., Johnston, A. M., & Clark, E. K. (2010). Seeking congruity between goals and roles: A new look at why women opt out of science, technology, engineering, and mathematics careers. *Psychological Science, 21*(8), 1051–1057. <https://doi.org/10.1177/0956797610377342>
- Diekmann, A. B., Steinberg, M., Brown, E. R., Belanger, A. L., & Clarck, E. K. (2017). A goal congruity model of role entry, engagement, and exit: Understanding communal goal processes in STEM gender gaps. *Personality and Social Psychology Review, 21*(2), 142–175. <https://doi.org/10.1177/1088868316642141>
- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Lawrence Erlbaum.
- Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review, 109*, 573–598. <https://doi.org/10.1037/0033-295X.109.3.573>
- Engvik, M., & Pettersen, M. (2021). *Lengst pappaperm blant lærere, men langt fra en likedeling*. <https://www.ssb.no/befolkning/likestilling/artikler/lengst-pappaperm-blant-laerere-men-langt-fra-en-likedeling>
- Fagot, B. I., & Leinbach, M. D. (1989). The young child's gender schema: Environmental input, internal organization. *Child Development, 60*(3), 663–672. <https://doi.org/10.2307/1130731>
- Garriott, P. O., Hultgren, K. M., & Frazier, J. (2017). STEM stereotypes and high school students' math/science career goals. *Journal of Career Assessment, 25*(4), 585–600. <https://doi.org/10.1177/1069072716665825>
- Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology, 28*(6), 545–579. <https://doi.org/10.1037/0022-0167.28.6.545>
- Hannah, J. A. S., & Kahn, S. E. (1989). The relationship of socioeconomic status and gender to the occupational choices of Grade 12 students. *Journal of Vocational Behavior, 34*(2), 161–178. [https://doi.org/10.1016/0001-8791\(89\)90012-2](https://doi.org/10.1016/0001-8791(89)90012-2)
- Hardie, J. H. (2015). Women's work? Predictors of young men's aspirations for entering traditionally female-dominated occupations. *Sex Roles, 72*(7–8), 349–362. <https://doi.org/10.1007/s11199-015-0449-1>
- Harmon, L. W., Hansen, J. C., Borgen, F. H., & Hammer, A. L. (1994). *Strong interest inventory applications and technical guide*. Stanford University Press.
- Hartung, P. J., Porfeli, E. J., & Vondracek, F. W. (2005). Child vocational development: A review and reconsideration. *Journal of Vocational Behavior, 66*(3), 385–419. <https://doi.org/10.1016/j.jvb.2004.05.006>
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis; A regression-based approach* (2nd ed.). Guilford Publications.
- Hayes, A. R., Bigler, R. S., & Weisgram, E. S. (2018). Of men and money: Characteristics of occupations that affect the gender differentiation of children's occupational interests. *Sex Roles, 78*(11–12), 775–788. <https://doi.org/10.1007/s11199-017-0846-8>
- Helwig, A. A. (2001). A test of Gottfredson's theory using a ten-year longitudinal study. *Journal of Career Development, 28*(2), 77–95. <https://doi.org/10.1177/089484530102800201>
- Hilliard, L. J., & Liben, L. (2010). Differing levels of gender salience in preschool classrooms: Effects on children's gender attitudes and intergroup bias. *Child Development, 81*(6), 1787–1798. <https://doi.org/10.1111/j.1467-8624.2010.01510.x>
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Psychological Assessment Resources.
- Kohlberg, L. (1966). A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. E. Maccoby (Ed.), *The development of sex differences* (pp. 82–173). Stanford University Press.
- Kvalø, M., Olsen, M., Thorsteinsen, K., Olsson, M. I. T., & Martiny, S. E. (2021). Does the stereotypicality of mothers' occupation influence children's communal occupational aspirations and communal orientation? *Frontiers in Psychology, 12*, 730859. <https://doi.org/10.3389/fpsyg.2021.730859>
- Le, B. M., Impett, E. A., Kogan, A., Webster, G. D., & Cheng, C. (2012). The personal and interpersonal rewards of communal orientation. *Journal of Social and Personal Relationships, 30*(6), 694–710. <https://doi.org/10.1177/0265407512466227>
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior, 45*, 79–122. [https://doi.org/10.1007/978-1-4419-1695-2\\_219](https://doi.org/10.1007/978-1-4419-1695-2_219)
- Levy, G. D., Sadovsky, A. L., & Troseth, G. L. (2000). Aspects of young children's perceptions of gender-typed occupations. *Sex Roles, 42*(11), 993–1006. <https://doi.org/10.1023/A:1007084516910>
- Liben, L. S., Bigler, R. S., & Krogh, H. R. (2001). Pink and blue collar jobs: Children's judgements of job status and job aspirations in relation to sex of worker. *Journal of Experimental Child Psychology, 79*(4), 346–363. <https://doi.org/10.1006/jecp.2000.2611>
- Lipton, J. P., O'Connor, M., Terry, C., & Bellamy, E. (1991). Neutral job titles and occupational stereotypes: When legal and psychological realities conflict. *Journal of Psychology, 125*, 129–151. <https://doi.org/10.1080/00223980.1991.10543278>
- Low, K. S. D., Yoon, M., Roberts, B. W., & Rounds, J. (2005). The stability of vocational interests from early adolescence to adulthood: A quantitative review of longitudinal studies. *Psychological Bulletin, 131*, 713–737. <https://doi.org/10.1037/0033-2909.131.5.713>
- Mao, A., Wang, J., Cheong, P. L., Van, I. K., & Tam, H. L. (2020). Male nurses' dealing with tensions and conflicts with patients and physicians: A theoretically framed analysis. *Journal of Multidisciplinary Healthcare, 13*, 1035–1045. <https://doi.org/10.2147/JMDH.S270113>
- Martin, C. L., Eisenbud, L., & Rose, H. (1995). Children's gender-based reasoning about toys. *Child Development, 66*(5), 1453–1471. <https://doi.org/10.1111/j.1467-8624.1995.tb00945.x>
- Martin, C. L., Ruble, D. N., & Szkrybalo, J. (2002). Cognitive theories of early gender development. *Psychological Bulletin, 128*(6), 903–933. <https://doi.org/10.1037/0033-2909.128.6.903>
- Martiny, S. E., Thorsteinsen, K., Parks-Stamm, E. J., Olsen, M., & Kvalø, M. (2021). Children's well-being during the COVID-19 pandemic: Relationships with attitudes, family structure, and mother's well-being. *European Journal of Developmental*



- Psychology*, 19(5), 711–731. <https://doi.org/10.1080/17405629.2021.1948398>
- McMahon, M., & Watson, M. (2008). Introduction to the special section: Children's career development: Status quo and future directions. *The Career Development Quarterly*, 57(1), 4–6. <https://doi.org/10.1002/j.2161-0045.2008.tb00161.x>
- OECD. (2022). *Income inequality (indicator)*. <https://doi.org/10.1787/459aa7f1-en>
- Ojanen, T., Grönroos, M., & Salmivalli, C. (2005). An interpersonal circumplex model of children's social goals: Links with peer-reported behavior and sociometric status. *Developmental Psychology*, 41(5), 699–710. <https://doi.org/10.1037/0012-1649.41.5.699>
- Olsson, M. I. T., & Martiny, S. E. (2018). Does exposure to counter-stereotypical role models influence girls' and women's gender stereotypes and career choices? A review of social psychological research. *Frontiers in Psychology*, 9, Article 2264. <https://doi.org/10.3389/fpsyg.2018.02264>
- Pässler, K., & Hell, B. (2020). Stability and change in vocational interests from late childhood to early adolescence. *Journal of Vocational Behavior*, 121, Article 103462. <https://doi.org/10.1016/j.jvb.2020.103462>
- Patterson, M. M., & Bigler, R. S. (2006). Preschool children's attention to environmental messages about groups: Social categorization and the origins of intergroup bias. *Child Development*, 77(4), 847–860. <https://doi.org/10.1111/j.1467-8624.2006.00906.x>
- Serbin, L. A., Poulin-Dubois, D., Colburne, K. A., Gen, M. G., & Eichstedt, J. A. (2001). Gender stereotyping in infancy: Visual preferences for and knowledge of gender-stereotyped toys in the second year. *International Journal of Behavioral Development*, 25(1), 7–15. <https://doi.org/10.1080/01650250042000078>
- Serbin, L. A., Powlishta, K. K., Gulko, J., Martin, C. L., & Lockheed, M. E. (1993). The development of sex typing in middle childhood. *Monographs for the Society for Research in Child Development*, 58(2), 1–98. <https://doi.org/10.2307/1166118>
- Spinner, L., Cameron, L., & Calogero, R. (2018). Peer toy play as a gateway to children's gender flexibility: The effect of (counter) stereotypic portrayals of peers in children's magazines. *Sex Roles*, 79(5–6), 314–328. <https://doi.org/10.1007/s11199-017-0883-3>
- Statistisk sentralbyrå. (2021a). *Helse- og sosialpersonell*. <https://www.ssb.no/arbeid-og-lonn/sysselsetting/statistikk/helse-og-sosialpersonell>
- Statistisk sentralbyrå. (2021b). *Ansatte i barnehage og skole*. <https://www.ssb.no/utdanning/barnehager/statistikk/ansatte-i-barnehage-og-skole>
- Statistisk sentralbyrå. (2021c). *Lønn*. <https://www.ssb.no/arbeid-og-lonn/lonn-og-arbeidskraftkostnader/statistikk/lonn>
- Statistisk sentralbyrå. (2021d). *Befolkningens utdanningsnivå*. <https://www.ssb.no/utdanning/utdanningsniva/statistikk/befolkningens-utdanningsniva>
- Tay, P. K. C., Ting, Y. Y., & Tan, K. Y. (2019). Sex and care: The evolutionary psychological explanations for sex differences in formal care occupations. *Frontiers in Psychology*, 10, 867. <https://doi.org/10.3389/fpsyg.2019.00867>
- Thorsteinsen, K., Parks-Stamm, E. J., Kvalø, M., Olsen, M., & Martiny, S. E. (2022). Mothers' domestic responsibilities and well-being during the COVID-19 lockdown: The moderating role of gender essentialist beliefs about parenthood. *Sex Roles*, 87(1–2), 85–98. <https://doi.org/10.1007/s11199-022-01307-z>
- Thorsteinsen, K., Parks-Stamm, E. J., Olsen, M., Kvalø, M., & Martiny, S. E. (2021). The impact of COVID-19-induced changes at schools on elementary students' school engagement. *Frontiers in Psychology*, 12, Article 687611. <https://doi.org/10.3389/fpsyg.2021.687611>
- Trice, A. D., & Rush, K. (1995). Sex-stereotyping in four-year-olds' occupational aspirations. *Perceptual and Motor Skills*, 81(2), 701–702. <https://doi.org/10.2466/pms.1995.81.2.701>
- Utdanning. (2014). *Likestilling i norsk arbeidssalder*. <https://utdanning.no/likestilling>
- VandenBos, G. R. (Ed.). (2015). *APA dictionary of psychology* (2nd ed.). American Psychological Association. <https://doi.org/10.1037/14646-000>
- Weisgram, E. S., Bigler, R. S., & Liben, L. S. (2010). Gender, values, and occupational interests among children, adolescents, and adults. *Child Development*, 81(3), 778–796. <https://doi.org/10.1111/j.1467-8624.2010.01433.x>
- World Economic Forum. (2020). *Global gender gap report 2020*. [http://www3.weforum.org/docs/WEF\\_GGGR\\_2020.pdf](http://www3.weforum.org/docs/WEF_GGGR_2020.pdf)

## **Appendix B: Paper II – Published Paper**



Contents lists available at ScienceDirect

# Journal of Experimental Child Psychology

journal homepage: [www.elsevier.com/locate/jecp](http://www.elsevier.com/locate/jecp)



## Brief Report

# Salary and power: How occupational status affects children's occupational aspirations



Marte Olsen<sup>a,\*</sup>, Elizabeth J. Parks-Stamm<sup>b</sup>, Kjærsti Thorsteinsen<sup>a,c</sup>, Sarah E. Martiny<sup>a</sup>

<sup>a</sup> Department of Psychology, Research Group Social Psychology, UiT The Arctic University of Norway, 9019 Tromsø, Norway

<sup>b</sup> Department of Psychology, University of Southern Maine, Portland, ME 04104, USA

<sup>c</sup> NORCE Norwegian Research Centre AS, 9019 Tromsø, Norway

## ARTICLE INFO

### Article history:

Received 7 October 2022

Revised 16 February 2023

### Keywords:

Occupational aspirations

Occupational status

Occupational values

Self-perceptions

prestige

power

## ABSTRACT

In many countries, labor markets are still highly gender segregated, with very few men working in communal occupations such as nursing. Because occupational aspirations start to develop during early childhood, it seems crucial to foster our understanding of which factors affect occupational aspirations during this period. Earlier correlational research showed that the status of occupations seems to be one important factor. Therefore, in the current work, we experimentally tested the effect of two dimensions of status (i.e., salary and power) on children's occupational aspirations and examined its interaction with child gender. We also tested the relationship among gender, self-perceptions, and occupational values. Using a 2 (Salary: high vs. low)  $\times$  2 (Power: high vs. low) within-participants design ( $N = 127$  [59 boys and 68 girls],  $M_{\text{age}} = 9.37$  years,  $SD = 0.50$ ) with child gender as a between-participants factor, we show positive main effects of both salary and power on children's occupational aspirations but no interaction with gender. Correlational analyses show preliminary evidence for the mediating role of agentic self-perceptions in the relationship between gender and occupational values related to status. Thus, we provide evidence for the causal effect of occupational status on children's occupational aspirations but show experimentally that this is independent of child gender. Interestingly, the correlational analyses indicate that gender norms might play a role given that boys in trend reported stronger agentic self-perceptions, which then were associated with a stronger

\* Corresponding author.

E-mail address: [marte.olsen@uit.no](mailto:marte.olsen@uit.no) (M. Olsen).

desire to pursue high-status occupations. Implications for early interventions to reduce occupational gender segregation are discussed.

© 2023 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

## Introduction

Gender segregation in labor markets persist worldwide (World Economic Forum, 2021). Even in Norway, one of the most gender egalitarian countries in the world, women are overrepresented in communal occupations (i.e., associated with communal behaviors and traits such as being warm and caring, e.g., nursing) and men are overrepresented in agentic occupations (i.e., associated with agentic behaviors and traits such as being assertive and analytical, e.g., pilot) (Statistisk sentralbyrå [SSB], 2022). Interestingly, research from the United States shows that even as the gender gap in agentic occupations has narrowed during the last decades, the gender gap in communal occupations persists (Bureau of Labor Statistics, 2013 as cited in Croft et al., 2015). One explanation is that women who enter agentic occupations often gain status and power, whereas men who enter communal occupations do not tend to earn higher salaries or gain greater prestige (for an overview, see England, 2010).

One important predictor of career decisions is occupational aspirations (i.e., preferences regarding future occupational roles and activities; Lent et al., 1994), which begin to develop during early childhood (Levy et al., 2000; Trice & Rush, 1995; Weisgram et al., 2010). Despite widespread agreement that childhood is an important period for the formation of occupational aspirations, research on occupational aspirations during early and middle childhood is scarce (Hartung et al., 2005; Olsen et al., 2022). Therefore, in the current research, we investigated variables shaping occupational aspirations during middle childhood (7–11 years of age), specifically focusing on two dimensions of status (i.e., salary and power).

### *Development of occupational aspirations and the role of occupational status and self-perceptions*

The developmental theory of occupational aspirations by Gottfredson (1981) is an important theory that describes which factors influence the development of occupational aspirations throughout childhood. This theory states that throughout childhood children exclude occupations that they view as a poor match for them, and thus childhood aspirations can influence occupational choices during adulthood. In line with this, longitudinal research has found that occupational aspirations remain relatively stable from childhood to adulthood (Low et al., 2005) and that interests during adolescence shape occupational choices during adulthood (Hoff et al., 2022).

Gottfredson's (1981) developmental theory of occupational aspirations argues that occupational status begins to influence children's occupational aspirations around 9 to 13 years of age. Empirical evidence for the effect of occupational status has been found among both this age group and younger children (Hayes et al., 2018; Olsen et al., 2022; Teig & Susskind, 2008; Weisgram et al., 2010). For example, an experimental study in the United States found that preadolescent boys (6–11 years of age) showed greater interest in novel occupations that were described as having a high salary (Hayes et al., 2018). In addition, an experimental study of children aged 6 to 8 and 9 to 12 years in the United States found that girls' aspirations toward agentic occupations were influenced by occupational status in both age groups (Teig & Susskind, 2008). However, they found that 6- to 8-year-old boys' aspirations were influenced by gender roles and occupational status, whereas 9- to 12-year-old boys' aspirations were solely determined by occupational status, indicating that status increases in importance with age for boys' occupational aspirations. In Norway, which was the context of the current research, a correlational study found a positive relationship between both boys' and girls' (6–13 years of age) occupational aspirations toward communal occupations and perceived salary

for these occupations (Olsen et al., 2022). An experimental study by Weisgram et al. (2010) in the United States showed a similar relationship with occupational values (i.e., desires that one most wants to be fulfilled within a career); whereas both boys and girls aspired significantly more toward occupations associated with salary (vs. family and power), only boys aspired more toward occupations associated with power than with altruism.

Taken together, several studies have shown correlational evidence of the relationship between occupational status or values and occupational aspirations during childhood (e.g., Olsen et al., 2022; Weisgram et al., 2010). However, only three previous studies used an experimental approach to manipulate the status associated with occupations and then measured children's occupational aspirations (Hayes et al., 2018; Teig & Sussskind, 2008; Weisgram et al., 2010). One of these studies did not use novel occupations in the experimental manipulation (Teig & Sussskind, 2008), meaning that children's prior knowledge about the occupations might have influenced the findings (e.g., occupational gender stereotypes). The two studies that used novel occupations manipulated the gender of the worker in the novel occupation as well as the status of the occupation, meaning that gender attitudes, not only status, might have influenced the children's responses (Hayes et al., 2018; Weisgram et al., 2010). Therefore, to test the unique effect of status on children's occupational aspirations, experimental research must use novel occupations and manipulate only the status (high vs. low) of the occupations.

Gottfredson's (1981) theory proposes that during adolescence aspects of children's self-concept such as self-perceptions (i.e., how much children view themselves as preferring communal and agentic behaviors; Olsen et al., 2022) also begin to influence occupational aspirations. One of the few studies that investigated the effect of self-perceptions on occupational aspirations during early to middle childhood found that self-perceptions mediate the relationship between gender and occupational aspirations even in this age group (Olsen et al., 2022). Therefore, it is possible that children's occupational aspirations emerge from their self-perceptions given that children might come to value the aspects of work that they enjoy and perceive themselves to be skilled at. The current research builds on these preliminary findings to explore whether the gender differences we observe in occupational aspirations during childhood may be explained by children's gendered self-concepts.

### *The current study*

In the current work, we investigated whether the status of occupations influences elementary school children's occupational aspirations using an experimental approach. We manipulated two dimensions of status (i.e., salary and power) for novel occupations and measured children's occupational aspirations for these occupations. We also aimed to explore other factors that might influence occupational aspirations in children, such as children's agentic self-perceptions, and how these relate to their occupational values.

The current research was conducted in Norway, and thus the cultural context of this study differs from earlier work mostly conducted in the United States (Hayes et al., 2018; Teig & Sussskind, 2008; Weisgram et al., 2010). Even though Norway is ranked as one of the most gender egalitarian countries in the world (World Economic Forum, 2021), horizontal gender segregation (i.e., under- or overrepresentation of men/women in different occupations or sectors) and vertical gender segregation (i.e., under- or overrepresentation of men/women in income or prestige levels of occupations or sectors) continues to exist in the Norwegian labor market. For example, vertical gender segregation is shown in a persistent gender wage gap, with men earning on average 8.6% more than women in the same job (Penner et al., 2023) and being overrepresented in high-paying leadership positions in the private sector (only 27% are women; Teigen & Reisel, 2017). In terms of horizontal gender segregation, men are still overrepresented in agentic occupations (e.g., only 20.4% of engineers are women; Utdanning.no, 2020), whereas women are overrepresented in communal occupations and in the public sector (e.g., only 10% of nurses are men; Utdanning.no, 2020). Children are likely more able to perceive horizontal gender segregation than vertical gender segregation, but the existing vertical gender segregation in Norway likely contributes to a general social perception that women's labor is worth less. For this reason, we hypothesized that, in line with earlier work from the United States (Hayes et al., 2018), salary and power would affect boys' occupational aspirations more than those of girls.

Based on the empirical and theoretical work outlined above, we developed the following preregistered hypotheses ([https://osf.io/35nfc/?view\\_only=d10bb0cdc8d44a8ca9b8dfebdc8f7015](https://osf.io/35nfc/?view_only=d10bb0cdc8d44a8ca9b8dfebdc8f7015)). We predicted that children would aspire more toward occupations associated with high salary than with low salary (H1) and that children would aspire more toward occupations associated with high power than with low power (H2). We also predicted an interaction between child gender and the effects of salary and power on occupational aspirations, where the effect of salary and power would be stronger for boys than for girls (H3).<sup>1</sup> In addition, we predicted that children's agentic self-perceptions would mediate the relationship between their gender and their values toward salary and power in their imagined future occupations (H4).<sup>2</sup>

## Method

### Participants

We calculated the required sample size for the hypothesis that would require the largest sample (i.e., H4). Based on the results of Olsen et al. (2022; a moderate a-path of .39 and a small-to-moderate b-path of .26), a sample of 116 participants is needed (Fritz & MacKinnon, 2007). Therefore, we aimed for a minimum sample of 120 participants.

We collected data from 139 children from three schools and 11 classes. Four children reported being nonbinary or did not wish to indicate their gender. Because our hypotheses focused on differences between girls and boys, these children were excluded from the analyses. Participants were also excluded from all analyses in line with our preregistered exclusion criteria if they reported that they had not read the questions carefully ( $n = 4$ ), experienced technical issues, or did not speak Norwegian well ( $n = 4$ ). Therefore, our final sample consisted of 127 elementary school children (59 boys, 68 girls) aged 7 to 11 years (boys:  $M = 9.44$  years,  $SD = 1.13$ ; girls:  $M = 9.30$  years,  $SD = 1.24$ ), with 25.2% of the children speaking a language other than Norwegian at home. There were no significant differences between boys and girls in age or language.

### Design

We used a 2 (Salary: high vs. low)  $\times$  2 (Power: high vs. low) within-participants design with child gender as a between-participants factor. Children received information about 12 novel occupations and were asked to indicate their aspirations toward each occupation. The condition of each occupation was randomized between participants, meaning that each child was presented with 3 occupations per condition (high salary/high power, high salary/low power, low salary/high power, and low salary/low power). After the experimental part was finished, children completed a questionnaire assessing occupational values and agentic and communal self-perceptions.

### Procedure

Participants were recruited by contacting the principals at five elementary schools in northern Norway in 2021. Three of the schools agreed to participate. We then asked for permission from the teachers to conduct our study in their class. Of the 16 teachers we approached, 11 gave us permission. Prior to data collection, we obtained parental consent for children's participation in each class.

<sup>1</sup> An additional hypothesis (H4 in the preregistration) was preregistered, stating that the effect of H3 (interactions between the conditions and gender) would be explained by boys' higher agentic self-perceptions. We decided to exclude this hypothesis from the main text because the interaction predicted in H3 was not found (leaving no interaction to explain). We instead tested whether self-perceptions (dichotomized into high vs. low) interacted with experimental condition and child gender. This was not the case (see the online supplementary material for details).

<sup>2</sup> In addition to the preregistered main hypotheses H1 to H3, we also preregistered additional hypotheses in an exploratory part of the preregistration. H4 is one of these additional hypotheses (in the preregistration referred to as Additional Hypothesis 2 [AH2]).

The study was conducted in Norwegian in elementary schools during school hours. The participants were tested in groups of up to 5 children in a separate room by two trained experimenters (i.e., psychology students), one acting as experimenter (i.e., instructing the children) and the other acting as secretary (i.e., taking notes). The study was conducted on tablets using Qualtrics. The children could either read the questions or listen to audio recordings of a female, native Norwegian voice that read aloud all instructions, questions, and scale points. Halfway through the study, the children were given a break where they could watch a short music video for children. After finishing the study, the children were debriefed and received a sticker and a small toy as a reward for participating.

### Materials

All original materials can be found in the online [supplementary material](#) in both Norwegian and English. The study was conducted in Norwegian. The scales are presented in this article in the order they were presented, but items were randomized within all scales.

### Manipulation

Children first completed the experimental block. In this block, they read/heard about 12 novel occupations. These novel occupations were developed based on previous research (Liben et al., 2001) and adjusted to the Norwegian context. Prior to the main study, we tested these occupations on a group of children ( $N = 14$ ; age range: 6–12 years) to ensure that the occupations were understandable to the children and that the children did not have previous knowledge about these occupations. We attempted to use novel occupations that would not be associated with communal or agentic traits.

Each occupation was briefly described to the children (e.g., “This is a job where you test the quality of the water in a city to check that the water is safe to drink”). The occupation was then described as having either high or low salary (i.e., “People who have this occupation make very little/a lot of money”) and as having either high or low power (i.e., “People who have this occupation do not get to decide over other people who they work with but have to do what others tell them to do” or “People who have this occupation get to decide over other people who they work with and can tell other people what to do”). Children were then asked: “How much would you like to have this occupation when you grow up?”. Children answered on a 5-point Likert scale from 1 = *not at all* to 5 = *very much*, which was used for all measures in the current study.

### Occupational values

After finishing the experimental block, children were asked to complete a questionnaire. First, we assessed children’s occupational values toward salary, power, and prestige. The measures were developed based on the Occupational Values Scale for Children (Weisgram et al., 2010). Children were instructed to imagine their future occupation and to report how important salary, power, and prestige were to them in their future occupation (e.g., “How much would you like to have a job that lets you earn a lot of money?”). The scales showed acceptable reliability (money:  $\alpha = .74$ ; power:  $\alpha = .75$ ; prestige:  $\alpha = .65$ ).<sup>3</sup>

### Agentic self-perceptions

To assess their agentic self-perceptions, the children were asked how much they like to engage in five agentic behaviors (e.g., “Do you like to decide over others when you play together?”). The reliability of the scale was acceptable ( $\alpha = .63$ ).<sup>4</sup>

<sup>3</sup> A principal components analysis was conducted to investigate the factor structure of the 12 items measuring occupational values toward salary, power, and prestige. The analysis showed a three-factor solution that corresponds to the three predicted subdimensions. However, one item that was originally included in the prestige subdimension loaded on the power subdimension and therefore was included in the power subdimension. For further details, see supplementary material.

<sup>4</sup> We also measured children’s communal self-perceptions by asking the children how much they like to engage in five communal behaviors (e.g., “Do you like to help other children?”). Even though the reliability of the scale was good ( $\alpha = .76$ ), this scale was not included in the current analyses because we had not preregistered hypotheses about communal self-perceptions.

### Demographics

Children indicated their gender (0 = boy, 1 = girl, 2 = other, 3 = don't want to say), their age (in years), and whether they spoke a language other than Norwegian with their parents at home. We also collected information about the children's school and class, which has been anonymized in the dataset uploaded on the Open Science Framework (OSF) as numerical codes.<sup>5</sup>

### Results

The descriptive statistics of all the relevant measures and the correlations between them can be found in [Table 1](#). Age was included as a covariate in all analyses because our sample contained a relatively large age range (7–11 years).

#### Testing the effects of salary and power

To test the main effects of our experimental manipulations of salary and power on children's occupational aspirations, we conducted a repeated-measures analysis of variance (ANOVA).<sup>6</sup> Salary and power were included as within-participants factors with two levels each in the analysis (H1 and H2). Gender was included as a between-participants factor to investigate the interactions between the manipulated variables and gender (H3). We found the predicted main effect of salary,  $F(1, 124) = 10.97, p = .001, \eta_p^2 = .081$ , and the predicted main effect of power,  $F(1, 124) = 5.07, p = .026, \eta_p^2 = .039$  (see [Table 2](#)). This means that elementary school children aspired more toward occupations with high salary and power than occupations with low salary and power (high salary/high power:  $M = 2.85, SD = 0.99$ ; high salary/low power:  $M = 2.68, SD = 0.92$ ; low salary/high power:  $M = 1.89, SD = 0.74$ ; low salary/low power:  $M = 1.64, SD = 0.66$ ). Contrary to H3, there was neither an interaction between salary and gender,  $F(1, 124) = 1.80, p = .182, \eta_p^2 = .014$ , nor an interaction between power and gender,  $F(1, 124) = 0.04, p = .840, \eta_p^2 < .000$ . This means that both boys' and girls' occupational aspirations were affected equally by the manipulations of salary and power. We found no interaction between salary or power and child age ( $p = .085$ ), and no further three-way interactions were found (for details, see [supplementary material](#)).<sup>7</sup>

#### Mediation of self-perceptions on relationship between gender and occupational values

Next, we conducted additional analyses with the data from the questionnaire. First, we investigated whether children's agentic self-perceptions mediated the relationship between their gender and their occupational values toward salary, power, and prestige. We conducted three mediation analyses using [Hayes's \(2017\) Process Macro](#) (Version 3.4.1, Model 4, 10,000 bootstrap samples), where gender was the predictor (X), occupational values (salary, power, and prestige) were the outcome (Y), and agentic self-perception was the mediator (M). Age was included as a covariate. We found the predicted mediating effects in trend of agentic self-perceptions on the relationship between gender and the occupational values. Gender predicted agentic self-perceptions in trend ( $B = -0.24, p = .065$ ). Agentic self-perceptions significantly predicted occupational values for salary ( $B = 0.26, p = .007$ ), power ( $B = 0.51, p < .001$ ), but only in trend for prestige ( $B = 0.19, p = .060$ ). The direct effect of gender on the occupational values was not significant for salary ( $B = 0.06, p = .683$ ), power ( $B = 0.14, p = .294$ ), or prestige ( $B = 0.14, p = .341$ ). The bias-corrected bootstrap confidence intervals (CIs) for the indirect effect of gender on the occupational values through agentic self-perceptions included zero (salary:  $B = -0.06, 95\% \text{ CI } [-0.16, 0.00]$ ; power:  $B = -0.12, 95\% \text{ CI } [-0.28, 0.01]$ ; prestige:

<sup>5</sup> In addition to the measures presented in this article, we collected a measure of occupational gender stereotypes. Analyses including this measure can be found in the supplementary material.

<sup>6</sup> We conducted multilevel analyses to account for the possible multilevel structure of children within each participating school and each participating class. The  $\chi^2$  change between the linear models and the multilevel models was significant; however, the results of our analyses remained unchanged by including variability in intercepts. Therefore, we report the results of the multilevel linear models in the supplementary material.

<sup>7</sup> For analysis of whether the novel occupations were perceived as gendered by the children, see the supplementary material.



**Table 1**  
Descriptive statistics and correlations between self-reported measures.

	N	M	SD	1	2	3	4	5	6	7
1. Age	127	9.37	1.19	1						
2. Gender	127	0.54	0.50	-.06	1					
3. Value salary <sup>a</sup>	127	4.02	0.78	.08	-.01	1				
4. Value power <sup>a</sup>	127	2.90	0.88	.04	.04	.46**	1			
5. Value prestige <sup>a</sup>	127	3.66	0.74	.15	.02	.40**	.49**	1		
6. Communal self-perceptions <sup>a</sup>	127	4.24	0.65	-.19*	.31**	.24**	.32**	.35**	1	
7. Agentic self-perceptions <sup>a</sup>	127	2.90	0.72	.02	-.17	.24**	.41**	.24**	.13	1

Note. Gender coding: boys = 0, girls = 1.

<sup>a</sup> Scale ranged from 1 (not at all) to 5 (very much).

\* < .05.

\*\* p < .01.

**Table 2**  
Repeated-measures analysis of variance.

	df	F	p	$\eta_p^2$
Between-participants effects				
Gender	1	0.08	.775	.001
Age	1	0.73	.394	.006
Error	124			
Within-participants effects				
Salary	1	10.97	.001	.081
Salary * Age	1	3.02	.085	.024
Salary * Gender	1	1.80	.182	.014
Error(Salary)	124			
Power	1	5.07	.026	.039
Power * Age	1	0.97	.326	.008
Power * Gender	1	0.04	.840	.000
Error(Power)	124			
Salary * Power	1	0.95	.333	.008
Salary * Power * Age	1	0.60	.441	.005
Salary * Power * Gender	1	1.15	.285	.009
Error(Salary * Power)	124			

Note. Gender coding: 0 = boy, 1 = girl.

$B = -0.04$ , 95% CI [-0.14, 0.01]). This indicates that those children who reported more agentic self-perceptions also valued salary, power, and prestige (in trend) more when thinking about their future occupation. In addition, by trend, boys reported higher agentic self-perceptions than girls.<sup>8</sup>

**Discussion**

In line with the first two hypotheses (H1 and H2), we found that the children aspired more toward occupations high in salary or power than toward occupations low in salary or power, indicating that occupational status is important for children when considering their future occupations. This finding provides causal evidence in line with previous correlational research (Olsen et al., 2022; Weisgram et al., 2010) and with Gottfredson’s (1981) developmental theory of occupational aspirations. This implies that in order to increase children’s interest in communal occupations, the status of communal

<sup>8</sup> To test the robustness of this effect, we included communal self-perceptions as a covariate. Analyses showed that when controlling for communal self-perceptions, the positive relationship between gender and agentic self-perceptions was significant ( $B = -0.33$ ,  $p = .015$ ), whereas the relationship between agentic self-perceptions and the occupational values remained unchanged.

occupations needs to be increased. According to [Gottfredson \(1981\)](#), occupations that are viewed as a poor fit during childhood will be excluded and rarely revisited later when the choice of occupation is made. Therefore, given that children appear to prefer occupations associated with high status, including both salary and power, children might exclude communal occupations such as nursing already during childhood if they assume that these occupations are associated with relatively low salary and/or low power.

Contrary to the third hypothesis (H3) and previous studies ([Hayes et al., 2018](#)), we found no gender differences in the effect of salary and power on occupational aspirations among children when these were manipulated experimentally. However, we did find some preliminary evidence for gender differences in the children's self-reported occupational values toward status, with boys in trend reporting higher agentic self-perceptions than girls and agentic self-perceptions being positively related with occupational values toward status (H4). This trend is in line with previous research showing that communal self-perceptions mediate the relationship between children's gender and their communal occupational aspirations ([Olsen et al., 2022](#)). Therefore, it might be that when children are asked to imagine themselves in the future, aspects of their gendered self-concept influence their responses given that, according to construal level theory, abstract mindsets can lead to increased activation and use of stereotypes ([McCrea et al., 2012](#); [Trope & Liberman, 2003](#)). In contrast, when children form opinions about specific novel occupations, they may focus more specifically on the status of the occupation without being affected by gender-related norms or stereotypes.

Another reason why we did not find a gender difference in the effect of occupational status on occupational aspirations might be that previous studies were mostly conducted in the United States, whereas the current study was conducted in Norway (e.g., [Hayes et al., 2018](#)). A previous Norwegian study also found no gender differences in the effect of salary on occupational aspirations toward communal occupations ([Olsen et al., 2022](#)). Even though horizontal and vertical gender segregation in Norway continues to exist, Norway is one of the most gender egalitarian countries of the world ([Organization for Economic Cooperation and Development, 2012](#); [World Economic Forum, 2021](#)). Therefore, Norwegian girls may have a higher expectation concerning their later salary than girls in the other Western countries, where girls may have internalized traditional gender stereotypes and the notion that some preferred job characteristics are unattainable to their social group to a larger degree and therefore they are less optimistic about their future salary.

## Conclusion

The current results provide causal evidence for the effect of occupational status on occupational aspirations during middle childhood. Our study shows that, when using novel occupations, children's occupational aspirations are influenced by both salary and power from a young age. Based on this finding, interventions that aim to increase communal occupational aspirations should focus on increasing the status of the occupation even when targeting children. In contrast to previous findings, our study did not find a gender difference in the effect of occupational status on occupational aspirations toward novel occupations when power and salary were manipulated experimentally. However, our findings may indicate that when girls imagine their future occupation, their self-perceptions might lead them to value status less in occupations compared with boys. Because research regarding self-perceptions during childhood is scarce, this should be a focus in future research concerning occupational aspirations and values during childhood.

## Data availability

The data and analytical code are publicly available on the OSF ([https://osf.io/bgewm/?view\\_only=fd28120612ae427dabdc523fd61a6726](https://osf.io/bgewm/?view_only=fd28120612ae427dabdc523fd61a6726)).

## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jecp.2023.105667>.

## References

- Croft, A., Schmader, T., & Block, K. (2015). An underexamined inequality: Cultural and psychological barriers to men's engagement with communal roles. *Personality and Social Psychology Review*, 19(4), 343–370. <https://doi.org/10.1177/1088868314564789>.
- England, P. (2010). The gender revolution: Uneven and stalled. *Gender & Society*, 24(2), 149–166. <https://doi.org/10.1177/0891243210361475>.
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, 18(3), 233–239. doi:10.1111/2Fj.1467-9280.2007.01882.x.
- Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology*, 28(6), 545–579. <https://doi.org/10.1037/0022-0167.28.6.545>.
- Hartung, P. J., Porfeli, E. J., & Vondracek, F. W. (2005). Child vocational development: A review and reconsideration. *Journal of Vocational Behavior*, 66(3), 385–419. <https://doi.org/10.1016/j.jvb.2004.05.006>.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis; A regression-based approach* (2nd ed.). Guilford.
- Hayes, A. R., Bigler, R. S., & Weisgram, E. S. (2018). Of men and money: Characteristics of occupations that affect the gender differentiation of children's occupational interests. *Sex Roles*, 78(11–12), 775–788. <https://doi.org/10.1007/s11199-017-0846-8>.
- Hoff, K. A., Chu, C., Einarsdóttir, S., Briley, D. A., Hanna, A., & Rounds, J. (2022). Adolescent vocational interests predict early career success: Two 12-year longitudinal studies. *Applied Psychology*, 71(1), 49–75. <https://doi.org/10.1111/apps.12311>.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45, 79–122. [https://doi.org/10.1007/978-1-4419-1695-2\\_219](https://doi.org/10.1007/978-1-4419-1695-2_219).
- Levy, G. D., Sadovsky, A. L., & Troseth, G. L. (2000). Aspects of young children's perceptions of gender-typed occupations. *Sex Roles*, 42(11), 993–1006. <https://doi.org/10.1023/A:1007084516910>.
- Liben, L. S., Bigler, R. S., & Krogh, H. R. (2001). Pink and blue collar jobs: Children's judgements of job status and job aspirations in relation to sex of worker. *Journal of Experimental Child Psychology*, 79(4), 346–363. <https://doi.org/10.1006/jecp.2000.2611>.
- Low, K. S. D., Yoon, M., Roberts, B. W., & Rounds, J. (2005). The stability of vocational interests from early adolescence to adulthood: A quantitative review of longitudinal studies. *Psychological Bulletin*, 131, 713–737. <https://doi.org/10.1037/0033-2909.131.5.713>.
- McCrea, S. M., Wieber, F., & Myers, A. L. (2012). Construal level mind-sets moderate self- and social stereotyping. *Journal of Personality and Social Psychology*, 102(1), 51–68. <https://doi.org/10.1037/a0026108>.
- Olsen, M., Olsson, M. I. T., Parks-Stamm, E. J., Kvalø, M., Thorsteinsen, K., Steffens, M. C., & Martiny, S. E. (2022). What do I want to be? Predictors of communal occupational aspirations in early to middle childhood. *International Journal of Behavioral Development*, 46(6), 528–541. <https://doi.org/10.1177/01650254221121842>.
- Organization for Economic Cooperation and Development (2012). *Closing the gender gap: Act now*. OECD Publishing. <https://doi.org/10.1787/9789264179370-en>.
- Penner, A. M., Petersen, T., Hermansen, A. S., Rainey, A., Boza, I., Elvira, M. M., Godechot, O., Hällsten, M., Henriksen, L. F., Hou, F., Mrčela, A. K., King, J., Kodama, N., Kristal, T., Křížková, A., Lippényi, Z., Melzer, S. M., Mun, E., Apascaritei, P., ... Tufail, Z. (2023). Within-job gender pay inequality in 15 countries. *Nature Human Behavior*, 7, 184–189. <https://doi.org/10.1038/s41562-022-01470-z>.
- Statistisk sentralbyrå. (2022). *Arbeidskraftundersøkelsen*. <https://www.ssb.no/arbeid-og-lonn/sysselsetting/statistikk/arbeidskraftundersokelsen>.
- Teig, S., & Susskind, J. E. (2008). Truck driver or nurse? The impact of gender roles and occupational status on children's occupational preferences. *Sex Roles*, 58, 848–863. <https://doi.org/10.1007/s11199-008-9410-x>.
- Teigen, M., & Reisel, L. (2017). *Kjønnsbalanse på toppen? Sektorvariasjon i næringsliv, akademia, offentlig sektor og organisasjonsliv* (Rapport 2017:11). Institutt for samfunnsforskning. [https://www.regjeringen.no/contentassets/d4497c6f79394330a42c887ddcbbcd20/rapport\\_11\\_17\\_web.pdf](https://www.regjeringen.no/contentassets/d4497c6f79394330a42c887ddcbbcd20/rapport_11_17_web.pdf).
- Trice, A. D., & Rush, K. (1995). Sex-stereotyping in four-year-olds' occupational aspirations. *Perceptual and Motor Skills*, 81(2), 701–702. <https://doi.org/10.2466/pms.1995.81.2.701>.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, 110(3), 403–421. <https://doi.org/10.1037/0033-295X.110.3.403>.
- Utdanning.no. (2020). *Likestilling i arbeidslivet*. <https://utdanning.no/likestilling>.
- Weisgram, E. S., Bigler, R. S., & Liben, L. S. (2010). Gender, values, and occupational interests among children, adolescents, and adults. *Child Development*, 81(3), 778–796. <https://doi.org/10.1111/j.1467-8624.2010.01433.x>.
- World Economic Forum. (2021). *Global gender gap report 2021*. [https://www3.weforum.org/docs/WEF\\_GGGR\\_2021.pdf](https://www3.weforum.org/docs/WEF_GGGR_2021.pdf).

## **Appendix C: Paper III – Submitted Paper**

Who Cares? Effects of Gendered Self-Perceptions on Dropout Intentions in  
Communal Degree Programs

Marte Olsen<sup>1</sup>, Elizabeth J. Parks-Stamm<sup>2</sup>, Ingvild Marie Hansen Lund<sup>1</sup>, & Sarah E.

Martiny<sup>1</sup>

<sup>1</sup>UiT The Arctic University of Norway, Norway

<sup>2</sup>University of Southern Maine, USA

**Word count:** 7055 words

Keywords: dropout intentions, self-perceptions, communal degree program, sense of belonging, perceived fit

**Author Note**

Marte Olsen, Ingvild Marie Hansen Lund, and Sarah E. Martiny, Department of Psychology, Research Group Social Psychology, UiT The Arctic University of Norway, Norway. Elizabeth J. Parks-Stamm, Department of Psychology, University of Southern Maine, USA.

Correspondence concerning this article should be addressed to Marte Olsen, Department of Psychology, Research Group Social Psychology, UiT The Arctic University of Norway, Department of Psychology, PO Box 6050 Langnes, 9037 Tromsø, Norway, email: [marte.olsen@uit.no](mailto:marte.olsen@uit.no)

## Abstract

Global population aging trends create an increased need for educated workers in the health domain. At the same time, communal degree programs (i.e., HEE – health care and early education) show high dropout rates –particularly for men. Extending person-environment fit theory and the lack of fit model, we investigate whether students’ (gendered) self-perceptions relate to perceived fit, and whether fit is associated with their sense of belonging to the degree program and dropout intentions. We conducted an online experiment with 298 Norwegian students enrolled in HEE degree programs (66 men, 232 women;  $M_{age} = 25.32$ ,  $SD = 6.08$ ). We experimentally manipulated the importance of communal versus neutral traits in communal occupations. The manipulation showed no effects on students’ perceived fit or sense of belonging. However, students’ gender was significantly related to their communal self-perceptions. Male students perceived themselves as less communal, and this perception was associated with lower perceived fit. Lower perceived fit was associated with a lower sense of belonging and higher dropout intentions. Our findings indicate that gender differences in communal self-perceptions exist even among students in communal degree programs, and that this difference in perceived communality may contribute to the higher dropout rates of male students.

**Word count (max 200 words):** 198 words

**Data availability statement:** The data and analytical code is publicly available on OSF:

[https://osf.io/n286j/?view\\_only=26c75eee64ce40f3b91b50ece98f101a](https://osf.io/n286j/?view_only=26c75eee64ce40f3b91b50ece98f101a)

## Who Cares? Effects of Gendered Self-Perceptions on Dropout Intentions in Communal Degree Programs

In recent years, the shortage of health care workers has become a massive problem, mainly due to the increasingly aging population (United Nations, 2019). This is a global issue; a report from the World Health Organization (WHO, 2020) predicts a worldwide shortage of 18 million healthcare workers by 2030. At the same time, the number of students dropping out of academic programs in healthcare and early education has increased (Canzan et al., 2022; Hamshire et al., 2019; Twigg & McCullough, 2014). Dropout rates in health and early education are also high in Norway, the context of the present research: Dropout rates are between 15 and 20% in nursing (Dolonen & Reppen, 2022) and approximately 30% in teacher education (data from 2012; Kunnskapsdepartementet, 2016). Interestingly, there seems to be a gender difference in the dropout rates in these communal degree programs: A report from a Norwegian university stated that the dropout rate for men in their nursing program was 50%, whereas the dropout rates for women in the same program was around 20% (Nedregård & Abrahamsen, 2018). These numbers are alarming, particularly as men are already underrepresented in health and early education (HEE) domains, with men only accounting for 20.9% of students in health- and social degree programs and 27.4% of pedagogics and teaching degree programs in 2021 in Norway (Statistisk Sentralbyrå [SSB], 2022a). Not only are men an underused resource in dealing with the global shortage in care workers, but research has also shown that having more men engaged in care work can be beneficial for both patients (Mao et al., 2020) and for the men themselves (Bauer & McAdams, 2010; Le et al., 2012).

Several reasons have been discussed that might explain students' dropout intentions and dropout rates. Research suggests that important predictors of attrition among medical and nursing students include socioeconomic background, ethnicity, race, previous grades and

perceived quality of teaching staff (e.g., Kruzicevic et al., 2012; Nguyen et al., 2022; Ten Hoeve et al., 2017). However, there are also psychological factors that can influence dropout intentions among students. For example, person-environment fit theory (PE fit theory; Caplan & Van Harrison, 1993) indicates that aspects of the self-concept (i.e., the description and evaluation of oneself that contributes to one's sense of identity, VandenBos, 2015) are important determinants of how we respond to our physical and psychological environment, influencing performance, well-being, and withdrawal behaviors (e.g., Kristof-Brown et al., 2005). Therefore, according to PE fit theory, a lack of fit between a student's self-concept and the environment of their university program might lead to poorer performance and greater intentions to drop out of that program. Recent empirical work has also found that aspects of the self-concept might influence students' dropout intentions by influencing their perceived personal fit and sense of belonging (i.e., a feeling of being accepted, valued, included, and encouraged; Goodenow, 1993) in the degree program (Menkor et al., 2021). However, very little research has empirically investigated how underlying psychological mechanisms, like aspects of identity and the self-concept, might relate to students' dropout intentions in communal academic programs and whether there are differences between men and women. In the present research, we aim to bridge this gap in knowledge by investigating how both gender and gendered self-perceptions (i.e., an aspect of the self-concept relating to how one views oneself in line with gendered traits) affect sense of belonging and dropout intentions among students in communal degree programs.

### **The Gendered Self-Concept**

As previously mentioned, PE fit theory indicates that the self-concept is important for the perceived fit of students in their chosen degree programs. Another theory that highlights the importance of the self-concept is the developmental theory of occupational aspirations (Gottfredson, 1981). This theory states that from adolescence, individuals' self-concept is one



of the most important determinants of their occupational aspirations. The self-concept includes aspects such as self-perceptions, interests, and values. Importantly, according to this theory, the self-concept is partially based on internalized gender stereotypes, which leads to the observed gender differences in self-concepts (Gottfredson, 1981). Therefore, women typically have a more communal self-concept (i.e., identifying as being caring and kind), whereas men typically have a more agentic self-concept (i.e., identifying as being assertive and competitive; Korlat et al., 2022). In line with this theory, women aspire more toward communal occupations, whereas men generally aspire more toward agentic occupations (Su et al., 2009; Weisgram et al., 2010). Additionally, the lack of fit model by Madeline Heilman (1983; 2012) posits that the associations of communality with women and agency with men leads to barriers for women pursuing agentic careers. Indeed, research has found that female scientists observed a lack of fit between their self-concept and their perception of a successful individual in academia, and this lack of fit was related to lower work engagement and greater intentions to leave academia (Van Veelen & Derks, 2022).

However, research suggests that in many Western countries these gender differences in the self-concept have changed over the last decades. A study investigating changes in the responses to the Bem Sex-Role Inventory (BSRI) from the 1970's to 2012 found that women increasingly identify with "masculine" qualities, while there were no changes in men's identifications with communal qualities (Donnelly & Twenge, 2017). In addition to self-views, a meta-analysis by Eagly and colleagues (2020) also found that people's stereotypes about women have changed over time, such that women are viewed as increasingly agentic. However, this meta-analysis found no change in people's stereotypes regarding men. These studies indicate that both women themselves and society at large view women as more agentic, which is also reflected in women's increasingly agentic occupational aspirations and in the increasing proportion of women entering agentic occupations (Bureau of Labor

Statistics as cited in Croft et al., 2015). However, this research does not show parallel shifts in men's communality. For example, while the percent of women in male-dominated careers increased from 1995 to 2013 (i.e., an increase from 24% to 33%), the percentage of men in female-dominated jobs slightly decreased (Croft et al., 2015). As previous research has found the perceived lack of fit between women's self-concept and their agentic occupation was related to lower work engagement and higher dropout intentions, and as men's low communality has remained unchanged over recent years, this could indicate that men perceive a strong lack of fit between their self-concept and communal occupations and degree programs. This could explain men's high dropout rates in communal degree programs. It is therefore important to investigate how gendered self-perceptions influence male and female students' sense of belonging and dropout intentions in communal degree programs.

### **The Effect of Perceived Fit on Sense of Belonging and Dropout Intentions**

According to PE fit theory, the perceived and objective fit between individuals and their environment are influenced by their self-concept (see Caplan & Van Harrison, 1993). This relationship between aspects of the self-concept and perceived fit has also been found in empirical studies. For example, a study at a German university found that undergraduate students who perceived a good fit between their self-concept and the university's norms showed a stronger sense of belonging to the university (Menkor et al., 2021). Given the communal norms in HEE domains, this suggests that students in communal degree programs who view themselves as caring and compassionate will likely feel a better fit with their degree program, leading to a greater sense of belonging to the program.

Studies have also found relationships between perceived fit and dropout intentions. For example, two meta-analyses found consistent relationships between person-environment fit and withdrawal behaviors in organizations (Kristof-Brown et al., 2005; Verquer et al., 2003). This means that individuals who perceived a good fit between themselves and their job

or organization had less intentions to quit their jobs than those who felt a worse fit with their occupational environment. Additionally, a study among German university students found that students with high perceived fit with the university norms showed increased well-being and academic motivation, and reduced dropout intentions (Suhlmann et al., 2018). A longitudinal study among American college and university students also found that increases in perceived fit over time correlated negatively with changes in dropout intentions (Schmitt et al., 2008). Lastly, as previously mentioned, a study among female scientists found that perceived lack of fit with the prototypical scientist was related to intentions to leave academia (Van Veelen & Derks, 2022). Thus, perceiving a lack of fit between oneself and one's degree program can lead to greater dropout intentions, and could thus explain men's higher dropout rates in communal degree programs (e.g., Nedregård & Abrahamsen, 2018).

The present work extends earlier research by including gender as a precursor to this perception of fit. Do men's and women's gendered self-perceptions predict their perceived fit in communal degree programs? Both stereotypes about men and their self-perceptions regarding their communality have not changed in recent decades (Eagly et al., 2020; Donnelly & Twenge, 2017), and the proportion of men in female-dominated jobs has not increased (Croft et al., 2015). These unchanged communal self-perceptions might explain why there are so few men in communal degree programs (SSB, 2022a), and—as self-perceptions are related to both dropout intentions and sense of belonging via perceived fit—why the dropout rates among men in communal degree programs are so high (Nedregård & Abrahamsen, 2018). As mentioned previously, there are some indications that women's self-concept may have changed over the past decades where women increasingly view themselves in terms of typically masculine traits and less in terms of typically feminine traits (Donnelly & Twenge, 2017). Therefore, it is interesting to investigate how women's potentially lower communal self-perceptions might also influence their perceived fit with communal degree programs. For

this reason, it is important to explore how both male and female students' communal self-perceptions relate to their perceived fit with their degree program, their sense of belonging with their degree program, and their dropout intentions.

### **The Present Study**

The present study was conducted in Norway, which is a country with relatively low inequality in general and which is ranked as the second most gender egalitarian country in the world (World Economic Forum, 2023). Higher education in Norway is assessable to nearly everyone because there are no study fees at public universities and colleges and all students can get the same student loan from the Norwegian government to pay for cost of living while studying. At the same time, dropout rates at universities in Norway are generally high: around 17.3% of all students who were in a 3-year bachelor's degree program dropped out in the period from 2016-2021 (SSB, 2022b). Dropout is an even larger problem in communal degree programs with 15-20% of dropout among nursing students and 30% of dropout in teaching education in Norway (Dolonen & Reppen, 2022; Kunnskapsdepartementet, 2016). This is the case despite a shortfall of an estimated 16,100 employees in health- and social services in Norway (Myklathun, 2022). Therefore, getting a better understanding of factors that relate to students' dropout intentions in these degree programs is of high importance to Norwegian society, as in many Western societies.

In the first part of the present study, we used an experimental approach to investigate how students' gender and gendered self-perceptions influence their perceived fit with their degree program and their resulting sense of belonging and dropout intentions. As previous research has found relationships between students' self-concept and their perceived fit with their university (Menkor et al., 2021), we predicted that highlighting the importance of communal traits –compared to neutral traits– for future success in communal occupations might lower perceived fit and sense of belonging for students with lower communal self-

perceptions. We therefore experimentally manipulated whether communal (experimental condition) or neutral (control condition) traits were presented as important for future success within communal occupations, and then assessed female and male students' perceived fit, sense of belonging, and dropout intentions.

We tested the following preregistered hypotheses<sup>1</sup>: (H1) In the experimental condition (emphasizing the importance of communal traits) male students –but not female students– will report reduced perceived fit with their communal degree program relative to the control condition. (H2) In the experimental condition (emphasizing the importance of communal traits) male students –but not female students– will report reduced sense of belonging with their communal degree program relative to the control condition. These hypotheses were preregistered on OSF:

[https://osf.io/bv35q/?view\\_only=b25f6b3ade844684a619c768391b8a2d](https://osf.io/bv35q/?view_only=b25f6b3ade844684a619c768391b8a2d)

In addition to these preregistered hypotheses, we sought to understand whether men's generally lower communal self-perceptions (Donnelly & Twenge, 2017) partially explain their higher dropout rates in communal degree programs. Additionally, as previous research has found that female scientists' perceived lack of fit between their self-concept and their stereotype of an agentic scientist is related to dropout intentions, we further investigated if men's higher dropout intentions can be explained by a perceived lack of fit between their self-concept and communal occupations. We therefore tested the following non-preregistered hypotheses: (H3) Participants' gender will predict their sense of belonging in their communal degree program, through their communal self-perceptions and perceived fit with their program. (H4) Participants' gender will predict their dropout intentions from their communal degree program, through their communal self-perceptions and perceived fit with their program. Specifically, male students will report less communal self-perceptions than female students, which will be related to less perceived fit with their communal degree program,

which will then be related to a lower sense of belonging with the communal degree program and higher dropout intentions.

## **Methods**

### **Participants**

As no studies have previously tested these hypotheses, we followed the general advice in experimental psychological research and aimed for at least 50 participants per cell (Brysbaert, 2019). As we collected data from both male and female participants, we aimed for a total sample of 200 participants.

We collected data from 445 participants (84 men, 350 women, 2 non-binary, 9 missing). Participants were then excluded based on the following preregistered criteria: did not provide their consent twice, did not answer at least one out of the three items in the manipulation check correctly, did not answer at least two out of three attention check items correctly, did not report identifying as either a woman or a man, did not report studying for a communal occupation (e.g., nurse, preschool teacher, or psychologist), did not report studying at a Norwegian university or college, or did not fill in at least 50% of the questionnaire. Our final sample consisted of 298 students in a communal degree program (66 men, 232 women;  $M_{age} = 25.32$ ,  $SD = 6.08$ ; age range: 19-45 years). A sensitivity analysis for an ANCOVA with a 2 x 2 between-participants experimental design conducted for a sample of 298 indicated that a medium effect of  $f^2 = .21$  can be detected at a power of .95. However, only a large effect of  $f^2 = .45$  can be detected at a power of .95 when comparing the male participants ( $n = 66$ ) in the control group and the experimental group.

### **Design**

We used a 2 (salience of communal vs. salience of neutral traits) x 2 (female vs. male) between-participants experimental design. At the beginning of the questionnaire, participants were presented with a short excerpt of a fictional online newspaper article about the

personality traits needed to be successful in communal occupations. The experimental group read a fictional newspaper article that stated that a new study conducted in Norway showed that communal traits such as being compassionate, warm, and supportive are particularly important for success in communal occupations, whereas the control group read that neutral traits such as being engaged, effective, and reliable are important for success in communal occupations. The excerpts of the fictional articles can be found in the Supplemental Materials in Norwegian and English. After this experimental manipulation, the participants completed a questionnaire that assessed aspects of their gendered beliefs and identity, as well as aspects of their educational motivations.

### **Procedure**

Participants were recruited through social media and through contacting the administrators at different communal degree programs in Norway. The participants were forwarded a link to an online questionnaire. Participants first were exposed to either the experimental manipulation or a control manipulation before completing the questionnaire. Participants were then debriefed about the experimental manipulation and the purpose of the study. Participants were asked to provide their consent at the beginning of the questionnaire, and once again after the debriefing. Participants had the option of participating in a lottery where they could win a gift card of NOK 500 as a reward for their participation in the study.

### **Materials**

The study was conducted in Norwegian. All original materials can be found in the Supplemental Materials in both Norwegian and English. The scales are presented in this paper in the order they were presented in the questionnaire, but items were randomized within scales.

### ***Sense of Belonging***

The sense of belonging scale was developed based on the Sense of Belonging to Math Scale (Good et al., 2012). The participants were asked to indicate their feelings of belonging to their degree program (i.e., “Please indicate to which degree you feel a sense of belonging to your degree program”). The scale consisted of 8 items: (e.g., “I feel like I belong in my degree program”; “I feel connected with other students in my degree program”). Participants answered on a 7-point scale from 1 = *disagree very much* to 7 = *agree very much*. The scale showed high reliability ( $\alpha = .93$ ).

### ***Perceived Fit***

The perceived fit scale was developed based on the Academic Fit Scale (Schmitt et al., 2008). The participants were asked to indicate their agreement to five statements (e.g., “The degree program I am taking matches my interests”; “My current degree program is not really what I would like to be doing”). Participants answered on a 7-point scale from 1 = *disagree very much* to 7 = *agree very much*. The scale showed high reliability ( $\alpha = .87$ ).

### ***Communal Self-Perceptions***

The communal self-perceptions scale was developed based on items from Kosakowska-Berezecka and colleagues (2022). The participants rated how much four communal traits described them (i.e., compassionate, caring, warm, supportive), answered on a 7-point scale from 1 = *does not describe me at all* to 7 = *describes me very well*. The scale showed high reliability ( $\alpha = .89$ ).

### ***Dropout Intentions***

The dropout intentions scale was developed based on items used in Hardré and Reeve (2003). The participants were asked to indicate their agreement with four statements (e.g., “Sometimes I consider dropping out of university before exams”; “Sometimes I think that other jobs would suit me better than the ones I can get with my current degree program”).



Participants answered on a 7-point scale from 1 = *disagree very much* to 7 = *agree very much*. The scale showed acceptable reliability ( $\alpha = .74$ ).

### ***Demographics***

We collected information about participants' gender (1 = *man*, 2 = *woman*, 3 = *non-binary*, 4 = *don't want to say*) and their degree program (which was subsequently coded as communal vs. not communal), as well as other demographic variables to be used as potential covariates in the analyses, including their age (in years), if they study at university or college (1 = *college*, 2 = *university*), and their sexual orientation (1 = *heterosexual*, 2 = *homosexual*, 3 = *bisexual*, 4 = *other*, 5 = *don't want to say*)<sup>2</sup>.

### **Analysis Plan**

To test if the male participants in the experimental condition reported lower perceived fit and sense of belonging with their communal degree program than female participants (H1 & H2), we conducted two ANCOVAs with gender, experimental condition, and the interaction between gender and experimental condition as independent variables, controlling for participants' age. To test the serial mediating effect of communal self-perceptions and perceived fit on the relationship between gender and sense of belonging, and on the relationship between gender and dropout intentions, we conducted two serial mediation analyses using Model 6 in Hayes' Process macro in SPSS (Hayes, 2017; Version 4.0, 10,000 bootstrap samples).

## **Results**

The descriptive statistics of the measures, demographic variables, and their correlations can be found in Table 1. Due to the large age range in the sample (19-45 years), age is included as a covariate in all analyses.

**Table 1***Descriptive Statistics and Correlations*

	<i>N</i>	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.
1. Age	66/232	24.11/25.67	4.70/6.38	1				
2. Perceived fit	66/232	5.13/5.55	1.24/1.14	.30*/.21**	1			
3. Communal self-perceptions	66/232	5.24/6.28	1.25/0.75	.20/.13	.64**/.37**	1		
4. Sense of belonging	66/232	4.76/5.13	1.27/1.32	-.05/-.03	.54**/.49**	.59**/.35**	1	
5. Dropout intentions	66/231	2.59/2.34	1.35/1.30	-.30*/-.015*	-.75**-.68**	-.44**/-.24**	-.34**/-.35**	1

*Note.*  $n = 298$ ; Statistics are for men/women; \*  $p < .05$ . \*\*  $p < .01$ .

## Testing the Effects of the Experimental Manipulation (H1 & H2)

The results of the ANCOVAs can be found in Table 2 and Table 3. Contrary to our predictions (H1 & H2), we found no interaction between condition and gender on perceived fit,  $F(1, 293) = 0.91, p = .342$ , or sense of belonging,  $F(1, 293) = 0.25, p = .621$ . We found significant main effects of gender on perceived fit,  $F(1, 293) = 5.25, p = .023$ , and on sense of belonging,  $F(1, 293) = 4.73, p = .031$ . Additionally, the effect of age on perceived fit was significant, meaning that older students reported a greater perceived fit with their degree program,  $F(1, 293) = 15.20, p < .001$ . The results of the analyses remain unchanged if the covariate age is excluded from the models. The estimated marginal means for men and women in the two conditions can be found in the Supplemental Materials.

**Table 2**

*ANCOVA with Perceived Fit as the Outcome*

Variable	<i>SS</i>	<i>df</i>	M. Sq.	<i>F</i>	<i>p</i>	$\eta^2_p$
Intercept	1713.74	1	1713.74	1320.29	<.001	.818
Age	19.73	1	19.73	15.20	<.001	.049
Gender	6.81	1	6.81	5.25	.023	.018
Condition	0.51	1	0.51	0.40	.530	.001
Gender X Condition	1.18	1	1.18	0.91	.342	.003
Error	380.32	293	1.30			

*Note.* DV = Perceived fit with communal degree program.

**Table 3**

*ANCOVA with Sense of Belonging as the Outcome*

Variable	<i>SS</i>	<i>df</i>	M. Sq.	<i>F</i>	<i>p</i>	$\eta^2_p$
----------	-----------	-----------	--------	----------	----------	------------

Intercept	1792.44	1	1792.44	1038.07	<.001	.780
Age	0.80	1	0.80	0.47	.495	.002
Gender	8.16	1	8.16	4.73	.031	.016
Condition	2.03	1	2.03	1.18	.279	.004
Gender X Condition	0.42	1	0.42	0.25	.621	.001
Error	505.93	293	1.73			

*Note.* DV = Sense of belonging with communal degree program.

### **Additional Analyses (H3 and H4)**

Combining the participants from the two experimental conditions, we then tested the additional (non-preregistered) H3 and H4. This allowed us to explore relationships between participants' gendered self-perceptions and their perceived fit and sense of belonging with their degree program, as well as their dropout intentions from their degree program.

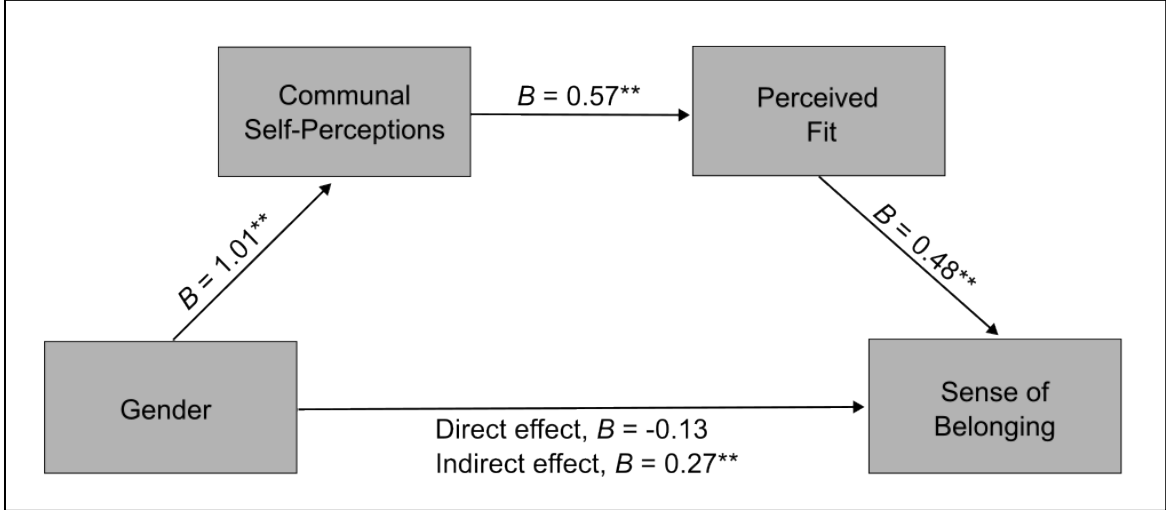
For the following analysis, we included both male and female students in communal degree programs in our sample, resulting in sample of 298 participants (232 women, 66 men). We conducted two serial mediation analyses. In the first analysis, gender was the predictor (X), communal self-perceptions was the first mediator (M1), perceived fit was the second mediator (M2), and sense of belonging was the outcome (Y). Age and experimental condition were included as covariates. Gender was significantly positively related to communal self-perceptions,  $B = 1.01, p < .001, 95\% \text{ CI } [0.77; 1.25]$ , such that women reported stronger communal self-perceptions than men (women:  $M = 6.28, SD = 0.75$ ; men:  $M = 5.24, SD = 1.25$ ). Communal self-perceptions were positively related to perceived fit,  $B = 0.57, p < .001, 95\% \text{ CI } [0.43; 0.70]$ , and perceived fit was positively associated with sense of belonging,  $B = 0.48, p < .001, 95\% \text{ CI } [0.36; 0.60]$ . The direct effect of gender on sense of belonging was not

significant,  $B = -0.13$ ,  $p = .430$ , 95% CI [-0.47; 0.20]. The indirect effect of gender on sense of belonging through communal self-perceptions and perceived fit was significant,  $B = 0.27$ , 95% CI [0.16; 0.41]. There was no effect of the covariate experimental condition, but the effect of age on sense of belonging was significant,  $B = -0.03$ ,  $p = .001$ , 95% CI [-0.06; -0.02], meaning that older participants reported a slightly lower sense of belonging with their communal degree program.

In the second analysis, gender was the predictor (X), communal self-perceptions was the first mediator (M1), perceived fit was the second mediator (M2), and dropout intentions was the outcome (Y). Age and experimental condition were included as covariates. Again, gender was significantly related to communal self-perceptions,  $B = 1.02$ ,  $p < .001$ , 95% CI [0.77; 1.26]. Communal self-perceptions were positively related to perceived fit,  $B = 0.57$ ,  $p < .001$ , 95% CI [0.43; 0.70], and perceived fit was negatively associated with dropout intentions,  $B = -0.80$ ,  $p < .001$ , 95% CI [-0.89; -0.68]. The direct effect of gender on dropout intentions was not significant,  $B = 0.05$ ,  $p = .742$ , 95% CI [-0.24; 0.34]. The indirect effect of gender on dropout intentions through communal self-perceptions and perceived fit was significant,  $B = -0.45$ , 95% CI [-0.67; -0.28]. There were no effects of the covariates age and experimental condition.

**Figure 1**

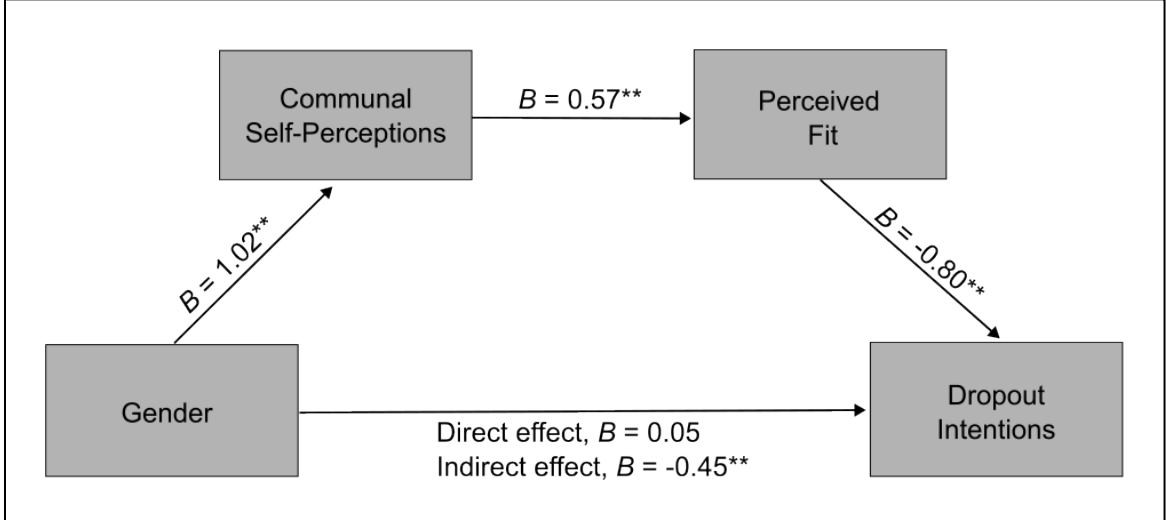
*Serial Mediating Effect of Communal Self-Perceptions and Perceived Fit on the Relationship Between Gender and Sense of Belonging.*



*Note.* \*  $p < .05$ ; \*\*  $p < .01$ ; age and experimental condition were included as covariates.

**Figure 2**

*Serial Mediating Effect of Communal Self-Perceptions and Perceived Fit on the Relationship Between Gender and Dropout Intentions.*



*Note.* \*  $p < .05$ ; \*\*  $p < .01$ ; age and experimental condition were included as covariates.

## Discussion

The present study investigated how gender and gendered self-perceptions of students in communal degree programs influenced their perceived fit with their degree program, their sense of belonging with their degree program, and their intentions to drop out of their degree program. There was no effect of experimental condition, suggesting that our experimental manipulation was not salient enough to induce any changes in participants' perceived fit and sense of belonging. However, as our sample size of men was quite small ( $n = 66$ ), this nonsignificant effect of the experimental manipulation could be due to low statistical power, as we did see descriptive differences between the control group and the experimental group in the direction of our hypotheses.

As a next exploratory step, we investigated the relationships between gender and communal self-perceptions, and whether this relationship could explain gender differences in perceived fit, sense of belonging, and dropout intentions. We found evidence for the two serial mediations that we tested. They showed that gender was related to communal self-perceptions and perceived fit, which in turn was related to sense of belonging. In the second analyses, we showed the same path for dropout intentions. More precisely, we found that women reported more communal self-perceptions than men, and that those with more communal self-perceptions also reported greater perceived fit with their communal degree program. Those who reported a greater fit with their communal degree program also reported a higher sense of belonging and lower dropout intentions. Our findings in these mediational analyses are mostly in line with previous research finding relationships between aspects of the self-concept, perceived fit, and dropout intentions (Menkor et al., 2021; Suhlmann et al., 2018).

An interesting aspect of our findings in these additional analyses is that both female and male students with more communal self-perceptions perceived a greater fit with their

communal degree program, which was related to lower dropout intentions. This indicates that the higher attrition rate among male students in communal degree programs (Nedregård & Abrahamsen, 2018) might be partially explained by their lower communal self-perceptions. Future interventions to address the high dropout rate of males in communal programs could include exercises to modify students' communal self-perceptions, such as by redefining communality in more gender-neutral and self-relevant ways (e.g., asking participants to recall times they were helpful to a friend or family member; reconceptualizing one's experience volunteering as a coach for a youth sports team as an example of communal behavior).

Additionally, the reduction in women's communal self-perceptions over recent years (Donnelly & Twenge, 2017) could lead to women perceiving less fit between themselves and their communal degree program. Therefore, the high attrition rate that is also found for female students (Dolonen & Reppen, 2022) might also be partially explained by changes in women's self-perceptions. Based on this line of argumentation, governments and traditionally communal programs might need to highlight for men and women how traits other than communal traits are valued in these programs and important for success in the resulting occupations. For example, schools or hospitals may advertise that is not only important to be caring and empathetic to be a good nurse; being organized, structured, and successful in high pressure situations, as well as possessing an interest in natural sciences might be equally important to succeed and thrive as a nurse. Emphasizing these neutral or more typically agentic traits might lead more people to feel that these traditionally female-dominated communal occupations might be a good fit for them.

Due to the shortage of qualified workers both in Norway (Myklathun, 2022) and internationally (WHO, 2020), it is critical that we find ways to recruit more people to communal occupations, especially in healthcare. One type of intervention that has been successfully implemented to increase women's engagement in STEM fields (science



technology, engineering, and math) is communal goal interventions (see Diekmann & Steinberg, 2013). These interventions highlight how occupations in STEM can also fulfill communal goals (e.g., helping other people), and therefore make a career in STEM seem more attractive to girls and women. For example, the US National Academy of Engineering redesigned a recruitment flyer to highlight the social impact of engineers, which led to quadrupled attendance at a recruitment event for high school girls, as well as an increase from 19% to 24% in the proportion of female students enrolled in engineering studies (Yowell & Sullivan, 2011). To our knowledge, similar interventions that highlight agentic goals in HEE fields have not been conducted but should be considered in the future.

An important point to consider when discussing attrition rates in communal degree programs and occupations is the lower relative status and pay of communal occupations. Although there is a lack of research on the effects occupational status on attrition rates in communal degree programs, a survey conducted among Norwegian nurses in 2021 found that 64% of nurses who considered quitting their job reported low salary as a cause (Helmers et al., 2021). Additionally, data from the same survey showed that male nurses were more unhappy with their salary than female nurses. These findings highlight the lack of financial incentives for men to pursue careers in communal fields, compared to the financial incentives for women to pursue careers in high-paid and prestigious agentic fields (e.g., engineering, law). It is therefore important to incorporate measures that promote the status of communal occupations (e.g., increases in salary) along with interventions that highlight the value of agentic traits in communal occupations.

Despite the important findings in the present study, there are some limitations that need to be considered. First, the experimental manipulation in our study was likely too weak to induce the effects that we aimed to explore with the preregistered hypotheses. Future studies that aim to highlight the importance of communal vs. neutral traits in communal

occupations should therefore use a stronger manipulation that either lasts longer or has a more salient message, for example by showing participants multiple articles or headlines from different sources claiming that communal traits are necessary for success in communal occupations. As the experimental manipulation showed only minimal effects, we have reported additional cross-sectional analyses in the present paper. As these analyses were correlational, we cannot make any causal conclusions regarding the direction of the found effects. Additionally, our sample included fewer men than women (232 women versus 66 men). This low number of men in our analysis might have reduced statistical power. However, this gender distribution is similar to the actual gender distribution in communal degree programs, as the majority of these students are female (SSB, 2022a). It is therefore difficult to recruit a gender-balanced sample of students in communal degree programs. Further research may want to target prospective (high school) students to gain more knowledge of male students' perceptions of communal degree programs and their anticipated fit.

### **Conclusion**

The present study investigates the important topic of the psychological causes of dropout intentions in communal degree programs. We find that having communal self-perceptions is an important factor in perceiving a good fit and a strong sense of belonging with communal degree programs for both male and female students, which can lead to lower dropout intentions. At the same time, we find that men in communal degree programs report lower communal self-perceptions than women. Therefore, in order to ensure that communal degree programs are able to retain their students and educate a sufficient number of qualified workers to meet the especially large need of healthcare workers, typically communal traits should not be the only traits that are highlighted as essential in these programs. Drawing inspiration from communal goal interventions, novel interventions highlighting how

communal occupations provide a good fit for individuals with lower communal self-perceptions and can fulfill individuals' agentic values may increase men's interest in communal occupations. This could lead to a more diverse group of students feeling a good personal fit with their degree program, which the present research has found is related to a stronger sense of belonging and lower dropout intentions among both male and female students in communal degree programs.

## Footnotes

<sup>1</sup> In addition to the hypotheses presented in this paper, additional hypotheses related to the female participants were preregistered:

[https://osf.io/4b7ta/?view\\_only=469f955f6066487f9f13bcbc263e6c62](https://osf.io/4b7ta/?view_only=469f955f6066487f9f13bcbc263e6c62). However, as we did not find any effects of the experimental condition in H1 and H2, and since we found no effects of the preregistered hypotheses in the second preregistration, we decided to report the results from these analyses in the Supplemental Materials. Additionally, two hypotheses were excluded from the first preregistration that investigated the effect of masculinity threat, as we decided to only include the variables collected for both male and female participants in the present paper.

<sup>2</sup> In addition to the scales presented in this paper, the questionnaire assessed male participants' perceived masculinity threat, backlash, gender stereotypes, male norm role beliefs, personal values, importance of masculinity/femininity, and identification with their gender.

## References

- Bauer, J. J., & McAdams, D. P. (2010). Eudaimonic growth: Narrative growth goals predict increases in ego development and subjective well-being 3 years later. *Developmental Psychology*, 46(4), 761–772. <https://doi.org/10.1037/a0019654>
- Brysbaert, M. (2019). How many participants do we have to include in properly powered experiments? A tutorial of power analysis with reference tables. *Journal of Cognition*, 2(1), 16. <https://doi.org/10.5334/joc.72>
- Canzan, F., Saiani, L., Mezzalana, E., Allegrini, E., Caliaro, A., & Ambrosi, E. (2022). Why do nursing students leave bachelor program? Findings from a qualitative descriptive study. *BMC Nursing*, 21(1), 71. <https://doi.org/10.1186/s12912-022-00851-z>
- Caplan, R. D., & Van Harrison, R. (1993). Person-environment fit theory: Some history, recent developments, and future directions. *Journal of Social Issues*, 49(4), 253-275. <https://doi.org/10.1111/j.1540-4560.1993.tb01192.x>
- Croft, A., Schmader, T., & Block, K. (2015). An underexamined inequality: Cultural and psychological barriers to men's engagement with communal roles. *Personality and Social Psychology Review*, 19(4), 343-370. <https://doi.org/10.1177/1088868314564789>
- Diekmann, A. B., & Steinberg, M. (2013). Navigating social roles in pursuit of important goals: A communal goal congruity account of STEM pursuits. *Social and Personality Psychology Compass*, 7(7), 487-501. <https://doi.org/10.1111/spc3.12042>
- Dolonen, K. A., & Reppen, N. K. (2022). Tusenvis av sykepleiere har droppet ut av studiet de siste ti årene. *Sykepleien*. <https://sykepleien.no/2022/11/tusenvis-av-sykepleiere-har-droppet-ut-av-studiet-de-siste-ti-arene>

- Donnelly, K., & Twenge, J. M. (2017). Masculine and feminine traits on the Bem Sex-Role Inventory, 1993-2012: A cross-temporal meta-analysis. *Sex Roles: A Journal of Research*, 76(9-10), 556-565. <https://doi.org/10.1007/s11199-016-0625-y>
- Eagly, A., Nater, C., Miller, D. I., Kaufmann, M., & Sczesny, S. (2020). Gender stereotypes have changed: A cross-temporal meta-analysis of U.S. public opinion polls from 1946 to 2018. *American Psychologist*, 75(3), 301-315. <https://doi.org/10.1037/amp0000494>
- Good, C., Rattan, A., & Dweck, C. S. (2012). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology*, 102(4), 700-717. <https://doi.org/10.1037/a0026659>
- Goodenow, C. (1993). Classroom belonging among early adolescent students: relationships to motivation and achievement. *The Journal of Early Adolescence*, 13(1), 21-43. <https://doi.org/10.1177/0272431693013001002>
- Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology*, 28(6), 545-579. <https://doi.org/10.1037/0022-0167.28.6.545>
- Hamshire, C., Jack, K., Forsyth, R., Langan, A. M., & Harris, W. E. (2019). The wicked problem of healthcare student attrition. *Nursing Inquiry*, 26(3), e12294. <https://doi.org/10.1111/nin.12294>
- Hardré, P. L., & Reeve, J. (2003). A motivational model of students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology*, 95(2), 347-356. <http://dx.doi.org/10.1037/0022-0663.95.2.347>
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis; A regression-based approach* (2<sup>nd</sup>. Ed.). Guilford Publications.
- Heilman, M. E. (1983). Sex bias in work settings: The lack of fit model. *Research in Organizational Behavior*, 5, 269-298.

- Heilman, M. E. (2012). Gender stereotypes and workplace bias. *Research in Organizational Behavior*, 32, 113-135. <https://doi.org/10.1016/j.riob.2012.11.003>
- Helmers, A.-K. B., Johansen, L. B., & Reppen, N. K. (2021). Derfor vurderer 3 av 4 sykepleiere i kommunene å slutte. *Sykepleien*. <https://sykepleien.no/2021/09/derfor-vurderer-3-av-4-sykepleiere-i-kommunene-slutte>
- Korlat, S., Foerst, N. M., Schultes, M.-T., Schober, B., Spiel, C., & Kollmayer, M. (2022). Gender role identity and gender intensification: Agency and communion in adolescents' spontaneous self-descriptions. *European Journal of Developmental Psychology*, 19(1), 64-88. <https://doi.org/10.1080/17405629.2020.1865143>
- Kosakowska-Berezecka, N., Bosson, J. K., Jurek, P., Besta, T., Olech, M., Vandello, J. A., Bender, M., Dandy, J., Hoorens, V., Jasinskaja-Lahti, I., Mankowski, E., Venäläinen, S., Abuhamdeh, S., Agyemang, C. B., Akbas, G., Albayrak-Aydemir, N., Ammirati, S., Anderson, J., Anjum, G., ... Zadkowska, M. (2022). Gendered self-views across 62 countries: A test of competing models. *Social Psychological and Personality Science*. <https://doi.org/10.1177/19485506221129687>
- Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*, 58(2), 281-342. <https://doi.org/10.1111/j.1744-6570.2005.00672.x>
- Kruzicevic, S. M., Barisic, K. J., Banozic, A., Esteban, C. D., Sapunar, D., & Puljak, L. (2012). Predictors of attrition and academic success of medical students: A 30-year retrospective study. *PLoS ONE*, 7(6), e39144. <https://doi.org/10.1371/journal.pone.0039144>

Kunnskapsdepartementet (2016). *Tilstandsrapport for høyere utdanning 2016*.

[https://www.regjeringen.no/contentassets/ff233dff1b2a48359ee92c7e1b4eb876/tilstandsrapport2016\\_endelig\\_nettsversjon.pdf](https://www.regjeringen.no/contentassets/ff233dff1b2a48359ee92c7e1b4eb876/tilstandsrapport2016_endelig_nettsversjon.pdf)

Le, B. M., Impett, E. A., Kogan, A., Webster, G. D., & Cheng, C. (2012). The personal and interpersonal rewards of communal orientation. *Journal of Social and Personal Relationships*, 30(6), 694–710. <https://doi.org/10.1177/0265407512466227>

Mao, A., Wang, J., Cheong, P. L., Van, I. K., & Tam, H. L. (2020). Male nurses' dealing with tensions and conflicts with patients and physicians: A theoretically framed analysis. *Journal of Multidisciplinary Healthcare*, 13, 1035-1045.

<https://doi.org/10.2147/JMDH.S270113>

Menkor, M., Nagengast, B., Van Laar, C., & Sassenberg, K. (2021). The fit between dignity self-construal and independent university norms: Effects on university belonging, well-being, and academic success. *European Journal of Social Psychology*, 51(1), 100-112. <https://doi.org/10.1002/ejsp.2717>

Myklathun, K. H. (2022). *NAVs bedriftsundersøking 2022 – Stor mangel på arbeidskraft* (NAV Rapport 2). Arbeids- og velferdsdirektoratet.

Nedregård, O., & Abrahamsen, B. (2018). *Frafall fra profesjonsutdanningene ved OsloMet* (OsloMet Rapport 2018 8). Oslo Metropolitan University.

<https://skriftserien.oslomet.no/index.php/skriftserien/article/view/121/114>

Nguyen, M., Chaudhry, S. I., Desai, M. M., Chen, C., Mason, H. R. C., McDade, W. A., Fancher, T. L., & Boatright, D. (2022). Association of sociodemographic characteristics with US medical student attrition. *JAMA Internal Medicine*, 182(9), 917-924. <https://doi.org/10.1001/jamainternmed.2022.2194>



- Schmitt, N., Oswald, F. L., Friede, A., Imus, A., & Merritt, S. (2008). Perceived fit with an academic environment: Attitudinal and behavioral outcomes. *Journal of Vocational Behavior*, 72(3), 317-335. <https://doi.org/10.1016/j.jvb.2007.10.007>
- Statistisk sentralbyrå (2022a). *Studenter i universitets- og høyskoleutdanning*. <https://www.ssb.no/utdanning/hoyere-utdanning/statistikk/studenter-i-universitets-og-hogskoleutdanning>
- Statistisk sentralbyrå (2022b). *Gjennomføring ved universiteter og høyskoler*. <https://www.ssb.no/utdanning/hoyere-utdanning/statistikk/gjennomforing-ved-universiteter-og-hogskoler>
- Su, R., Rounds, J., & Armstrong, P. I. (2009). Men and things, women and people: A meta-analysis of sex differences in interests. *Psychological Bulletin*, 135(6), 859-884. <https://doi.org/10.1037/a0017364>
- Suhlmann, M., Sassenberg, K., Nagengast, B., & Trautwein, U. (2018). Belonging mediates effects of student-university fit on well-being, motivation, and dropout intention. *Social Psychology*, 49(1), 16-28. <https://doi.org/10.1027/1864-9335/a000325>
- Ten Hoeve, Y., Castelein, S., Jansen, G., & Roodbol, P. (2017). Dreams and disappointments regarding nursing: Student nurses' reasons for attritions and retention. A qualitative study design. *Nurse Education Today*, 54, 28-36. <https://doi.org/10.1016/j.nedt.2017.04.013>
- Twigg, D., & McCullough, K. (2014). Nurse retention: A review of strategies to create and enhance positive practice environments in clinical settings. *International Journal of Nursing Studies*, 51(1), 85-92. <https://doi.org/10.1016/j.ijnurstu.2013.05.015>
- United Nations (2019). *World Population Ageing 2019: Highlights* (ST/ESA/SER.A/430). <https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf>

- Van Veelen, R., & Derks, B. (2022). Academics as agentic superheroes: Female academics' lack of fit with the agentic stereotype of success limits their career advancement. *British Journal of Social Psychology, 61*(3), 748-767.  
<https://doi.org/10.1111/bjso.12515>
- VandenBos, G. R. (Ed.). (2015). *APA dictionary of psychology* (2<sup>nd</sup>. Ed.). American Psychological Association. <https://doi.org/10.1037/14646-000>
- Verquer, M. L., Beehr, T. A., & Wagner, S. H. (2003). A meta-analysis of relations between person-organization fit and work attitudes. *Journal of Vocational Behavior, 63*(3), 473-489. [https://doi.org/10.1016/S0001-8791\(02\)00036-2](https://doi.org/10.1016/S0001-8791(02)00036-2)
- Weisgram, E. S., Bigler, R. S., & Liben, L. S. (2010). Gender, values, and occupational interests among children, adolescents, and adults. *Child Development, 81*(3), 778-796.  
<https://doi.org/10.1111/j.1467-8624.2010.01433.x>
- World Economic Forum. (2023). *Global Gender Gap Report 2023*.  
[https://www3.weforum.org/docs/WEF\\_GGGR\\_2023.pdf](https://www3.weforum.org/docs/WEF_GGGR_2023.pdf)
- World Health Organization (2020). Global strategy on human resources for health: Workforce 2030.
- Yowell, J. L., & Sullivan, J. F. (2011). Who should be an engineer? *Bridge, 41*(2), 23-29.