EXAMINING BARRIERS TO MEN'S COMMUNAL ORIENTATION

by

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Abstract

Despite western societies’ considerable progress towards gender equality on many fronts, men and women remain divided on the extent to which they adopt care-oriented values and roles. Men tend to embrace basic communal values and traits (i.e., a focus on care and connection with others; Bakan, 1966) to a lesser extent than women do (e.g., Donnelly & Twenge, 2017; Falk & Hermle, 2018). At a more concrete level, men are also underrepresented in communal careers in healthcare, early education, and in domestic roles (HEED; Croft, Schmader, & Block, 2015). In the three empirical chapters of my dissertation, I examine some of the processes that constrain men’s internalization of communal values, and, in turn, how men’s relatively lower communal values have downstream consequences for their engagement with communal careers.

Chapter 2 focuses on the role of automatic communal=female stereotypes in curtailing men’s personal identification with communal values. The findings I present suggest that gender differences in identification with communal values are especially large among those who hold such stereotypes, and that retraining men to associate communion with males as a group also increases their personal identification with communal values. Chapter 3, in turn, focuses on understanding gender differences in communion from a developmental perspective. Results from a study of 411 children suggest that, by age six, boys see themselves as less communal than do girls, a difference in fundamental values that also predicts how children envision their future prioritization of career- over family-roles. Given such early gender differences in communal values, Chapter 4 focuses on understanding how relatively low communal values, in conjunction with more external norms, might deter men from taking on communal careers.

Findings suggest that communal values and the overrepresentation of women in HEED both play important roles in deterring men from HEED careers.
Lay Summary

Despite considerable progress towards gender equality, men and women are not equally adopting care-oriented values and roles. Compared to women, men are less concerned with care-oriented (i.e., communal) values and less interested in roles in healthcare, early education, and in the domestic sphere (HEED), such as nurse or teacher. In three empirical chapters, my dissertation aimed to understand men’s and boys’ relatively lower communal values and role interests.

Findings from Chapter 2 suggest that stereotypes of communion as associated with women rather than with men decrease men’s own identification with communal values. Results from Chapter 3 suggest that adult-like gender differences in communal values have emerged by age six, and predict how children envision their future roles. Chapter 4 examines the downstream consequences of men’s relatively low communal values and finds that both low communal values and the overrepresentation of women in HEED independently deter men from taking on such careers.
Preface

This dissertation proposal is an original intellectual product of the author, Katharina Block. For all projects included in this dissertation proposal, Katharina Block spearheaded the project conceptualization (literature reviews, hypotheses, material design, etc.) with the help of her co-authors. Katharina also oversaw data collection, conducted data analyses, and executed the bulk of writing for these projects.

For Chapter 2, Dr. Schmader and Katharina Block worked together on the conceptualization of the project, after which Katharina programmed the experiments, collected the data, analyzed the data and wrote a draft of the manuscript, on which Dr. Schmader provided several rounds of comments. Work presented in Chapter 2 is currently under review. For Chapter 3, Katharina conceptualized the study idea together with Dr. Gonzalez and Dr. Baron, after which oversaw data collection and analyzed the data. Dr. Schmader then provided comments on the analyses, after which Katharina wrote the manuscript. All co-authors provided several rounds of comments on this manuscript.

A version of the work presented in Chapter 3 was published in Block, Gonzalez, Schmader, & Baron, 2018 in the journal Psychological Science.

For Chapter 4, Dr. Schmader and Katharina Block worked together on the conceptualization of the paper, after which Sheila Wee programmed the questionnaires. Katharina oversaw data collection, analyzed the data and wrote a draft of the manuscript, on which Dr. Schmader and Sheila Wee provided several rounds of comments. Sheila Wee helped make some of the figures. Work presented in Chapter 4 is in preparation, as additional studies will be needed before submission for publication is possible.
All work reported within this dissertation has been approved by the UBC research ethics board (applications; H10-00147; H10-03173; H15-00087).
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1 Introduction

Despite western societies’ considerable progress towards gender equality on many fronts, men and women remain divided on the extent to which they adopt care-oriented values and roles. Men tend to embrace basic communal values and traits (i.e., a focus on care and connection with others; Bakan, 1966; Abele & Wojciszke, 2007) to a lesser extent than women do (Diekman, Steinberg, Brown, Belanger, & Clark, 2017; Donnelly & Twenge, 2017; Falk & Hermle, 2018; Schwartz & Rubel, 2005). As a consequence, men might be missing out on an important part of the human experience to some degree. Valuing care for and connection with others is often conceptualized as a universal human drive allowing us to live in groups (Baumeister & Leary, 1995; Ko et al., 2020; Trapnell & Paulhus, 2012). Even infants tend to expect, and prefer, others to exhibit communality by helping someone in need (Hamlin & Wynn, 2011). Such a fundamental communal motivation does not only benefit others; the pursuit of communal values and goals has a well-documented relationship to one’s own health and psychological well-being (for a meta-analysis, see Le et al., 2018). At a more concrete level, men’s relatively lower communal values go hand in hand with their persistent underrepresentation in communal careers in healthcare, early education, and in domestic responsibilities at home (HEED; Croft, Schmader, & Block, 2015; Block, Schmader, & Croft, 2018b). As men show disproportionally less interest in HEED careers, like nursing, they forgo viable job opportunities, even as governments struggle to fill such HEED positions with qualified personnel (Bureau of Labor Statistics, 2013; World Health Organization, 2013).

Given the psychological as well as practical benefits that communal values and roles offer, what prevents men, and boys, from embracing communion to the same extent that women and girls do? Researchers have successfully applied psychological theory on the reciprocal
relationships between gendered self-concepts, gender roles, and gender stereotypes to understand the constraints to women’s participation in science and leadership roles (e.g., see Cheryan, Ziegler, Montoya, & Jiang, 2016; Heilman, 2012, for reviews). Yet, relatively less work applies social psychological theory to understand whether, and how, men’s and boys’ identification with communal values and roles might also be constrained by gender stereotypes and related processes. In seven empirical studies, my dissertation examines the psychological processes which constrain communal orientation among men and boys. Specifically, I examine how gender stereotypes may shape men’s relatively weaker internalization of communal values (Chapter 2), and in turn, how relatively weaker communal values, together with gender role norms as external barriers, explain gender gaps in HEED interest among boys (Chapter 3), and men (Chapter 4). To gain a systematic understanding of these processes, I employ correlational, experimental, and developmental approaches that combine data collection using both implicit and explicit measures. Furthermore, I have made a concerted effort to incorporate emerging standards of open and replicable science in my work.

In the next section of this introductory chapter, I first provide more detail on current evidence for gender differences in communal values and roles – the motivation for my research. I then provide a brief overview of Croft, Schmader, and Block’s (2015) theoretical framework of psychological barriers to men’s entry into communal roles, which guides the empirical work I present in this dissertation. To provide more theoretical context to my empirical work, I then turn to an in-depth discussion of the possible internal and external barriers to men’s and boys’ communal orientation. For this, I first discuss the possible mechanisms by which basic communal values are internalized by men and women to different extents. Next, I outline how such values then act as direct internal motivators of one’s interest in communal careers.
Moreover, I discuss how perceptions of societal gender role norms might provide an additional, more external, barrier that deters men from entry into HEED, independently from, or in interaction with, their internal communal value motivations (or the lack thereof). The introduction concludes with an overview of the empirical chapters in my dissertation.

1.1 Gender Differences in Communal Orientation

Agency and communion represent the two core dimensions of individual differences (Bakan, 1966; Abele & Wojciszke, 2007; 2014). A wealth of past research has found that perceptions of both self and others appear to form two distinct factors in a number of domains – for example, warmth vs. competence in judgment of others (Fiske, Cuddy, Glick, & Xu, 2002; Fiske, Cuddy, & Glick, 2007), nurturance vs. dominance in social interactions (Wiggins, 1991), and interdependent vs. independent in self-construals (Markus & Kitayama, 1991). While not all theorists label these dimensions ‘communion’ and ‘agency’, there are some striking similarities across these factors. More recently, Abele and Wojciszke (2014) have synthesized such past work by noting that communion can be overarchingly characterized by attending to others’ needs (i.e., a focus on care for others), whereas agency is characterized by attending to one’s own needs (i.e., a focus on self-promotion). In addition, these scholars have argued that both communion and agency contain distinct sub-facets. Agency can be divided into a focus on assertiveness (i.e., seeking status and power) vs. a focus on competence (i.e., seeking mastery and independence), whereas communion can be divided into warmth (i.e., being warm and caring towards others) and morality (i.e., being fair and honest toward others; Abele, Hauke,
In my dissertation, I focus on communion and agency as the dimensions of men’s and women’s own values and role preferences.1 Western women have increasingly embraced agentic traits over the past half century. A recent meta-analysis of data gathered from more than 20,000 subjects between 1974 and 2012 suggests that women have significantly increased in their self-ascribed agentic traits, defined as encompassing both competence and assertiveness. However, despite these changes in their self-ascribed traits, women continue to be less likely to endorse agentic traits than are men \( (d = -.50; \text{Donnelly & Twenge, 2017}) \). Evidence on gender differences in agentic values (i.e., the extent to which agentic pursuits are valued by men vs. women) is more mixed. Some work shows that, across cultures, men tend to assign more importance to agentic values, like power and achievement, than women do (Falk & Hermle, 2018; Schwartz & Rubel, 2005). This might, however, not be the case for all populations. Recent work finds that, at least in some samples, college-educated North American women and men assign similar levels of importance to agentic values (Diekman, Brown, Johnston, & Clark, 2010; Block et al., 2018b).

Despite these shifts in women’s agency, men have not begun to increasingly embrace communion. In recent large samples, men identify with communal traits and values markedly less than women do \( (d = .72, \text{Donelly & Twenge, 2017}; d = .21 \text{ to } .29, \text{Schwartz & Rubel, 2005}, \text{Falk & Hermle, 2018}) \). While there is variability in this gender difference across cultures, men’s relatively lower endorsement of communal values is observable in most nations \( (d \text{ ranged} \).

\footnote{Traits, as a core individual difference, are often defined as behavioral consistencies across situations (McCrae & Costa, 1987). Values, as a another integral individual difference, can be defined as the extent to which a person deems certain life goals important (Schwartz et al., 2012). Meta-analytic evidence shows that values and traits are closely related (Fischer & Boer, 2015). In my work, I am especially interested in values, because, as an indicator of the basic motivations we hold, they should be especially related to important life choices – such as the careers we choose. This is not to say, however, that gender differences in communal traits are meaningless or would not show some of the same patterns I find with values in my work. Note, however, that comparing evidence between gender differences in traits and values is difficult, since measures typically do not use identical items.}
between .05 to .24 for nations in “altruistic” values; Falk & Hermle, 2018). Additionally, and in contrast to trends in women’s agency, there is no evidence that men’s internalization of communion has significantly increased since the 1970s and 80s (Donnelly & Twenge, 2017).

This gender difference in basic communal traits and values is mirrored by the careers that men and women tend to occupy in society. Men are markedly underrepresented in communal careers, which are concentrated in healthcare and education (part of the communal domains we have termed HEED). In the United States, for example, men represent only 10% of nurses, 19% of social workers, and 4% of pre-school and kindergarten teachers (Bureau of Labor Statistics, 2017). Similar to stagnant gender differences in more basic communal values, there is little indication that this pattern is shifting. Whereas women have increasingly moved into the workforce and into formerly male-dominated careers (e.g., law) over the past three decades, men are not becoming equally likely to take on HEED careers (Croft, Schmader, & Block, 2015). In fact, many young men show little interest in considering careers like nursing or teaching (Cheryan & Plaut, 2010; Forsman & Barth, 2017; Su, Rounds, & Armstrong, 2009a; Tellhed, Bäckström, & Björklund, 2018).

Unpaid domestic labor in the home represents another communal domain in which men are less engaged than women. Whereas women now hold paid positions outside the home at rates almost equal to men, men’s domestic involvement has not increased to match women’s increased time spent outside the home (PEW, 2018). As a result, the primary burden of childcare and domestic chores still falls on women, even among dual-earner couples (PEW, 2018; Hochschild

Note, however, there is some evidence that cultures that emphasize collectivist values also tend to perceive men and women’s communal traits as more similar – evidence for important cultural variation in communion (Cuddy et al., 2015).

Note that while women are employed at rates similar to men, women, on average, work fewer hours per week in paid positions than do men. This pattern is especially evident among adults who have children under the age of 18 in their home. Among both parents and non-parents, women have consistently less leisure time (time outside of paid work, housework, and childcare) than do men (PEW, 2018).
Furthermore, this traditional division of labor is still reflected in boys’ and girls’ anticipated roles in early childhood, such that by elementary school, boys already expect to lead a less family-oriented life in their future than girls do (Croft, Schmader, Block, & Baron, 2014). Given this evidence, it is fair to conclude that men (and to some extent boys) remain less communally oriented than do women. To what extent might men benefit from a reduction in this communal gender gap?

1.2 Benefits of Increasing Communion Among Men

Evidence suggests that there is much to gain from increasing men’s engagement with communal values and roles. First, because communion is a fundamental part of the human experience (Bakan, 1966; Baumeister & Leary, 1995; Trapnell & Paulhus, 2012; Ko et al., 2019), being involved in care-oriented roles and pursing communal goals would likely benefit men themselves. Meta-analytic evidence reveals that a communal orientation, regardless of gender, is beneficial for psychological and physical health (Le et al., 2018). Fostering young men’s psychological well-being appears particularly worthwhile, as suicide is a leading cause of death among this demographic (Pitman, Krysinska, Osborn, & King, 2012). This relatively high suicide rate has been repeatedly linked to the disproportionate social isolation among young men (Cleary, 2012; Oliffe et al., 2019; 2015; Ramirez & Badger, 2014). Given these implications alone, understanding how to foster communal values and roles among men appears to be a worthwhile effort for researchers.

Increasing communal orientation among men might also benefit women and girls. Given women’s struggle to combine both work and household duties, women would likely welcome men’s increased involvement in domestic life and caregiving, potentially alleviating some of the disproportionate burden placed on women. For example, working women experience greater
well-being when their husbands are more involved in childcare (Frisco & Williams, 2003; Stevens, Kiger, & Riley, 2001). Recent work also suggests that greater involvement in domestic life models a more gender-equal future for women and girls alike. Specifically, heterosexual women who expected their future male partners to be more involved in the household found it easier to imagine focusing on their career (Croft, Block, & Schmader, 2019), and girls’ whose fathers did more household work also tended to envision a more career-oriented future (Croft, Schmader, Block, & Baron, 2013).

Increasing men’s involvement in HEED roles would also more broadly benefit children and others served by HEED professionals. As noted in the previous paragraph, especially female children might be protected from restrictive gender roles when they have a father who is highly involved in their upbringing. More broadly, an involved father-figure has unique benefits for children’s social and cognitive development for children of both genders (Fletcher, 2011; Marsiglio, Amato, Day, & Lamb, 2000). In addition, an increased number of men in healthcare and teaching professions could solve some concerns that men and boys feel alienated in these settings because of the overrepresentation of women. Recruiting more male teachers and nurses has thus been suggested as one solution to the relatively high levels of alienation that boys and men feel within the healthcare and education systems (Skelton, 2003; Cooney & Bittner, 2001; Wolfenden, 2011).

Finally, from a practical standpoint, job openings in HEED occupations, and especially healthcare, are projected to increase over the coming decade (a shortage that has become painfully apparent during the global epidemic of COVID-19 in the spring of 2020). Recruiting more men into HEED fields would help to meet the increasing demand for healthcare professionals, like nurses, who are vital for the functioning of societies (Bordieu & Passeron,
1990; Holmes & Gastaldo, 2002). At the same time, this would provide valuable job opportunities for men, who tend be disproportionately affected by rising unemployment (Albanesi & Sahin, 2013), and tend to suffer psychologically from unemployment more than women do (Michniewicz, Vandello, & Bosson, 2014). Given the numerous benefits to increasing men’s communal orientation, it is crucial to gain a better understanding of men’s apparent dissociation from communal values and roles. Past theory on gender role dynamics can guide empirical research with the goal to gain such understanding.

1.3 Overview of Guiding Theoretical Perspective

In a recent theoretical review, my co-authors and I draw on social role theory to outline how distal historical processes and proximal psychological factors prevent men’s participation in communal HEED careers (Croft et al., 2015). Figure 1-1 visualizes a version of the model developed in this paper, with an emphasis on the processes that I focus on in my dissertation (see bolded paths). In line with social role theory (Eagly & Karau, 1984), our model outlines that more distal biological and historical socio-cultural factors lead to the initial distribution of men and women into distinct roles – with women being concentrated in care-oriented, low-status roles, and men being concentrated in high-status occupations outside the home. A broad discussion of these distal processes falls outside the scope of this dissertation (but see Croft et al., 2015 for a review). Social role theory, discussed in more depth below, argues that the historical distribution of men and women into different roles then leads to corresponding gender stereotypical beliefs about the men’s and women’s traits and abilities. This eventually leads new generations of men and women to internalize communal traits and values in ways that reproduce stereotypical gender roles. Building on this broad assumption, the theoretical synthesis I helped to develop alongside my co-authors focuses on specifying the psychological processes through
which gender stereotypes derived from men’s and women’s roles eventually serve to deter new generations of men from pursuing HEED roles.

**Figure 1-1**

*Schematic of model proposed in Croft, Schmader, & Block, 2015.*

*Note.* Bolded fonts to indicate variables central to my dissertation. Red-outlined arrows indicate paths that were not explicitly included in the original model but are examined in my dissertation.

Our model then posits that the gender stereotypes resulting from these more distal processes provide the basis for both a lack of *internal* motivation as well as perceptions of *external* barriers, which act together to deter men from pursuing HEED careers. Through the first pathway discussed here (D → E → G in Figure 1-1), gender stereotypes are thought to indirectly shape men’s participation in HEED careers by shaping men’s internalization of communal motivations. By learning to automatically associate communion with women, but also through more active socialization encouraging behaviors in line with gender stereotypes from adults and
peers, boys and men internalize communal values less than women do. This relatively lower internalization of communal values, in turn, is thought to provide an internal psychological barrier to men’s involvement in HEED – a sense that care-oriented HEED roles do not fit men’s personal goals and values (Block, Croft, & Schmader, 2018b).

Distinct from men’s relative lack of internal communal values, the widespread acceptance of gender stereotypes associating communion with women also translates into rigid gender role norms, which form external barriers to men’s involvement in HEED careers (A → F → G in Figure 1-1). As summarized in our model, transgressing gender role norms is tied to various negative reactions from others (e.g., status costs, identity threats, backlash), of which men are very much aware. Thus, men’s expectations of such negative consequences deter them from taking on communally-oriented HEED roles. In addition to directly deterring interest in HEED careers, such restrictive norms against men showing interest in communally-oriented roles are also thought to inhibit men’s internalization of more basic communal values.

Despite not being a focus of my dissertation, it is important to note that the internal (i.e., lack of communal values) and external (i.e., expectations of social sanctions and masculinity threats) barriers described here should also be amplified by the status-asymmetries between men, women, and their respective roles. Historically, men, as a group, have been assigned higher status in society than women. As a result, men have not only taken on higher status roles, but the roles and traits they are associated with are also imbued with higher status (England, Allison, & Wu, 2007; Levanon, England, & Allison, 2009; Ridgeway & Correll, 2004; Schmader et al., 2001). Thus, female-stereotypic values and roles – i.e., communal values and roles – are associated with relatively low status. In a recent paper, we find that this status asymmetry leads to a downstream asymmetry in efforts to foster the representation of men and women in certain
roles – to the extent that people see female-dominated communal roles as lower in status than male-dominated roles in science and leadership, people are also less concerned with closing gender gaps in communal roles (Block et al., 2019). In our model, we pose that the association of women and communal roles with low status further serves to amplify the effects of internal and external barriers to men’s engagement in communal roles.

The three empirical chapters of my dissertation represent investigations into the causes and consequences of men’s and boys’ relatively low internalization of communal values. This work is guided by the above-described synthesis of past research and theory put forth in Croft, Schmader, & Block (2015). Chapter 2 summarizes three studies examining the role of automatic gender stereotypes in men’s internalization of communal values. Chapter 3 examines the internalization of communal values and their consequences by asking whether gender differences in communal values emerge in childhood in a way that predicts early antecedents of HEED interest. Finally, Chapter 4 of my dissertation summarizes three studies examining how men’s relatively lower internalization of communal values shapes their interest in HEED careers independently from the social norms that form external barriers to men’s HEED engagement.

In the remainder of the introduction, I will elaborate specifically on aspects of this model as they pertain to the different parts of my dissertation.

1.4 Internalization of Gendered Values

Social role theory (Eagly & Steffen, 1984) describes the process by which the historical distribution of men and women into different roles leads to persistent gender stereotypical perceptions of men’s and women’s place in society. The theory proposes that, as perceivers observe women’s overrepresentation in care-oriented roles (such as nurse, teacher, or homemaker) and men’s overrepresentation in agentic roles (such as engineer or business leader),
we form corresponding stereotypes about both gender stereotypic traits and gender stereotypic roles. As a consequence, communal traits and values (e.g., helping, caring, and nurturing), as well as communal roles come to be seen as inherent to women, whereas agentic traits and values (e.g. independence, competence, dominance), and agentic roles, come to be seen as inherent to men (Diekman, 2005; Eagly & Steffen, 1984; Koenig & Eagly, 2014). A recent meta-analysis of explicit trait stereotypes about men and women from 1946 to 2018 exemplifies how such processes play out historically. Specifically, the evidence from this meta-analysis shows that perceivers have begun to see women as increasingly more competent (but not assertive/dominant) as women have increasingly entered the workforce. Men’s continued underrepresentation in care-oriented careers, in turn, is accompanied by a strengthening stereotype that men are less communal than women (Eagly et al., 2019).

Once such beliefs about the inherent qualities of men and women are formed, they then further serve to constrain gender roles. Role congruity theory, a key corollary of social role theory (Diekman & Goodfriend, 2006; Eagly & Karau, 2002), suggests that the gender stereotypes we form based on observing men’s and women’s roles in society (i.e., descriptive norms) in turn shape our injunctive norms – our perceptions of what roles men and women should take on. We hold men and women to these injunctive norms and react negatively to those who take on gender incongruent roles (Rudman, Moss-Racusin, Phelan, & Nauts, 2012). Such injunctive norms about which roles are appropriate for each gender thereby encourage men and women to display stereotypical attributes and roles (Eagly & Karau, 2002; Eagly & Wood, 1999).

Both social role theory and role congruity theory imply that new generations of men and women personally internalize communal and agentic values that match the roles they expect
Based on the current descriptive and injunctive gender role norms (Eagly & Karau, 2002; Eagly & Wood, 1999). Indeed, evidence suggests that women’s own agentic traits (broadly defined) have increased steadily as women’s workforce participation has risen (Donnelly & Twenge, 2017). In line with this interpretation of social roles as the origin of sex differences in behavior, men’s continued underrepresentation in communal roles coincides with men’s relatively lower personal endorsement of communal traits and values (Diekman et al., 2017; Donnelly & Twenge, 2017; Evans & Diekman, 2009). Thus, men and women seem to internalize traits and values according to societal stereotypes and injunctive gender role norms derived from descriptive gender roles in society. Whereas social role theory has long provided a powerful illustration of how gendered roles, gendered stereotypes, and gendered self-concepts shape each other reciprocally, the theory does not specify the psychological processes by which this takes place.

1.4.1 Mechanisms of Internalization

Gender stereotypes can lead to gender differences in communal traits, values, and behaviors through several avenues, which likely all play a role. Others around them (e.g., parents) might explicitly encourage their children to adopt stereotypical behaviors and refrain from counter-stereotypical ones. However, even if parents and others do not explicitly socialize children to be stereotypically, they might still model such behaviors more indirectly (e.g., see Ruble & Martin, 2009; Lytton & Romney, 1991, for reviews). Though such socialization efforts likely reflect the perceiver’s own societal stereotypes, children might adopt stereotypic actions through this pathway without any explicit knowledge or internalization of the broader societal stereotypes. My dissertation, however, is focused on another, distinct pathway; Instead of learning to pursue specific values and behaviors directly, young people might learn and internalize stereotypes about their own gender, which then shape their own values and behavior.
Balanced identity theory (BIT; Greenwald et al., 2002) specifies one cognitive pathway by which gender stereotypic associations (e.g., math=male) might directly shape an individual’s self-concept. This theoretical perspective is based on Heider’s (1946) assumption that all humans tend to strive for non-contradictory (i.e., balanced) cognitions. Because of this general tendency, an individual’s group identification (e.g., me=female) and their stereotypes about their ingroup (e.g., female ≠ math) should come to form a non-contradictory triad of cognitions with their self-concept (e.g., me ≠ math). Put differently, if one strongly identifies with one gender (i.e., gender identity), and associates that gender with a specific domain or attribute (i.e., stereotype), then one’s sense of self (i.e., self-concept) should align with the domain or attribute associated with the ingroup.

Given that the overwhelming majority of people show a clear identification with a gender (e.g., Deaux & LaFrance, 1998; Nosek et al., 2002), the balanced identity framework suggests that learning and internalizing gender stereotypes should have important consequences for men’s and women’s communal self-concepts. As I discuss in more depth in Chapter 2, these processes might be especially likely to take place on the level of implicit cognitions – such as automatic associations between concepts in a schematic network (Gawronski & Bodenhausen, 2011, 2014; Greenwald & Banaji, 1995b). Because implicit associations are formed, activated, and can affect

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4 Note that past research, as well as our work, almost exclusively employs a binary view of gender identity. That is, for simplicity, we assume that a majority of people identify with one of two gender categories – man/boy or woman/girl. Epidemiological research suggests that about 95-99% of children and adults non-ambiguously identify with the gender corresponding to their sex at birth (Zucker & Lawrence, 2009; Kuyper & Wijsen, 2014; Van Caenegem et al., 2015; Perez-Brumer et al., 2017). Focusing on the two most common genders, however, has important shortcomings. It does not capture the 1-5% of individuals who identify as non-binary (not falling in either categories) or trans (their gender does not align with their sex assigned at birth), a number that may even be greater given strong incentives not to report non-conforming identities. Furthermore, examining gender as binary also forces a negative relationship between male and female identities that does not truly reflect how people at all stages of development relate to gender (Martin et al., 2017). While this is an issue I am not equipped to answer with my dissertation, I want to note that my work simplifies the issue of gender roles somewhat by focusing on individuals who identify as ‘man’ or ‘woman’.
cognitions largely outside of our awareness, they allow for balance processes to operate independent of the constraints of explicit reasoning (Nosek et al., 2002).

The BIT framework has been tested extensively – albeit largely using correlational designs – to understand how girls’ and women’s internalization of implicit stereotypes shapes their math and science self-concepts. Evidence from a number of studies suggests that implicit (but not explicit) gender stereotypes about math, science, and engineering predict disidentification and disengagement from these domains among school-aged girls (Cvencek, Kapur, & Meltzoff, 2015; Cvencek, Meltzoff, & Kapur, 2014), undergraduate women (Nosek, Banaji, & Greenwald, 2002; Stout, Dasgupta, Hunsinger, & McManus, 2011), and even among working female engineers (Block, Hall, Inness, Schmader, & Croft, 2018c). For example, in a recent study, my colleagues and I show that implicit (but not explicit) engineering=male stereotypes predict female engineers’ perception that their job represents a mismatch with their self-concept, which in turn predicts reduced job commitment (Block et al., 2018c). Given that past correlational research has focused on such balance processes in women, Chapter 2 of my dissertation applies the principles of BIT to examine the role of implicit gender stereotypes in men’s communal self-concept. Specifically, I examine whether and how implicit communal=female stereotypes constrain men’s personal identification with communal values (i.e., implicit me=communal).

1.4.2 Internalization of Stereotypes and Values in Development

In addition to examining constraints to men’s identification with communal values in adulthood, our understanding of gender differences in values can benefit from taking a developmental perspective. Childhood is an extraordinary period of learning for humans, who are born less mature, but with more potential flexibility for learning than other mammals (Reader
The capacity to learn from others around them – often termed social learning – is what distinguishes humans from other primates and has contributed to the success of the human species in diverse habitats (Boyd, Richerson, & Henrich, 2011). Past evidence suggests that young people are in some ways especially receptive to social learning. For example, research on acculturation suggests a sensitive period for learning the beliefs and customs of a culture; individuals who immigrated to a new culture before age 15 became more acculturated the longer they resided in their new culture, whereas length of stay in the new culture did not predict acculturation for those who moved at a later age (Cheung, Chudek, & Heine, 2011). Given that childhood appears to be an important time for humans to learn social norms and beliefs more broadly, my dissertation’s next goal was to examine gendered values, and their relationship to role expectations, in children.

Children are not only apt at learning from others, they also appear to possess a readiness to learn about others – particularly how such others fit into social categories. Even in young children, evidence already shows automatic social group evaluations that are similar to those made by adults (e.g., racial attitudes; Baron & Banaji, 2006; Dunham, Baron, & Banaji, 2008). Children even learn novel attitudes towards fictitious (‘minimal’) groups in only one short experimental session (Dunham, Baron, & Carey, 2011), and appear to learn novel information about groups especially well when presented with explicit statements (e.g., square-faced people are good; Charlesworth, 2019). Children’s existing attitudes toward real social groups (e.g., African Americans) can also be changed with new information in a single session (Gonzalez, Dunlop, & Baron, 2016; Gonzalez, Steele, & Baron, 2017). Given this apparent readiness to think about people in terms of social categories, it is not surprising that children also think about people in terms of gender.
Gender is a salient social category which children use to understand new information about their social world at an early age. Between the ages two and three, children start to have a sense that humans, including themselves, can be categorized according to their gender (Bem, 1993; Ruble & Martin, 1998). Around the ages of three to four, children also start to report stereotypical views of gender roles (i.e., they have clear ideas about which jobs are typically done by men and which are typically done by women; Ruble & Martin, 1998; Martin & Ruble, 2009). Implicit gender stereotypes have been documented in children by the time they enter school (Cvencek, Meltzoff, & Greenwald, 2011), and can perhaps even be measured earlier with novel methods (Gonzalez, Block, Oh, & Baron, 2020). An especially rich body of research has examined math-gender stereotypes in children. Several studies show that, by age six, children reliably exhibit both explicit and implicit stereotypes linking math more to males than to females (Cvencek et al., 2015, 2011, 2014; Steele, 2003; Steffens, Jelenec, & Noack, 2010).

More central to the work I present in my dissertation, children hold stereotypes about traits that are at least somewhat related to communion and agency. Recent work has examined children’s gender stereotypes about two traits – brilliance and niceness – that can be seen as facets of agency and communion respectively. Findings from several studies reported by Bian and colleagues (Bian, Lin, & Cimpian, 2017) suggest that six to eight-year-olds (but not five-year-olds) stereotypically associate boys more than girls with brilliance (i.e., being “really really smart”). Although not the focus of this research, one study in this line of research also shows that boys were less likely than girls to choose their own gender as being “really really nice”. Based on this evidence, it is probable (though not certain – an issue I return to in the discussion section) that boys and girls assume that communion is stereotypically feminine whereas agency is stereotypically masculine. What does this mean for boys’ and girls’ own values?
Not only do children hold and use gender stereotypes to evaluate others, they also behave in stereotypical ways themselves from an early age. Around ages three to four, when kids start showing knowledge of gender roles, they also exhibit gender stereotypic toy and activity preferences (Ruble & Martin, 1998; Martin & Ruble, 2009). Boys appear to be especially rigid in their conformity to the male gender role at that time (Ruble, Martin, & Berenbaum, 2006). Such gender-typing of behavior is especially strong in middle-childhood, between elementary and middle school age, when children have formed a complex concept of gender and are becoming increasingly concerned with others’ opinion of themselves (Halim, Ruble, & Amodio, 2011; Halim et al., 2014).

As discussed previously, such gender differences in behavior likely develop through multiple processes – more direct socialization efforts to encourage stereotype-congruent behaviors, but also internalization of (implicit) stereotypes that are learned through socialization as well. There is evidence for both kinds of processes in children. There is widespread agreement that children learn at least some of their behavior and knowledge of stereotypes from parents. Parents – in line with their own stereotypes – socialize their children to adhere to gender stereotypes almost from the moment they are born, either actively through encouragement of gendered behavior or more passively through modelling of gender-congruent roles (for a meta-analysis see Lytton & Romney, 1991). More recent work suggests that stereotypes which children internalize (possibly by learning from their parents) also provide a more indirect way of shaping the way children see themselves. In line with BIT, for example, evidence suggests that girls are less identified with math than are boys to the extent that they implicitly associate math with boys as a group (Cvencek et al., 2015). A recent theoretical analysis suggests that identification with gender stereotypical domains can be especially observed in middle childhood.
because concerns for others’ judgments arise at this time, while brain development also allows increasingly complex cognitive representations of gender roles (Halim et al., 2011, 2014). Taken together, past research demonstrates that many children (explicitly and implicitly) identify with gender-stereotyped domains from an early age. Given that gender differences in communal and agentic values have important consequences for men’s future roles (Block et al., 2018b) and even their well-being in adulthood (Le et al., 2018), it is important to understand the extent to which boys’ and girls’ values start diverging in childhood. Chapter 3 of my dissertation thus examines evidence for early gender difference in communal and agentic values.

Some previous evidence suggests that children’s gendered preferences and behaviors can be characterized along the underlying dimensions of communion and agency. When compared to girls, boys tend to have less communal motivations in their social relationships (Ojanen, Grönroos, & Salmivalli, 2005; Ojanen et al., 2005) and value communal career goals less (Dinella, Fulcher, & Weisgram, 2014; Tellhed et al., 2018; Weisgram & Bigler, 2006; Weisgram, Bigler, & Liben, 2010; Weisgram, Dinella, & Fulcher, 2011). Given this evidence, we might also expect boys and girls to differ in the basic values they endorse by the time they reach elementary school. The first goal of Chapter 3 of my dissertation was therefore to test whether, by elementary school age, boys see basic communal values (e.g., helping, being kind) as less personally important than girls do. We also test whether this tendency in turn predicts precursors of HEED orientation among these children – a prediction I provide broader background for in the next section of this introduction.

1.5 Gender Differences in Communal Values as an Internal Barrier

Broadly speaking, people tend to engage with domains (e.g., certain college majors, careers, or spaces) that they feel ‘fit’ them personally. Fit can be broadly defined as a sense that
features of a given environment are in line with how people think about themselves. A recent theoretical perspective proposes that such a sense of fit can be additionally broken down into three types – self-concept fit, social fit, and goal fit (Schmader & Sedikides, 2017). According to Schmader and Sedikides (2017), feelings of fit in a given domain increase engagement by facilitating a sense of (cognitive, social, and motivational) fluency that motivates engagement. Particularly relevant to the current research, goal fit refers to the extent to which an environment allows us to pursue personally valued goals. For example, a competitive individual might feel more goal fit working in an organization that emphasizes competition and provides opportunity for advancement, as compared to an organization that emphasizes teamwork and humility. When such an individual feels high goal fit in an organization, they are more likely to experience motivational fluency, which, in turn, heightens their engagement with the organization. Taking this theoretical perspective gives some clues as to why men and women might seemingly self-select into different roles, as differences in basic motivations could lead men and women to feel fit with different domains.

Once gender differences in communal value orientation have emerged, these differing values guide men and women toward differing role choices. According to the goal congruity perspective (Evans & Diekman, 2009; Diekman et al., 2017 for a review), both men and women seek to find careers that afford the values and goals they personally prioritize. To the extent that men and women have internalized different values, however, this results in self-selection into different careers. Past research has applied this theoretical perspective to test whether women’s relatively higher communal values explain their relatively lower interest in STEM careers (see Diekman et al., 2017 for a review of this work). Evidence indeed suggests that women are less interested in STEM careers than are men to the extent that women believe that STEM fields do
not afford their own highly communal values. Furthermore, reframing STEM as more communal increases women’s interest (Diekman, Clark, Johnston, Brown, & Steinberg, 2011).

Whereas most empirical research on goal congruity processes to date has focused on women, men’s relatively lower internalization of communal values should guide their career choices in a similar way. Recent theory and empirical evidence suggest that the goal congruity perspective is also helpful in understanding men’s relative reluctance to adopt communally-oriented HEED careers (Croft et al., 2015; Block et al., 2018b). My own work applied and extended the goal congruity perspective to understand both men’s interest in personally adopting HEED roles, but also their broader evaluations of HEED roles as adding worth to society (Block et al., 2018b). Evidence from three correlational studies suggests that men’s (compared to women’s) relatively lower communal values predict their lower interest in taking on HEED careers, such as nursing and elementary school teaching. Beyond personal interest in pursuing these careers, communal values also predicted the tendency to perceive HEED careers as adding more worth to society, i.e., making important contributions to the functioning of society that warrant high salaries. These findings provide first systematic evidence that understanding men’s internalization of communal values is one key to understanding men’s interest in adopting HEED roles. Both Chapter 3 and Chapter 4 of my dissertation further examine goal congruity processes in men’s and boys’ HEED interests. In Chapter 3 of my dissertation, I examine whether early gender differences in communal values are also predictive of the extent to which young boys and girls envision their future as involving domestic vs. paid work. In Chapter 4 of my dissertation, I focus on whether men’s relatively low communal values potentially interact with other barriers to deter men from pursuing HEED careers. Such additional barriers are discussed in the next section of this introduction.
1.6 External Barriers

Whereas past research documents a correlation between men’s relatively low communal values and their relatively low interest in HEED roles, less is known about whether and how such goal congruity processes play out in the presence of other barriers to men’s HEED engagement. Whereas communal values consistently predict HEED-related interest among men and women in several previous studies (Diekman et al., 2010; Evans & Diekman, 2009; Block et al., 2018b; Tellhed et al., 2018), evidence also consistently shows that communal values only account for a small part of the gender differences in HEED interest (value endorsement typically statistically accounts for ca. 5% to 20% of the gender difference in interest). In addition to the exclusively correlational nature of this past evidence, an important question thus remains: What other factors constrain men’s entry into HEED careers and do these factors predict interest in HEED careers independently of internal goal congruity processes?

According to our synthesis of the psychological perspective on men’s underrepresentation in HEED (Croft et al., 2015), men’s career decisions are not only guided by their internal motivations, but also constrained by the external barriers they face. As discussed earlier, the descriptive underrepresentation of men in HEED roles results in stereotypes and societal gender norms that purport that men do not fit into such communal roles (Eagly & Karau, 1984; Eagly & Karau, 2002). Men who take on HEED roles violate such societal gender role norms. As status-incongruity theory argues, however, they also threaten the prevailing status hierarchy because men’s entry into women’s roles is also incongruent with men’s high status in society (Moss-Racusin, Phelan, & Rudman, 2010; England et al., 2010; 2020; Gerber, 2009; Ridgeway, 2014). This theory argues that instances of men taking on female-stereotypic roles are met with especially strong backlash (e.g., disparaging comments) because we tend to justify
existing status hierarchies (Jost & Banaji, 1994). For example, men are liked less, and tend to be described as weak and/or gay when they display communal traits (e.g., modesty) in a job interview (Bosak, Kulich, Rudman, & Kinahan, 2018; Moss-Racusin et al., 2010), or when they endorse gender egalitarian attitudes (Rudman et al., 2012). Men are also perceived negatively and labelled as effeminate when they take on communal roles – by requesting parental leave (Rudman & Mescher, 2013) or by becoming elementary school teachers (Moss-Racusin & Johnson, 2016). In the workplace, fathers who prioritize caregiving for their children experience backlash in form of ridicule and direct questioning of their masculinity (Berdahl & Moon, 2013). In sum, others react quite negatively to men who take on communally-oriented roles.

Awareness of such social sanctions likely provides an external barrier to men’s pursuit of HEED roles. Perhaps one of the most reliable phenomena in social psychology is that people avoid breaking what they perceive to be the prevailing social norm (Cialdini & Trost, 1998), and men are no different. In line with this idea, men fear that taking on female-stereotypic roles or careers that could lead others to see them as feminine or gay (Rudman & Fairchild, 2004; Simpson, 2004; Bosson, Taylor, & Prewitt-Freilino, 2006; Allen & Smith, 2011). Outside the lab, men who have entered female-stereotypical careers report many negative consequences from the backlash they face. Among nurses and elementary school teachers, having colleagues who express traditional gender role beliefs predicted higher depressive mood and less job satisfaction (Sobiraj, Korek, Weseler, & Mohr, 2011), and gender-based teasing impaired men’s cognitive resources (Funk & Werhun, 2011). Given this evidence, the perception that HEED roles are normatively occupied by women represents an important external barrier to men’s engagement with such roles.
In fact, our current social psychological understanding of masculinity suggests that men might be especially sensitive to molding their self-concept to gender role norms. Compared to womanhood, manhood is culturally constructed as a precarious state – something that can be lost when not continuously proven (Vandello & Bosson, 2013; Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008). As follows from this cultural requirement to prove masculinity, men tend to feel pressure to live up to masculine ideals, like muscularity (McCreary, Saucier, & Courtenay, 2005) and dominance (Schmitt & Branscombe, 2001). Threats to manhood should thus heighten adherence to stereotypically masculine qualities and roles. In line with this idea, men report heightened masculine qualities, as well as increased preferences for buying masculine products, when their masculinity has been threatened (Cheryan, Cameron, Katagiri, & Monin, 2015). Given these psychological properties of masculinity, men might be especially motivated to avoid roles that are not seen as normative for their gender.

Importantly, an integral part of masculinity (at least in most cultures), is specifically the rejection of female roles and femininity (Vandello & Bosson, 2012; Thompson & Pleck, 1986; O’Neil, 2008; Brannon, 1976), and avoidance of the low-status associated with female-dominated domains (Moss-Racusin, Phelan, & Rudman, 2010; Rudman, Mescher, & Moss Racusin, 2012; Schmader et al., 2001). Thus, associating the self with stereotypically feminine tasks and traits is particularly threatening to men (Bosson & Vandello, 2011). Given the threats that femininity poses to masculine identity, it is especially likely that men are (consciously and/or subconsciously) driven to distance themselves from communal roles that are normatively occupied by women.

To date, little is known about how social norms as an external barrier function in conjunction with more internal motivations to avoid HEED roles. The theoretical review put
forth by my co-authors and I (Croft et al., 2015) focused on the unique and independent effects of internal and external barriers to men’s involvement in communal roles. In our model, we suggested that both the perception that HEED careers are normatively occupied by women, as well as men’s relatively low communal values, form distinct barriers which should each independently contribute to decreasing men’s interest in HEED careers. To date, these distinct pathways have not yet been empirically tested together. This is the goal of Chapter 4.

In addition to examining whether internal and external barriers have distinct effects, I also test another intriguing possibility: that the presence of external barriers might constrain the power of internal motivations to guide men’s personal interest in pursuing a HEED career. Past seminal work in social psychology broadly argues that characteristics of a person (e.g., traits or values) are most strongly predictive of their behaviour when a situation places few external constraints (Mischel, 1968; 1977). External barriers to men’s HEED interest could represent such a situation with strong constraints. Specifically, I examine the possibility that personal communal values might only shape one’s motivation to pursue a given HEED career if external barriers are not too prohibitive. Indirect support for such a dual-barrier perspective comes from recent findings: men’s own feminine traits predicted interest in careers described as requiring feminine traits more strongly when careers were not explicitly paired with a female-stereotypic label, compared to when careers were attached to a label like ‘nurse’, which presumably cued gender role norms surrounding the career (Forsman & Barth, 2017). Following this line of reasoning, increasing men’s communal values might not increase men’s affinity towards communal HEED careers if men still fear social sanctions, masculinity threats, or a loss of status if they took on a HEED career. This phenomenon could also go the other way; lifting external barriers might not lead to increased interest in HEED careers if men’s internal communal motivation remains low.
In Chapter 4 of my dissertation, I thus test how men’s interest in pursuing HEED careers is shaped by the independent effects, or interaction of, their personal communal values and the external barriers they expect to face when taking on a HEED careers.

1.7 Overview of Empirical Chapters

**Chapter 2: Stereotypes and Men’s Internalization of Communal Values.** In Chapter 2 of my dissertation, I examine how implicit gender stereotypes shape men’s internalization of communal values. Study 2.1 provides correlational evidence that implicit communal=female stereotypes moderate gender differences in implicit communal self-concept – men identify with communal values less than do women only among those who strongly associate communion with women. In turn, Study 2.2 provides the first evidence that implicitly retraining men to associate communal=male increases men’s own implicit identification with communal values. A proposed registered report (Study 2.3) aims to replicate these effects, and examine how long they persist, as well as whether they generalize to men’s identification with communal roles. The work presented in Chapter 2 is currently under review as a registered report.

**Chapter 3: The Development of Gender of Differences in Communion and Agency.** In Chapter 3 of my dissertation, I examine early gender differences in basic communal and agentic values in children. In a large sample of boys and girls aged 6 to 12, Study 3.1 documents early gender differences in explicit communal and agentic values, which in turn predict children’s expectations of family vs. career orientation. To the extent that boys at this age already hold less communal and more agentic values, they also tend to expect a less family- vs. career-oriented future than do girls. The work presented in Chapter 3 was published in *Psychological Science* in 2018.
Chapter 4: A Dual Barrier Perspective on Men’s Underrepresentation in HEED. In Chapter 4 of my dissertation, I examine how men’s sense of fit with HEED careers is shaped by the independent or interactive effects of external gender role norms and men’s internal communal values. Study 4.1 provides initial evidence that both communal values and perceived descriptive norms independently predict men’s perceived fit with HEED careers. Study 4.2 replicates these independent effects of communal values and descriptive norms. Study 4.3 is the first to test the interactive effect of experimentally changing both perceived norms and communal values. Experimentally increasing men’s communal values only increased their perceived fit with HEED careers when we also provided information suggesting that other men are becoming increasingly likely to enter HEED careers. We plan to submit the work presented in Chapter 4 after running an additional study, most likely to Personality and Social Psychology Bulletin.
2 Stereotypes and Men’s Internalization of Communal Values

2.1 Introduction

Caring for and connecting with others around us is an important motivation that is central to human existence (Bakan, 1966; Ko et al., 2020) and pursuing such “communal values” has been strongly linked to well-being (Le et al., 2018). Despite the important benefits of communal values for personal and societal well-being, men and women continue to differ in the extent to which communion is central to their self-concept. In particular, men are less likely than women to identify with communal values, traits, and roles (Croft, Schmader, & Block, 2015; Diekman, Steinberg, Brown, Belanger, & Clark, 2017; Donnelly & Twenge, 2017; Guimond, Chatard, Martinot, Crisp, & Redersdorff, 2006; Schwartz & Rubel, 2005; Block, Gonzalez, Schmader, & Baron, 2018). This gender gap in other-focused interests and pursuits has persisted over time (Su, Rounds, & Armstrong, 2009) and is present in most cultures (Falk & Hermle, 2018). In contrast, as women’s roles have changed through entering the workforce, they have to some extent embraced the pursuit of competence, independence, and self-promotion (i.e., “agency” in the broad sense; Bakan, 1966; Donnelly & Twenge, 2017; Twenge, Campbell, & Gentile, 2012; Abele et al., 2016). If such evidence suggests that gender differences in core values can be malleable, could changing stereotypic notions about men as a group have the power to change individual men’s personal identification with communion (what we will refer to as ‘communal self-concept’)?

Note that agency can be subdivided into different facets, and that men continue to score higher than women on ‘assertiveness’ or ‘dominance’ (i.e., seeking power/status; Abele, Hauke, Peters, Louvet, & Szymkow, 2016). This trend is also reflected in gender stereotypes, where with changes over the past seven decades, competence is now associated more with women than with men, but dominance traits such ‘ambitious’, ‘assertive’, and ‘competitive’ are still associated more strongly with men than with women (Eagly et al., 2019).
The current research, with two existing studies and a proposed pre-registered report, asks whether implicit gender stereotypes (i.e., tendencies to automatically associate communion more strongly with women than with men) limit the extent to which men incorporate communion into their self-concept. We draw on, and extend, evidence for a balanced identity framework (Greenwald et al., 2002; Nosek, Banaji, & Greenwald, 2002), which posits that implicit stereotypic associations about one’s own social groups shape people’s self-concepts through cognitive balance processes that are distinct from more explicitly held motivations, goals, and beliefs. Though not tested thus far, this perspective would suggest that changing stereotypes about a group could have effects on ingroup members’ self-concepts. We first examine how existing implicit communal=female stereotypes predict men’s and women’s implicit self-identification with communion (Study 1). More centrally, we then provide initial data (Study 2) and propose our key pre-registered study to test whether, and to what extent, changing such implicit stereotypes causally increases men’s communal self-concept.

2.1.1 The Self and Cognitions about our Ingroup

We incorporate our membership in social groups into our self-concept. Social identity theory (Tajfel & Turner, 1979) and its extension, self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), both suggest that our social ingroups (e.g., being a man or woman) are represented as an integral part of our identity. Self-categorization theory specifically suggests that, when we categorize ourselves as a member of a particular group, we tend to “self-stereotype” by aligning our self-concept with beliefs and norms that apply to that ingroup (Turner & Onorato, 1999; Sassenberg & Woltin, 2009). Though the direction of causality is rarely experimentally tested, past evidence on self-stereotyping is consistent with this theory – individuals tend to report personally disproportionately possessing characteristics that are
stereotypic of salient ingroups (Biernat, Vescio, & Green, 1996; Cho & Knowles, 2013; Ellemers, Spears, & Doosje, 2002; Hornsey, 2008; Latrofa, Vaes, Cadinu, & Carnaghi, 2010; Veelen, Otten, Cadinu, & Hansen, 2016). With respect to gender, for example, men and women are likely to explicitly describe themselves in stereotypical terms, especially in contexts that make gender salient. Specifically, women rate themselves as higher and men rated themselves as lower on communally-oriented traits like “affectionate” when asked to compare themselves to the opposite gender (as opposed to their own gender; Guimond et al., 2007; 2006). This suggests that gender stereotypes could play an important role in communal self-concepts. However, the specific cognitive mechanisms by which gender stereotypes shape self-views are less clearly defined by self-categorization theory.

People hold stereotypes about groups even when they are part of those groups themselves, especially on the level of more automatic cognitions. Implicit stereotypes are conceptualized as automatic associations between a group category and an attribute, which have been conditioned from prior exposure to repeated covariation (Gawronski & Bodenhausen, 2006; Greenwald & Banaji, 1995b), and are akin to associative, non-declarative memories (Amodio & Berg, 2018). These implicit associations are often juxtaposed with people’s explicit beliefs, which are derived through deliberative reasoning (i.e., propositional statements; Gawronski & Bodenhausen, 2006; Greenwald & Banaji, 1995; Nosek & Smyth, 2007). Although some perspectives suggest that such implicit associations partly tap into culturally held beliefs (Payne, Vuletich, & Lundberg, 2017), which themselves can change over time (Charlesworth & Banaji, 2019), a recent meta-analysis also supports the assumption that there are meaningful individual differences in people’s implicit stereotypes, attitudes, and self-concepts (Kurdi et al., 2019).
Gender is a particularly salient social identity and people readily form stereotypic associations about gender as a social category. Studies have documented strong implicit gender stereotypes about a number of domains (e.g., Nosek et al., 2007). According to social role theory, we generally form gender stereotypes through observing men and women in different roles (Eagly & Steffen, 1984; Miller, Eagly, & Linn, 2015). This applies to how implicit gender stereotypes are learned. For example, implicit gender-science stereotypes mirror the actual number of women in science in a country (Miller et al., 2015), and being exposed to female engineering professors has been shown to reduce implicit male-engineering stereotypes (Dasgupta & Asgari, 2004). Importantly, implicit gender stereotypes are often distinct from what people explicitly report they believe about men’s and women’s attributes and abilities (e.g., Hyde, Fennema, Ryan, et al., 1990; Nosek, 2005). Past research tends to find evidence for implicit stereotypes even in cases where a desire to appear egalitarian leads people to explicitly disavow stereotypic beliefs (Nosek, 2007; Nosek & Smyth, 2007). Thus, we can expect implicit gender stereotypes to operate even alongside strong explicit motivations to be unbiased. Given the salience of gender as social category and the ubiquity of implicit gender stereotypes, researchers have long tried to understand how such implicit associations shape men and women’s lives. In the current research, we focus on how implicit stereotypes (and specifically changes in them) shape self-concepts.

Balanced identity theory (BIT; Greenwald et al., 2002) provides a framework for understanding the cognitive processes by which implicit stereotypes can shape the implicit self-concept. As an extension of broader cognitive consistency principles (Heider, 1946; Festinger, 1957), BIT assumes that cognitions about ourselves are formed and informed by cognitions about our ingroups in a vast network of associations. Because implicit associations are thought to
operate separately from explicit beliefs and motivations, balanced identity theorists have proposed that especially implicit stereotypes can directly constrain the associations that are implicitly made to one’s own self-concept as a function of one’s gender identity (Dunham, 2013; Nosek et al., 2002). In other words, there should be an automatic tendency for associations between: 1) the self and the ingroup (implicit identity) and 2) the ingroup and an attribute (implicit stereotype) to form a balanced, non-contradictory network of cognitions with: 3) associations between the self and the given attribute (implicit self-concept). Figure 2-1 provides a visual representation of this model. Thus, if we have formed stereotypic associations about a group that is central to our identity, our self-concept should also, to some extent, become automatically associated with the ingroup stereotype to create cognitive balance. Consistent with this theory (though not framed as a test of BIT by the authors), past evidence shows that subtly activating a variety of social categories causes automatic alignment of the self-concept with the widely held cultural stereotypes of each group by increasing implicit identification with the activated group (Kawakami et al., 2012).

More direct tests of BIT rely largely on correlational evidence showing that women’s and girls’ implicit math and science self-concepts are predicted by their implicit gender stereotypes. Among samples of young girls (Cvencek et al., 2011), female undergraduates (e.g., Nosek et al., 2002), and working professionals (Smyth & Nosek, 2015; Block, Hall, Schmader, Inness, & Croft, 2018), studies consistently find evidence of implicit stereotypes associating math and science more with males than with females, even when such stereotypes are often rejected explicitly (e.g., Nosek et al., 2002). Consistent with BIT, scoring higher on these implicit gender stereotypes correlates with lower self-identification, engagement, and achievement in math and science among girls and women (Cvencek et al., 2015; 2014; Nosek et al., 2002; Nosek &
Smyth, 2011; Block et al., 2018). Notably, explicit math-gender stereotypes tend not to predict women’s identification with math and science in the same way, suggesting the importance of implicit processes (Nosek et al., 2002; Block et al., 2018).

Research examining how implicit gender stereotypes shape the self-concept has largely focused on the constraints faced by women; little to no research has sought to examine the implicit gender stereotypes that shape men’s self-concepts. On the one hand, some argue that men might self-stereotype less than women do. As members of the dominant group that represents the cultural default, their gender identity is argued to be less salient and could thus place fewer constraints on their self-concept (see Cadinu & Galdi, 2012 for an argument). However, there are also theoretical reasons to expect that implicit gender stereotypes should profoundly shape what qualities men associate with their self. Croft and colleagues (2015) argue that culturally-prevalent stereotypes linking communion more to women than to men might diminish men’s propensity to personally identify with communal values and roles. Recent research suggests the tendency to stereotype men as less communal than women has dramatically increased over the past 75 years in the United States, making it perhaps the strongest stereotype people have about how men and women differ (Eagly, Nater, Miller, Kaufmann, & Sczesny, 2019). Furthermore, men’s gender identity and the stereotypes that distinguish them from women might be particularly central to their self-concept given past work which documents the precarious nature of masculine identity (Vandello & Bosson, 2013). There is evidence, for example, that men are generally less likely than women to implicitly identify with feminine qualities such as being sentimental and romantic, but this work has not directly linked these implicit self-associations to extent to which participants held gender stereotypes (Cadinu & Galdi, 2012). In line with BIT, we hypothesize that among men, stereotypic implicit associations
between communal values and female should predict weaker implicit associations of communal values with their concept of self.

Evidence of this nature would extend balanced identity theory to better understand constraints on men’s implicit self-views, but a second, and perhaps more theoretically impactful, goal of the present research is to test the hypothesis that a change in men’s stereotypes would causally lead to a change in men’s self-concept. If implicit communal=female stereotypes prevent men’s implicit identification with communal values, then directly reducing such stereotypical associations could theoretically increase the integration of communion into men’s self-concept.

Recent evidence from large-scale studies suggests that stereotypical implicit associations can be at least temporally changed with several interventions (Lai et al., 2014; Forscher et al., 2019). Implicit attitudes (Ebert, Steffens, Stuelpnagel, & Jelence, 2009; Kawakami, Steele, Cifa, Phills, & Dovidio, 2008), implicit math-gender stereotypes (Forbes & Schmader, 2010), and implicit identification with racial groups (Phills, Kawakami, Tabi, Nadolny, & Inzlicht, 2011) have all been directly changed with associative training paradigms that do not target explicit beliefs of participants. Such “implicit retraining” paradigms change existing associations by repeatedly pairing concepts together to train the desired associations (e.g., math=female). Such initial success in retraining implicit associations raises important questions about other consequences that such changes might have for self-definition.

To date, the evidence that direct associative training of existing attitudes about our ingroups might have effects outside the concepts directly targeted by retraining is sparse.

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6 Note that there is currently some theoretical questions about what truly happens when we “change” implicit associations (Gawronski & Bodenhausen, 2006; Lai et al., 2016). This debate might be informed by our test of the hypothesis that implicit stereotype retraining can have an effect on a related cognition (self-concept in this case) suggesting effects that are meaningful beyond simply changing performance on the same stereotyping measure.
Collectively, there is currently little evidence on whether and when implicit stereotype change affects behavior (Forscher et al., 2019). More specific to the self-concept, one paper provided some initial evidence that training novel implicit attitudes about a novel (minimal) ingroup affected participants’ implicit self-esteem, but only when the new trained attitude was more positive than the initial one (Dunham, 2013). However, more recent evidence suggests that causal effects in line with BIT may also occur for implicit cognitions about existing groups. A collection of studies shows that participants who were trained to associate positive attributes with a racial outgroup were afterwards more likely to identify *themselves* with that outgroup (i.e., group identity was affected; Phillips, Kawakami, Krusemark, & Nguyen, 2017). Additionally, experimentally increasing identification with a social group (e.g., African Americans) reduces negative implicit attitudes participants held against that group (Fritzlen, Phillips, March, Grzanka, & Olson, 2020).

With the current research, we hope to take one further step in understanding the relationships between the malleability of stereotypes and the self through the lens of balanced identity theory. We ask whether direct associative training to shape more counter-stereotypical associations about an important *ingroup* (i.e., men = communal) leads to corresponding causal changes to men’s own self associations (i.e., self = communal). A well-powered study is needed to answer this question because theoretical arguments can be made both for and against expecting this effect. BIT would predict that true changes in implicit stereotypes about one’s ingroup should have an effect on stereotype-relevant components of the self-concept – being trained to associate communal = male should facilitate the association between me = communal among men. In contrast, some theorists argue that self-concepts are resistant to new information

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7 Note that BIT might also predict that changing a group=attribute stereotype could lead to change in me=group identification, rather than the me=attribute self-concept. Although this is theoretically possible, we expected that, at
in adulthood (Campbell et al., 1996; Demo, 1992) and evidence from cultural psychology suggests that as we enter early adulthood, we become increasingly less likely to incorporate cultural norms and stereotypes into our self-concept (Cheung, Chudek, & Heine, 2010). Together with evidence from one particular study that suggests that implicit self-concepts are harder to change than other implicit cognitions (Dunham, 2013), these perspectives might suggest that we should not expect a change in implicit self-concept in response to retraining stereotypes. While associative retraining is not likely to be used as a real-world intervention, it reduces the threat of confounding variables and demand-characteristics (Forbes & Schmader, 2010), thus making it an ideal method to address this theoretical question. To our knowledge, the work we present and propose here is the first to empirically address the competing predictions for this theoretical question.

Showing that stereotype retraining has a causal effect on men’s self-concept is the first step to testing our prediction. But to establish that implicit ingroup stereotypes have causal effects on one’s self-concept, it is further important to rule out simple priming effects as an alternative explanation by testing whether changes to men’s self-concept persist outside of the stereotype retraining session. The current evidence on the durability of changes in implicit cognitions is sparse and mixed (Lai et al., 2016; Forscher et al., 2019). A handful of past studies have found that implicit retraining paradigms and contact-interventions resulted in changed implicit cognitions that lasted several days (Olson & Fazio, 2006; Vezzali, Capozza, Giovannini, & Stathi, 2012). On the other hand, a recent comprehensive test of several brief interventions in an online paradigm showed that several manipulations led to significant changes in implicit race attitudes at first, but none of the changes lasted longer than a few hours (Lai et al., 2016). This least on average, men’s communal self-concept cognitions would be more malleable given that past research suggests that masculine identity is deeply engrained in men’s self-concept (e.g., Vandello et al., 2008).
study, though extremely large-scale, took place online, where distractions might be more prevalent than in a more controlled laboratory setting. Perhaps the study most closely related to our current work suggested that retraining women’s implicit math-gender stereotypes in the lab protected math engagement in a threatening situation one day later (Forbes & Schmader, 2010). Using a similar laboratory paradigm, where outside distractions can be controlled, our goal is to assess whether changes in implicit stereotypes result in changes in implicit self-associations that can be measured both immediately and one day later, after simple semantic priming (i.e.,

Despite presenting both communion and agency as categories in both conditions, it is possible that one condition primes the “communal = male” to be more salient, leading to a very temporary activation of this association that would not persist beyond the immediate setting) effects would have dissipated.

In addition to establishing that changes in implicit stereotypes lead to direct causal changes to the value self-concept, it is also important to understand to what extent such changes might have downstream consequences for identification with more concrete roles. Broadly speaking, the self-concept is the organizing structure of a collection of interrelated cognitions about the self (Banaji & Prentice, 1994; Baumeister, 1987; Greenwald, 1980). As such, any given part of our self-concept (e.g., our identification with communal values) is not isolated from other parts of the self-concept. While the communal value self-concept concerns identification with abstract concepts like “care”, it is also closely related to identification with more concrete communal roles (e.g., parent, nurse, teacher; Diekman et al., 2017; Block et al., 2018 (Chapter 3); Block et al., 2018b). Thus, balanced identity principles should apply for all closely related parts of the self-concept. In other words, effects on a particular part of our self-concept should also have downstream effects on other closely related parts of the self-concept (Greenwald et al.,
2002). Given that abstract values and more concrete role preferences are related parts of an individual’s self-concept (e.g., Diekman et al., 2017 for a review), changes in the former might also affect the latter, at least to some extent. To test this idea, we plan to examine whether retraining implicit gender stereotypes (with the consequence of increasing men’s communal value self-concept) also has downstream effects on participants’ association between their self and communal roles.

2.1.2 Overview of Current Research

In two completed preliminary studies and one key proposed study for pre-registration, the current research aims to examine the degree to which implicit gender/value stereotypes not only correlate with, but also causally shape men’s own implicit self-associations. Prior research has focused on assessing gender differences with explicit measures, which are susceptible to self-report biases (Nisbett & Wilson, 1977), especially when societal roles and prejudices are involved (Furnham, 1990; Fazio & Olson, 2003). Furthermore, explicit reports of stereotypic beliefs are often dissociated from measures of implicit associations (Nosek, 2005; Nosek, 2007). Study 1 begins by testing the simple hypothesis that men are less likely than women to implicitly associate communal (vs. agentic) values with the self (H1). In this study, we further hypothesized that these gender differences in an implicit value self-concept are larger among participants who hold stronger implicit communal=female stereotypes (H2). In Study 1, we also tested the hypothesis that implicit cognitions about gender, self, and values show the balanced interrelationships predicted by balanced identity theory (H3).

Study 2 then provides the first test of the key hypothesis that directly retraining men to have a stronger communal=male association (vs. communal=female) causally affects men’s communal self-concept (H4). A second, more exploratory, goal of Study 2 was to examine the
specificity of these effects to implicit associations, rather than participants’ explicit stereotypes and values. Finally, we propose a pre-registered report (Study 3) where we will test whether the retraining effects observed in Study 2 replicate (H4) and persist over a period of 24 hours (H5). Finally, we will assess whether stereotype retraining effects generalize to a related aspect of the self-concept – association of the self with communal roles such as nursing and teaching (H6a), as mediated by changes in communal value self-concept (H6b).

2.2 Study 2.1

2.2.1 Method

Participants

A sample of 228 undergraduates participated in a study on the “categorization of social stimuli” in exchange for course credit or $10. Our a priori goal was to collect data from approximately 115 men and 115 women, anticipating exclusions. Data from 40 participants were excluded due to computer error (n = 1), experimenter error (n = 4), or IAT error rates exceeding 20% on at least one of the three IATs (Karpinski & Steinman, 2006, Greenwald & Farnham, 2000; n = 34), resulting in a final sample of 188 (92 men, 96 women). Participants were on average 21 years old and identified predominantly as East Asian or Pacific Islander (58.8%), or Caucasian (19.1%). Psychology was the most common academic major (30.9%), followed by other science (29.8%), and arts majors (15.4%). No power analysis was conducted prior to this first study. A post-hoc sensitivity analysis conducted in G*power suggested that with our final sample of 188, we are able to detect a minimum gender difference of $d = .41$, and a slope minimum difference in regression analyses of $\Delta = .21$ (assuming standard deviations of 1 for each group, and the default .5 for the standard deviation of the residual) at 80% power, two-tailed.
**Procedure and Measures**

Participants were run in groups of 1-5 people, seated at individual computer stations. They first completed three separate standard Implicit Association Tests (IAT; Greenwald, Schwarz, & McGhee, 1998), ordered randomly. IATs assess the strength of automatic cognitive associations between pairs of concepts by measuring the time it takes to categorize words when paired categories are association-congruent, compared to when they are association-incongruent (Nosek, Greenwald, & Banaji, 2005). Each of the three IATs consisted of two training blocks, and four test blocks with 40 trials each. On each test trial, participants were instructed to judge as quickly and accurately as possible whether a stimulus word appearing in the center of the screen fits into one of two categories appearing at the top left, or into one of the two categories at the top right of the screen. Using scoring procedures recommended by Nosek, Greenwald, and Banaji (2003), $d$-scores were calculated to quantify the relative speed at which participants categorize words when the paired categories were stereotype-congruent (e.g., female & communal) vs. incongruent (e.g., male & communal). Stimuli for “gender: male vs. female” and “identity: me vs. not me” were taken from published sources (Nosek, Banaji, & Greenwald, 2002), and those for “values” were created for this task. To select value stimuli, we had a sample of 59 participants recruited from Amazon Mechanical Turk categorize 14 communal and 15 agentic words into “focus on self” vs. “focus on others”, and subsequently rate how hard each was to categorize. We had sourced these words from previous work on communal values (Trapnell & Paulhus, 2012), and gender differences in communal value and role preferences (Diekman et al., 2010). For each category, we selected the seven words showing the fewest categorization errors and rated as easiest to categorize. For an overview of all stimuli, see Table 1. To ensure that people understood the value categories, we defined communal values as a focus on helping others, connecting, and “getting along”; and agentic values as a focus on competence,
status achievement, and “getting ahead” before the beginning of the task. For both studies in this manuscript, all measures, manipulations, and exclusions in the studies are disclosed.

**Implicit gender identity.** For the critical trials of the gender identity IAT, participants categorized words into the categories of “Me” vs. “Not Me,” and “Male” vs. “Female”. Here, a $d$-score above zero indicates implicit male-identity, and a $d$-score below zero indicates female-identity.

**Implicit gender stereotypes.** For the critical trials of the implicit gender stereotype IAT, participants categorized words into the categories “Communal Values” vs. “Agentic Values”, and “Male” vs. “Female”. Higher $d$-scores indicate a stereotypical association of women with communal values, and men with agentic values.

**Implicit communal self-concept.** Finally, for the critical trials of the communal self-concept IAT, participants categorized words into the categories “Communal Values” vs. “Agentic Values,” and “Me” vs. “Not me”. Higher $d$-scores on this measure indicate a stronger implicit identification with communal (vs. agentic) values.

**Additional variables.** In addition to our main outcome variable we also measured a number of additional variables assessing participants’ explicit interest in future roles in Science, Technology, Engineering, and Math (STEM), as well as Healthcare, Early Education, and the Domestic sphere (HEED). These explicit measures of career interest were unrelated to implicit values and stereotypes.

**Demographics.** Participants self-reported standard demographics including age, gender, ethnicity, academic major, sexual orientation, religion, political orientation, and socioeconomic status.
2.2.2 Results

Gender Differences and Descriptive Statistics

We first tested the hypotheses that men and women would show: 1) implicit gender identity significantly different from zero (i.e., men showing a significant self = male association; and women showing significant self = female association), 2) implicit stereotypes significantly different from zero (i.e., on average participants would show a women = communal vs. men = agentic associations), and 3) that women would show a stronger implicit communal (vs. agentic) value self-concept (i.e., self = communal) than would men (H1). Because past research has only documented a gender difference in communal self-views using explicit self-report measures, and because men might be reluctant to present themselves in communal (i.e., feminine) ways (Ickes, Gesn, & Graham, 2000), it was important to first establish that this gender difference would exist on an implicit associative measure. Means, SDs, Cohen’s $d$ for gender differences, and results of independent samples t-tests assessing gender differences, as well as single sample t-tests against zero within gender, are summarized in Table 2-2.

Consistent with past research (e.g., Nosek et al., 2002), men ($M = 0.42, SD = 0.38$) and women ($M = -0.54, SD = 0.31$) showed a reliable implicit association of self with their own gender, $t$s $> 10.65$, $ps < .001$. Additionally, both men ($M = 0.37, SD = 0.41$) and women ($M = 0.42, SD = 0.34$) associated communal values more with females than with males (i.e., their implicit gender stereotypes differed significantly from zero), $t$s $> 8.65$, $ps < .001$, with no gender difference in this tendency, $t(186) = -0.92, p = .359$. Importantly, we also found evidence in support of H1: Mirroring past findings on explicit values (e.g., Diekman et al., 2017; Block et al., 2018b), men ($M = -0.31, SD = 0.49$) implicitly associated their self-concept less with communal (and more with agentic) values than did women ($M = -0.10, SD = 0.58$), $t(182.92) = -2.72, p =$
.007, \( d = -0.40, CI_{95} (-0.69, -0.11) \). Moreover, one-sample t-tests (against zero) within each gender suggested that men implicitly identified themselves with agentic values more than with communal values, \( t(91) = -6.13, p < .001 \), whereas women’s average implicit self-concept score was not significantly different from zero, \( t(95) = -1.67, p = .098 \). This latter result is akin to past studies showing that women from university samples tend to explicitly identify equally with communal and agentic values (e.g., Diekman et al., 2010).

**Implicit Gender Identity, Stereotypes, and Communal Values**

We hypothesized that the gender gap in implicit communal values would be predicted by the strength of one’s implicit gender stereotypes. That is, gender gaps in implicit communal values should be larger among those who have stronger communal = female stereotypes. To test this hypothesis, we conducted linear regression analyses examining how gender differences in implicit communal self-concept are moderated by implicit gender-value stereotypes (testing H2). To examine evidence for balanced associations among gender identity, gender stereotypes, and self-concept, we then carried out cognitive balance analyses (described below) with our three measures of implicit associations (testing H3).

**Are gender differences in communal values moderated by stereotypes?** To test H2, we regressed implicit communal self-concept (standardized) onto dichotomous gender (0 = male, 1 = female) and implicit stereotypes (standardized) entered on step 1, and their interaction entered on step 2 as predictors in a linear regression model. As hypothesized, this analysis yielded a significant participant gender by implicit stereotype interaction, \( \beta = .20, SE = .08, t(184) = 2.53, p = .012, CI_{95} (.04,.35) \). See Figure 2-2 for a visualization of this interaction. In line with H2, simple slopes analyses revealed that among those with strong implicit communal = female stereotypes (+ 1SD; IAT \( d = .77 \)), men associate themselves with communal values
significantly less than did women, $b = 0.74$, $SE = 0.20$, $t(184) = 3.73$, $p < .001$, CI95 (0.35, 1.13). In contrast, this gender difference in implicit communal value self-concept was not significant among those who did not show implicit gender-value stereotypes (-1SD; IAT $d = .02$), $b = 0.01$, $SE = 0.20$, $t(184) = 0.09$, $p = .931$, CI95 (-0.38, 0.42).

**Analyses of cognitive balance.** Our third hypothesis (H3) was that implicit cognitions about self, gender, and values would form a balanced triad. Greenwald et al. (2002) postulated that if three cognitions are balanced, it should be possible to predict each cognition from the interaction of the other two. In contrast to more typical regression analyses, balance analyses thus require adding the interaction of predictor variables A and B on Step 1, and *afterwards* adding the main effects of the two interacting components (A, B) on Step 2 of a linear regression analysis predicting variable C. This is repeated for each of the three variables (implicit gender identity, stereotype, and self-concept) as outcomes. Balance is indicated if, in all three models, the interaction term explains significant variance in the criterion, and no additional variance is explained by either of the main effects on Step 2 (Greenwald et al., 2002). Note also that these analyses are performed with unstandardized IAT scores, so that zero indicates no association and we report raw regression coefficients to better interpret these analyses (Aiken & West, 1991).

Results from these analyses are summarized in Tables 2-3 and 2-4s and Figure 2-3. In all three analyses (predicting implicit communal self-concept, implicit gender stereotypes, and implicit gender identity), the interaction of the two predictors is significant on Step 1 and Step 2. In addition, the individual predictors did not explain additional variance when added to the

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s Balanced identity analyses on gender identity traditionally collapse across men and women without controlling for dichotomously reported gender. Reported gender and implicit gender identity are highly correlated, $r = .81$, $p < .001$. Exploratory analyses provide no indication that implicit gender identity predicts communal values as moderated by implicit stereotypes over and above dichotomous gender, however statistical power is very low for these tests.
model in Step 2. These results provide evidence that participants’ implicit associations between concepts of self, gender, and communion/agency are significantly cognitively balanced.

2.2.3 Discussion

Results from Study 1 showed that, as predicted, men tend to implicitly associate their self with communal values less than do women. These results also supported our hypothesis that differences in the extent to which men and women themselves implicitly identify with communal (vs. agentic) values are predicted by the extent to which individuals automatically associate communal (vs. agentic) values more with women (vs. men). These results are consistent with the broader theory that internalizing value-based gender stereotypes may constrain men’s communal self-concept (Croft, Schmader, & Block, 2015), and extend evidence for balanced identity beyond findings on math-gender stereotypes predicting women’s math self-concept.

A key limitation of Study 1, as with much past research on balanced identity and self-stereotyping, is that correlational methods do not allow for causal inferences. Although we theorize that implicit communal=female stereotypes prevent men from associating communal values with the self, another possibility is that implicit gender-value stereotypes simply result from inferences men and women make based on their own personal values. For example, boys and girls could be differentially socialized to behave in agentic and/or communal ways, and through false consensus processes, generalize inferences from their own behavior to the gender category they identify with more broadly (i.e., if men are personally less communal than most women they meet, they begin to associate communion more with women than with their own gender). Moreover, even if internalizing implicit gender stereotypes directly causes gender differences in self-concepts in the long-term, it remains an important theoretical question
whether changing implicit stereotypes would have an immediate effect on men’s self-concept (even temporarily).

The only indirect evidence suggesting that changes in implicit associations with a social group can affect the self-concept comes from recent research on identification with racial outgroups discussed earlier (Phills et al., 2017; Fritzlen et al., 2019). Evidence from cultural psychology suggests that self-concepts develop in accordance with cultural stereotypes and norms. However, this research also tends to find that self-concepts are less malleable to cultural context in adults than in children (Cheung, Chudek, & Heine, 2010). Thus, it remains unclear whether immediate changes in ingroup stereotypes affect adults’ self-concepts. Study 2 thus utilized an association retraining paradigm (Ebert, Steffens, Stülpnagel, & Jelenec, 2009; Forbes & Schmader, 2010) to experimentally reduce (vs. reinforce) implicit gender-value stereotypes and examine the effect on men’s implicit value self-concept. We were centrally interested in providing the first test of the hypotheses that changes in implicit stereotypes would lead to changes in implicit self-concepts in ingroup members. Given this theoretical focus, having two well-powered conditions seemed to be favorable over adding a third no-training control condition. We thus focused on training maximally different stereotypes between conditions by implementing one condition with stereotypical (communal=female and agentic=male) training compared another condition with counter-stereotypical (communal=male and agentic=female) training (a strategy that we propose maintaining for Study 3).

Additionally, Study 2 explores the extent to which implicitly retraining male participants to associate communion with men would affect their explicitly reported stereotypes and values. Given a general lack of relationships between implicit stereotypes and any explicit measures in Study 1, we had no clear expectations about such effects. Past research has shown that implicit
and explicit measures are often dissociated (Fazio, Jackson, Dunton, & Williams, 1995; Nosek, 2005), with implicit associations rooted in associative learning and memory systems, whereas explicit beliefs are rooted in more conscious reasoning (Amodio & Berg, 2018; Gawronski & Bodenhausen, 2011; 2006; 2014). Implicit stereotypes should then be directly targeted by retraining individuals’ associative structure (Gawronski & Bodenhausen, 2006) or associative memory (Amodio & Berg, 2018). Explicit stereotype change need not follow such changes in associative connections. Indeed, past studies on associative training report changes in implicit but not explicit attitudes (e.g., Olson & Fazio, 2006). However, the associative-propositional evaluation (APE) model posits that explicit attitude change can sometimes follow implicit associations change if associations are changed sufficiently (Gawronski & Bodenhausen, 2006). In Study 2, we specifically target implicit gender stereotypic associations by retraining associations between values and gender without any explicit messaging to participants. It is unclear whether, in this instance, associative training will also change propositional processes. As an exploratory secondary question, we thus tested whether the effects of retraining would be unique to implicit values or would extend to explicit stereotypes and values as well.

2.3 Study 2.2

2.3.1 Method

Participants

We recruited 152 undergraduate men for “a study on classic videogames” for course credit or $10. We excluded 23 participants ($n = 2$ not identifying as male; $n = 21$ with $> 10\%$ of reaction times below 300 ms and/or $> 30\%$ errors on the Brief Implicit Association task (bIAT), based on current recommendation for this task; Nosek, Bar-Anan, Sriram, Axt, & Greenwald,
leading to a final sample of 129 (mean age = 20.57). Our data collection goal of 128 usable participants was determined with G*power by estimating a medium effect size in a two-cell design ($d = .50$), and with 80% power. The sample was predominantly East Asian (33.3%), Caucasian (30.2%), or South East Asian (20.9%), and mostly came from psychology (31.4%), other arts majors (15.5%), or science majors (24.0%).

**Procedure**

All participants were introduced to the study by a female experimenter, and completed the procedure on an individual computer station in a room with 1-5 participants. Participants were randomly assigned to one of two retraining conditions consisting of a modified IAT modelled after Forbes and Schmader (2010). Participants first completed two blocks (20 trials each; counter-balanced) familiarizing them with categorizing words into the target (“Men” vs. “Women”) and attribute categories (“Communal Values” vs. “Agentic Values”). They then completed four retraining blocks with 40 trials each, where they were randomly assigned to see target and attribute categories paired together in stereotype-congruent (*stereotypic training condition; n = 57*) or stereotype-incongruent pairings (*counter-stereotypic training condition; n = 72*). See Figure 2-4 for a schematic of this set-up. Stimuli used in this retraining can be found in Table 2-1. To divert participants from the true purpose of the task and add some delay, all participants next played a browser-version of Tetris for 5 minutes. After this, they completed implicit and explicit measures of their own values (in randomized order), followed by other explicit measures in the order described below.

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9 All significant condition differences remain significant when these participants are included.
Measures

Implicit communal self-concept. To avoid considerable method-overlap between our retraining task and the dependent variable, we measured participants own implicit communal self-concept – our key dependent variable – with a brief Implicit Association Task in this study (bIAT; scored according to Nosek, Bar-Anan, Sriram, Axt, & Greenwald, 2014; Sriram & Greenwald, 2009). Similar to the standard IAT, each trial of a bIAT task requires participants to categorize a word appearing in the middle of the screen using the “E” or “I” key. Instead of showing two category pairings on each side of the screen, however, the bIAT presents only one category pairing (one focal target and one attribute category) on the top-center of the screen. On each trial, participants decide whether the word displayed on the screen fits into one of the displayed focal categories or not. Participants completed one practice block, categorizing words from only the “focal” category, “Me” (vs. “Not me”, 20 trials), and four test blocks (20 trials each). In two test blocks (order randomized), the focal “Me” category was paired with “Communal Values” (vs. “Agentic Values) on top of the screen, consistent with a communal self-concept. In the other two blocks, the focal “Me” category was paired with “Agentic Values”. We shortened the list of stimuli from Study 1, to better fit the bIAT format (See Table 2-1). Following Nosek et al., 2014, the final score of implicit communal value self-concept is computed by taking the difference between the average response latencies of two types of blocks, and dividing it by their standard deviation across the blocks. As in Study 1, scores above zero indicate that a participant was faster to respond when “communal values” was paired with “Me” than when “agentic values” was paired with “Me”, thus representing a more communal than agentic self-concept.
**Explicit communal self-concept.** To assess explicit value identification, participants rated how personally important 13 communal (e.g., helping, intimacy; $\alpha = .91$) and 12 agentic values (e.g., competition, power; $\alpha = .85$; combined from Diekman et al., 2011; Trapnell & Paulhus, 2012) were to them on a seven-point scale, ranging from “1 = Not at all important” to “7 = Extremely Important”. Averages for each type of value were created separately ($r = .11$, $p = .229$) and then subtracted from each other, so that positive numbers correspond to a more communal than agentic self-concept (and negative numbers correspond to a more agentic than communal self-concept) to match implicit measure scoring.

**Explicit stereotypes.** To assess the extent to which participants were aware of associating communal and agentic values with women (rather than with men), participants rated the extent to which they believed that: 1) communal values, and 2) agentic values are more important to women than to men (1 = “these values are more important to men” to 7 = “these values are more important to women”), as well as the extent to which they associated: 3) communal values, and 4) agentic values more with women vs. men (1 = “I strongly associate them with men”, to 7 = “I strongly associate them with women”). To make zero on the scale as more clearly interpretable as a lack of stereotypes, we re-scaled these items to scores ranging from -3 (lowest gender-stereotyping) to +3 (strongest gender stereotyping). To provide a measure of explicit gender stereotypes comparable to IAT scores, we then averaged these 4 items ($\alpha = .73$), so that numbers above zero indicate an explicit communal=female (and agentic=male) stereotype and numbers below zero indicate the opposite.
2.3.2 Results

Does Retraining Communal Gender Stereotypes Increase Communal Self-Concept?

To test our primary hypothesis that retraining men to associate communal values with “male” (vs. “female”) would increase the degree to which they incorporate communal values into their implicit self-concept, we conducted an independent samples t-test to compare scores between the two conditions. In line with our key hypothesis, those men who completed the counter-stereotypically retraining implicitly associated the self with communal values significantly more than those who completed the stereotypical retraining, $t(127) = -3.50$, $p = .001$, $d = .61$, CI.95 (-0.96, -0.25). See Table 2-5 for correlations and condition differences for key variables.

Does Implicit Retraining Affect Explicit Stereotypes and Values?

As the retraining was devised to change implicit gender stereotypes about values, we had no clear expectation that such a subtle retraining would affect men’s explicit values and stereotypes. Implicit communal self-concept was positively correlated with explicit communal self-concept ($r = .24$, $p = .007$), providing convergent validity for our individual difference measure of implicit value self-concept. Yet, independent samples t-tests yielded no significant effect of retraining on either explicit values or explicit stereotypes, all $t(127)s < 0.50$, $ps > .620$. Taken together, these results suggest that whereas retraining implicit gender stereotypes significantly affected men’s implicit self-concept, there was no clear evidence that it similarly affected explicitly endorsed gender stereotypes or values, consistent with other dual process accounts on the distinctions between explicit and implicit cognitions (e.g., Fazio, 1990).

Do Explicit Stereotypes Predict Communal Self-Concept?

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10 Since explicit and implicit stereotypes were counterbalanced, we tested for but did not find order effects, all $F$s < 0.67, $ps > .41$. 

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Study 1 found that participants held significant implicit gender stereotypes about values, which predicted gender differences in implicit communal self-concept. We next explored whether participants would report such stereotypes explicitly, and whether these explicit stereotypes would predict implicit and/or explicit value self-concept. We first assessed the extent to which men explicitly reported stereotypes about values with one-sample t-tests against the midpoint of the scale (0). Similar to implicit gender stereotypes in Study 1, results showed that men in our sample explicitly rated communal values as being significantly more associated with women (and agentic values as more associated with men), $M = 0.68, SD = 0.65, t(128) = -11.96, p < .001$. In line with past evidence showing that explicit math-gender stereotypes do not predict women’s math self-concept (Nosek et al., 2002), correlational analyses (see Table 2-5) revealed no evidence that these explicit stereotypes predicted either men’s explicit or implicit communal (vs. agentic) self-concepts.

2.3.3 Discussion and Proposed Preregistered Study 3

Study 2 is, to our knowledge, the first to directly test whether retraining implicit stereotypes about one’s ingroup has a measurable effect on one’s implicit self-concept – in this case men’s own identification with communal values. Compared to men trained with the existing communal=female stereotype, men who were trained to associate communion with male showed a stronger implicit association between their self-concept and communal (vs. agentic) values. In addition, Study 2 provided greater convergent validity that this novel implicit measure of communal self-concept is related to explicit endorsement of communal (vs. agentic) values. And yet, retraining implicit stereotypes did not have a parallel effect on men’s self-reported communal values. Taken together, these findings provide important initial evidence that
prevalent communal=female stereotypes could causally prevent men’s personal identification with communal values.

At a more basic level, these findings also provide novel evidence that changes to a specific implicit association in a balanced system of interconnected cognitions can cause changes to another association in the system. More concretely, our findings suggest that when we associatively retrain an implicit stereotype about an ingroup, we incorporate these changes, at least to some extent, into implicit cognitions about ourselves. Whereas these findings are generally in line with principles put forward by BIT (Greenwald et al., 2002) and self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), little empirical evidence thus far has pinpointed the causal nature of the relationship between automatic ingroup stereotypes and self-concepts. The immediate effect of changing stereotypes on men’s self-concepts in Study 2 not only provides novel evidence that ingroup stereotypes causally shape our self-concepts, but further suggests that our self-concepts remain responsive to changes in ingroup stereotypes in real-time in early adulthood, rather than being shaped by social cues, like stereotypes, mainly in a sensitive period during childhood and adolescence (e.g., MacDonald, 1985, Cheung et al., 2011). Given the theoretical and practical impact of these novel findings, the first goal for the proposed Study 3 is to closely replicate the stereotype retraining effect on the implicit self-concept in a peer-reviewed and publicly pre-registered study. Specifically, we will repeat the procedures used in Study 2 with a new sample of men recruited from the same population.

Our pre-registered report further seeks to answer important theoretical questions that cannot be answered by simply replicating Study 2. The second goal of our pre-registered study is thus to examine whether this retraining effect persists beyond the session where the retraining
occurs. This is an important extension of Study 2 for two reasons. First, a longer delay between retraining and the dependent variable can more effectively rule out an alternative explanation that stereotype retraining only momentarily activates a specific category or an association between categories that transfers effects to the self-concept IAT (i.e., semantic priming explanation), but do not reflect an actual change in the implicit self-concept. More broadly, the durability of changes in implicit cognitions is currently a hotly debated topic (e.g., Lai et al., 2016; Forscher et al., 2019). It is practically valuable to understand whether short stereotype retraining interventions have any potential to impact on implicit self-concepts beyond a single session. Thus, a key goal of the proposed study is to examine whether effects of implicit stereotype change on men’s self-concepts are still observable one day after retraining. We specifically chose this delay because past research provides some precedent for similar implicit stereotype retraining affecting math engagement after a 24-hour delay (Forbes & Schmader, 2010).

As a third goal of this proposed study, we seek to examine whether retraining a stereotype about a specific value not only affects the implicit self-association to that value, but also increases the self-association to roles that would afford that value. In particular, we have designed Study 3 to examine whether changes in men’s communal value self-concept (that are hypothesized to result from stereotype retraining) will also lead to changes in their implicit identification with communal roles. Mirroring gender differences in communal values, men express less interest in pursuing communal roles (like nurse or kindergarten teacher) than do women (Croft, Schmader, & Block, 2015 for a review). A wealth of recent research using explicit measures has documented a relationship between self-reported endorsement of communal values and interest in communal careers (in healthcare, early education, and the
domestic sphere; collectively referred to as HEED; Croft, Schmader & Block, 2015; Block et al. 2018a; 2018b) vs. identification with less communal (and more agentic) careers (in science, technology, engineering, and math; collectively referred to as STEM; Diekman et al., 2017 for a review). It is not known whether implicit stereotypes and values are similarly related to implicit identification with concrete roles. However, given the theoretical understanding of networks of related implicit cognitions and these past findings on explicit career interest, we expect that changing communal value stereotypes should have downstream effects on men’s communal role self-concept. Specifically, we predict that, after being trained to associate men as a group (and as a consequence, themselves) with communal values, men should also be more likely to implicitly identify with communal roles (e.g., kindergarten teacher). If this hypothesis is supported, these findings could lay important groundwork for future studies to examine the role of these implicit associations in guiding people’s implicit role preferences in ways that are distinct from their explicit goals and interests.

2.4 Study 2.3

2.4.1 Method

Participants

As in Study 2, we will recruit male undergraduate students to participate in the study for course-credit or a payment of $10 per hour. Although the experimental effect of stereotype retraining on self-concept in Study 2 was large ($d = .61$), we designed Study 3 to be able to detect an estimated effect of $d = .37$ (40% smaller than the original effect) given the introduction of a 24-hour delay, as well as an additional measure of communal roles. G*power suggests a minimum sample of 252 participants to detect such a small to medium effect in an independent sample t-test ($d = .37$, 90% power, alpha = .05, one-tailed). To allow for exclusions based on
error rates estimated using Study 2 (ca. 15%), we plan pre-register recruiting a sample of 300 participants. The same exclusion criteria as in Study 2 will be applied – participants who do not explicitly identify as male, and participants with > 10% of reaction times below 300 ms and/or > 30% errors on either of the two bIATs (based on current recommendation for this task, Nosek, Bar-Anan, Sriram, Axt, & Greenwald, 2014) will be excluded from all analyses. Based on the rate of recruiting male undergraduate students in previous studies at our institution, we estimate that it will take ca. 12 months to collect this sample.

Procedure

**Session I.** As was the case in Study 2, male participants will be run in groups of up to four participants in individual cubicles on two consecutive days (referred to as Session 1 and Session 2). Session 1 represents a direct replication of the procedure of Study 2, which begins with random assignment of each subject to one of the two retraining conditions (stereotypical vs. counter-stereotypical) followed by a distractor task (playing 5 minutes of a browser-version of Tetris). Afterward, participants will complete the original measure of implicit communal value self-concept followed by a new measure of communal role self-concept. Lastly, participants will complete measures of explicit value self-concept and explicit value-gender stereotypes, which will be counter-balanced in order.

**Session II.** On the following day (i.e., within 72 hours of the first sessions), participants will be asked to return to the lab, where they will again complete measures of implicit communal value self-concept and communal role self-concept (also in a fixed order), followed by measures of explicit value self-concept, and explicit value-gender stereotypes (also in a counter-balanced order). At the end of session II, participants will be thoroughly debriefed and compensated.
Measures

**Implicit value self-concept.** Implicit communal value self-concept will be measured with a bIAT identical to that used in Study 2.

**Implicit role self-concept.** A second bIAT will assess participants’ implicit communal role self-concept – the extent to which men in our sample associate the self with communally focused careers like “registered nurse” vs. agentically focused careers like “corporate lawyer”. This newly developed bIAT has the same general setup as the value self-concept bIAT. What differs in this bIAT is that the focal value categories are replaced with career categories. To avoid simple semantic mapping by using the words “communal role” and “agentic role”, we chose the focal category labels “Pro-Social Careers” (stimuli: Registered Nurse, Kindergarten Teacher, Special Education Teacher, Speech Therapist) and “Enterprising Careers” (Stimuli: Project Supervisor, Business Consultant, Finance Manager, Corporate Lawyer). In two of the four test blocks (order randomized), the focal “Me” category will be paired with “Pro-Social Careers” on top of the screen, consistent with a communal role self-concept. In the other two blocks, the focal “Me” category will be paired with “Enterprising Careers”. Following Nosek et al. (2014), the final score of implicit communal value self-concept is computed by taking the difference between the average response latencies of two types of blocks, and dividing it by their standard deviation across the blocks. This means that scores above zero indicate that a participant was faster to respond when ‘Pro-Social Careers’ (i.e., communal roles) were paired with ‘Me’ than when ‘Enterprising careers’ (i.e., agentic roles) were paired with ‘Me’, thus representing a more communal than agentic role self-concept.
**Development and Piloting.** To create this novel brief IAT to measure implicit role self-concept, we had to select both category labels for communal and agentic careers that participants would see, and career stimuli clearly fitting into these categories to enable easy categorization by participants. To avoid confounding our two IATs by using the words “communal” and “agentic” again in this new task, we selected category labels based on how Holland categorizes careers in the widely used RIASEC model of career types (1977; 1979). Stimuli for communal roles were taken from previous research showing that endorsing communal values predicts higher interest in these communally-oriented careers specifically (Block et al 2018a; 2018b). Stimuli for “Enterprising Careers” were selected from several lists of high-status careers of this type in Holland’s model. We piloted the first draft of this measure on a convenience sample of 103 undergraduate women, who completed both this new measure as well as the familiar measure of implicit value self-concept. This initial pilot study led us to exclude two careers from our initial list (“Chief Executive Officer” and “Social Worker”) in order to increase the correlation of the implicit stereotype measures with communal value self-concept from $r = .23, p = .018$ to $r = .27, p = .006$, which increased our confidence of the construct validity of the new measure.

Next, to better ensure that this new measure of implicit communal role self-concept: a) was related to our existing measure of implicit value self-concept, in men specifically, and b) showed construct validity by correlating with an explicit measure of career preference, we ran a second pilot study on Amazon Mechanical Turk, collecting a sample of 128 men who completed the study for a payment of $1.50. An additional 61 participants were excluded for failing at least one of four attention checks embedded in the survey and/or showing more than 30% errors on the implicit tasks. Participants completed the measure of implicit value self-concept (as described in Study 2), followed by the new communal role self-concept bIAT (as described
above). Afterwards, participants completed a measure of “explicit communal vs. agentic career preferences”. In this measure, participants completed 16 trials, each of which asked them to consider “which career would you rather take on?” with one of the communal careers and one of the agentic careers as the forced-choice options. This explicit measure used the same career stimuli as in the role bIAT. The total number of communal careers chosen out of 16 (i.e., on a possible scale of 0 to 16) was used as measure of “explicit “communal vs. agentic career preference”.

Exploratory analyses examined the means, standard deviations, and correlations for the new implicit communal role self-concept measure with the other measures in the pilot (see Table 2-6). These pilot data suggested that, as expected, there was a medium-sized and significant positive relationship between implicit communal values and implicit role self-concept, \( r = .24, p = .007 \). In addition, our new measure of implicit communal role self-concept was also positively related to explicit communal (vs. agentic) career preference, \( r = .23, p = .009 \). Thus, the findings from our pilot studies yield evidence for the validity of our new implicit communal role self-concept measure.

**Explicit measures.** Explicit values will be measured similar as in Study 2, with one minor improvement. For better correspondence with the implicit value self-concept measure, explicitly rated items will now only include the exact five communal (helping, humanity, empathy, compassion, caring) and five agentic values (self-promotion, superiority, wealth, success, power) used in the bIAT. Similarly, our explicit gender stereotype measure will be improved by having participants rate the same five communal and five agentic values on the extent to which they associate them more with men or women (1 = strongly associated with women to 7 = strongly associated with men). As in the other Study 2, these items will be
rescored onto a -3 to +3 scale, so that numbers above zero indicate an explicit communal=Female and agentic=male stereotype, and negative numbers indicate the opposite explicit stereotype.

**Demographics.** As in other studies, participants will complete a standard demographic questionnaire including their age, gender, major, political orientation, etc.

### 2.4.2 Proposed Analyses and Hypothesized Results

**Key Hypothesized Condition Differences**

Given that our key hypotheses for Study 3 (H4, H5, H6a) are clearly directional and derived from both theory and results from Studies 1 and 2, we will use one-tailed $p$-values < .05 as our criteria for statistical significance unless otherwise specified.

**Implicit value self-concept.** To examine the effects of implicit stereotype retraining on men’s implicit communal value self-concept, we will conduct two independent sample t-tests. To replicate Study 2, our primary preregistered hypothesis (H4) concerns the effect of condition at Time 1 (i.e., the effect that is the basis for the power analysis for the study). More precisely, we hypothesize that men in the counter-stereotypical retraining condition (communal = male training) will show a significantly stronger implicit communal value self-concept than men who were trained to stereotypically associate communal = female. An independent samples t-test will thus implicit value self-concepts between conditions at Time 1. Next, we plan to examine evidence for the hypothesis that this effect of retraining on the implicit value self-concept persists one day later at Time 2 (H5). To test this, we will compare implicit value self-concept at Time 2 between conditions with another independent samples t-test. If the retraining has an effect on the self that is at least somewhat durable and distinct from temporary priming, we
would expect this pattern to replicate at Time 2, though condition differences may be smaller compared to Time 1.

Though not central to our hypotheses, exploratory follow-up analyses will be run to ascertain whether effects of retraining condition are significantly different in strength at Time 1 than they are at Time 2. To examine this, we will run a 2 (between: retraining condition) x 2 (within: timepoint) mixed model, with implicit communal value self-concept as an outcome. Here, we will specifically examine and report the condition by timepoint interaction effect. If significant, we will report the effect for condition differences at the two time points, as well as the simple paired sample t-tests for change over time within each condition.

**Implicit role self-concept.** To test H6a, effects of retraining on role self-concept will be similarly tested with independent samples t-tests at each timepoint. Similar to communal value self-concepts, we predict that those men who were counter-stereotypically trained to associate communion=male should show a significantly stronger implicit identification with communal (vs. agentic) roles, like teacher or nurse, than those in the stereotypic training condition who were training to associate communion=female. We primarily hypothesize that this effect will be observed at Time 1, but will also test whether it exists at Time 2.

As with communal value self-concept, a parallel 2 (between: retraining condition) x 2 (within: timepoint) mixed model, with communal role self-concept as outcome, will explore a possible condition by timepoint interaction. As above, we will also examine and report the condition by timepoint interaction for exploratory purposes. If the interaction is significant, we will report the effect for condition differences at the two time points as well as the simple paired sample t-tests for change over time within each condition.
**Explicit Measures.** Additional independent samples t-tests, as well as mixed models, with explicit communal self-concept and explicit gender stereotypes as outcomes will be run on an exploratory basis. Thus, for all tests on explicit measures we will used two-tailed \( p \)-values as criteria for statistical significance. Given the lack of effects of retraining on explicit measures in Study 2, we have no hypotheses about effects of retraining on these variables. If retraining of implicit stereotypes affects balanced cognitions only on the implicit level, we may see no significant effects of retraining on explicit measures. On the other hand, given past theory suggesting that changes in implicit associations can inform new propositional beliefs (Gawronski & Bodenhausen, 2011; Sritharan & Gawronski, 2010), it is possible that the increased power in this new study could allow us to detect small effects of stereotype retraining on explicit stereotypes or value self-concepts, either immediately, or after a one-day delay that allows greater opportunity for memory consolidation.

**Exploring Indirect Effects of Stereotypes on Role Identification**

We will run exploratory mediation analyses to discern to what extent changes in implicit value self-concept as consequence of stereotype retraining directly account for any observed changes in implicit role self-concept. These hypotheses are more exploratory because it is unclear whether stereotype change would affect role self-concept only through changes in value self-concept. Specifically, our exploratory hypothesis 6b states that there should be an indirect effect of retraining condition on communal role self-concept as mediated through changes in communal value self-concept (within a timepoint). Because this hypothesis presupposes an existing direct effect of retraining on implicit value self-concept, we will only test H6b if effects of condition on value self-concept are significant at the corresponding timepoint. To test this hypothesis, we will conduct mediation analyses in the SEM framework using the lavaan package.
in R (Roessel, 2012). Two parallel mediation models will test this hypothesis, with a separate model for each timepoint (Model 1 includes condition, Time 1 value self-concept, and Time 1 role self-concept; and Model 2 includes condition, Time 2 value self-concept, and Time 2 role self-concept. Each of these models will test whether condition (IV) predicts communal value self-concept (a-path), which in turn predicts communal role self-concept (b-path). The indirect effect of these two paths (a*b) will then be estimated in the SEM framework.

2.5 Preliminary Summary

Can changing implicit stereotypes about an ingroup lead to changes to group members’ self-concepts? With evidence from two existing studies and a proposed pre-registered report, we aim to examine the extent to which weakening implicit gender stereotypes that associate communion more with women than with men can result in an increase in men’s communal self-concept. In Study 1, we found evidence that both male and female participants tend to associate communal values more with women than with men (and agentic values more with men than with women). In line with our predictions, we also found an overall gender difference in implicit communal values self-concept that is moderated by implicit stereotypes – men have less communal (and more agentic) implicit self-concept than women have, but only among those who hold strong implicit communal=female stereotypes. To expand upon this correlational evidence, Study 2 sought to provide evidence that directly retraining existing communal=female stereotypes can increase men’s own communal value self-concept. Results from this study revealed that men who were trained to associate communal values with their ingroup (compared to those trained to stereotypically associate communal values with women) exhibited a significantly stronger implicit communal (vs. agentic) self-concept. This study provides some evidence for the theoretical proposition that subtle retraining of implicit stereotypes about an
ingroup can have direct consequences for ingroup members’ self-concepts. Replicating and building on this evidence by adding a well-powered pre-registered study would have theoretical significance as well as practical implications for future research.

Our proposed package of studies addresses important theoretical questions about the consequences of retraining implicit stereotypes about an ingroup. Past research provides some evidence that holding strong implicit gender stereotypes is correlated with more gender-stereotypical self-concepts for women and girls in the STEM context (e.g., Cvencek et al., 2015; Nosek et al., 2002; Nosek & Smyth, 2011; Block, Hall, Schmader, Inness, & Croft, 2018). This correlational evidence, however, leaves an important question open: Can implicit self-concepts change as the consequence of retraining implicit stereotypes about an ingroup? Some evidence suggesting that the self becomes less sensitive to external inputs as we age (e.g., Cheung et al., 2011), and may generally be hard to change (Dunham, 2013), speaks against this possibility. In contrast, balanced identity theory – the basis for our hypotheses – would predict that changing men’s stereotypes about their ingroup should lead to corresponding changes in self-concept. It is important that a high-powered replication study tests this prediction.

In addition to replicating Study 2’s initial evidence that retraining stereotypes can affect the implicit self-concept, our proposed Study 3 would extend the current theoretical understanding of how implicit stereotype change affects the self. First, testing effects after a delay will reveal the durability of the effect beyond what in-session priming might explain. Second, our proposed Study 3 will also provide some answers about the potentially broader downstream consequences of changing an implicit stereotype. Specifically, we ask whether retraining stereotypes about a specific domain (here communal vs. agentic values) not only affects the self-association to those values, but also to roles that would be afforded by those
values (communal vs. agentic careers). Given these theoretical and practical considerations, our proposed Study 3 represents an excellent candidate for a registered report.

Practically, understanding constraints to men’s identification with communal values and roles is an important issue. There has been a recent renaissance in research on the importance of communality. This research shows that focusing on communal values by connecting with and caring for close others is fundamental to what it means to be human (Ko et al., 2020) and greatly benefits our well-being (Le et al., 2018). Men, however, tend to identify less with communal values and roles than do women, potentially leading men to miss out on the benefits of communality (Croft et al., 2015). It is thus important to understand what role, if any, stereotypes might play in constraining men’s development of a communal self-concept. Whereas we do not see implicit retraining as a practical intervention to be scaled, the work we present here will contribute to our emerging understanding of how implicit gender stereotypes shape men’s self-concepts and how changing such stereotypes might make men more receptive to communal values and roles.
Table 2-1

IAT Stimuli by Category.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Me</th>
<th>Not me</th>
<th>Communal Values</th>
<th>Agentic Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>I,</td>
<td>they,</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
<tr>
<td>brother,</td>
<td>I,</td>
<td>they,</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
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<td>father,</td>
<td>I,</td>
<td>they,</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
<tr>
<td>uncle,</td>
<td>I,</td>
<td>they,</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
<tr>
<td>grandmother,</td>
<td>I,</td>
<td>they,</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
<tr>
<td>him,</td>
<td>I,</td>
<td>theirs</td>
<td>helping,</td>
<td>wealth,</td>
</tr>
<tr>
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<td>I,</td>
<td>their,</td>
<td>helping,</td>
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<td>I,</td>
<td>their,</td>
<td>helping,</td>
<td>wealth,</td>
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<td>sister,</td>
<td>me,</td>
<td>them,</td>
<td>humanity,</td>
<td>self-promotion,</td>
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<td>me,</td>
<td>them,</td>
<td>humanity,</td>
<td>self-promotion,</td>
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<td>me,</td>
<td>them,</td>
<td>humanity,</td>
<td>self-promotion,</td>
</tr>
<tr>
<td>her</td>
<td>me,</td>
<td>them,</td>
<td>humanity,</td>
<td>self-promotion,</td>
</tr>
</tbody>
</table>

*Note.* Words in italics were also used in the narrower set of stimuli for Study 2 and Study 3.
<table>
<thead>
<tr>
<th>Implicit Gender Identity</th>
<th>Men: One Sample t-test Against 0</th>
<th>Women: One Sample t-test Against 0</th>
<th>Independent Samples t-test of Gender Differences</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>t</td>
<td>df</td>
</tr>
<tr>
<td>Implicit Gender Identity</td>
<td>0.42 (0.38)</td>
<td>10.66</td>
<td>91</td>
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<tr>
<td>Implicit Gender Stereotype</td>
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<td>91</td>
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<td>Implicit Communal Self-Concept</td>
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<td>-6.13</td>
<td>91</td>
</tr>
</tbody>
</table>

Note. 1 Numbers above zero indicate a stronger identification with male than female, while numbers below zero indicate a stronger identification female than male. 2 Higher numbers indicate a stronger association of communal=women and agentic=male, 3 Higher numbers suggest a stronger association of the self with communal values vs. agentic values.
### Table 2-3

*Summary of Balance Analyses.*

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Outcome: Implicit Communal Self-Concept</th>
<th>Outcome: Implicit Gender Stereotypes</th>
<th>Outcome: Implicit Gender Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction of Other Two Measures</td>
<td>$b$</td>
<td>$SE$</td>
<td>$t$</td>
</tr>
<tr>
<td>-0.42</td>
<td>0.11</td>
<td>3.81</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Change in $R^2$</td>
<td>$\Delta R^2 = .072, F(1, 186) = 14.49, p &lt; .001$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Outcome: Implicit Communal Self-Concept</th>
<th>Outcome: Implicit Gender Stereotypes</th>
<th>Outcome: Implicit Gender Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction</td>
<td>$b$</td>
<td>$SE$</td>
<td>$t$</td>
</tr>
<tr>
<td>-0.35</td>
<td>0.17</td>
<td>2.08</td>
<td>.039</td>
</tr>
<tr>
<td>Implicit Self-Concept</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Implicit Stereotype</td>
<td>-0.01</td>
<td>0.10</td>
<td>-0.08</td>
</tr>
<tr>
<td>Implicit Gender Identity</td>
<td>-0.06</td>
<td>0.10</td>
<td>-0.60</td>
</tr>
</tbody>
</table>

| Change in $R^2$ | $\Delta R^2 = .072, F(1, 186) = 14.49, p < .001$ |

*Note. As required by balanced identity analyses, in Step 1 each implicit outcome is predicted solely by the interaction of the two other implicit variables. On Step 2, the individual predictors are added to the equation. Step 1 df = 186, Step 2 df = 184.*
## Table 2-4

*Balance Analyses - Changes in R2 in Step 1 and Step 2.*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Step 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$R_2$</td>
<td>Adj. $R_2$</td>
<td>$R_2$ change</td>
<td>df</td>
<td>$F$-change</td>
<td>$p$</td>
</tr>
<tr>
<td>Implicit Communal (vs. Agentic)</td>
<td>Step1</td>
<td>.072</td>
<td>.067</td>
<td>.072</td>
<td>1, 186</td>
<td>14.49</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>Step2</td>
<td>.074</td>
<td>.059</td>
<td>.022</td>
<td>2, 184</td>
<td>0.18</td>
<td>.833</td>
</tr>
<tr>
<td>Implicit Gender Stereotypes</td>
<td>Step1</td>
<td>.022</td>
<td>.017</td>
<td>.022</td>
<td>1, 186</td>
<td>4.23</td>
<td>.041</td>
</tr>
<tr>
<td></td>
<td>Step2</td>
<td>.039</td>
<td>.023</td>
<td>.016</td>
<td>2, 184</td>
<td>1.57</td>
<td>.211</td>
</tr>
<tr>
<td>Implicit Gender Identity</td>
<td>Step1</td>
<td>.068</td>
<td>.063</td>
<td>.068</td>
<td>1, 186</td>
<td>13.59</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>Step2</td>
<td>.084</td>
<td>.070</td>
<td>.016</td>
<td>2, 184</td>
<td>1.64</td>
<td>.196</td>
</tr>
</tbody>
</table>
Table 2-5

Study 2 – Correlations and Means (SDs) for Key Variables.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>$M_{\text{stereotypic}}$ (SD)</th>
<th>$M_{\text{counter-stereotypic}}$ (SD)</th>
<th>t</th>
<th>p</th>
<th>d   (CI.95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Implicit self-concept</td>
<td></td>
<td>.24** .06</td>
<td></td>
<td></td>
<td></td>
<td>-3.50</td>
<td>.001</td>
<td>0.61 (.25, .96)</td>
</tr>
<tr>
<td>2. Explicit self-concept</td>
<td></td>
<td></td>
<td>-.11</td>
<td></td>
<td></td>
<td>-0.49</td>
<td>.624</td>
<td>0.09 (-.26, .44)</td>
</tr>
<tr>
<td>3. Explicit stereotypei</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.49</td>
<td>.628</td>
<td>0.08 (-.27, .44)</td>
</tr>
</tbody>
</table>

Note. * $p < .05$, ** $p < .01$, † $p < .10$, df = 127 for all tests. iHigher values indicate a stronger explicit association between communion and women (vs. men) and agency with men (vs. women).
Table 2-6

*Descriptive Statistics from Pilot Study.*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Implicit role self-concept</td>
<td>-</td>
<td></td>
<td></td>
<td>0.14</td>
<td>0.38</td>
</tr>
<tr>
<td>2. Implicit value self-concept</td>
<td>.24**</td>
<td>-</td>
<td>-</td>
<td>-.10</td>
<td>0.47</td>
</tr>
<tr>
<td>3. Explicit career preference</td>
<td>.23**</td>
<td>-.02</td>
<td>-</td>
<td>0.26</td>
<td>0.33</td>
</tr>
</tbody>
</table>

*Note. * p < .05, ** p < .01, † p < .10.*
Figure 2-1

Representation of Balanced Identity Applied to Men’s Self-Concept.

Note. Balanced identity theory posits that implicit identity, ingroup stereotypes, and self-concept form a balanced triad. This means that the combination of any two elements in the triad can predict the third element, as signified by the arrows in the figure. For example, if me=male and male = communal, the combination of these two cognitions should predict me=communal.
Figure 2-2

Study 1 – Gender by Stereotype Interaction Predicting Value Self-Concept.
Figure 2-3

Raw Relationships between the Three Key Components of the Balanced Triad.

Average $R^2$ increment, Step1: 5.4%, Step2: 6.6%.

Note. This figure summarizes statistical test evidence of balance in a triad of implicit cognitions. On the outer triangle, we report raw means and standard deviations for each of the three implicit cognitions, in addition to raw proportions of the variable explained by the Step 1 ($R_1$) and Step 2 ($R_2$) regressions. The inner triangle represents zero order correlations between the three cognitions. The Average $R^2$ increment at the bottom of the figure signifies the average percentage explained by the three Step 1 (interaction only) regressions, and the three Step 2 (interaction + 2 linear predictors) regressions respectively. As conventional for balanced analyses, these statistics collapse across dichotomous gender categorization. ** $p < .01$. 
Figure 2-4

*Representation of Study 2 Retraining Set-Up.*

[Diagram showing the representation of Study 2 Retraining Set-Up.]

- **Block 3 & 5**
  - **Men**: Agentic Values
  - **Women**: Communal Values
  - **Stimuli**

- **Block 4 & 6**
  - **Women**: Communal Values
  - **Men**: Agentic Values
  - **Stimuli**

**Stereotypical Condition**

**Counter-Stereotypical Condition**
3 The Development of Gender Differences in Communion and Agency

3.1 Introduction

Two core values guide human behavior: communion (i.e., other-promotion) and agency (i.e., self-promotion; Bakan, 1966). Pursuing communion is especially predictive of psychological health (Le, Impett, Kogan, Webster, & Cheng, 2013). Yet men value communion relatively less than do women (Donelly & Twenge, 2017), a difference mirrored by men’s lower family-orientation and participation in communal careers (Croft, Schmader, & Block, 2015; Diekman, Steinberg, Belanger, Brown, & Clark, 2017). Because men’s lower communal engagement might negatively affect men themselves, as well as their families (Croft et al., 2015), it is important to understand the early development of gender differences in communal values and future role expectations. The current study examined whether young boys explicitly devalue communion (and perhaps accentuate agency), in ways that relate to lower anticipated prioritization of family over career.

By age six, boys expect to prioritize career over family (Croft, Schmader, Block, & Baron, 2014). Cognitive development theory suggests that these gender differences in anticipated roles might arise because children conform to gendered behavioral scripts that align with their gender identity (e.g., Kohlberg, 1966; Martin & Ruble, 2009). However, theoretically, gender identification (i.e., as feminine or masculine) and gender expression (i.e., exhibiting stereotypically feminine or masculine preferences; APA, 2008) are related to, but distinct from more fundamental communal and agentic values (Spence & Buckner, 2000). Based on goal congruity theory (Diekman et al., 2017), we expect that the internalization of values, more than gender identification or expression, predicts children’s expectations of their future roles.
According to goal congruity theory, people seek out roles that afford their values. Adults self-segregate into different occupations, not only to conform to gendered expectations, but because of the different values men and women have internalized (Diekman et al., 2017). If internalized early, these values could shape how children imagine their future. Whereas no research has directly examined children’s endorsement of core values, children’s preferences provide indirect evidence. Girls, more than boys, want to connect rather than compete in friendships (Ojanen, Grönroos, & Salmivalli, 2005), and value altruism rather than status in careers (Weisgram, Bigler, & Liben, 2010).

The current research examined gender differences in core values, and their relationship to family vs. career orientation, in a large sample of children. We hypothesized that boys endorse communal values less than do girls (H1a). We had no predictions for agentic values, given mixed evidence in adults (Diekman et al., 2017; Croson & Gneezy, 2009). We also hypothesized that boys (relative to girls) anticipate less future family vs. career orientation (H1b). To the degree that values are distinct from gender identity and expression, but important for role preferences, they should explain unique variance in children’s family vs. career orientation. We thus hypothesized that gender differences in communal (and perhaps agentic) values mediate boys’ relatively lower family vs. career orientation, over and above explicit and implicit gender identification (H2a), and gender expression (H2b). Additionally, we explored the developmental trajectory of these relationships from childhood and early adolescence.

3.2 **Method**

**Participants and Procedure**

Our final sample included 411 children (216 boys, 195 girls), aged 6 - 14 (M = 9.84, SD = 2.23) recruited from a community science center. We excluded 41 participants because of
experimenter error \((n = 12)\), incomplete data \((n = 9)\), or technical issues \((n = 20)\). Based on the feasibility of recruiting children from the science center, we aimed to recruit at least 25 usable participants per age (in years) and gender (target \(n = 400)\). Participants were predominantly Caucasian (54.5%) or East Asian (17.8%), but also included participants were identified as South Asian (6.6%), Aboriginal/Canadian First Nation (4.6%), Middle Eastern (1.5%), Mixed (10.5%), Black (0.5%), or identified outside of the categories provided (2.7%). Participants were tested individually in a sound-proof room, by one of four research assistants (1 male, 3 females; research assistant gender did not moderate results, see SOM – Appendix A) who read all instructions. Participants completed measures of implicit and explicit gender identification, their own values, and then answered open-ended questions about their occupational interests and made ratings of their family vs. career orientation. The open-ended responses to the question, “What do you want to be when you grow up?” (missing data for 85 children) were coded for gender stereotypicality and goal affordances. Because these coded variables were unrelated to other variables in the study (details in SOM - Appendix A), they are not discussed further. In addition, for 392 children, a parent completed other demographics and rated their child’s gender expression as masculine - feminine. A full list of measures can be found in the SOM - Appendix A.

**Measures**

**Communal and agentic values.** For the purposes of this study, we developed a child-friendly scale of communal and agentic value orientation by adapting items used in adult samples (Diekman et al., 2017; Trapnell & Paulhus, 2012). We first explained to children that “some things are important to some people but not at all important to other people. I want you to tell me how important these things are to YOU!”. Children were then asked to rate the personal
importance of four communal values (“How important do YOU think it is to always help others, even if it takes effort?”; “How important do YOU think it is to do things together with others?”; “How important do YOU think it is to be kind to others?”; “How important do YOU think it is to think about others’ feelings?”; α = .65) and three agentic values (“How important do YOU think it is to be the one who gets to make decisions?”; “How important do YOU think it is to win?”; “How important do YOU think it is to be good at things?”; α = .68) on a five-point scale ranging from “Not very important” to “Super important”. A fourth agentic value: “doing things all by yourself,” was not highly related to other items (item-total correlation < .25) and was thus excluded from the measure. Submitting the remaining seven items into an exploratory maximum likelihood factor analysis with direct oblimin rotation revealed that communal and agentic items loaded on two distinct primary factors with minimal cross-loading (see analyses in SOM - Appendix A). Children’s reports of communal and agentic values were weakly, but significantly, negatively correlated, r = -.18, p < .001. An example item can be seen in Appendix A.

Family vs. career orientation. To assess children’s expected family vs. career orientation for adulthood, children made ratings on two items taken from Croft et al. (2014). For each of the two items, children saw two individuals (matched to participant gender and similar to each other in the physical appearance of skin color, haircut and color, and facial features). These individuals were described as childhood friends who grew up to have different priorities as adults. For each of the two pairs, one target was described as family-oriented, and one was described as career-oriented. After being read each description, participants were asked “Someday you will also be all grown up. When you are grown up, who do you think you will be more like?”. Participants indicated who they thought they would be more similar to on a five-point scale from “1 = a lot similar to [name of career-oriented exemplar]” to “5 = a lot similar to
Implicit gender identification. The extent to which children implicitly identified as female vs. male was measured with a child-friendly Implicit Association Test (IAT; Baron & Banaji, 2006). The implicit association test has been used and validated as a measure of implicit gender identity in children as young as age six (e.g., Cvencek, Meltzoff, & Greenwald, 2011). The IAT assesses the strength of associations between concepts by measuring participants’ reaction times to categorize word and picture stimuli into congruent vs. incongruent categories (e.g. self + girl vs. self + boy). Initially, participants completed separate practice blocks to familiarize them with the identity stimuli delivered auditorily (self = I, me, my, myself vs. other = their, them, themselves, they; Dunham et al., 2007), and gender stimuli delivered visually (pictures of boy vs. girls; see SOM - Appendix A for all stimuli used). Each practice block consisted of twelve trials in which participants had to decide (using one of two large response buttons) whether a word they heard or picture they saw belonged to the category shown on the left or right.

After finishing two practice blocks, participants completed two critical test blocks (N = 40 trials each, order counterbalanced), requiring them to categorize stimuli from both self and gender categories simultaneously. In one block, category pairings congruent with female identity, i.e., “self” and “girl” (vs. “boy” and “other”), were mapped onto the same response button. In the other block, category pairings congruent with male identity, i.e., “self” and “boy” (vs. “girl” and “other”), were mapped onto the same response button. Following scripts from Baron and Banaji (2006), d-scores were computed to represent strength of implicit female (vs.
male) identification. This scoring allowed gender identification to positively correlate with other variables that were also coded so that high numbers equal more feminine or female. Based on recent general recommendations (Nosek et al., 2014), analyses using this measure exclude participants with more than 10% of responses faster than 300ms, or with more than 30% errors on this task (19 participants, 4.6% of total sample).

Explicit gender identification. Four questions were designed to assess the extent to which children explicitly identified with other females vs. males. For each of these four questions, participants were presented with clip art depictions of one boy and one girl, matched to each other in ethnicity (e.g., “Sarah and David”) and then asked, “I want you to tell me who you are more like”. Participants made their ratings on a five-point scale that was labeled for them as “Are you a lot more like X (1), a little more like X (2), in the middle between X and Y (3), a little more like Y (4), or a lot more like Y (5)”. In two of the four pairs, the female character was presented on the right (corresponding to a rating of 5), and in the other two the male character was presented on the right. To approximate ethnic representation in the sample community, two boy-girl pairs appeared to be Caucasian, one pair appeared to be East Asian, and one pair appeared to be medium dark-skinned (meant to be interpretable as South Asian or Latino). Ethnicity was thus never confounded with target gender and a composite score of all four items was reliable ($\alpha = .89$).

However, to avoid contaminating scores with children’s ethnic identity, we followed the recommendation of an anonymous reviewer and operationalized gender identification as the responses made only to the items that matched the participant’s own parent-reported ethnicity (i.e., a Caucasian participant’s score is the average of two Caucasian items, an East Asian participant’s score is the rating of the East Asian item, a Black/Hispanic/South Asian
participant’s score is their score on the medium dark-skinned item, and the full four-item composite was used for children of mixed or non-reported ethnicity). This ethnicity-matched coding of explicit female-identification correlated highly with the four-item composite, $r = .94, p < .001$, and results are the same with either measures (see SOM - Appendix A for these analyses and all stimuli). Scores are coded so that higher numbers represented greater identification with females (vs. males).

**Parent-reported gender expression.** To assess the extent to which children currently exhibited feminine vs. masculine gender expressions, parents completed a 12-item measure (Johnson et al., 2004) assessing the frequency with which their child shows in a number of gendered behaviors and preferences (e.g., “He/She plays with girl-type dolls, such as “Barbie”). Parents also completed two face-valid items rating how: 1) feminine and 2) masculine they perceived their child compared to other children of the same age. Because these latter two items were highly related to the 12-item questionnaire (item-total correlations $r > .74$), we standardized all 14 items and averaged the standardized responses into an overall index of *parent-reported gender expression*. Higher scores on this measure indicated more feminine vs. masculine gender expression. See Table 3-1 for means and correlations for all variables.
Table 3-1

Bivariate Correlations and Means (SD) by Gender.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>M&lt;sub&gt;boy&lt;/sub&gt; (SD)</th>
<th>M&lt;sub&gt;girl&lt;/sub&gt; (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
<td>-15*</td>
<td>-06</td>
<td>-12</td>
<td>-37*</td>
<td>.08</td>
<td>.12#</td>
<td>9.98a (2.29)</td>
<td>9.69a (2.17)</td>
</tr>
<tr>
<td>2. Communal Values (1-5)</td>
<td></td>
<td>.13#</td>
<td>-03</td>
<td>.15*</td>
<td>.19*</td>
<td>.03</td>
<td>.13#</td>
<td>4.38a (0.59)</td>
<td>4.52b (0.48)</td>
</tr>
<tr>
<td>3. Agentic Values (1-5)</td>
<td>.08</td>
<td>-27*</td>
<td>-09</td>
<td>.07</td>
<td>-01</td>
<td>.12</td>
<td></td>
<td>2.77a (1.00)</td>
<td>2.48b (0.99)</td>
</tr>
<tr>
<td>4. Family Orientation (1-5)</td>
<td>-05</td>
<td>.18*</td>
<td>-21*</td>
<td>.03</td>
<td>-03</td>
<td>-10</td>
<td></td>
<td>3.05a (0.94)</td>
<td>3.38b (0.87)</td>
</tr>
<tr>
<td>5. Gender expression (z-Score)</td>
<td>.06</td>
<td>-08</td>
<td>-09</td>
<td>.12#</td>
<td></td>
<td>.001</td>
<td>.12</td>
<td>-0.63a (.33)</td>
<td>0.67b (.38)</td>
</tr>
<tr>
<td>6. Implicit Female Identification</td>
<td>-11</td>
<td>.08</td>
<td>.05</td>
<td>.05</td>
<td>-04</td>
<td></td>
<td>-07</td>
<td>-0.22a (.39)</td>
<td>0.27b (.38)</td>
</tr>
<tr>
<td>7. Explicit Female Identification</td>
<td>-19*</td>
<td>-001</td>
<td>-01</td>
<td>.04</td>
<td>.21*</td>
<td>.03</td>
<td></td>
<td>2.05a (0.85)</td>
<td>4.01b (0.67)</td>
</tr>
</tbody>
</table>

Note. Correlations for boys below the diagonal, correlations for girls above the diagonal. Means that do not share the same subscript differ significantly, p < .05.

* p < .05, # p = < .10

3.3 Results

Gender and Age Differences

We first examined gender differences in our focal variables (communal values, agentic values, and family vs. career orientation; H1a, H1b). To control for age variation within our sample and explore the possible developmental trajectory of boys’ and girls’ value endorsement, we also included age as a moderator in these analyses. To examine gender and age effects, we entered children’s gender (male = 0, female = 1) and age (standardized) as predictors on Step 1, and their interaction on Step 2 of a hierarchical linear regression model for each outcome.
**Value orientation.** On average, older children endorsed communal values less than did younger children, $\beta = -.14, SE = .03, t(406) = -2.85, p = .005$, whereas age did not predict agentic values, $\beta = .01, SE = .05, t(406) = 0.25, p = .803$. Over and above these effects of age, and as predicted, boys endorsed communal values significantly less than did girls, $\beta = .12, SE = .05, t(406) = 2.43, p = .015$. Boys also endorsed agentic values significantly more than did girls, $\beta = -.14, SE = .10, t(406) = -2.93, p = .004$. There were no significant interactions between gender and age predicting values, $\beta s < .10, ps > .16$, suggesting that the observed gender differences in values varied little within the age range of our sample. Thus, results revealed gender differences in children’s core values that emerge by age six and parallel gender differences in valued careers in children (Weisgram et al., 2010). In addition, values reported by children resemble patterns of values in adults, with communal value endorsement being generally high, but higher for women than for men (e.g., Diekman et al., 2017).

**Family vs. career orientation.** We next examined gender differences in children’s role orientation. In line with H1b, and replicating Croft et al. (2014), boys (as compared to girls) expected to be less family-oriented, $\beta = .18, SE = .09, t(394) = 3.53, p < .001$. Neither age, $\beta = -.08, SE = .05, t(394) = -1.61, p = .108$, nor the age by gender interaction, $\beta = -.04, SE = .09, t(393) = -0.58, p = .564$, predicted children’s family vs. career orientation. These results suggest that by age six, we clearly observe gender differences in values as well as family vs. career orientation.

**Do Gender Differences in Values Explain Expected Family vs. Career Orientation?**

Having established an early gender difference in core values, we next tested these gender differences as mediators of gender differences in seeing one’s future as more family- rather than career-oriented. To test this, we conducted mediational analyses with the PROCESS macro.
(Hayes, 2013; 10000 resamples for bootstrapped confidence intervals), entering gender as a predictor, and communal and agentic values as simultaneous mediators, predicting children’s family vs. careers orientation (all standardized; see Figure 3-1). As hypothesized, expecting a family- rather than a career-oriented future was predicted by both higher communal values, $\beta = .14$, $SE = .05$, $t (395) = 2.81$, $p = .005$, and lower agentic values, $\beta = -.13$, $SE = .05$, $t (395) = -2.56$, $p = .011$, even after controlling for gender. In addition, significant indirect effects are consistent with both boys’ lower communal, $IE = .02$, $CI_{95} (.003, .04)$, $p < .05$, and higher agentic values, $IE = .02$, $CI_{95} (.003, .05)$, $p < .05$, accounting, at least in part, for their relatively low family vs. career orientation compared to girls. These indirect relationships suggest that gender differences in both communal and agentic values partly account for gender differences in family vs. career orientation. These results held when controlling for both participant age and research assistant gender, and paths were not moderated by age. For more information about these as well as mediation analyses on younger vs. older children, please refer to the SOM-Appendix A.

**Figure 3-1**

*Values as Mediators of Gender Differences in Family vs. Career Orientation.*
Note. 0 = boys, 1 = girls; Analyses include a sample of 399 children. Additional children were excluded for missing data.

Alternative explanations. Next, we examined whether our results could simply be accounted for by the extent to which children are implicitly or explicitly identified as female (vs. male), or the extent to which children currently displayed feminine vs. masculine gender expression. Either might suggest that children’s tendency toward identifying as, or outwardly expressing feminine or masculine behaviors and preferences, and not endorsement of communal values itself (constructs which are distinct; Spence & Buckner, 2000), better predict future role expectations.

First, to better understand these variables in our dataset, we tested for gender and age effects on all variables using linear regression analyses with children’s gender (male = 0, female = 1) and age (standardized) as predictors on Step 1, and their interaction on Step 2 for each outcome. As expected from past research (Cvencek et al., 2011), girls implicitly identified more as girls than did boys, $\beta = .54, SE = .04, t (387) = 12.47, p < .001$, suggesting that implicit gender identification corresponded sensibly to children’s binary gender identity. Neither age, $\beta = -.02, SE = .02, t (387) = -0.34, p = .733$, nor the age by gender interaction, $\beta = .11, SE = .04, t (386) = 1.87, p = .062$, significantly predicted implicit gender identification.

Similarly, results showed a large gender difference in explicit female identification, with girls explicitly identifying more strongly with females than did boys, $\beta = .78, SE = .08, t (406) = 25.47, p < .001$. Although we observed no main effect of age, $\beta = -.04, SE = .04, t (406) = -1.33, p = .184$, the main effect of gender was qualified by a significant gender by age interaction, $\beta = .13, SE = .06, t (405) = 3.23, p = .001$. Decomposing this interaction suggested that the tendency to explicitly identify with girls more than with boys did not significantly increase with age for
girls, $\beta = .07, SE = .06, t (405) = 1.49, p = .137$, but significantly decreased with age among boys, $\beta = -.13, SE = .05, t (405) = -3.16, p = .002$.

We next examined how parents’ reports of their children’s gender expression differed between boys and girls. Results suggested that our sample showed substantial gender differences in gender expression, with boys’ gender expression being rated as less feminine (more masculine) by their parents than were girls’, $\beta = .87, SE = .04, t (379) = 35.79, p < .001$. Notably, gender and age interacted significantly when predicting parent-rated gender expression, $\beta = -.18, SE = .04, t (378) = -5.57, p < .001$. Decomposing this interaction suggested that, for girls, $\beta = -.23, SE = .03, t (378) = -6.53, p < .001$, but not for boys, $\beta = .04, SE = .02, t (378) = 1.13, p = .260$, increasing age was associated with less feminine (more masculine) gender expression, suggesting that girls express less uniquely feminine behaviors as they age, whereas boys tend to express relatively more masculine behavior at all ages examined.

*Do values predict over and above identification and expression?* Given the significant gender differences in gender identification and parents’ reports of children’s gender expression, it is possible that the relationship between values and family vs. careers orientation is simply a reflection of children’s explicit or implicit gender identity (H2a), or gender expression (H2b). To rule out these alternative explanations, we repeated the above mediational analyses two times to test: 1) the extent to which children implicitly and explicitly identified as female (vs. male), and 2) the extent to which children showed a feminine vs. masculine gender expression, as control variables (Z-scored) in the relationship between values and orientation (b-path). These analyses were done separately for gender identification and gender expression variables to preserve degrees of freedom, since some children were excluded based on IAT error rates, and a different subsample of children were excluded because their parents did not complete their questionnaire.
Results of analyses controlling for children’s implicit and explicit gender identification (H2a) revealed neither explicit identification as female vs. male, $\beta = -.08$, $SE = .08$, $t (374) = -1.02$, $p = .307$, nor implicit identification as female vs. male, $\beta = -.04$, $SE = .06$, $t (374) = -0.63$, $p = .527$, significantly predict children’s family vs. career orientation (over and above dichotomous gender and values). Importantly, both communal, $\beta = .13$, $SE = .05$, $t (374) = 2.45$, $p = .015$, and agentic values, $\beta = -.11$, $SE = .05$, $t (374) = -2.24$, $p = .025$, remained significant predictors of family vs. career orientation when controlling for these two gender identification variables. Moreover, the indirect effects of child gender on family vs. career orientation through communal, $IE = .01$, $SE = .01$, $CI_{.95} (.002, .04)$, and agentic values, $IE = .02$, $SE = .01$, $CI_{.95} (.001, .05)$, also remained significant, though small.

Finally, results of parallel analyses controlling for gender expression (H2b) revealed that this measure did not significantly predict children’s family vs. career orientation, $\beta = .14$, $SE = .11$, $t (367) = 1.30$, $p = .196$. Importantly, both communal, $\beta = .12$, $SE = .05$, $t (367) = 2.25$, $p = .025$, and agentic values, $\beta = -.12$, $SE = .05$, $t (367) = -2.30$, $p = .022$, remained significant predictors of future family vs. career orientation when adding gender expression into the model. Moreover, the indirect effects of gender on future family vs. career orientation through communal, $IE = .01$, $SE = .01$, $CI_{.95} (.001, .04)$, and through agentic values, $IE = .02$, $SE = .01$, $CI_{.95} (.001, .05)$, also remained significant. Thus, we find no evidence that either children’s current identification as female (vs. male), or their current gender expression (as rated by their parents) were better explanations for their expected future selves than their own values were.

3.4 General Discussion

In adults, communal and agentic values are important predictors of gender roles. Little research has investigated these values in children. Our results indicate that, by age six, boys
show lower communal and higher agentic values than do girls. Over and above children’s
gender-identification and expression, valuing communion less and agency more predicted boys’
relatively lower family vs. career orientation. Although effect sizes were modest, effects could
have cumulatively meaningful consequences for children’s aspirations over development.
Correlational designs preclude causal inference. However, this evidence is consistent with our
hypothesis that values relate to children’s orientation well before children confront the realities
of balancing family and career.

There was no evidence that effects were moderated by age. Future research is needed to
understand: 1) how, and how early, communal and agentic values are internalized, 2) assess their
causal impact with prospective or experimental designs, and 3) identify effects on actual
behavioral outcomes. Moreover, studies should examine effects alongside non-binary
conceptions of gender identity (Martin et al., 2017). Societal gender disparities in childcare and
housework are pressing issues (Croft et al., 2015). Our data underscore the importance of
understanding the early development of core values and how they might set the stage for
gendered expectations about career and family for adulthood.

[End of Psychological Science Manuscript]
4 A Dual-Barrier Perspective on Men’s Underrepresentation in HEED

4.1 Introduction

Healthcare workers and educators are indispensable – without nurses to take care of our sick and teachers to educate our youngest, civil societies would quickly break down (Bordieu & Passeron, 1990; Holmes & Gastaldo, 2002). In many countries, these roles are critically understaffed. For example, the World Health Organization estimates a shortage of 7.2 million healthcare workers worldwide that is projected to grow even further (WHO, 2013). Men represent an untapped resource for filling positions in these care-oriented roles in healthcare and early education (as well as the domestic sphere; collectively termed HEED; Croft, Schmader, & Block, 2015). For example, men currently make up only 10% of nurses and 4% of preschool and kindergarten teachers in the U.S. (Bureau of Labor Statistics, 2017). Furthermore, the next generation in line for such jobs – young men in their teens and early twenties – report relatively less internal motivation to pursue communal HEED careers than young women do (Evans & Diekman, 2009; Tellhed et al., 2018; Block, Schmader, & Croft, 2018). Even those men who are internally motivated to pursue HEED careers still face negative judgment from others (Moss-Racusin et al., 2010; Simpson, 2005), and leave careers like teaching at a disproportionately high rate (Boyd et al., 2005; Omenn & Robinson, 2006). To date, there is little empirical work that can speak to how the combination of internal motivation and threat of external judgment might signal to men that HEED careers are not a good fit for them. The current research is thus aimed at identifying how these potentially distinct barriers (simultaneously or in interaction) shape men’s apparent “choice” to self-select out of HEED careers.
There are practical benefits to understanding how several factors act together to stifle (or encourage) men’s participation in HEED roles. Many countries face serious and continued shortages of workers in these care-oriented roles (WHO, 2013; Bureau of Labor Statistics, 2013; International Council of Nurses, 2006), a shortage that has only been amplified by the recent global COVID-19 pandemic. The WHO projects that the current shortage of healthcare workers, for example, will double to an estimated 12.9 million missing workers by 2035. Such a shortage will seriously impair healthcare systems that have to deal with both growing and aging populations (WHO, 2013). Whereas increasing men’s interest in HEED careers would increase the total number of potential workers in general, increasing the representation of specifically men in these careers might have further benefits. Theorists suggest that increasing the representation and visibility of men working in healthcare and education would especially help other men and boys served by these professionals, as this group of clients currently feels disenfranchised from these female-dominated spaces (Skelton, 2003; Cooney & Bittner, 2001; Wolfenden, 2011).

Pursuing HEED roles could also benefit men themselves. Not only do HEED careers represent viable career options for young men who face relatively higher rates of unemployment (Albanesi & Sahin, 2013; Paul & Moser, 2009; Strandh, Hammarström, Nilsson, Nordenmark, & Russel, 2013), but care-oriented roles can also be quite rewarding career options that are linked to increased well-being (Le et al., 2018). Given these broad implications, it is important to understand the psychological barriers to men’s pursuit of careers in HEED fields like nursing, elementary school teaching, or social work. In the current research, we apply a dual-barrier perspective to understanding men’s sense of fit with such careers (Croft et al., 2015). We examine how men’s internal motivations act alongside (and possibly interact with) their
perceptions of external gender role norms to shape men’s sense that HEED careers are not a good fit for them.

**Barriers to HEED Interest**

People generally choose to self-select into environments that feel like a good “fit” for them. According to Schmader and Sedikides’s (2018) State Authenticity as Fit to Environment (SAFE) model, we are attracted to environments that cue a sense of fit to our personal identity and enable us to feel authentic in those contexts. We can feel a sense of fit when a context automatically activates core aspects of ourselves (i.e., self-concept fit) or allows us to pursue the goals we most value (i.e., goal fit). In addition, we can also feel a sense of fit because others in a context validate and accept us (i.e., social fit). Thus, according to the SAFE model, fit can be cued by a combination of factors that are internal to a person (i.e., traits, values, goals) versus externally existing in the environment (i.e., social reactions from others). Environments that cue a lack of fit (of any kind) leave us feeling inauthentic, a key reason why people might self-select out of domains that are counter-stereotypical (Schmader & Sedikides, 2018). Moreover, those who are negatively stereotyped in a given domain are more likely to encounter a lack of fit as a result of being underrepresented, if not devalued, in that setting. Thus, when trying to understand men’s underrepresentation in HEED careers like nursing or social work, we need to consider what cues do and do not activate a sense of fit for men in these domains.

Gender stereotypes can form the basis for such cues that might erode men’s sense of fit to certain careers. These stereotypes develop through the historical distribution of men and women into different social roles. When groups of people (e.g., men and women) self-segregate into roles with similar others, people naturally develop stereotypes that explain and justify that division of labor. According to social role theory (Eagly & Karau, 1984), the historical division
of labor with women relegated to care-oriented roles and men predominantly occupying competitive and high-status roles leads perceivers to form corresponding gender stereotypes. Congruent with their roles, women are stereotyped to be nurturing, caring, and pro-social (i.e., communal), whereas men are stereotyped to be assertive, competent, and dominant (i.e., agentic; Diekman, 2005; Eagly & Steffen, 1984; Koenig & Eagly, 2014). A recent analysis of temporal changes in stereotypes about men’s and women’s traits from 1946 to 2018 illustrates these processes. Specifically, the evidence shows that perceivers have begun to see women as increasingly more competent (but not assertive/dominant) over this time-period, as women have started taking on paid work outside the home at increasing rates. Men’s continued underrepresentation in care-oriented careers, in turn, is accompanied by a strengthening stereotype that men are less communal than women (Eagly et al., 2019).

Such societal stereotypes, once established, have the power to shape both other’s expectations of young men and women, but also their own internal motivations. Croft and colleagues (2015) synthesize past psychological research to propose a theoretical model of multiple barriers to men’s interest in HEED roles that arise as consequence of historical gender roles and stereotypes. The model outlines that once the initial division of labor has led to widely accepted gender stereotypes, men are judged by others according to these stereotypes, but also perceive themselves through the lens of stereotypes as well (Diekman & Goodfriend, 2006; Eagly & Karau, 2002). Whereas pervasive gender role norms in a society represent an external barrier to men’s pursuit of HEED careers, historical stereotypes also guide the socialization of young men’s internal values and goals. Once internalized, men’s own motivations then act as internal cues to what kind of careers provide a good fit for them (Croft et al., 2015). Based on this theoretical synthesis, our goal was to empirically examine to what extent these internal and
external barriers contribute, either independently or in interaction with each other, to men’s sense that HEED careers provide a poor fit for them. Specifically, in the current research, we focused on men’s internal values and their perceptions of dynamic changes in descriptive social norms representing such internal and external barriers respectively.

**Internal barriers.** One result of the social role processes described above is that men and women differ, on average, in the fundamental internal motivations that guide their lives – personal values and traits. Communion (i.e., focus on care for others), and agency (i.e., focus on self-promotion) represent two basic dimensions of individual differences (Bakan, 1966; Abele & Wojciszke, 2014). Men tend to endorse communal traits and values less than do women (Diekman et al., 2017; Donnelly & Twenge, 2017; Evans & Diekman, 2009; Schwartz & Rubel, 2005; Twenge et al., 2012). These gender differences appear to emerge early, with elementary-school aged boys already endorsing communal values less than girls do (see Chapter 3 of this dissertation; Block, Gonzalez, Schmader, & Baron, 2018a). Evidence for gender differences in agency are less clear-cut; whereas men consistently rate their own traits as more agentic than do women (Donnelly & Twenge, 2017, for a meta-analysis), some samples with high socio-economic status (i.e., university students) show little gender differences in broadly defined agentic values (Diekman et al., 2010; Block et al., 2018b).

According to goal congruity theory, once gender differences in communal values have developed, these values provide an internal cue for men and women to self-select into the different careers that they perceive to afford their personal values (Diekman et al., 2017). This means that, to the extent that women have internalized more communal values than men have, women are more likely to seek out careers that specifically afford their higher communal values (i.e., careers that cue goal-fit). Goal congruity theory has been applied extensively to understand
women’s underrepresentation in science, technology, engineering, and math (STEM), in light of the mismatch between women’s relatively strong communal values and the perceptions that STEM careers are not communally oriented. Supporting the theory’s basic tenets, several studies show that women’s, compared to men’s, relatively lower interest in STEM is predicted by their stronger communal values. Moreover, framing STEM jobs as more communal increases women’s interest in pursuing such careers (Diekman et al., 2010; Diekman, Clark, Johnston, Brown, & Steinberg, 2011; Diekman et al., 2017; Evans & Diekman, 2009). According to this evidence, goal congruity seems to play an important role in gender differences in career aspirations, at least in the STEM context.

Whereas past work has focused on understanding goal congruity processes in constraining women’s career choices, recent correlational evidence suggests that men’s relatively lower internalization of communal values could also provide an important internal barrier to their interest in HEED careers. To the extent that men value communion less than do women, they tend to see HEED careers as less personally interesting, but also perceive HEED careers as having less worth to society at large (Block et al., 2018b). Developmental research suggests that goal congruity processes may steer boys away from female-stereotypic communal roles at an early age. Among Swedish teenagers, boys’ relatively lower communal values predict their lower probability of choosing female-dominated study programs, such as “social sciences” (Tellhed et al., 2018). Similarly, by age six, boy’s relatively lower endorsement of communal values predicts the extent to which they already expect a less family- (vs. career-) oriented future than girls do (Chapter 3 of this dissertation; Block et al., 2018a). Whereas these findings provide initial evidence for a (correlational) relationship between communal values and male’s relative disinterest in HEED roles, it currently remains unclear whether men’s internal motivations
(causally) shape their career interests independent of more external normative barriers to their HEED interest.

**External Barriers.** According to our recent theoretical synthesis (Croft et al., 2015), the underrepresentation of men in communal roles is only partly a function of their internal motivations, and can also be linked to more external barriers. Decades of social psychological research shows that humans are attuned to social norms and look to the behaviour of others to make decisions about how they should behave themselves (Cialdini & Trost, 1998). External social norms might thus provide powerful cues for the extent to which certain careers are a good fit for us. In line with this reasoning, the SAFE model (Schmader & Sedikides, 2018) proposes that an environment can cue a lack of fit if it appears that others will not accept and value our presence (i.e., a lack of social fit), regardless of whether that environment provides fit with our personal goals. Perhaps the most visibly obvious signal of the potential for low social fit is merely the underrepresentation of people like us in a given setting (Murphy, Steele, & Gross, 2007). This descriptive information about who chooses and excels in a given role is likely to be an important normative cue to one’s fit and belonging.

Expanding our understanding of how norms shape behavior, recent work finds that especially information about rapid norm changes provides a powerful influence on people’s choices (Sparkman & Walton, 2019). In a set of five studies, the authors demonstrate that participants’ intentions to change a wide array of behavior (e.g., dietary choices and support for feminism) were most likely to increase after participants were given information that societal norms are in flux, rather than staying stable (Sparkman & Walton, 2019). Specifically, suggesting that a given behavior is becoming increasingly normative (i.e., dynamic normative information like “an increasing number of people are avoiding sugary drinks”) was even more
successful in increasing participant’s motivation to enact that behavior compared to information that simply suggested the behavior is common (i.e., static normative information like “60% of people are currently avoiding sugary drinks”). Given this recent evidence, information about stability and change in gender role norms could be an important cue to role fit among men and women.

Given that men’s representation has changed very little over the past five decades, women’s continuing overrepresentation in HEED careers likely provides information that signals the counter-normativity of men in HEED careers. Generally, people tend to infer social norms from observing the behaviors of others around them (Prentice & Miller, 1996). Observing men and women in distinct roles leads to gender-stereotypic notions that men and women are indeed best suited for these divergent roles (Eagly et al., 2019; Eagly & Wood, 1999; Miller, Eagly, & Linn, 2015; Prentice & Miller, 2006). Once such descriptive norms have arisen, they are both socially reinforced and internally justified through injunctive norms for what men and women should do. Although violating gender role norms is generally perceived negatively by others (Diekman & Goodfriend, 2006; Eagly & Karau, 2002), men can face quite distinct constraints because society requires them to continuously prove their masculinity (Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008). Men who enter non-normative HEED roles can thus face “backlash” – others challenge their masculinity, question their sexuality, and even ridicule them (Berdahl & Moon, 2013; Moss-Racusin & Johnson, 2016; Moss-Racusin, 2014; Rudman & Mescher, 2013). This evidence suggests that the descriptive underrepresentation of men in HEED, with little evidence of changing roles, can lead others to react negatively to men who pursue HEED careers (Croft et al., 2015).
To the degree that men are aware of these social constraints, simply perceiving that men’s normative representation in HEED roles is not dynamically increasing is likely to cue a low sense of fit to HEED careers among young men – even before others actively punish them for norm transgressions. In line with this idea, men’s own concerns about judgment from others appear to inhibit their interest in female-stereotypic careers (e.g., Allen & Smith, 2011; Korek et al., 2014). In addition, men in HEED careers, like nursing, tend to report “role strain” – the perception that their job conflicts with broad normative expectations for their gender (Simpson, 2005). Such personal feelings of role strain are related to lower well-being among men in counter-normative careers (Wolfram, Mohr, & Borchert, 2009), especially for those men who themselves endorse traditional attitudes about masculinity (Sobiraj, Rigotti, Weseler, & Mohr, 2015). Based on this research, the perception that HEED careers remain, continuously and overwhelmingly, occupied by women should predict young men’s sense that HEED careers are a poor fit for them, regardless of their own communal motivations (Croft, Schmader, & Block, 2015). But what if such norms were to change rapidly?

The implication of this theoretical perspective, together with evidence on the power of dynamic norms, is that a (perceived) rise of male participation in HEED might causally increase young men’s willingness to take on such careers. Evidence for the benefits of numeric representation comes from past research on women in STEM. For example, undergraduate women feel more engaged with STEM in environments in which there are more other women (Dasgupta, Mcmanus, & Hunsinger, 2015; Murphy, Steele, & Gross, 2007), and mathematics faculties with more female professors (Sharpe & Sonnert, 1999) and graduate students (Griffith, 2010) also attract more undergraduate women. Thus, the current research seeks to understand
how perceptions of increasing (vs. static) male participation in HEED roles not only predict, but also causally shape young men’s sense of fit with HEED careers.

Whereas goal congruity theory offers a clear prediction that communal values should have a direct and causal effect on men’s careers interests, it is less clear exactly how, or through what mechanisms, descriptive gender role norms translate into men’s lowered HEED interest. The current research explores three theoretically distinct, but related mechanisms through which evidence of changing descriptive norms could cue low levels of fit to HEED careers for men. Expectations of negative reactions and discrimination (often termed “backlash”) represent one external barrier to men’s HEED fit that might be heightened when men feel like their own gender remains underrepresented in these careers (vs. becoming increasingly represented). As discussed above, men face, and even anticipate, such directly gender-based backlash when they violate norms by taking on female-dominated roles. Thus, social norm perceptions might cue men’s sense of fit with HEED careers by shaping expectations of gender-based backlash if one were to take on a HEED career. Specifically, men who see male representation in HEED as quite low, and unlikely to increase, might conclude that they would face gender-based backlash if they were to enter HEED, which likely represents a strong deterrent for such men.

In addition to fears about clearly gender-based backlash from others, men’s anticipation of a lack of positive and accepting relationships with future co-workers (i.e., a lack of belonging) could also account for a relationship between norm perceptions and men’s relative lack of fit with HEED careers. Whereas expectations of gender-based backlash concern worries about negative treatment for taking on HEED careers, men might also worry about the extent to which they would be able to foster positive connections in a HEED workplace. Feeling inclusion and belonging is a basic human motivation that is desired by all (Baumeister & Leary, 1995), but
often not afforded to underrepresented groups. Past work shows that individuals who are part of an underrepresented group in a given setting (e.g., women in STEM) are at heightened risk for experiencing lack of social belonging simply because they are in the numerical minority (Walton & Cohen, 2007; Walton & Cohen, 2011; Purdie-Vaughns et al., 2008; Good, Rattan, & Dweck, 2012). A lack of belonging can predict lower performance (e.g., Walton & Cohen, 2007; Walton, Cohen, Cwir, & Spencer, 2012) and domain interest (Cheryan & Plaut, 2010). Given this past work, men might have concerns that they would not fit in among their co-workers if most of their colleagues would be women in a HEED field.

In addition to shaping anticipated backlash and sense of belonging, men’s descriptive underrepresentation in HEED might also signal the relatively lower social status of these careers. As men tend to have higher status than women do in most societies (Conway & Vartanian, 2000; Ridgeway & Correll, 2004), the overrepresentation of women in a career confers lower status to that career, whereas the overrepresentation of men confers higher status (England et al., 2007; Levanon et al., 2009; Schmader, Major, Eccleston, & McCoy, 2001). Because men tend to have greater concerns with achieving and maintaining their status (Moss-Racusin et al., 2010; Vandello & Bosson, 2013), men might be less likely to consider taking on a HEED role to the extent they associate HEED with low status – whether or not men have the internal communal motivation that might otherwise attract them to HEED careers. Thus, the perception that women are overrepresented in HEED careers might reduce men’s interest in these careers because these careers are seen as having lower status. In the current research, we will examine expectations of backlash, belonging, and status as possible explanations for the link between dynamic descriptive norms and men’s relatively low sense of fit with HEED careers.
Independent vs. interactive effects of internal and external barriers. In addition to better understanding the mechanisms through which changes to descriptive norms might shape men’s sense of fit with HEED careers, it was also our goal to understand whether internal and external barriers to HEED have independent or interactive effects on men’s HEED interest. There are several possible ways to understand the relationship between internal and external barriers to men’s HEED fit. In our past theoretical model (Croft et al., 2015), we laid out the rationale for why both internal and external barriers might separately shape men’s interest in pursuing HEED careers. Based on the previous research we had synthesized for this theoretical model, we might expect that both internal values and external norm perceptions should independently predict and causally shape the extent to which men perceive fit with HEED careers.

No research to date, however, has tried to isolate internal and external barriers as distinct and unique determinants of men’s feelings of fit in these careers. It is possible that these internal and external factors might not only act in parallel, but could also interact in shaping men’s career aspirations. Seminal social psychological research suggests that factors internal to a person (e.g., values or personality) predict their choices better in situations that provide little external constraints (i.e., weak situations), rather than situations in which external factors place strict constraints on behavior (i.e., strong situations; Mischel, 1968; 1977; see Cooper & Withey, 2009 for a review). Perhaps strong external norms against men’s HEED participation mitigate the relationship between men’s internal values and their career interests. There is some initial evidence that highlighting external gender role norms can reduce the extent to which men let internal motivations guide their career aspirations. Forsman and Barth (2017) had participants read descriptions of traits required for a range of careers, which were either not labelled or
presented with a career label (e.g., “surgical nurse”), which presumably cued all stereotypical norms tied to this career. Results from this study show that men’s own feminine traits (e.g., intuitive, cautious) predicted their interest in careers requiring such traits more strongly when participants only judged careers without the label (Forsman & Barth, 2017). This could mean congruity between personal goals and a career is a stronger motivator for those who are not strongly constrained by external normative information. Because, as the authors themselves admit, a career label makes the female-stereotypicality of a career salient alongside other perceptions of the specific career, the evidence thus far is very tentative. Theoretically speaking, it is possible that a strong external norm against men’s HEED participation might nullify any effect that internalized values typically have on career interest. Conversely, if gender roles are permissive and thus do not represent a barrier to men’s entry into a specific role, a career’s match to personal values might more strongly predict career interest. The current research thus examines whether communal values most strongly predict, and causally shape, men’s HEED interest when changes to descriptive norms suggest an increasingly permissive climate towards men in HEED roles. Alternatively, internal values and external norms might simply have independent main effects on men’s sense of fit with HEED careers.

4.1.1 Current Research

In three pre-registered studies, the current research examines how internal communal motivations and perceptions of external descriptive gender role norms independently predict (Study 1 & Study 2) and causally shape (Study 3) men’s sense of fit with HEED careers. In Studies 1 and 2, we examine how men’s (and in Study 1, also women’s) internalized values and perceptions of gender role norms predict their own sense of fit with HEED careers. In line with Croft et al. (2015), we hypothesized that both communal values and the perception that other
men are moving into HEED careers would independently predict men’s sense of fit with HEED careers. We also tested the hypothesis that individual differences in values and norm perceptions might interact to predict men’s fit in HEED. In Study 2, we further explored expectations of reduced backlash, increased belonging, and increased status as possible explanations for the relationship between descriptive gender role norm perceptions and men’s perceived fit with HEED careers.

Study 3 focuses on understanding how changes in internal values and external norms causally shape men’s perceptions of whether a career in nursing is a good fit for them. We examine whether experimentally increasing communal values in men directly affects their perceived fit with HEED, or whether such an effect of increased communal values depends on the descriptive information men were given about representation in HEED (men’s representation increasingly rapidly vs. men’s low representation staying stagnant). Specifically, we tested the hypothesis that increasing internal motivations for communion would only increase men’s sense that HEED is a good fit for them when they also learn that it is becoming increasingly normative for men to enter HEED careers.

4.2 Study 4.1

Study 1 was designed as a correlational test of how personal communal values as well as perceptions of men’s participation in HEED roles predict men’s (as well as women’s) perception of fit with HEED careers (nursing and social work, in this case). All hypotheses, measures, and analyses were pre-registered on the Open Science Framework (OSF; see full pre-registration at https://osf.io/fidy8s/) unless otherwise noted.
4.2.1 Method

Participants and Procedure

Our final sample included 437 participants (217 women/220 men; $M_{age} = 20.4$, $SD = 1.76$) recruited from a large Canadian university. Trained research assistants recruited participants in public areas of the university campus to participate in a study on “understanding career interests” in exchange for a piece of candy as compensation. We determined a minimum final sample size of 420 based on recommendations for achieving 80% power to detect a mediation of gender differences, given a medium sized gender difference in our outcome ($a$-path $\beta = .14$, $b$-path $\beta = .26$; Fritz & Mackinnon, 2007). We kept collecting participants until we believed we were close to this criterion. As pre-registered, we excluded an additional 93 participants who did not complete the survey ($n = 10$), were over the age of 25 ($n = 37$), or identified as non-heterosexual ($n = 49$). Participants were predominantly of East Asian descent (48%), with remaining participants identifying as White/Caucasian (22%), South Asian (11%), or other categories (19%). Given the recruitment across campus, participants came from a wide range of majors: predominantly science (28%), non-psychology liberal arts (22%), psychology (15%), and business (13%). Participants first completed a measure of communal and agentic values, followed by two randomized blocks assessing participants’ perceptions of and attitudes towards two HEED careers – nursing and social work.

Measures

**Personal values.** Participants were asked to report the extent to which seven communal values (helping others, serving humanity, working with people, connection with others, attending

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1) We chose to focus on participants under the age of 25 since we reasoned that these people were likely not yet entirely committed to a specific career, thereby ruling out any other careers. We also decided to focus on heterosexual participants, as past research suggest that non-heterosexual participants do not always feel bound by the same gender role norms (Vogel, Heimerdinger-edwards, Hammer, & Hubbard, 2011).
to others, caring for others, intimacy) and seven agentic values (power, recognition, achievement, self-promotion, independence, status, competition) were personally important to their well-being. These values were taken from past work (Evans & Diekman, 2009; Block et al., 2018b). Specifically, participants were asked: “Different people have different goals. How important are the following values and goals to you personally?” Participants rated each value on a nine-point Likert scale ranging from “1 = not at all beneficial” to “9 = extremely beneficial”. Responses were averaged to represent participants’ endorsement of communal ($\alpha = .83$) and agentic goals ($\alpha = .81$).12

**Perceived descriptive norms.** To assess the extent to which participants perceive that descriptive norms are shifting towards greater participation of men in HEED, participants rated two items to indicate how fast they believed men were moving: 1) into nursing and 2) into social work. These items were first standardized and then averaged. Higher numbers thus indicate a perception of change towards more progressive descriptive norms ($r = .39$). Ratings were made on a seven-point Likert scale ranging from “1 = extremely slowly” to “7 = extremely fast”.13

**Fit with HEED.** As our primary dependent variable, we assessed the extent to which participants felt that nursing and social work would provide a good fit to their self-concept. For each career, participants first read a vignette (see Appendix B for an example) about an average daily routine among people in these careers (developed by the authors). After reading the given career’s vignette, participants rated their agreement with six items (e.g. “I feel like the job is a good fit to the kinds of things I value”) on a seven-point scale from “1 = not at all” to “7 = very much”. These items were adapted from Steger, Dik, and Duffy’s (2012) Work as Meaning

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12 Communal and agentic values were not significantly related, $r = .13, p = .11$.
13 We had initially pre-registered separate analyses for nursing and social work as outcomes. However, because results were so similar (see supplementary online material (SOM - Appendix B)), we report results combining social work and nursing measures in the interest of parsimony.
Inventory (WAMI) to specifically assess fit with nursing and social work. All items for nursing as well as social work were averaged into an overall composite variable of HEED fit ($\alpha = .93$).

**Demographics.** Participants completed a standard demographic questionnaire, including their gender, age, sexual orientation, ethnicity, English language proficiency, and major.

4.2.2 Results

**Gender Differences**

We first assessed gender differences in HEED fit, values, and perceived norms with independent-samples t-tests. As expected based on past work (Block et al., 2018b), men ($M = 4.18, SD = 1.20$) perceived HEED careers to be a poorer fit to them personally than did women ($M = 4.82, SD = 0.94$), $t(434) = 6.21, p < .001, d = .59, CI_{95} (0.44, 0.85)$.

Consistent with previous research (Diekman et al., 2011; Block et al., 2018b), we found gender differences in participants’ identification with communal values. As expected, men ($M = 6.98, SD = 1.02$) endorsed communal values significantly less than did women ($M = 7.20, SD = 1.07$), $t(435) = 2.18, p = .029, d = .21, CI_{95} (0.02, 0.40)$. In contrast to recent studies that do not report significant gender differences in agentic values (Diekman, Clark, Johnston, Brown, & Steinberg, 2011; Evans & Diekman, 2009), we also found that men ($M = 6.47, SD = 1.20$) endorsed agentic values significantly more than women did ($M = 6.11, SD = 1.16$), $t(434) = -3.14, p = .002, d = .31, CI_{95} (0.12, 0.49)$.

A parallel t-test comparing men’s and women’s perceptions of descriptive norms suggested that men ($M = 0.07, SD = 0.81$) and women ($M = -0.05, SD = 0.84$) did not perceive

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14 A pilot study on Amazon Mechanical Turk ($n = 192$) for this scale showed strong reliability, $\alpha = .91$. 
men to move into HEED roles at significantly different rates, $t(435) = 1.48, p = .139, d = .14, CI_{95} (-0.04, 0.33)

**Predicting Men’s Fit to Career**

As pre-registered, our primary interest was in how personal values would predict specifically men’s self-concept fit with HEED in conjunction with norm perceptions. To examine the relative effects of norms and values, we thus conducted linear multiple regression analyses on a sub-sample of only men. We entered norms and communal values (both $z$-scored) as predictors on step 1, and their interaction as predictors on Step 2 of a linear regression model, with HEED fit as the outcome. Results from these analyses can be found in Table 4-1.

As expected based on past work (Block, Croft, & Schmader, 2018), over and above norm perceptions, communal values predicted higher self-concept fit with HEED careers among men, $\beta = .37, SE =.06, t(216) = 5.74, p < .001$. Furthermore, higher agentic values were independently related to reduced self-concept fit with HEED for men, $\beta = -.13, SE = .07, t(216) = -2.07, p = .039$. In addition, and as we expected, norm perceptions were also a significant predictor of men’s fit with HEED even after controlling for the effect of their personal values. Specifically, those men who perceived male representation in HEED careers was rising rapidly perceived HEED as a better fit for themselves than those who perceived that men remain stagnantly underrepresented in HEED, $\beta = .16, SE = .07, t(216) = 2.38, p = .018$. We did not, however, find evidence for an interaction between men’s norm perceptions and their internal communal values in predicting self-concept fit with HEED, $\beta = .09, SE = .06, t(215) = 1.46, p = .146$.

**Testing Mediation of Gender Differences**

**Communal values as mediator of gender differences.** Given past evidence that gender differences in communal values explain gender differences in STEM interest (see Diekman et al.,
2017 for a review) and HEED interest (Block et al., 2018b), we tested whether gender differences in communal values still account for a significant proportion of the gender difference in HEED fit when accounting for norm perceptions. To test this hypothesis, we conducted mediational analyses with gender (0 = male, 1 = female) as the independent variable, communal values (z-scored) and agentic values (z-scored) as simultaneous mediators, and HEED fit as outcome variable in a mediational model conducted in the SEM framework using the R-package lavaan (Rosseel, 2012). Analyses controlled for the effect of perceived norms (z-scored) on the outcome variable, which remains a significant predictor in this model of overall nursing fit, $\beta = .15$, $SE = .04$, $z = 3.72$, $p < .001$. Results, summarized in Figure 4-1, revealed that communal values accounted for a significant proportion of the gender difference in HEED fit, $a_1 * b_1 = .08$, $SE = .04$, $z = 2.14$, $p = .032$. Whereas agentic values did not have a significant unique indirect effect on HEED fit, $a_2 * b_2 = .03$, $SE = .02$, $z = 1.84$, $p = .066$.

4.2.3 Discussion

Study 1 provides initial evidence that men’s own values and perceptions of descriptive gender role norms independently relate to men’s sense of fit with HEED careers, together explaining one quarter of the total variance in HEED fit among men, $R_{adj}^2 = .19$. Extending past research that documented a relationship between men’s communal values and their interest in HEED careers (Block et al., 2018b), we find that even when controlling for perceptions of other men’s participation in HEED, higher personal communal values were related to increased fit.

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15 We pre-registered a model focusing only on the mediational effect of values, not accounting for norms. In this model, the mediation through communal values remains significant, but we deemed it important to demonstrate in the main manuscript that these results hold when accounting for norm perceptions.

16 Note that additional analyses suggested that participant gender did not moderate the relationships of norms, $\beta = -.02$, $SE = .08$, $t(429) = -.28$, $p = .781$, communal values $\beta = -.02$, $SE = .08$, $t(429) = -.36$, $p = .798$, or agentic values, $\beta = .08$, $SE = .08$, $t(429) = 0.95$, $p = .342$, to nursing fit.
with nursing and social work among men (and women). Moreover, men’s (compared to women’s) relatively lower communal values partially accounted for the gender difference in feelings of fit with HEED careers, even over and above perceptions of external descriptive norms.

Our results further suggest that individual differences in norm perceptions also represent an important additional factor in predicting men’s sense of fit with HEED careers. Over and above what values men personally endorsed, the perception that other men are becoming increasingly likely to enter HEED careers predicted greater fit with HEED careers. Importantly, we also tested whether such perceptions of gender role norms moderated the relationship between men’s personal values and their sense fit with HEED careers. We found no evidence that communal values had a significantly weaker relationship to HEED fit for men who perceived that it remains uncommon for other men to enter HEED (compared to men who perceived that men are increasingly entering HEED). It is possible that Study 1 did not have enough statistical power to detect what we might expect to be a relatively small interaction, especially given that the range of descriptive norm perceptions was somewhat restricted – 68% of responses fell between 2.56 and 4.88 on a seven-point scale, suggesting that very few men actually perceived very truly rapid movement of men into HEED. Post-hoc sensitivity analyses suggested that in a sample of 220, we needed a standardized regression coefficient of at least $\beta = .19$ to be detected with 80% power (alpha = .05, two-tailed). Based on these limitations, Study 2 focuses on collecting a larger sample of exclusively men to be able to more adequately examine whether the predictive effects of internal values and external norms are independent or

Note that this is especially small, given that the averages we observed on a similarly worded manipulation check item in Study 3 were 1.83 when we gave information suggesting slow change and 5.28 when giving information suggesting fast change.
interactive in nature. To be able to collect a large sample, and given the similarity in results for nursing and social work, we also decided to focus all measures on the domain of nursing for all forthcoming studies.

An additional, somewhat serendipitous finding in Study 1 further highlighted the need to better understand the relationship between descriptive norm perceptions and men’s sense of HEED fit. Contrary to what we might have expected, perceptions of the descriptive gender role norms did not predict the size of the gender gap in HEED fit. Instead, perceiving increased movement of men into HEED careers related to greater fit with HEED careers among both men and women. These results might be explained by the presence of men conferring status to a role. Since men represent a high-status group in society (Conway & Vartanian, 2000; Ridgeway & Correll, 2004), careers tend to increase in status when they become increasingly associated with men (England, Thompson, & Aman, 2001; Levanon et al., 2009). Both men and women might therefore see a given career as higher in status, and therefore more desirable, when they believe that increasingly more men are choosing that career. Theoretically, however, there might also be other mechanisms through which descriptive gender role norms might shape men’s sense of fit with HEED careers.

In addition to the larger sample focused on men, Study 2 was thus designed to test possible mechanisms by which perceptions of changing gender role norms might allow young men to feel increased fit with HEED careers. According to the broader theoretical synthesis developed by Croft, Schmader, and Block (2015), the descriptive underrepresentation of men in HEED roles, and the gender stereotypes that arise from this gender distribution, lead men to expect several related but distinct external barriers to their HEED involvement. In Study 3, we plan to test three such possible mechanisms – expectations of gender-based backlash, more
subtle feelings of belonging at one’s workplace, as well as expectations of social status gained through a given career. While we reasoned that all three mechanisms provided theoretically sound accounts, we had no a priori hypothesis about which mechanism would be the strongest predictor.

4.3 Study 4.2

4.3.1 Method

Participants & Procedure

Our final sample for Study 2 contains 475 men recruited by trained research assistants in public areas of campus to participate in a survey on “understanding career interests” in exchange for candy. Following our pre-registration (https://osf.io/skunx) we collected data until we reached a final sample of close to 480 participants after exclusions. This sample size was determined because Fritz and MacKinnon (2007) suggest that a minimum sample size of 445 is needed to detect a statistical mediation of a direct effect of c-path with the size .14, with an a-path of .14 and b-path of .26 (i.e., similar to what we had found in Study 4.1), and 80% power (alpha = .05). This sample size would also provide us with better power to test the interaction from Study 1.

As pre-registered, we excluded additional participants over the age of 25 (n = 57), participants who did not identify as men (n = 3), and participants who did not identity as heterosexual (n = 73). In addition, because gender norms might be culturally variable, we also preregistered to exclude participants who moved to Canada after age 18 (n = 240), and/or participants who thought they would not live in North America in their future (n = 95) for this study. Note that these high exclusions rates reflect our diverse campus, with a large proportion of international students who are in North America primarily to earn their degree. Lastly, we
excluded participants who had outlying scores on any of our key variables (5 participants who scored below - 3SD on values were excluded, no one scored above + 3SD). Of the final sample, participants were predominantly of East Asians descent (46.6%), with remaining participants predominantly identifying as White/Caucasian (21.6%), or South Asian (14.4%). Given the recruitment across campus, participants came from a wide range of majors: predominantly science (33.5%), non-psychology arts (23.5%), engineering (17.3%), and business (8.8%).

Participants first completed a measure of descriptive norms, then completed items about the three potential mediators in randomized order, followed by our measure of personal values. Next, participants completed the outcome measure of nursing fit followed by demographics. Note that since Study 1 showed virtually identical results for ratings of nursing and social work, Study 2 and all subsequent studies contained only measures focused on nursing.

Measures

Perceived descriptive norms (1 item), personal communal values (α = .85), agentic values (α = .78), and nursing fit (α = .91) were measured exactly as in Study 1 with the exception that, for consistency, values were now also rated on seven-point scale (instead of a nine-point scale) like the other measures.

Mechanisms. We measured three possible mechanisms through which descriptive norms could theoretically shape feelings of fit for men – expectations of backlash, belonging, and status. To assess these, participants were first presented with the following instructions:

“Now, please disregard your current occupation or the job you plan to have in the future. Please think about what it WOULD be like if YOU worked as a registered nurse. Really try to imagine

18 Note. This study also added a new item that asked about how common male nurses were in Canada. As per our pre-registration, however, we excluded this item from analyses because it was correlated with the descriptive norm item below r = .50.

19 For details on how this measure was developed and piloted, please refer to the SOM - Appendix B.
how you would feel about how others treat you as a nurse. To give you some things to think about, we have provided you with a number of statements below. Please rate the extent to which you agree or disagree that each of the following would be true if you were to work as a nurse.”

After this prompt, participants rated their agreement or disagreement with items about backlash, belonging, and status on a scale of “1 = strongly disagree” to “7 = strongly agree”. The order of items was randomized.

*Expected backlash.* The extent to which participants expected gender-based backlash if they were to become a nurse was indicated by their agreement with five items (e.g., “Some people would discriminate against me because I am a man in nursing.”, “Some people would question my masculinity because I am a man in nursing.”; $\alpha = .89$) that were averaged into an overall score.

*Expected belonging.* The extent to which participants expected to feel a sense of belonging with their colleagues if they were to become a nurse was indicated by their agreement with five items that were averaged into an overall score (e.g., “I would feel like my co-workers would accept me”, “I would feel like I get along well with my co-workers at work.”; $\alpha = .80$).

*Expected status.* The extent to which participants expected having high social status as nurse was indicated by their agreement with four items (e.g., “As a nurse, I would feel like I have a career that has high status in Canada.”, “As a nurse, I would feel like I have a career that is highly respected in Canada.”; $\alpha = .88$).
4.3.2 Results and Discussion

Correlations between all key measures can be found in Table 4-2.

Validating the Factor-Structure of Novel Measure

To examine the fit of the proposed three-factor structure for the 14 items included in the mechanism measure, we first conducted confirmatory factor analyses with structural equation modelling using the lavaan package in R (Roessel, 2012). As per our pre-registration, we specified a model where items only loaded onto their respective scale, but the three factors (i.e., backlash, belonging, and status) were allowed to correlate. Fit indices from this model suggest that our items fit the three-factor structure well, \( \chi^2(74) = 197.93, p < .001, \text{CFI} = .96, \text{RMSEA} = .059, \text{SRMR} = .04 \). This evidence suggests we are justified in using the scale as planned. See Table 4-2 for correlations between these mechanisms.

Communal Values and Descriptive Norms as Predictors of Nursing Fit

Next, we conducted linear regression analyses to test whether personal values and descriptive norms, either independently or in interaction with each other, predict men’s nursing fit in this new and larger sample of exclusively men. We entered norms, as well as communal and agentic values as predictors on Step 1, and the interaction of norms and communal values as predictors on Step 2 of a linear regression model with HEED fit as the outcome. All variables were standardized. Detailed regression coefficients, standard errors, confidence intervals, and significance tests from these analyses are summarized in Table 4-3.

Results from the Step 1 model suggested that both descriptive norms and communal values distinctly predict men’s nursing fit. As found in Study 1, men who personally endorsed communal values more strongly, \( \beta = .40, t(471) = 9.35, p < .001 \), and men who perceived that other men were moving into nursing at faster rate, \( \beta = .09, t(471) = 2.13, p = .034 \), tended to
report significantly higher fit with nursing. Less central to our hypotheses, but also replicating Study 1, men with relatively higher agentic values also tended to report significantly less fit with nursing, $\beta = -0.12$, $t(471) = -2.84$, $p = .003$. As in Study 1, there was no significant interaction between communal values and descriptive norms interaction in predicting nursing fit, $\beta = -0.05$, $SE = .04$, $t(470) = -1.36$, $p = .174$.

**Mediation analyses.** To examine whether expectations of backlash, belonging, and/or status could account for the relationship between descriptive norms and nursing fit, we conducted mediation analyses in the SEM framework with lavaan. These analyses specified a model where each of the three mediators (i.e., three $a$-paths) was predicted by descriptive norm perceptions. In turn, all three mediators were then entered as predictors of nursing fit (i.e., $b$-paths). Communal values, agentic values, and descriptive norms were also entered as predictors of fit. All predictors were $z$-scored to obtain standardized coefficients, and the model allowed for correlations between the three mediators as well as correlations between communal values, agentic values, and norm perceptions.$^{20}$

As visualized in Figure 4-2, estimates of the indirect effects showed significant indirect effects through belonging, $a*b = .03$, $z = 2.56$, $p = .010$, and through status, $a*b = .07$, $z = 3.88$, $p < .001$, but not through expectations of backlash, $a*b = .01$, $z = 1.09$, $p = .276$. Specifically, men who perceived that other men were more moving into nursing at faster rate tended to anticipate higher belonging, $\beta = .19$, $SE = .05$, $z = 4.15$, $p < .001$, less backlash, $\beta = -0.14$, $SE = .05$, $z = -2.95$, $p = .003$, and more social status as a nurse, $\beta = .24$, $SE = .05$, $z = 4.97$, $p < .001$. However, only belonging and status predicted nursing fit significantly. Men who tended to expect more

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$^{20}$ In these analyses, we used the composite scores of the three mechanism measures, as per our pre-registration. Note that these results also hold if we define the belonging, backlash, and status as factors (comprised of the 14 items on our scale), rather than entering their composite measures into the SEM model.
belonging in nursing, $\beta = .15, SE = .05, z = 3.10, p = .002$, and tended to expect more status as a nurse, $\beta = .27, SE = .05, z = 6.03, p < .001$, also tended to perceive nursing a better fit for themselves. Expectations of gender-based backlash, somewhat surprisingly, did not predict personal fit with nursing among men, $\beta = -.05, SE = .05, z = -1.16, p = .245$.

After accounting for the relationships of the three mediators with nursing fit, communal values, $\beta = .30, SE = .05, z = 6.86, p < .001$, and agentic values, $\beta = -.12, SE = .04, z = -2.99, p = .003$, remained significant independent predictors of nursing fit, whereas perceived descriptive norms did not, $\beta = .003, SE = .04, z = 0.08, p = .935$. This evidence is consistent with the theoretical perspective that perceptions of other men are moving into nursing rapidly are related to personal fit with the career among men because such perceptions predict the expectation that one would experience high belonging and status in this career. These perceived changes in external norms are distinct predictors from men’s own internalized values.

**Exploratory Analyses.** Whereas we had pre-registered testing whether our three proposed mechanisms statistically account for the relationship between descriptive norms and sense of fit with nursing, we also conducted exploratory analyses to examine whether belonging, status, and/or expectations of gender-based backlash might play a role in the relationship between communal values and nursing fit. To explore what paths our pre-registered SEM model might be erroneously omitting, we first requested residual covariances for the model above. Two residual covariances in this model stood out as $\geq .20$: a) the relationship between communal values and belonging, and b) the relationship between communal values and perceived status of nursing. Based on this, we repeated the above mediation model (i.e., mechanisms mediating the relationship between descriptive norms and nursing fit) but also added additional paths from communal values to expected belonging and to expected status (i.e., expectations of belonging
and status mediating the effect of communal values on nursing fit). We did not add additional paths between agentic values and status or belonging, because residual covariances between these were small, < .10. Comparing this new model with our previous mediation model suggested that the new model showed significantly better fit to our data than the previous one, \( \chi^2 \text{difference}(2) = 54.93, p < .001 \).

Results from this new model, visualized in Figure 4-3, suggested that both expected belonging, \( a\times b = .02, z = 2.25, p = .025 \), and expected status, \( a\times b = .06, z = 3.66, p < .001 \), remained significant mediators of the relationship between descriptive norms and nursing fit as in the previous model. Importantly, we found additional evidence that belonging, \( a\times b = .04, z = 2.68, p = .007 \), and status expectations, \( a\times b = .06, z = 3.74, p < .001 \), also partially mediated the relationship between men’s communal values and their perceived fit with nursing. Specifically, men who reported stronger communal values also tended to anticipate higher belonging, \( \beta = .33, SE = .05, z = 7.49, p < .001 \), and more social status as a nurse, \( \beta = .22, SE = .04, z = 5.17, p < .001 \) (over and above their norm perceptions). As in the previous model, men who tended to expect more belonging in nursing, \( \beta = .15, SE = .05, z = 3.12, p = .002 \), and tended to expect more status as a nurse, \( \beta = .27, SE = .05, z = 5.93, p < .001 \), also tended to perceive nursing a better fit for themselves. In contrast to belonging and status expectations fully accounting for the relationship between descriptive norms and HEED fit, personal communal values remained a significant direct predictor of fit even after accounting for the indirect effect through belonging and status expectations, \( \beta = .30, SE = .05, z = 6.57, p < .001 \). These results suggest that expected belonging and status not only account for the relationship between norms perceptions and

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21 Expectations of backlash were not added as mediator of the effects of communal values because the previous model showed that expectations of gender-based backlash did not actually predict nursing fit.
nursing fit, but can also account for a small part of the relationship between communal values and nursing fit.

In sum, Study 2 provides additional evidence from a high-powered and pre-registered sample suggesting that both internal values and perceptions of the gender distribution in HEED careers independently predict men’s sense of fit with these careers. In Studies 1 and 2, we find converging evidence that both communal and agentic values seem to play a role in men’s HEED fit; to the extent men personally endorsed communal values more, and agentic values less, they also tended to report a greater sense of personal fit with HEED careers. These findings provide more evidence that the extent to which men have internalized different values than women predicts their career aspirations (Block et al., 2018a; 2018b; Tellhed et al., 2018).

Study 2 also provides a better test of how perceptions of gender role norms function as barriers in conjunction with men’s internal values. Study 2 lends additional support to the idea that, independently of men’s personal values, their perceptions of descriptive gender norms surrounding HEED careers predict their sense of fit with such careers. We specifically found that to the extent that men perceived that other men were moving into nursing at a faster (vs. slower) pace, they also tended to report a greater sense of fit with nursing as a career path.

Study 2 also provides some additional insight into how exactly descriptive norms might be shaping men’s sense of fit with HEED careers. Our findings suggest that this relationship between descriptive norm perceptions and sense of fit was statistically mediated by expectations of belonging and status, but not by expectations of gender-based backlash. Specifically, men who perceived that men’s representation in nursing was rising rapidly tended to also expect to feel greater belonging among their colleagues and more social status if they were to become a nurse. These expectations of greater belonging and status, in turn, predicted men’s greater sense of fit.
with nursing. Additional exploratory analyses hint that expectations of belonging and status may also play a role in the relationship between men’s communal values and their sense of fit with HEED careers. Men with relatively stronger communal values also tended to predict that they would feel a sense of belonging among co-workers in nursing and expected that such a career would lend them greater status.

Whereas these mediation analyses were targeted at understanding how perceptions of norms might shape HEED fit among men, they were unable to fully distinguish mechanism by which norms vs. values might shape HEED fit. Instead, exploratory analyses suggest that both communal values and norm perceptions predict expectations of belonging and status as a nurse. With the goal of better understanding how dynamic social norms causally shape expectations of belonging and status as a nurse, we ran an additional experimental study, which we do not report in the main body of this manuscript for sake of brevity. In this study we randomly assigned participants to receive information showing that men remain underrepresented in nursing (restrictive norms) or showing that men are increasingly moving into nursing (progressive norms). As predicted, those who were given information suggesting that men are moving into nursing at a rapid pace (progressive norms) felt more fit with the career than those given information suggesting that men continue to avoid nursing (restrictive norms). However, in contrast to correlational findings, the descriptive norms manipulations did not significantly affect expectations of social fit, status, or backlash. More detail on these findings can be found in Appendix B. Given these findings, it remains unclear to what extent norms vs. communal values shape nursing fit by affecting men’s expectations of belonging and social status. What did become clear, however, is that we needed further studies to examine how men’s norm perceptions and internal values may interact to shape their sense of fit with HEED careers.
A second important goal of Study 2 was to test whether norm perceptions and communal values interacted in predicting men’s sense of fit with nursing. Despite a substantially larger sample compared to Study 1, Study 2 found no support for such an interaction, suggesting that at least individual differences in norm perceptions and communal values predict fit with HEED careers independently (though they might both be shaping belonging and status expectations). It is possible, however, that the correlational nature of these studies is not the most sensitive way to isolate an interactive effect of values and norm perceptions, especially given the limited range of responses on perceived descriptive norms. And of course, experimental methods are also needed to isolate the causal effects of values and norms. Therefore, it remains an open question whether changing either internal or external factors would directly result in an increase in men’s affinity for HEED roles.

Based on past evidence that communal values causally shape women’s interest in STEM careers (Diekman et al., 2017), we also expected a causal relationship between men’s communal values and HEED fit. Similarly, we expected that changing men’s perceptions of descriptive norms by giving them information showing that men are moving into nursing at a rapid (vs. slow) pace, would also result in an increased sense of fit with nursing. In addition, we speculated about the possibility that changes in descriptive norms might moderate this causal relationship between communal values and nursing fit. Specifically, it might be possible that increasing men’s communal values alone might not increase perceptions of personal fit to HEED careers, if restrictive gender role norms still represent external barriers to HEED interest. To examine the causal effects of changes in descriptive norms and internal communal values (and their possible interaction), Study 3 manipulated descriptive social norms (progressive vs. restrictive) and communal values (high vs. low) orthogonally to test how these affect men’s perceptions of
personal fit with a HEED career. We pre-registered measures, hypotheses, and analyses for this study on the OSF (https://osf.io/ce82y/).

4.4 Study 4.3

4.4.1 Method

Participants

Our final sample for Study 3 included 193 male undergraduate students who were recruited through the subject pool of a large Canadian university. We determined an a priori sample size minimum of 183 through a power analysis with G*Power to detect a medium-sized (partial eta^2 = .055) 2 x 2 interaction effect with 90% power, and oversampled to account for exclusions. We reasoned that this study should be highly powered in order to detect a possible interaction effect of changing norms and values. As pre-registered, we excluded 37 additional participants who did not complete the study (n = 1), did not stay on topic in the essay manipulation (n = 1), failed to remember the materials correctly (n = 13), or identified as non-heterosexual (n = 21). Participants were predominantly of East Asian descent (47%), White/Caucasian (23%) or of South Asian descent (18%). Lastly, most of our participants identified as a non-psychology arts major (48%), followed by science majors (32%), psychology majors (17%), and engineering majors (7%).

Procedure

Participants were recruited either through an undergraduate subject pool system in exchange for course credit or the psychology department’s paid study webpage for a $10 remuneration. Participants were brought into the lab in groups of one to five and assigned to individual computer stations in separate rooms. Upon arrival, a trained research assistant
explained to participants that the study was (ostensibly) conducted in collaboration with the Department of Nursing to test advertising materials and assess individuals’ interest in and aptitude for nursing as a potential career. As part of our cover story, we informed participants that the main study assessing their attitudes about nursing is relatively short, but required a break in the middle to assess the memorability of a nursing brochure we were going to present to them. To bridge this break, we explained to them that they would be enlisted to help in a completely separate pilot study concerned with how individuals understand and personally relate to research (which, unbeknownst to participants, contained our manipulation of communal values).

Participants were told that an assessment of the memorability of the nursing brochure that they viewed in the first part, as well as measures of their personal opinions, would be conducted after this brief unrelated study. After completing the consent form, participants completed a pre-measure of nursing interest to capture their baseline interest prior to any manipulations. Next, participants were randomly assigned to one of two norm conditions (descriptive norms: restrictive vs. progressive).

**Descriptive social norm manipulation.** To manipulate perceptions of changes in descriptive norms about men’s participation in nursing in a believable way, participants were presented with a nursing brochure, which gave a variety of information about nursing (job openings, salary, education requirements). Embedded within this brochure was a graph depicting the percentage of male nurses from 1970 – 2011 taken directly from US Census Bureau (2013). The scaling of the y-axis of this graph differed by condition (see Croft et al., 2018, for a similar manipulation). In the restrictive norms condition, the y-axis extended from 0 to 50% to give the appearance that the percentage of men in nursing is low and has remained low across these four decades. The legend of the graph in this condition read “Men’s underrepresentation among
licensed practical and licensed vocational nurses continues to be a problem. Since 1970 the percentage of men in nursing has grown only little.” In the progressive norms condition, the y-axis ranged from only 0 to 10% to create the appearance that the percentage of male nurses has been steeply increasing across this time period. The legend of the graph in this condition read “Men’s representation among licensed practical and licensed vocational nurses has been rising steadily and has doubled since 1970.”22 See Appendix B for this manipulation.

**Communal values manipulation.** To strengthen the credibility of our cover story, we next provided participants with a new consent form for the “pilot study” and explained that the subsequent tasks would be completed with pen and paper. To manipulate communal values, participants were randomly assigned to read one of two articles (values: anti-communal vs. pro-communal) formatted to look like a recent report from Psychology Today. The articles selectively presented actual research findings that reflected ways in which communion is either potentially harmful to the self (low communal condition) or potentially beneficial for personal well-being (high communal condition; see Appendix B for full text). To encourage the internalization of the articles, participants were then asked to spend seven minutes writing about how the findings in the article related to their personal lives. Finally, participants rated how much they identified with different agentic and communal values personally. Upon conclusion of this paper questionnaire, participants completed attention checks regarding the brochure they had read earlier, and completed our main dependent variable.

**Measures**

22 In an initial pilot test (n = 182), male participants who read the permissive norms brochure on an IPad reported perceiving that men are entering nursing at faster rates than male participants who read the restrictive norms brochure.
**Baseline nursing interest.** To assess baseline interest in nursing, participants rated three items (“Without taking into consideration your current qualification, please indicate the degree to which you can imagine yourself being at all interested in nursing?”; “In this moment, how easy or difficult is it for you to imagine yourself in nursing?”; “In this moment, how much do you think you could enjoy nursing?”) on a seven-point scale. These items were averaged to represent overall baseline interest in nursing (α = .76, M = 3.17, SD = 1.17). This measure was highly correlated with our key outcome measure nursing fit, r = .61, p < .001, and served as a control variable in key analyses as per our pre-registration.

**Manipulation and attention checks.** To assess the effectiveness of our value manipulation, communal (α = .83) and agentic values (α = .76) were measured as in Study 1. As a manipulation check for our descriptive norm manipulation, we asked participants: “To the best of your memory, at what rate did the graphs show men moving into nursing in Canada?” Ratings were made on a seven-point scale from “1 = extremely slowly” to “7 = extremely fast”.

*Attention checks* were also included throughout the study in both the online materials and the paper packet to ensure that participants were paying attention to the materials presented, as well as to increase the credibility of the cover story. First, after the nursing brochure, a multiple-choice question asked participants to pick the program advertised in the brochure. After the essay manipulation, a multiple-choice question asked participants to recall the topic of the article they just read. Participants who failed either of these attention checks were excluded from analyses.

**Nursing fit.** After completion of the communal values manipulation packets, participants completed the same six-item measure of nursing fit used in Study 1 (α = .89).
4.4.2 Results

Manipulation Checks

Changing descriptive social norms. We first tested whether our manipulations were effective in changing men’s perceptions of descriptive norms regarding nursing. A 2 (values; 0 = low-communal vs. 1 = high-communal) x 2 (descriptive norms; 0 = restrictive, 1 = progressive) ANOVA revealed the effectiveness of the norm manipulation. Participants in the progressive norms condition ($M = 5.28$, $SD = 1.07$) perceived that men are moving into the nursing field at a significantly faster rate compared to those in the restrictive norms condition ($M = 1.83$, $SD = 0.98$), $d = 3.36$, CI$_{.95}$ (3.65, -3.07), $F(1, 189) = 543.72$, $p < .001$. Note that this spread between conditions was much wider than what we observed in terms of individual differences in Studies 1 and 2. There was no main effect of the values condition, $F(1, 189) = 0.04$, $p = .847$, or interaction between the norms and values condition on these perceptions, $F(1, 189) = 1.50$, $p = .223$.

Changing communal values. Additional analyses revealed the expected effect on men’s communal values. Men in the pro-communal condition ($M = 7.18$, $SD = 1.05$) reported higher communal values than those in the non-communal condition ($M = 6.68$, $SD = 1.19$), $F(1, 186) = 10.15$, $p = .002$, $d = .45$, CI$_{.95}$ (0.26, 0.64)$^{23}$. Communal values were not influenced by the descriptive social norms manipulations, $F(1, 186) = 0.010$, $p = .921$, and we did not observe an interaction between the norms and values conditions in affecting communal values, $F(1, 186) = 2.15$, $p = .145$.^{24}

Effects of Norms and Values Manipulations on Fit

Note that men in the pro-communal condition scored similarly to women in Study 1 ($M = 7.20$, $SD = 1.07$), whereas men in the non-communal condition scored even below the average of men in Study 1 ($M = 6.98$, $SD = 1.02$).

Note that men in the pro-communal condition scored similarly to women in Study 1 ($M = 7.20$, $SD = 1.07$), whereas men in the non-communal condition scored even below the average of men in Study 1 ($M = 6.98$, $SD = 1.02$).

There were also no main or interactive effects of these conditions on men’s agentic values, $Fs < 0.64$, $p > .420$. 
We next tested our main hypothesis that more progressive descriptive social norms and increasing communal values might interact to increase men’s sense of fit with nursing. We tested this hypothesis by entering norms condition (0 = restrictive, 1 = progressive) and value condition (0 = low-communal, 1 = high-communal) on Step 1, and their interaction in Step 2 of a linear regression model predicting nursing fit, controlling for the baseline measure of nursing interest.25

Results, visualized in Figure 4-4, yielded no main effects of value condition, $\beta = .18, SE = .12, t(189) = 1.55, p = .123$, or norms condition, $\beta = .09, SE = .12, t(189) = 0.80, p = .424$. However, values and norms interacted to affect men’s nursing fit, $\beta = .53, SE = .23, t(188) = 2.32, p = .022$. As visualized in Figure 4-2, nursing fit was significantly increased after participants read information increasing their communal motivation (vs. lowering their communal motivation) only when they also saw information priming increasingly progressive norms, $\beta = .46, SE = .18, t(188) = 2.76, p = .006$, but not after seeing information priming stagnant restrictive norms, $\beta = -.07, SE = .16, t(188) = -0.47, p = .638$. Decomposed differently, participants only showed an increase in nursing fit in response to being presented with more progressive (vs. restrictive) norms when they also read information on the benefits of communion, $\beta = .34, SE = .16, t(188) = 2.16, p = .032$, but not after reading information about the costs of communion, $\beta = -.20, SE = .17, t(188) = -1.17, p = .244$. As expected, baseline nursing interest was significantly positively related to self-concept fit with nursing, $\beta = .61, SE = .06, t(189) = 10.68, p < .001$.

25 Note we pre-registered these analyses as an ANCOVA model but prefer reporting results regression framework for ease of effect size comparison to Study 1. Results are the same with an ANCOVA model.
4.4.3 Discussion

Study 3 provides empirical evidence that changes in internal and external barriers shape men’s sense of fit with HEED careers in interaction with each other. We found that lifting only external or internal barriers to men’s involvement in HEED alone did not effectively increase men’s sense that a career in nursing provides a good fit for them. When we increased men’s communal values, but suggested that men’s entry into nursing is non-normative, men did not show increased fit with nursing. In contrast, when we suggested to male participants that it is becoming increasingly normative for other men to enter nursing, and then experimentally increased men’s communal values, this resulted in an increased sense that HEED would be a good fit for men personally. Whereas Studies 1 and 2 suggest independent effects of communal values and norm perceptions as predictors of HEED fit among men, findings from Study 3 suggest that interventions seeking to increase men’s sense of fit with HEED careers by increasing their communal motivations might only be viable if descriptive norms are at least somewhat in favor of men entering HEED. These findings lend concrete causal evidence for the assertion that men’s affinity for HEED careers will increase if men internalize communal values to a greater degree, but perhaps only if they perceive fewer external barriers to entering these careers. In contrast to past evidence that has largely focused on the role of communal values in men’s and women’s career interest in isolation, Study 3 suggests that changes in descriptive norms play a potentially central role as well.

4.5 General Discussion

Given the importance of HEED professionals to the functioning of societies, the current research sought to understand the interplay between internal and external barriers to men’s interest in HEED careers. In two correlational and one experimental study, the current research
tested how internal communal values and external descriptive gender role norms predict and causally shape men’s sense of fit with HEED careers.

The current research contributes to our emerging understanding of goal congruity processes in shaping men’s sense of fit with HEED careers. Based largely on past research that identified the importance of goal congruity processes in women’s (lack of) interest in STEM careers (see Diekman et al., 2017 for review), Croft and colleagues theorized that men’s internal values might also play an important role in their interest in taking on HEED careers (Croft et al., 2015). Some initial correlational studies did suggest that communal values predict interest in HEED careers among young men (Block et al., 2018b; Tellhed et al., 2018). Yet, these studies did not unconfound men’s internal values from their perceptions of social norms. Isolating the effects of internal values from those of external barriers is, however, important because men’s internalization of values is likely shaped by gender role norms and stereotypes themselves (Croft et al., 2015; Eagly & Wood, 1999). Our studies find that internal values predict men’s (and women’s) sense of fit with HEED, even when controlling for perceptions of external norms (Studies 1 and 2). Furthermore, providing important experimental evidence that had been lacking to date, we show that elevating men’s communal motivations causally increases their perceived fit with nursing, at least when information suggests that it is also increasingly normative for men to enter HEED fields (Study 3).

In addition, our results also suggest that internal goal congruity processes are not limited to communal values guiding fit to HEED careers. We found consistent evidence that men’s (compared to women’s) relatively higher agentic values additionally predict the lack of fit they tend to feel to HEED careers. Men who highly valued agentic values such as power, dominance, and independence tended to see HEED careers as a poor fit for themselves. While this
relationship was descriptively weaker than the relationship between communal values and HEED fit, it emerged consistently across studies. These findings do suggest that holding strong agentic values may represent a mismatch with HEED careers, regardless of one’s own valuing of communion.

The current research further provides evidence that external barriers to men’s HEED interest are distinct from internal goal congruity processes. Studies 1 and 2 show that perceptions of changes in descriptive norms predict men’s sense of fit with HEED over and above their communal and agentic internal motivations. In both samples, men who perceived a continuing underrepresentation of men in HEED (rather than thinking men are increasingly entering these careers) tended to expect less fit with HEED careers, regardless of their own communal and agentic values. With Study 3, we provide critical evidence that the relationship between dynamic vs. static norm perceptions and men’s sense of HEED fit is causal, at least among those men who are already internally motivated to take on HEED careers.

Whereas we provide consistent evidence for the importance of both communal (as well as agentic) values and dynamic social norms in shaping men’s sense of fit with HEED careers, the mechanisms for these effects are still tenuous. Results from Study 2 provide some initial hints that expectations of belonging and status as a nurse can account for the relationship between descriptive norm perceptions and fit with HEED. Those men who perceived that increasing numbers of males are currently taking on careers in nursing also tended to expect more belonging among their co-workers and higher status in society if they were to become nurses, perceptions that in turn predicted heightened sense of fit with nursing. Perhaps somewhat surprisingly, expectations of gender-based backlash did not relate to the extent to which men imagined HEED careers as being a good fit for them personally. This might hint that more subtle
concerns about not fitting in with one’s co-workers and not being afforded high status if one were to take on a career in HEED could be more prominent deterrents for men than explicit fears of facing backlash, at least among young North American university students.

Additional exploratory findings, however, suggested that the potential mediators we examined were not exclusively linked to men’s norm perceptions. Analyses from Study 2 suggest that those men who have relatively high communal values also tend to expect that they would fit in well among other nurses, and tend to see nursing as a career that can afford them higher status. Rather than being specifically tied to norm perceptions, these results suggest expectations of belonging and status could also partially explain why more communal men tend to feel a higher sense of fit with nursing. Given that we did not find a causal link between norm changes and these mechanisms in an experimental study we detail in Appendix B, however, the mechanisms by which internal values and external norms shape men’s sense of fit with HEED remain unclear at this point.

Limitations and Future Directions

Whereas our studies clearly show distinct and causal effects of both internal communal values and perceptions of external descriptive norms, evidence on whether these barriers interact was more mixed. Our correlational studies suggest that men’s own communal values predicted a greater sense of fit with HEED independent of perceptions of descriptive norms (i.e., the two predictors did not interact). In contrast, Study 3 provides evidence that the extent to which HEED fit is causally increased by heightened communal values depends critically on perceptions of dynamic descriptive norms. Specifically, we found that men who completed a writing exercise

26 Note an additional study, which we summarize in the SOM – Appendix B for the sake of being concise, also replicates the causal link between descriptive norms and men’s HEED fit among men whose communal values have been activated. However, we find no causal link between descriptive norms and belonging or status expectations. We discuss this issue further in the SOM – Appendix B.
designed to activate their communal motivation (vs. discourage communal motivation) only reported a higher sense of fit with nursing when they also received information suggesting that descriptive gender role norms are increasingly favoring men in nursing.

It is possible that the nature of attitude change could account for these seemingly divergent findings. Understanding how explicit attitudes change might provide a basis for understanding our effects. Men’s reports of HEED fit are essentially an explicit attitude. According to the APE model, explicit attitudes are the consequence of propositional processes (i.e., explicit reasoning about the available evidence; Gawronski & Bodenhausen, 2011; 2006). Whereas more automatic associations change in a slow, linear fashion, explicit attitudes can be changed rapidly when sufficient new information is provided (Rydell & Mcconnell, 2006). It is possible that we are observing interactive effects in our experimental study because only the combination of increasing internal motivations and lifting external barriers is able to reach such a threshold for an immediate change of men’s explicit attitudes towards HEED. Future research should thus aim to replicate effects found in Study 3, and further examine under which circumstances internal values interact with external norms to shape men’s interest in HEED.

In addition to better understanding the intricacies of how and when internal and external barriers may have interactive effects on men’s sense of fit with HEED, future research may also want to determine when and how a sense of HEED fit directly translates to the approach of HEED careers. Based on past research and theory, higher sense of fit with a career should also translate to an increased tendency to approach this career (Schmader & Sedikides, 2018), or remain committed to this career (Block, Hall, Innes, Croft, & Schmader, 2018). To date, it remains an empirical question whether internal and external barriers would shape approach of HEED careers in the same way as they shape HEED fit. In Studies 1 and 2 especially we find
that internal values are somewhat more strongly related to fit than are external norms (though they are both significant predictors). It is possible that this is the case because fit is determined by the extent to which an environment activates our internal sense of self. Such an internal sense of fit, however, need not always translate into direct action. In fact, external norms might determine how easy it is for people to translate such feelings of fit into approach behavior. Future research might, thus, more directly test whether external norms make a greater relative contribution to actual behavioural decisions to approach a HEED career.

Another future direction would be to contextualize the effects of internal and external barriers to men’s sense of fit with HEED within their broader cultural setting. In the current study, we sampled North American undergraduate students. For quite some time, however, theorists have cautioned that effects in psychological research do not always generalize from such western, educated, industrialized, rich, and democratic (WEIRD) contexts to the rest of the world (Henrich, Heine, & Norenzayan, 2010). In regards to barriers to men’s HEED fit, the relationship between internal personal values and sense of fit to certain careers may vary in meaningful ways between cultural context. In highly individualistic western countries, we tend to encourage individuals to emphasize their personal identity and let their internal motivation guide their decisions (Markus & Kitayama, 1991). In these cultures, which are characterized by a high level of security (e.g., food, shelter), people typically highly value self-expression in their personal lives (Inglehart, 1997; Welzel & Inglehart, 2009). Such an emphasis on expressing personal values might explain the strong relationship between men’s internal communal values and their career interest, which we find in a North American culture. In contrast, less westernized and economically developed cultures tend to prioritize focusing on survival over encouragement of self-expression (Welzel & Inglehart, 2009). It is possible that such cultures urge individuals to
select career paths based on external pressures (e.g., availability, economic prospects, or prestige to family) rather than selecting a career that expresses internal personal values. In such cultures, we may not expect a strong relationship between men’s communal values and their career interests. Future research might thus want to empirically examine the relationship between men’s values and their career aspirations in different cultural context.

Despite these open questions for future research to address, the current research provides some empirical evidence on an underexamined issue – barriers to men’s sense of fit with HEED careers. Whereas a rich literature has gained insight into the complex processes that shape women’s relative disinterest in STEM careers, our understanding of men’s underrepresentation in HEED careers is still far less developed. Yet, understanding the processes that might deter men from taking interest in HEED roles is imperative. Men themselves could benefit both psychologically and economically from taking on HEED roles, and more men are also needed in HEED fields such as nursing and elementary school education (Croft, Schmader, & Block, 2015). The research we present here therefore focused on understanding the dynamics through which internal and external barriers together constrain men’s interest in HEED careers. Whereas additional studies will be needed to better understand under which circumstance communal values and descriptive norms interact to shape men’s interest in HEED, our studies do provide convincing evidence that both internal values and external norms have to be considered if we want to understand what deters men from taking on such careers.
### Table 4-1

**Study 1 – Results from Linear Regression Analyses Predicting HEED Fit.**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Outcome Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HEED fit in MEN</td>
</tr>
<tr>
<td></td>
<td>( n = 220 )</td>
</tr>
<tr>
<td></td>
<td>( Beta )</td>
</tr>
<tr>
<td>Gender (b)</td>
<td>-</td>
</tr>
<tr>
<td>Permissive Norms</td>
<td>0.16</td>
</tr>
<tr>
<td>Communal Values</td>
<td>0.37</td>
</tr>
<tr>
<td>Agentic Values</td>
<td>-0.13</td>
</tr>
<tr>
<td>Norms x Communal Values</td>
<td>0.09</td>
</tr>
<tr>
<td>Gender x Norms</td>
<td>-0.02</td>
</tr>
<tr>
<td>Gender x Communal Values</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

*Note. All interactions tested separately.*
Table 4-2

Study 2 – Correlations for Key Measures.

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fit</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Communal values</td>
<td>0.40***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agentic values</td>
<td>-0.04</td>
<td>0.20***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Descriptive Norms</td>
<td>0.15***</td>
<td>0.14***</td>
<td>0.03</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Backlash</td>
<td>-0.14***</td>
<td>0.05</td>
<td>0.14***</td>
<td>-0.15***</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Social fit</td>
<td>0.36***</td>
<td>0.31***</td>
<td>0.09</td>
<td>0.19***</td>
<td>-0.21***</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7. Status</td>
<td>0.42***</td>
<td>0.23***</td>
<td>0.04</td>
<td>0.24***</td>
<td>-0.18***</td>
<td>0.45***</td>
<td>-</td>
</tr>
</tbody>
</table>

Computed correlation used Pearson-method with listwise-deletion.

Note. ** p < .01, *** p < .001
### Table 4-3

*Study 2 – Results from Linear Regression Analyses Predicting HEED Fit.*

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Model Step 1</th>
<th></th>
<th></th>
<th>Model Step 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>µ</td>
<td>SE</td>
<td>CI&lt;sub&gt;95&lt;/sub&gt;</td>
<td>P-value</td>
<td>µ</td>
<td>SE</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.00</td>
<td>0.04</td>
<td>-0.08 – 0.08</td>
<td>1.000</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Descriptive Norms</td>
<td>0.09</td>
<td>0.04</td>
<td>0.01 – 0.17</td>
<td>0.034</td>
<td>0.09</td>
<td>0.04</td>
</tr>
<tr>
<td>Communal Values</td>
<td>0.40</td>
<td>0.04</td>
<td>0.32 – 0.49</td>
<td>&lt;0.001</td>
<td>0.40</td>
<td>0.04</td>
</tr>
<tr>
<td>Agentic Values</td>
<td>-0.12</td>
<td>0.04</td>
<td>-0.20 – -0.04</td>
<td>0.005</td>
<td>-0.12</td>
<td>0.04</td>
</tr>
<tr>
<td>Norms x Communal Values</td>
<td></td>
<td></td>
<td></td>
<td>-0.06</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>475</td>
<td></td>
<td></td>
<td></td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>R² / adjusted R²</td>
<td>0.175 / 0.170</td>
<td></td>
<td></td>
<td></td>
<td>0.179 / 0.172</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4-1

Study 1 – Mediation Model.

Note. †p < .10, *p < .05, **p < .01, ***p < .001.
Figure 4-2

Study 2 – Results from Key Mediation Analysis.
Figure 4-3

Study 2 – Results from Exploratory Mediation Analysis.

**Descriptive Norms**
- $\beta = .15^{**}$
- $\beta = .21^{**}$
- higher = men are moving in faster

**Backlash**
- $\beta = -.14^{**}$

**Belonging**
- $\beta = -.05$, N.s

**Status**
- $\beta = .15^{**}$
- $\beta = .27^{**}$

**Communal Values**
- $\beta = .33^{**}$
- .003, N.s

**Agentic Values**
- $\beta = .22^{**}$

**Interest in Nursing**
- $\beta = .30^{**}$
- $\beta = -.11^{**}$
Figure 4-4

Perceived Fit with Nursing by Condition.

Note. Error bars represent standard error of the mean.
5 Conclusion

5.1 Summary and Significance of Findings

Communion is a central part of human life shared, to some extent, by men and women. Although women increasingly value striving for competence and have embraced roles outside the home, men’s roles have shifted relatively less in the past five decades. To date, men, compared to women, identify less with basic communal values, and show relatively lower interest in care-oriented careers in healthcare and early education (Croft et al., 2015; England et al., 2010; 2020). For example, men represent only 10% of nurses, 19% of social workers, and 4% pre-school and kindergarten teachers (Bureau of Labor Statistics, 2017). As detailed in the introduction, increasing men’s (and boys’) communal involvement could have numerous benefits, not only for men themselves, but also for women, children, and society at large. Given these implications, social psychologists should be motivated to understand the psychological mechanisms that constrain men’s communal orientation. This includes understanding both factors that prevent men’s internalization of communal values, and factors that constrain men’s entry into communal roles, like nurse or elementary school teacher. My dissertation represents an effort to understand some particular pieces of this larger puzzle. Specifically, I examined the processes that constrain the internalization of communal values among men, and also sought to understand downstream consequences of such constrained communal values in children and young adult men thinking about their future careers.

In Chapter 2 of my dissertation (“Stereotypes and Men’s Internalization of Communal Values”), I examined how automatic gender stereotypes shape men’s internalization of communal values. Social role theory and its corollaries have long suggested that the stereotypes that men and women learn from observing gender roles in society serve to reproduce these
gender roles (Eagly & Wood, 1999). However, little research had addressed the exact mechanisms by which this happens. I first documented a prevalent tendency to stereotypically associate communal values with women rather than with men, which predicts gender differences in automatic identification with communal values. Men showed weaker communal self-concepts than did women, but only among those participants who exhibited strong implicit communal=female stereotypes (Study 2.1). Importantly, I provided novel evidence that retraining men’s stereotypes about their own gender directly shapes their implicit value self-concept. Training men to associate communal values with males (rather than reinforcing the stereotypical communal=female association) increased men’s own implicit identification with communal values (Study 2.2). These novel findings are currently under review in conjunction with a proposed registered report of a new study. Taking advantage of a new mechanism to promote replicable science in scientific publishing, this registered report first aims to replicate our experimental effects. Perhaps more importantly, the report also seeks to examine whether the effects of stereotype retraining on value self-concept are sustained over a delay of 24 hours, and generalize to related aspects of the self-concept (Study 2.3).

The work summarized in Chapter 2 has both broad theoretical implications and potential practical applications for increasing men’s engagement with communal values and roles. On the theoretical level, findings summarized in Chapter 2 are potentially broadly meaningful, even beyond considering men’s values and roles. While this chapter of my dissertation specifically examines the relationship between communal=female stereotypes and implicit communal self-concept in men, the research also represents a promising step for our emerging understanding of causality in balanced identity processes. Whereas several past studies have documented a correlational relationship between implicit ingroup stereotypes and group members’ self-
concepts (Cvencek, Greenwald, & Meltzoff, 2012; Cvencek et al., 2015; 2014; Greenwald et al., 2002; Nosek et al., 2002; Cvencek et al., 2020 for a review), no research has, to our knowledge, demonstrated the causal direction between implicit stereotypes and implicit self-concepts in a balanced system. By showing that retraining existing implicit communal=female stereotypes causally increases men’s personal implicit identification with communal values, we also provide first evidence that momentary changes to ingroup stereotypes can translate into direct effects on group members’ self-concepts. Whereas this theoretical contribution advances our broader understanding of balanced identity processes, findings from Chapter 2 are also more directly relevant to our understanding of communal values and roles among men.

In Chapter 2, I present first empirical evidence that changes to implicit stereotypes have direct consequences to men’s own identification with communal values, a finding with possible practical applications. This evidence suggests that interventions which are designed to change implicit stereotypes could be an important avenue to increasing communal motivations among men. Future research might explore how to most effectively deliver such interventions. While we utilized a direct retraining of stereotypes to minimize demand characteristics and implement a high level of experimental control in the lab, there are a number of interventions that have been shown to change implicit stereotypes and attitudes, if only for a brief time (Forscher et al., 2019; Lai et al., 2014). Particularly promising for implementing interventions in real world contexts, past work in the field of STEM suggests that role models that defy STEM=male stereotypes effectively reduce such stereotypes and combat their negative effects (Dasgupta, 2011). For example, exposure to women professors predicted reduced gender stereotyping among undergraduate students and increased identification with science among women (Dasgupta & Asgari, 2004; Young, Rudman, Buettner, & McLean, 2013). Based on my work, future research
might explore how to implement similar stereotype changing interventions in an applied context to foster adoption of communal values among men, for example by providing or highlighting role models of communal men. To develop the best interventions possible, it will be vital to examine the most effective components of such interventions, and also consider the developmental trajectory of men’s communal values to find optimal timepoints for intervention. Findings from Chapter 3 might provide some hints here.

Whereas Chapter 2 focused on factors that may be able to shape the internalization of more basic communal values among adult men, research I presented in Chapter 3 ("The Development of Gender Differences in Communion and Agency") sought to examine the developmental trajectory of gender differences in communal values and role aspirations. In this chapter of my dissertation, I demonstrated that meaningful gender differences in communion and agency are present early in human development. By the time they are only six years old, boys were less likely to predict a family-oriented future (i.e., a communal role) for themselves than were girls. As such, the findings I described in Chapter 3 of my dissertation fit within a broader literature suggesting that children’s activity preferences differentiate between genders by the time they enter elementary school (Bian, Leslie, & Cimpian, 2017; Halim et al., 2011; Martin, Andrews, England, Zosuls, & Ruble, 2017; Martin & Ruble, 2009). In addition, we find important evidence that early gender differences in more basic values might be underlying gendered interests in children. Even the youngest boys in our sample endorsed communal values less, and agentic values more than did girls. These early gender differences in children’s communal and agentic values partially account for gender differences in the more concrete roles boys and girls anticipate. To the extent that boys endorsed communal values less, but agentic values more, they tended see their future as less family- vs. career-oriented than did girls (i.e.,
partial mediation). With this work, we provide first evidence that the goal congruity processes that seem to play an important role in men’s and women’s career choices in adulthood (Diekman et al., 2017; Block et al., 2018b; Tellhed et al., 2018), might also be an important factor driving gender differences in interest among children. Given how early gender differences in basic communal values seem to emerge, my work next took a closer look at how relatively low communal values, in conjunction with other barriers, deter men from taking on HEED careers.

In Chapter 4 of my dissertation (“A Dual Barrier Perspective on Men’s Underrepresentation in HEED”), I examined how, and under what circumstances, men’s communal values shape their sense of fit with more concrete communal roles, like social worker or nurse. In this chapter, I take what we have labelled the “dual-barrier perspective”; empirically examining how men’s internal communal value motivations shape their interest in HEED careers in conjunction with social norms as a more external barrier (Croft et al., 2015). The evidence I present suggests that individual differences in both internal communal values and perceptions of restrictive external norms have distinct effects in predicting men’s relatively low interest in taking on HEED careers (Study 4.1 and Study 4.2). Men who value communal values less strongly, and men who are most aware that women remain overrepresented in HEED careers, both tend to perceive relatively low levels of fit with HEED careers personally. In addition, I find that experimentally increasing men’s communal value motivation only translates into increased interest in a HEED career (nursing) when we also suggested that men in general are increasingly entering these careers. Whereas follow-up studies will have to be conducted to better understand under which circumstances communal value and social norm interventions show such interactive effects, these findings suggest that both communal values and descriptive norms have distinct and causal effects on men’s sense of fit with HEED careers. These findings might provide the
basis for devising successful interventions tackling these internal and external barriers simultaneously with the aim to increase men’s HEED participation.

5.2 Limitations and Future Directions

The studies I conducted for my dissertation contribute to our emerging understanding of the mechanisms involved in men’s relatively low communal values and role engagement. Despite providing theoretically novel and practically important empirical evidence, several questions also clearly emerge from my initial findings, calling to be explored with future research.

5.2.1 Developmental Trajectory of Stereotypes and Balanced Identity.

Exploring factors that underlie early gender differentiation of values is one future direction that follows from my dissertation. Whereas my work documented early gender differences in communal (and agentic) values, I have not yet examined factors underlying these differences. In our theoretical review of barriers to communal orientation in men, my colleagues and I (Croft et al., 2015) summarized several general avenues through which gender stereotypes can shape gender differences in communal value orientation. First, others, for example parents, possess stereotypes and explicitly encourage their children to behave in accordance with these stereotypes thereby producing gender-stereotypic values and behaviors children directly. In addition, children could also learn to adopt gender-stereotypic values and behaviors by modeling their own choices after what they observe in others – often adults who themselves display stereotypical preferences and roles. Moreover, as I examined in Chapter 2, people can internalize gender stereotypes (presumably through socialization processes) and apply them to inform their own self-concept. This could mean that, as children learn that communal values and behaviors
are stereotypically associated with girls and women, these stereotypes would deter boys from communal domains. In order to better understand why gender differences in values develop among children, future research might systematically investigate direct encouragement of stereotypic behaviors and values (e.g., through parents and teachers), as well internalization of gender stereotypes about these domains, as two avenues that constrain communal values and role interests among boys, perhaps in different ways.

**Parental Stereotypes: A Force for Socialization.** Societal stereotypes that prescribe communion for girls and agency for boys could provide the basis for the socialization of children’s values through their parents. Research synthesized by our theoretical review (Croft, Schmader, & Block, 2015) suggests that parents encourage communion in their own children according to their own gender stereotypes. Past research suggest that children’s attitudes and gender role norms generally correlate with their parents’ (Eccles, Jacobs, & Harold, 1990; Fagot & Leinbach, 1992). For example, a rich body of research suggests that parents’ own attitudes towards gender and math are transferred to their children, leading to negative math attitudes in girls (for a review see Gunderson, Ramirez, Levine, & Beilock, 2012). If parents perceive communal values as stereotypically linked to girls (and agentic values to boys), this might shape how they socialize male and female children differently. But, how exactly do parents pass down their stereotypic attitudes to their children?

Parents can socialize their children to behave according to societal gender stereotypes both by explicitly by encouraging and more subtly by modelling stereotype-congruent behavior. Broadly speaking, parents are known to encourage gender role congruent behavior in both girls and boys (see Lytton & Romney, 1991, for a review). Whereas less research concerns the parenting of boys specifically, some studies find that parents are even more vigilant in enforcing
gender appropriate behavior for boys than they are for girls (Endendijk et al., 2014). More specifically relevant, there is some evidence that parents appear less concerned with encouraging at least some communal qualities for male children compared to female children; beginning in early childhood, parents use less emotion-focused language in discussions with boys compared to girls (Dunn, Bretherton, & Munn, 1987), and actively discourage boys from being too emotional (Eisenberg, Cumberland, & Spinrad, 1998). Similarly, parents are more likely to encourage girls compared to boys to act pro-socially (Keenan & Shaw, 1994; Ross, Tesla, Kenyon, & Lollis, 1990; Zahn-Waxler, 2000). Future research may want to examine the extent to which parents actively try to instill particular communal (or agentic) values in their male vs. female children. On the one hand, parents often work extraordinarily hard to encourage their children to be helpful and friendly regardless of their child’s gender (Brownell et al., 2013). On the other hand, it is possible that particularly parents who hold strong gender stereotypes about communion are more encouraging of communal values towards female compared to male children. Such differential encouragement from parents, in turn, could then predict the extent to which boys and girls themselves internalize communal values and communal activity preferences.

Parents who hold strong gender stereotypes themselves might also shape children’s values through their power to model gendered roles to them. For a long time, researchers have known that children are generally attuned to learning behaviours from others they observe (i.e., social learning from role models; Bandura, 1965), and this applies to learning gendered behavior (Bussey & Bandura, 1999). Parents represent especially important role models to children, and their behavior therefore guides children to adhere to gender roles (Leaper & Friedman, 2007). For example, our own research suggests that girls’ attitudes towards domestic division of labor
are linked to what they observe at home; those girls who had fathers who were more involved in housework also tended to expect a less gender-stereotypic division of labor for their own future, regardless of parents’ explicit gender role attitudes (Croft et al., 2014). This suggests that parents could model stereotypical roles somewhat subconsciously, even when explicitly encouraging gender egalitarian roles in their children. Future research might explore more in depth how observing role models shapes the more basic values that young boys endorse. Looking to parents as role models is one obvious avenue for such future research. However, modelling of stereotypic roles to children can happen through many other sources, like children’s books (Diekman & Murnen, 2004), which future research might also explore.

**Indirect Effect Through Internalization of Stereotypes.** In addition to these accounts that presume that parents can directly encourage gender congruent behaviors and values in their individual children, children may also be learning broader gender stereotypes from their parents and social environment. Such early internalization of gender stereotypes itself could play an important role in shaping boys’ and girls’ values. Children understand gender as a social category and exhibit a number of gender stereotypes by the time they enter elementary school. Between the ages two and three, children start to have a sense that humans, including themselves, can be categorized according to their gender (Bem, 1993; Ruble & Martin, 1998). Around the ages of three to four, children also start to demonstrate stereotypical views of gender roles (e.g., they know nurses are typically women; Ruble & Martin, 1998; Martin & Ruble, 2009). A rich body of research has specifically examined this phenomenon in regards to math-gender stereotypes in children. Several studies show that, by age six, children reliably exhibit both explicit and implicit stereotypes associating math more with males than with females (Cvencek et al., 2015; 2011; 2014; Steele, 2003; Steffens et al., 2010). Whereas such gender
stereotyping is well-documented for math domains, it is less clear by what age children may hold stereotypes about more basic communal and agentic values.

There is some evidence that children hold stereotypes about traits that are at least somewhat related to communion and agency. Recent work has examined children’s gender stereotypes about two traits – brilliance and niceness – that can be seen as facets of agency and communion respectively. Findings from several studies reported by Bian and colleagues (Bian, Lin, & Cimpian, 2017) suggest that six to eight-year-olds (but not five-year-olds) stereotypically associate boys more than girls with brilliance (i.e. being “really really smart”). Although not the focus of the authors, one study also shows that boys were less likely than girls to choose their own gender as “really really nice” in a forced-choice tasks, providing some initial evidence suggestive of a communal=female stereotype. The developmental trajectory observed in these findings fits within the broader perspective that children increase their gender stereotyping throughout elementary school, as increased cognitive capabilities allow them to represent gender in increasingly complex terms (Halim et al., 2011; 2014). Based on these findings, it is possible that children (at least by the time they enter elementary school) already hold adult-like gender stereotypes about more basic communal and agentic values. Future research will have to examine this possibility more systematically.

I have recently started to investigate children’s stereotypes about communion and agency. In three studies conducted at a local science center \(N_1 = 76, N_2 = 112, N_3 = 211\), we asked boys aged four to 11 to report their gender stereotypes about communal and agentic values with several explicit measures (continuous and forced-choices between boy- and girl-exemplars). In these studies, we consistently find that, by age six to seven, boys demonstrate significant explicit gender stereotyping. These older boys in our samples tend to report that they view boys as less
communal, and more agentic, than they do girls. Boys aged four to five, in contrast, report that they perceive their own gender as both more communal and more agentic than they do girls, perhaps suggesting that ingroup preferences trump gender stereotypes at this younger age (Block, Schmader, Cimpian, & Baron, In Prep). While we are still running follow up studies to compare the levels of stereotyping we found in boys to the levels of stereotypes that girls might hold, these studies provide first evidence that gender stereotypes about communion and agency may emerge early in development. Based on these findings, future research is needed to explore how the early emergence of such gender stereotypes shapes children’s own communal preferences.

Once children have formed gender stereotypes about their own gender, these stereotypes might directly shape children’s value self-concept, independent from how parents socialize their children. Around ages three to four, when kids start showing knowledge of gender roles, they also tend to start exhibiting gender stereotypic toy and activity preferences (Ruble & Martin, 1998; Martin & Ruble, 2009). While early work suggested a temporal relationship between the point at which children learn stereotypical gender roles and the timing with which they start to show gendered preferences, it did not address the exact mechanisms by which stereotypes could shape kids’ own preferences and self-concepts. As discussed in depth in Chapter 2 of my dissertation, balanced identity principles (Greenwald et al., 2002) shed more light onto one possible mechanism by which this could happen. Kids appear to incorporate gender stereotypes into their self-concept, at least by the time they enter school. Findings from several studies suggest that girls are less identified with math domains to the extent that they implicitly associate math with males. Importantly, this relationship between stereotypes and self-concepts appears to become stronger throughout childhood (Cvencek et al., 2014; 2015). One recent study suggests
that children may also be applying their *explicit* stereotypes to their own preferences. To the extent that girls reported seeing brilliance linked to boys rather than their own gender, girls were also less eager to engage in activities that required brilliance (Bian, Leslie, & Cimpian, 2017). Future research might examine the extent to which boys themselves disengage from communal values and activities as they learn that communal values are associated with girls rather than with boys. Additionally, it will be important to better understand whether this relationship between stereotypes and personal preferences and values might strengthen with age, as some initial evidence might point to (Cvencek et al., 2014; 2015).

### 5.2.2 Understanding Agency and Social Status as Additional Barriers

Given the evidence for consistent gender differences in communion that arise early in development, my dissertation has focused largely on the role of communal motivations in driving men’s and boy’s affinity for HEED roles. Agency and status, however, may also play important roles in guiding men’s career choices. Recent work examining self-ascribed traits of men and women over several decades suggests that, while women have increased somewhat in their self-ascribed agency, men still see themselves as significantly more agentic than do women (Donnelly & Twenge, 2017). I find similar gender differences in children (Chapter 3) and adults (Chapter 4). Being strongly motivated by agentic values, such as competence and power seeking, may represent an additional barrier to men’s HEED engagement. In Chapter 4 of my dissertation I find that stronger agentic values predict a lower sense of fit with HEED careers among men, regardless of their communal values or perceptions of external norms. Future research might more systematically examine how agentic values shape HEED interest and why exactly pursuing agency might be seen as mismatch for HEED careers.
Sometimes seen as a facet of agency (Abele et al., 2016), status seeking might be an especially important factor in understanding men’s apparent reluctance to enter HEED careers. Status is confounded both with gender itself but also with communal roles. To some extent, communal roles are afforded low status because they are dominated by women, who represent a relatively lower status group in society (England et al., 2010; 2020; Ridgeway, 2014; Ridgeway & Correll, 2004). It is unclear, however, to what extent care-oriented communal roles are also themselves associated with low status, regardless of who occupies these roles. Some past studies show evidence that communal behaviours are often tied to low power, regardless of gender (e.g., Blader, Shirako, & Chen, 2016; Marszał-Wiśniewska & Siembab, 2012). In light of this evidence, future research might more clearly disentangle how the relatively low status of HEED careers interacts with men’s own communal and agentic values to deter them from entering such careers. It is possible that the perceptions of HEED careers as low status could especially deter men, who are often socialized to strive for status and power. Because of this, interventions increasing the status of HEED careers, as well as interventions that somehow curb status- and power-motivations, could be another viable avenue to increase men’s interest in HEED.

5.2.3 Cross-Cultural Considerations

Another important issue to be more thoroughly explored by future research is possible variations in men’s stereotypes, values, and roles across cultures. There are some clear limitations of the sampling strategy I employed with my dissertation, with a focus on WEIRD subjects (Western, Educated, Industrialized, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010). With the exception of studies at the Telus World of Science (Chapter 3), my studies focus exclusively on Canadian undergraduate students. Because I was concerned with career interest among a white-collar population (e.g., nurse, elementary school teachers), it was
somewhat reasonable to focus on this college-aged population who are in the process of choosing a career. In many ways, however, this sampling population is not representative of humans. Studying dynamics of gendered values and roles in an exclusively North American context gives a limited perspective, especially since gender roles vary between countries, sometimes dramatically. Taking a cross-cultural lens to the issues I have begun to examine in my dissertation could provide us with a richer understanding of the processes that shape men’s communal values and roles.

Previous research has found that the gender segregation of labor markets (i.e., actual gender differences in representation), as well as gender differences in career interests, both vary between countries, and this variation is correlated with economic development in paradoxical ways. Although more developed countries also tend to score higher on general gender equality indices, the overall gender segregation of labor markets (Charles, 1992; 2003; Charles & Bradley, 2002; 2009), as well as differences in men’s and women’s personal preferences for STEM-related careers (Charles, Harr, Cech, & Hendley, 2014; Sikora & Pokropek, 2012; Goldman & Penner, 2016), are more pronounced in countries with higher vs. lower development. Past research on this “Development Paradox” has largely focused on gender differences in self-reported personality/values or gender differences in STEM representation, with no studies specifically examining gender difference in HEED interest across nations.

Together with a team of international researchers, I am currently working on a project that examines predictors of this “Development Paradox” (among other questions). Together with Dr. Schmader, Dr. van Laar at the University of Leuven (Belgium), and Dr. Martiny at the University of Tromso (Norway), I developed a broad survey measure to assess young men’s and women’s attitudes and beliefs about communal values and roles. Specifically, undergraduate
men and women from over 73 universities around the globe reported their own values, future expectations, and career interests along with their perceptions of descriptive and injunctive gender role norms in their country. This dataset, now containing over 18,000 individual participants from 49 countries, will enable us to examine how processes shaping men’s (vs. women’s) interest in HEED careers are affected by cultural contexts.

One interesting way to connect these new cross-national data to Chapter 4 of my dissertation is to examine how a culture of self-expression plays into men’s career interest. One possible explanation for higher economic development predicting higher gender differences in career interest is that economic development leads to more free choices for individuals by lifting external pressures (e.g., Ingelhart & Welzel, 2010; Gelfand et al., 2011). In highly developed societies, focusing on survival becomes less of a necessity in everyday life (Ingelhart, 1997). As a result, such societies tend to loosen normative pressures on individuals (i.e., norms are “loose” vs. “tight”; Gelfand, 2011) and encourage self-expression (Ingelhart, 1997; Ingelhart & Oyserman, 2004). It is possible that the strong relationship between personal values and gendered career interests, which I have observed in my dissertation, is an entirely western cultural phenomenon, strongly relying on the tendency of western cultures to encourage the expression of personal values. In cultures that prioritize survival over self-expressions values, men (as well as women) might be more likely to make career decisions based on what is most practical or beneficial for their family, rather than trying to actualize one’s internal values. Personal communal and agentic values might therefore not closely guide men’s career interests in tight cultures that prioritize survival- over self-expression values. Following this line of reasoning, the relationship between communal values and interest in HEED careers might be relatively weak in countries that de-prioritize self-expression values. Basic values might,
therefore, not account for gender differences in career interests in such contexts. There is some indirect evidence that higher country-level self-expression values do relate to more gender segregation of careers. Charles, Harr, Cech, and Hendley (2014) find that, among 40 countries, national-level self-expression values predicted greater gender differences in math attitudes. Future research could thus test this idea more systematically using the cross-cultural data we have collected.

5.2.4 LBGTQ+ Considerations.

Just as some barriers to HEED engagement might not apply to men from all cultures in the same way, they might also not apply to all men within a culture in the same way. The studies I present in my dissertation focus predominantly on heterosexual subjects who ascribe to a binary gender identity. LGBTQ+ participants are typically excluded from the main analyses in my data. It is worth considering, however, in what ways their experiences might be similar and in what ways their experiences might be different from those of heterosexual and cisgender participants. Whereas internal communal motivations may guide the career aspirations of non-heterosexual and/or non-binary identifying individuals in ways similar to what we have observed in my samples (at least in western cultures), social norms might influence these populations in different and unique ways. On the one hand, traditional gender role stereotypes are often less readily applied to non-heterosexual men or individuals who were assigned male at birth but do not hold a binary gender identity (Blashill & Powlishta, 2009). Such individuals might, therefore, feel less confined by traditional gender role norms because they already defy traditional expectations. On the other hand, individuals who do not fall into heteronormative categories are still embedded in a dominant culture that fosters the internalization of traditional gender roles to some extent (e.g., Szymanski & Carr, 2008), and face serious social sanctions for not conforming to traditional
ideas of gender (Parrott, 2009). In this sense, traditional gender role norms might still be important factors deterring even LGBTQ+ men from HEED roles. Given such potentially diverging predictions, there is ample room for future research on understanding the internalization of communal values and roles among LGBTQ+ populations.

5.2.5 Implicit vs. Explicit Processes.

In following these future directions for research, it will also be important to address some overarching conceptual issues that were outside of the scope of my dissertation. One particular conceptual issue that I would like to touch on is the distinction between implicit and explicit processes in shaping communion among men. Whereas explicit cognitions are often defined as propositional processes in which a subject consciously reasons about the verity of a statement, implicit cognitions are seen associative processes that can take place outside of a subject’s direct awareness or control (Gawronski & Bodenhausen, 2011; 2014). Measuring these types of cognitions requires different approaches; explicit cognitions are typically measured with self-report measures that ask participants to introspect about an attitude or stereotype (“to what extent do you think men are better at math than women?”), while implicit cognitions are most commonly measured indirectly (for example by assessing the strength of math=male association with a reaction time task; Fazio & Olson, 2003; Greenwald & Lai, 2020). My dissertation measured (and manipulated) both implicit and explicit cognitions about communal values and roles, but did not necessarily pit these types of processes against each other in a systematic fashion.

There is some reason to think implicit processes might be especially important in shaping the self through balance processes. In the original formulation of balanced identity theory, Greenwald and colleagues suggest that evidence for cognitive balance between ingroup
stereotypes and self-concepts might be especially strong on the implicit level for two reasons (Greenwald et al., 2002, see also Greenwald et al., 2020); 1) subjects might not be able to accurately report cognitions on self-report measures because they are simply not fully aware of them, and 2) subjects might be motivated to distort cognitions they do have access to because they deem them inappropriate for some reason. Thus, it would be easier to show correlations between implicit stereotypes and self-concepts than their explicit counterparts. In my own previous work, I find evidence in line with this prediction. In a sample of women engineers, implicit but not explicit engineering=male stereotypes predicted lowered job commitment (Block et al., 2018c). A recent meta-analysis of cognitive consistency with more than 12,000 subjects concluded that evidence for ingroup attitudes predicting group members’ self-concepts was more pronounced with implicit than with explicit measures (Greenwald et al., 2020), though observable for both types of measures. Whereas this research suggests that ingroup stereotypes and group members’ self-concepts align with each other outside of awareness to some extent, the findings also suggest that such processes do not have to fully operate outside of conscious awareness. It is thus important for future research to assess how both implicit and explicit processes shape men’s engagement with communal values and roles, possibly in distinct ways.

There is less clarity on the extent to which social norms and values shape men’s more concrete career interests at an explicit or implicit level. Most likely, both processes are involved to some extent. In my work thus far, I have almost exclusively measured interest or fit with specific careers at the explicit level. The work I present in Chapter 4 suggests that men are at least partially aware of how social norms constrain their fit to HEED roles. This does not, by any means, prove that career interests are only shaped through explicit processes. Whereas eventual decisions on a specific career path are necessarily conscious, the processes by which people
arrive at these decisions need not be. Some researchers have suggested that implicit cognitions might represent a particular insidious influence on our self-concepts and behavior, because they can operate even when we reject constraints at the explicit level (Nosek et al., 2002). We have some evidence for such implicit processes. Chapter 2 finds that implicit, but not explicit, stereotypes predict gender differences in communal self-concept. Men’s career preferences might similarly have an implicit component. For example, a pilot study I conducted as part of the registered report in Chapter 2 of my dissertation suggests that men’s implicit communal values predicted their implicit, but not explicit, identification with HEED roles. This provides at least first evidence that some of the processes that shape our identification with certain roles elude introspective awareness. Since no studies thus far have directly pitted implicit against explicit processes in shaping men’s career choices, however, future research will have to test this possibility more systematically.
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Appendices

Appendix A: Supplemental Materials (Block, Gonzalez, Schmader, & Baron, 2018)

Appendix A Introduction. The following is a document containing supplementary documentation for the manuscript “Early Gender Differences in Core Values Predict Anticipated Family vs. Career Orientation”. The objective of the current work was to examine evidence for gender differences in children’s core values, and possible relationships of such gender differences in children’s anticipated future roles. Findings reported in the main manuscript suggest that boys tend to value communion less, and agency more, than do girls, and these gender differences in values partially explain their relatively lower family- (vs. career) orientation.

Section 1: Method

Section 1 of these supplementary materials provides additional detail and concrete stimuli used in the measures reported in the main manuscript.

Full List of Measures in Order

Measures used in analyses indicated with *

Child measures in order

- Implicit Gender Identity*
  - See items in next section
- Explicit Gender Identity (4 items)*
- Explicit Gender Identity Importance
- Explicit Communal (4 items)*
- Explicit Agentic Values (3/4 Items)*
- Is your primary teacher a man or a woman?
- What is your favorite thing to do?
- What is your favorite toy?
• What is your favorite TV show?
• When you grow up, what do you want to be?*
• Closeness to mom
• Closeness to dad
• Family vs. Career Orientation (2 items)*

Parent measures in order.
• What is your child's first name?
• What is your child's date of birth?*
• What is your child's gender?*
• Which of the following best describes your child's ethnicity?
• What is YOUR gender?
• Which of the following best describes YOUR ethnicity?
• What is your approximate annual household income? (in CAD)
• What is the highest level of education you have achieved as of today? Select which one of the following best represents your own highest level of educational achievement:
  • What is your political orientation?
• Compared to other children that are the same AGE and GENDER as your child, how masculine is your child?*
• Compared to other children that are the same AGE and GENDER as your child, how feminine is your child?*
• parent-report measures of behavioral expression Johnson and colleagues (2004)*
• parent-report measures of gender dysphoria by Johnson and colleagues (2004)
• Which of the following options most closely resembles the parenting structure in your household?
  • Who is the primary caregiver in your household?
  • Who is the primary breadwinner in your household?
  • How many siblings does your child have?
  • What gender are the siblings?
  • How many hours a week do you work?
  • How many hours a week does your partner work? (if not applicable put: NA)
Stimuli used in Measures

**Depiction of Explicit Gender Identification Measure.**

On the left, we have a girl. Her name is Marie. On the right, we have a boy. His name is Adam. Now, I want you to tell me who you are more like.

On the left, we have a boy. His name is David. On the right, we have a girl. Her name is Sarah. Now, I want you to tell me who you are more like.

On the left, we have a girl. Her name is Susan. On the right, we have a boy. His name is Matthew. Now, I want you to tell me who you are more like.

On the left, we have a boy. His name is Sam. On the right, we have a girl. Her name is Kate. Now, I want you to tell me who you are more like.

**Depiction of Values Measure.**

**SUPER Important**

How important do YOU think it is to be the one who gets to make decisions?

**Not very Important**
How important do you think it is to win?

How important do you think it is to be good at things?

How important do you think it is to do things all by yourself?

How important do you think it is to always help others, even if it takes effort?
How important do YOU think it is to think about others' feelings?

How important do YOU think it is to be kind to others?

How important do YOU think it is to do things together with others?
Stimuli for Implicit Gender Categories.
Here are Clara and Carina. When they were your age they were neighbours, so they saw each other a lot. Now they are all grown up. Clara has one child, who goes to daycare during the day so that she can go to her office job. Carina now has 2 children and stays at home to take care of them and the house.

One day you will also be all grown up!

When you are grown up, who do you think you will be more like?
Here are Jessica and Jennifer. When they were your age, they played a lot together. Now they are all grown up. Now, Jessica has a job at a marketing company. She likes her job, although, she often has to stay there late and can't look after her kids. Jennifer used to work long hours too but now she only works 3 days a week so she can spend time with her family.

One day you will also be all grown up!

When you are grown up, who do you think you will be more like?
Here are Tom and Mike. When they were your age, they played a lot together. Now they are all grown up. Now, Tom has a job at a marketing company. He likes his job, although, he often has to stay there late and can’t look after his kids. Mike used to work long hours too but now he only works 3 days a week so he can spend time with his family.

One day you will also be all grown up!

When you are grown up, who do you think you will be more like?
Factor Analyses on Value Measure

To explore whether our communal and agentic value items truly factored onto two distinguishable factors, we entered the items into an exploratory maximum likelihood factor analyses with direct oblimin rotation and no restriction of number of factors. Results suggested that items loaded onto only two factors that had an eigenvalue greater than 1. Factor 1, onto which mainly communal values loaded (see Table S1), had an initial eigenvalue of 2.39 and accounted for 34.17% of variance in the data. Factor 2, onto which mainly agentic items loaded, had an eigenvalue 1.56 and accounted for 22.22% of the variance in the data. The factors were correlated at $r = .26$. 
Table S1. Pattern Structure of Communal and Agentic Value Items Rotated to the Oblimin Criterion.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1: Communal</th>
<th>Factor 2: Agentic</th>
</tr>
</thead>
<tbody>
<tr>
<td>How important do you think it is …</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… to always help others, even if it takes effort?</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>… to be kind to others?</td>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>… to think about others’ feelings?</td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>… to do things together with others?</td>
<td>.47</td>
<td></td>
</tr>
<tr>
<td>… to win?</td>
<td></td>
<td>.77</td>
</tr>
<tr>
<td>… to be good at things?</td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td>… to be the one who gets to make decisions?</td>
<td></td>
<td>.58</td>
</tr>
</tbody>
</table>

*Note. Factor loadings < .10 are suppressed.*
Section 2: Additional Analyses

Section 2 for these supplementary materials focuses on additional exploratory analyses probing the main findings reported in the paper more deeply. These include analyses split by age-group, controlling for age, and controlling for research assistant gender.

Table S1.
Correlations and Means of all Study Variables by Gender

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
<td></td>
<td>-.15*</td>
<td>-.06</td>
<td>-.12</td>
<td>-.37*</td>
<td>.08</td>
<td>.12#</td>
<td>-.24*</td>
<td>-.004</td>
</tr>
<tr>
<td>2. Communal Values (1-5)</td>
<td></td>
<td></td>
<td>-.13#</td>
<td>-.03</td>
<td>.15*</td>
<td>.19*</td>
<td>.03</td>
<td>.13#</td>
<td>.09</td>
<td>.13</td>
</tr>
<tr>
<td>3. Agentic Values (1-5)</td>
<td></td>
<td></td>
<td>.08</td>
<td>-.27*</td>
<td>-.09</td>
<td>.07</td>
<td>-.01</td>
<td>.12</td>
<td>-.04</td>
<td>.06</td>
</tr>
<tr>
<td>4. Family Orientation (1-5)</td>
<td></td>
<td></td>
<td>-.05</td>
<td>.18*</td>
<td>-.21*</td>
<td>.03</td>
<td>-.03</td>
<td>-.10</td>
<td>.10</td>
<td>-.03</td>
</tr>
<tr>
<td>5. Parent-reported femininity (Z-Score)</td>
<td></td>
<td></td>
<td>.06</td>
<td>-.08</td>
<td>-.09</td>
<td>.12#</td>
<td>.001</td>
<td>.12</td>
<td>.10</td>
<td>.01</td>
</tr>
<tr>
<td>6. Implicit Female Identification</td>
<td></td>
<td></td>
<td>-.11</td>
<td>.08</td>
<td>.05</td>
<td>-.05</td>
<td>-.04</td>
<td>-.07</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>7. Explicit Female Identification</td>
<td></td>
<td></td>
<td>-.19*</td>
<td>-.001</td>
<td>-.01</td>
<td>.04</td>
<td>.21*</td>
<td>.03</td>
<td>-.03</td>
<td>-.08</td>
</tr>
<tr>
<td>8. Career femininity</td>
<td></td>
<td></td>
<td>.03</td>
<td>-.10</td>
<td>.04</td>
<td>.05</td>
<td>-.02</td>
<td>.10</td>
<td>-.03</td>
<td>.12</td>
</tr>
<tr>
<td>9. Career communality</td>
<td></td>
<td></td>
<td>-.01</td>
<td>.04</td>
<td>-.03</td>
<td>-.10</td>
<td>-.09</td>
<td>.02</td>
<td>-.06</td>
<td>.38*</td>
</tr>
<tr>
<td>10. Career agency</td>
<td></td>
<td></td>
<td>.16*</td>
<td>-.003</td>
<td>.05</td>
<td>-.17*</td>
<td>-.19*</td>
<td>.009</td>
<td>-.03</td>
<td>-.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M_{boy} (SD)</th>
<th>M_{girl} (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.98a (2.29)</td>
<td>9.59a (2.17)</td>
</tr>
<tr>
<td>4.38a (0.59)</td>
<td>4.52b (0.48)</td>
</tr>
<tr>
<td>2.77a (1.00)</td>
<td>2.48b (0.99)</td>
</tr>
<tr>
<td>3.05a (0.94)</td>
<td>3.38b (0.87)</td>
</tr>
<tr>
<td>-0.63a (.33)</td>
<td>0.67b (.38)</td>
</tr>
<tr>
<td>-2.22a (.39)</td>
<td>0.27b (.38)</td>
</tr>
<tr>
<td>2.05a (0.85)</td>
<td>4.01b (0.67)</td>
</tr>
<tr>
<td>1.30a (0.57)</td>
<td>2.33b (0.74)</td>
</tr>
<tr>
<td>1.50a (0.71)</td>
<td>1.87b (0.88)</td>
</tr>
<tr>
<td>2.11a (0.63)</td>
<td>1.83b (0.73)</td>
</tr>
</tbody>
</table>

Note. Correlations for boys below the diagonal, correlations for girls above the diagonal. The ethnicity-matched measure of explicit female identification is reported here. *p < .05, #p = < .10
Testing for Moderated Mediation by Age

The main manuscript reports a significant mediational model in which gender differences in family-orientation are mediated by gender differences in values. In these supplemental analyses, we examined whether any paths in this mediational model are moderated by age. These analyses were exploratory; we had no *a priori* hypotheses. We tested a moderated mediation model that allowed each path (*a, b* and *c* path of the mediation model) to be moderated by age. As seen in Figure 2, these analyses suggest that age does not moderate gender differences in communal values, gender differences in agentic values, gender differences in family-orientation, or the relationship of the two core values to family-orientation. Because we are underpowered to formally detect a moderated mediation, reporting indirect effects for children younger (-1SD in age) vs. older (+1SD) in age might still be informative to readers, even if the age does not formally moderate effects. As can be seen in Table 2, these analyses provide some suggestion that the gender difference in family-orientation is mediated by core values for children who are at or above the mean age in the sample (*M* = 9.84 years). Mediation effects in younger children (-1SD) were non-significant. These results suggest that the link between gendered values and aspirations could possibly be getting stronger with age. However, due to sample size constraints, we have inconsistent evidence that the mediational role of values in gender differences in family-orientation differs by age in our sample.
Table S3. *Indirect effect sizes for Values mediating Gender Differences in Family Orientation by Age Group.*

<table>
<thead>
<tr>
<th></th>
<th>Younger (- 1SD) (~ age 7)</th>
<th>Mean Age (~ age 9)</th>
<th>Older (+ 1 SD) (~ age 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IE</td>
<td>SE</td>
<td>CI.95</td>
</tr>
<tr>
<td>Communal</td>
<td>.006</td>
<td>.010</td>
<td>-.004, .04</td>
</tr>
<tr>
<td>Agentic</td>
<td>.008</td>
<td>.013</td>
<td>-.007, .051</td>
</tr>
</tbody>
</table>

*Note.* Results above display indirect effect sizes for mediational analyses modelling communal and agentic values as mediators of gender differences in family-orientation. Significant effects italicized.

**Analyses Controlling for Non-Ethnicity matched explicit GID Measure**

In our original analyses, we computed explicit gender identification as participants’ responses to all four. In response to the request from an anonymous reviewer, we recoded gender identification to only include the responses to items that matched the child’s ethnicity (or to the four-item composite for mixed-ethnicity or unknown-ethnicity children). Below are the results with the original four-item composite measure used for all children in the sample.
Table S4.

**Correlations and Means (SD) by Gender with Original 4-Item Composite Measure of Explicit Gender Identification Measure.**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M_{boy}</td>
<td>M_{girl}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.15*</td>
<td>-.06</td>
<td>-.12</td>
<td>-.37*</td>
<td>.08</td>
<td>.19*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.98a</td>
<td>9.59a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.29)</td>
<td>(2.17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Communal Values (1-5)</td>
<td>-1.13#</td>
<td>-.03</td>
<td>.15*</td>
<td>.19*</td>
<td>.03</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.38a</td>
<td>4.52b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.59)</td>
<td>(0.48)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agentic Values (1-5)</td>
<td>.08</td>
<td>-.27*</td>
<td>-.09</td>
<td>.07</td>
<td>-.01</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.77a</td>
<td>2.48b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td>(0.99)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Family Orientation (1-5)</td>
<td>-.05</td>
<td>.18*</td>
<td>-.21*</td>
<td>.03</td>
<td>-.03</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.05a</td>
<td>3.38b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.94)</td>
<td>(0.87)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Gender expression (z-Score)</td>
<td>.06</td>
<td>-.08</td>
<td>-.09</td>
<td>.12#</td>
<td>.001</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.63a</td>
<td>0.67b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.33)</td>
<td>(.38)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Implicit Female Identification</td>
<td>-.11</td>
<td>.08</td>
<td>.05</td>
<td>-.05</td>
<td>-.04</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.22a</td>
<td>.27b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.39)</td>
<td>(.38)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 4-item Explicit Female Identification</td>
<td>-.17*</td>
<td>.04</td>
<td>-.12#</td>
<td>.04</td>
<td>.21*</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.08a</td>
<td>3.92b</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(0.51)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Correlations for boys below the diagonal, correlations for girls above the diagonal. Means that do not share the same subscript differ significantly, p < .05.*

* p < .05, # p = < .10.

Results from linear regressions analyses testing gender, age and their interaction as predictors of the original explicit female identification measures showed a large gender difference in explicit female identification, with girls explicitly identifying more strongly with females than did boys, $\beta = .84$, $SE = .06$, $t (406) = 31.31$, $p < .001$. While we observed no main effect of age, $\beta = -.02$, $SE = .03$, $t (406) = -.58$, $p = .566$, the main effect of gender was qualified by a significant gender by age interaction, $\beta = .13$, $SE = .06$, $t (405) = 3.62$, $p < .001$.

Decomposing this interaction suggested that the tendency to explicitly identify with girls more than with boys increased with age among girls, $\beta = .09$, $SE = .04$, $t (405) = 2.29$, $p = .022$, and decreased with age among boys, $\beta = -.10$, $SE = .04$, $t (405) = 2.86$, $p = .004$.

Results of analyses controlling for children’s implicit and original explicit gender identification (H2a) revealed neither explicit identification as female vs. male, $\beta = .02$, $SE = .09$,.
t (374) = 0.21, p = .833, nor implicit identification as female vs. male, \( \beta = .04, SE = .06, t (374) = 0.62, p = .539 \), significantly predict children’s family vs. career orientation (over and above dichotomous gender and values). Importantly, both communal, \( \beta = .12, SE = .05, t (374) = 2.37, p = .018 \), and agentic values, \( \beta = -.11, SE = .05, t (374) = -2.22, p = .027 \), remained significant predictors of family vs. career orientation when controlling for these two gender identification variables. Moreover, the indirect effects of child gender on family vs. career orientation through communal, \( IE = .01, SE = .01, CI_{95} (.002, .04) \), and agentic values, \( IE = .02, SE = .01, CI_{95} (.001, .05) \), also remained significant, though small. Analyses Controlling for Age and Experimenter Gender

We wanted to ensure that our key findings (gender differences in communion and agency that relate to gender differences in family-orientation) were not confounded with children’s age or the gender of the research assistant that led them through the study. To test this, we conducted mediational analyses with the PROCESS macro (Hayes, 2013), entering participant gender as a predictor, and communal and agentic values as simultaneous mediators, predicting children’s self-reported family- (vs. careers) orientation (all standardized) as before. In addition, we now added experimenter gender \( (0 = \text{male}; 1 = \text{female}) \) and age \( (z\text{-scored}) \) as control variables for both the \( a \)- and \( b \)-paths into this model. Results were unchanged by including these covariates (main model results included in parentheses for easier comparison): boys’ in our data tended to endorse communal values less, \( \beta = .11, SE = .05, t (393) = 2.23, p = .026 \) (previous: \( \beta = .12, SE = .05, t (406) = 2.43, p = .015 \) ), and agentic values more, \( \beta = -.15, SE = .05, t (393) = -2.94, p = .003 \) (previous: \( \beta = -.14, SE = .10, t (406) = -2.93, p = .004 \) ), than did girls. Also as in previous analyses, anticipating a family- rather than a career-oriented future was predicted by both higher
communal values, $\beta = .14, SE = .05, t (391) = 2.55, p = .011$ (previous $\beta = .14, SE = .05, t (395) = 2.81, p = .005$), and lower agentic values, $\beta = - .13, SE = .05, t (391) = - 2.64, p = .009$ (previous: $- .13, SE = .05, t (395) = - 2.56, p = .011$). In addition, significant indirect effects consistent with both boys’ lower communal, IE = .01, CI .95 (.002, .004), $p < .05$, and higher agentic values, IE = .02, CI .95 (.003, .05), $p < .05$, accounting for their relatively low family-orientation remained significant with these controls. Age itself predicted less endorsement of communal values on average, $\beta = - .15, SE = .05, t(393) = - 3.20, p = .002$, but not agentic values or family-orientation, $\beta s < .05, ts < 0.95, ps > .34$. Experimenter gender predicted none of these outcomes significantly, $\beta s < .12, ts < 0.93, ps > .35$. Additional analyses also tested whether RA gender moderated any of the mediational paths, using moderated mediational analyses with the PROCESS macro (Hayes, 2013; Model 58). Results from these analyses also suggested that researcher gender did not moderate the relationship between gender and communal values, the relationships between gender and agentic values, or the relationships between each type of value and family vs. career orientation, $\beta s < .08, ts < 1.63, ps > .104$. Together, these analyses suggest that our main effects are robust when controlling for child age and gender of the experimenter, although we caution that there was only a single male RA who ran only 62 children (15% of sample).

Section 3: Understanding Children’s Open-ended Career Aspirations

Part 3 of our supplementary materials focuses on analyses of an additional measure of aspirations – children’s open-ended reports of what they want to be when they grow up. In addition to values predicting future family- vs. career-orientation, we initially thought it was possible that boys’ and girls’ values would also predict what kinds of specific careers they aspire to. We thus asked children to report what they “want to be when they grow up” and coded their responses for their gender stereotypicality (feminine vs. masculine career) and the extent to
which they afforded communal goals, as well as the extent to which they afforded agentic goals. We predicted that boys’ (as compared to girls’) would nominate careers that would be rated as less feminine, less communal, but possibly more agentic by our blind coders. In addition, we expected that children’s own communal values (and possibly their agentic values) would predict more feminine, more communal, and possibly less agentic career nominations. Because the large amount of missing data on this variable precludes direct comparison to our other outcome measures, and does not relate to any other variables in our dataset, we decided to move these analyses into the supplementary section.

**Method**

**Open-ended Measure.** To assess children’s aspired careers, we asked children “what do you want to be when you grow up?”. Open ended responses were typed by the research assistant and coded for 3 characteristics by four coders blind to the gender of participants; two coders assessed: 1) *female vs. male stereotypicality* (using coding scheme from Croft et al., 2014; \( ICC = .87 \)), and two separate coders assessed the degree to which each career would afford: 2) *communal goals* such as helping others (\( ICC = .79 \)), and 3) *agentic goals* such as achieving personal success (\( ICC = .73 \)). Each characteristic was scored on a scale of 1 to 3 (see word-for-word coding instructions for coders below). Missing data was observed for 85 children who gave made uncodable responses (e.g., “crown”, “retired”) or gave no response, resulting in a substantially lower sample size for analyses including this variable.

**Coding Schemes for Open Ended Responses**

**Coding scheme 1 – Femininity vs. Masculinity.**

“Your task will be to read through each participant’s answers and assign each answer a code. Note that both adults and kids are in this dataset, but that should not matter. The code will indicate the extent to which each of the following variables are more stereotypically male or stereotypically female in nature. Each of you will do so in their own excel document.”
- Place the code in the column NEXT to the participants answer, with will be labeled like the variable + CODED. So, for example, there will be a column for “Fav_Thing” in which participants reported what their favorite activity is. Next to it, there will be a column called “Fav_ThingCODED” in which you will enter the numerical code.

- If a participant has left an answer blank, please leave the corresponding space in the “coded” column blank as well.

- If you come across an answer that is essentially “uncodable” for one reason or another, please put an X in the corresponding space in the “coded” column. Then, in a separate document, please keep a log/record of all the participant numbers and variable names you deemed “uncodable”.

Variable Descriptions:

1) **Label: fav_todo**

Question: What is your favorite thing to do?

**rating:**

In our society, some activities are seen as stereotypical of girls (e.g. playing with dolls, playing dress-up) while others are seen as stereotypical of boys (e.g. playing with trucks, playing hockey). In addition, some activities are seen as more or less gender neutral. On the following scale, please rate whether the activity indicated by the child is more typically connected to males, to females or reflects a gender-neutral activity.

1 = Activity is more stereotypical of **males**
2 = Activity is gender neutral
3 = Activity is more stereotypical of **females**

**Coding Scheme 2 – Communion vs. Agency.**

“For each of the career aspirations our child participants listed, we would like you to think about how communal and how agentic the job is. For each job, ask yourself:

*To what extent does this job allow people to fulfill communal goals, and to what extent does this job allow people to fulfill agentic goals.*

**Communal Goals:**

Goals surrounding serving other’s needs, helping other people, caring for others, making social connections

**Agentic Goals:**

Goals surrounding self-promotion, success, achievement, status, competence

So, for each answer a child provided you will give a score under two variables. Give scores as follows:
Communal_Jobs
1 = Not at all Communal/Somewhat un-communal
2 = Neutral/Somewhere in between
3 = Definitely Communal

Agentic_Jobs
1 = Not at all Agentic/Somewhat un-agentic
2 = Neutral/Somewhere in between
3 = Definitely Agentic

IMPORTANT NOTES:
• When the kid did not provide an answer, leave the variables blank
• If you feel the answer might not be codable (like sometimes kids will say “I want to be unicorn), please mark the column red and put “NA”
• Make sure you give the same value to the same job always. (e.g. Nurse always a 3 on communal, and Banker always a 3 on Agentic). Sorting the columns like I did should help with that.
• Make sure you don’t resort the columns separately to avoid that subject numbers and answers don’t match anymore.”

Results

Age and Gender Differences. To first examine gender and age effects on children’s aspired careers, we entered children’s gender (male = 0, female = 1) and age (standardized) as predictors on Step 1, and their interaction on Step 2 of hierarchical linear regression models predicting coder-rated 1) femininity (vs. masculinity), 2) communality, and 3) agency of children’s nominated careers. As expected, aspired careers nominated by boys were rated as less female-stereotypic, $\beta = .61$, $SE = .07$, $t (323) = 14.01$, $p < .001$, less communal, $\beta = .22$, $SE = .09$, $t (323) = 4.13$, $p < .001$, and more agentic, $\beta = -.19$, $SE =.07$, $t (323) = -3.54$, $p < .001$, than careers nominated by girls. After accounting for gender, older children’s nominated careers were more agentic on average, $\beta = .19$, $SE =.04$, $t (323) = 3.50$, $p = .001$, and age and gender interacted in predicting the femininity of aspired careers, $\beta = -.12$, $SE =.07$, $t (322) = -2.04$, $p = .037$. Decomposing this interaction revealed that older girls reported less female-stereotypic aspired careers than did younger girls, $\beta = -.21$, $SE = .05$, $t (322) = -3.23$, $p = .001$. For boys, age
did not predict the femininity of their aspired occupations or, $\beta = -.03, t (322) = -0.47, p = .637$. Age and age by gender interactions did not predict other characteristics of aspired careers.

**Values and Characteristics of Aspired Careers?** To test whether gender differences in value endorsement could also help explain gender differences in 1) femininity (vs. masculinity), 2) communal, or 3) agentic goal-affordance of the aspired careers a child nominated, we conducted mediational analyses with the PROCESS macro (Hayes, 2013), entering gender as a predictor, and communal and agentic values as simultaneous mediators, predicting each of these codings of children’s aspired careers as outcomes. Note that our sample size for these analyses are much smaller because a number of children gave either no aspired career or gave answers that could not be coded as masculine or feminine.

Since $\alpha$-path analyses (gender differences in values) are essentially the same as those reported in the main manuscript, we here concentrate on the novel test of the relationship between children’s core values and characteristics of their aspired career. Results revealed communal values did not significantly predict femininity, $\beta = -.01, SE = .05, t (328) = -.17, p = .866$, communality, $\beta = .09, SE = .06, t(322) = 1.47, p = .142$, or agency-ratings of children’s aspired careers, $\beta = -.10, SE = .06, t (322) = 1.65, p = .101$. Similarly, agentic values did not significantly predict femininity, $\beta = -.01, SE = .04, t (328) = -0.12, p = .904$, communality, $\beta = .03, SE = .06, t (322) = 0.56, p = .573$, or agency-ratings of children’s aspired careers, $\beta = -.005, SE = .06, t (322) = -0.09, p = .930$. These results provide little evidence that gender differences in endorsement of communal and agentic values can account for gender differences in what kind of specific careers children aspire to in the age range our sample.

As we did with family- vs. career-orientation as an outcome in the main manuscript, we also repeated analyses controlling for 1) implicit gender identification, 2) explicit gender
identification and 3) parent-rated femininity in the relationship between children’s values and the characteristics of their aspired careers (separate models for each control to preserve degrees of freedom). We might have expected, for example, that these gender-specific variables could be more predictive of gender-typical career aspirations than core values. However, results revealed that parent-reported femininity did not significantly predict more femininity ratings, \( \beta = .09, SE = .10, t (302) = 0.96, p = .339 \), communality ratings, \( \beta = -.07, SE = .12, t (297) = -0.57, p = .566 \), or agency ratings of children’s’ aspired careers, \( \beta = -.21, SE = .12, t (297) = -1.81, p = .072 \). In addition, implicit female identification did also not significantly predict more feminine aspired careers, \( \beta = .05, SE = .05, t (313) = 0.87, p = .383 \), more communal aspired careers, \( \beta = .02, SE = .06, t (309) = 0.24, p = .808 \), or more agentic aspired careers, \( \beta = .05, SE = .07, t (309) = 0.76, p = .447 \). Similarly, explicit female identification did not significantly predict more feminine aspired careers, \( \beta = -.03, SE = .08, t (327) = -0.34, p = .736 \), more communal aspired careers, \( \beta = .004, SE = .10, t (321) = 0.04, p = .971 \), or more agentic aspired careers, \( \beta = -.04, SE = .10, t (321) = -0.43, p = .669 \). Importantly, regardless of whether we controlled for implicit gender identification, explicit gender identification, or parent-rated gender expression, communal values, \( \beta s < .11, ps > .076 \), and agentic values, \( \beta s < .05, ps > .800 \), remained non-significant predictors of the three characteristics of children’s aspired careers.

**Discussion**

We expected that to the extent that boys and girls differ in their endorsement of communal and agentic values, they would nominate different types of aspired careers. Our data suggested that careers chosen by boys vs. girls differed both in their femininity and their value affordance; as expected, boys’ nominated careers that were less feminine and communal, but more agentic, than did girls’. This pattern is similar to patterns of career preferences seen in past
research (Weisgram et al., 2010). However, while these results suggest gender-stereotypical preferences in aspired careers similar to research with adults (e.g., Evans & Diekman, 2009), we found no evidence for a relationship between children’s core values and specific career orientation. In fact, these career preferences were unrelated to any of our measured variables from parents or children.

Perhaps the most likely explanation for these null findings is that our measure of career orientation was not reliable and/or sensitive enough to detect effects. In the adult literature, career interest is measured with ratings to a large set of careers, leading to a more reliable scale (Evans & Diekman, 2009). In comparison, children in our sample self-reported a single career.

A somewhat different possibility is that any kind of a career measure might be insensitive if children’s concrete knowledge of careers is actually impoverished. Children’s responses were rated by coders on a three-point scale to assess goal affordance or stereotypicality. If children do not yet have to realistically think about what careers are actually viable options for them (as illustrated by answers like “unicorn”), then it is unlikely that children consider whether a career will match their goals in the same way adults might. Thus, children’s beliefs about these careers might be relatively disconnected from how coders have rated them. If children’s understanding of which goals certain careers afford has not fully developed by this age, we would not expect a significant relationship between children’s more basic values and their stated career preferences.

Finally, data loss is still a real concern for detecting hypothesized relationships. Sensitivity analyses suggest that at the sample size of 325, the minimal effect size to be detected with 85% power is $r = .16$. The sample is not sufficiently powered to detect effects smaller than this, even if such effects were to exist. Hence, future studies are needed to address whether boys’
and girls’ core values predict how they evaluate very specific careers using an adequately sized sample size.
Appendix B: Supplemental Materials (Block, Wee, & Schmader, In Prep)

**Appendix B Introduction.** The following is a document containing supplementary
documentation for the manuscript “A Dual-Barrier Perspective on Men’s Underrepresentation
in HEED”. The objective of the current work was to examine evidence that both internal
communal values and perceptions of changing (vs. stagnant) external norms shape men’s sense
of fit with HEED careers. Findings reported in the main manuscript suggest that both strong
communal values, and the perceptions that is becoming increasingly common for men to enter
HEED roles are linked to a sense of fit to HEED roles among men. Here, we detail additional
methodological information and analyses for Studies 1 through 3, as well as methods and results
for an additional study not included in the main manuscript.
Study 4.1 Analyses

Table S1

Study 1 – Results of Key Regression Analyses Separated by Career Type for Full Sample.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Nursing Fit</th>
<th></th>
<th></th>
<th>Social Work Fit</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>CI&lt;95</td>
<td>β</td>
<td>SE</td>
<td>CI&lt;95</td>
</tr>
<tr>
<td>Gender (b)</td>
<td>0.58</td>
<td>0.11</td>
<td>0.36 – 0.80</td>
<td>&lt;0.001</td>
<td>0.50</td>
<td>0.11</td>
</tr>
<tr>
<td>Communal Values</td>
<td>0.45</td>
<td>0.06</td>
<td>0.34 – 0.56</td>
<td>&lt;0.001</td>
<td>0.45</td>
<td>0.05</td>
</tr>
<tr>
<td>Agentic Values</td>
<td>-0.09</td>
<td>0.06</td>
<td>-0.20 – 0.02</td>
<td>0.109</td>
<td>-0.11</td>
<td>0.05</td>
</tr>
<tr>
<td>Descriptive Norm</td>
<td>0.24</td>
<td>0.08</td>
<td>0.09 – 0.39</td>
<td><strong>0.002</strong></td>
<td>0.15</td>
<td>0.08</td>
</tr>
<tr>
<td>Gender x Descriptive Norm</td>
<td>-0.05</td>
<td>0.11</td>
<td>-0.27 – 0.16</td>
<td>0.634</td>
<td>0.00</td>
<td>0.10</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>436</td>
<td></td>
<td></td>
<td></td>
<td>435</td>
</tr>
<tr>
<td>R² / adjusted R²</td>
<td></td>
<td>0.230 / 0.221</td>
<td></td>
<td></td>
<td></td>
<td>0.225 / 0.216</td>
</tr>
</tbody>
</table>

Note. Gender was coded 0 = men, 1 = women.
### Table S2.

**Study 1 – Results of Key Regression Analyses Separated by Career Type for Men.**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Nursing Fit</th>
<th></th>
<th>Social Work Fit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>CI&lt;sub&gt;95&lt;/sub&gt;</td>
<td>p</td>
<td>β</td>
</tr>
<tr>
<td>Communal Values</td>
<td>0.45</td>
<td>0.28 – 0.62</td>
<td>&lt;0.001</td>
<td>0.46</td>
</tr>
<tr>
<td>Agentic Values</td>
<td>-0.19</td>
<td>-0.35 – -0.02</td>
<td>0.031</td>
<td>-0.13</td>
</tr>
<tr>
<td>Descriptive Norm</td>
<td>0.25</td>
<td>0.08 – 0.42</td>
<td>0.005</td>
<td>0.14</td>
</tr>
<tr>
<td>Communal Values x</td>
<td>0.12</td>
<td>-0.04 – 0.29</td>
<td>0.153</td>
<td>0.08</td>
</tr>
<tr>
<td>Descriptive Norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>220</td>
<td></td>
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<td>220</td>
</tr>
<tr>
<td>R&lt;sup&gt;2&lt;/sup&gt; / adjusted R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.176 / 0.161</td>
<td></td>
<td></td>
<td>0.166 / 0.151</td>
</tr>
</tbody>
</table>
Study 4.2: Development of Mechanism Measure

For Study 2, we introduced a new measure of possible mechanisms that could explain the relationship between norm perceptions and sense of fit with nursing. The following details how we developed this measure.

To develop this novel measure of these three mechanisms, we first drafted a larger set of items (eight for social fit, eight for backlash, and four for status). Items for “social fit” were drafted based on Walton & Cohen’s (2007) measure of social fit to specifically represent social fit (and not efficacy) at work and were adapted to the nursing workplace context. Items on expected backlash were drafted based on past research that described the types of directly gender-based repercussions men fear in nursing careers (Korek et al., 2014; Rochlen, Good, & Carver, 2009; Wolfram et al., 2009). Items for status were drafted by us to create a face-valid measure of this construct. Our final set of items was chosen based on results from a pilot study of 108 men on Amazon Mechanical Turk. An exploratory factor analysis (direct oblimin rotation) was first performed to examine the factor loadings of the initial pool of items. This analysis suggested that the three hypothesized factors naturally emerged from the data with minimal cross-loading. With the goal to have four to five items per mechanism, we chose items that loaded highly on their primary factor while not loading strongly on any other factor (< .20). Study 2 was then used to formally validate the factor structure of this new measure.
Study 4.3 Method Details

Study 4.3 Graph Manipulations

*Restrictive Norms Condition.*

![Graph showing percentage of nurses who are men from 1970 to 2011 for registered nurses and licensed practical and licensed vocational nurses.]

Men’s underrepresentation among licensed practical and licensed vocational nurses continues to be a problem. Since 1970, the percentage of men in nursing has grown only little.

**The estimates based on these samples approximate the actual values and represent the entire household and noninstitutionalized group quarters population.**

*Permissive Norms Condition.*

![Graph showing percentage of nurses who are men from 1970 to 2011 for registered nurses and licensed practical and licensed vocational nurses.]

Men’s representation among licensed practical and licensed vocational nurses has been rising steadily and has doubled since 1970.

**The estimates based on these samples approximate the actual values and represent the entire household and noninstitutionalized group quarters population.**
Thinking of Others can be Good for Your Health

There are two broad ways that we motivate our behavior. Some of the things we do, we do for ourselves, to further our own goals and self-interests. Other things we do for others, to help them meet their goals or console them in difficult times. If these two broad motivations guide much of our behavior, is there any evidence that one is better for our well-being?

A growing body of psychological research over the last decade suggests that men and women equally benefit both physically and psychologically from prioritizing their communal relationships by engaging in prosocial helping, feeling a sense of empathy for others, and taking on caregiving roles. Altruism is most commonly thought of as a selfless act that benefits the recipient, but science has shown that altruism also benefits the helpers. For example, in a 2013 paper, researchers at Harvard University found that people who focus more on helping others benefit emotionally. In three separate studies, people who spent money on friends or gave money to charity experienced notable boosts in happiness. These emotional benefits were largest when these acts of kindness served to strengthen their social connections.

People who focus on others do not just report feeling happier, they are physically healthier too. Studies have found that those who volunteer their time to help others tend to live longer and have better physical health than those who have shied away from volunteering. This is likely connected to the direct health benefits of being prosocial. The empathy felt when people engage in acts of care and compassion is associated with the release of endorphins—neurotransmitters that make us feel positive. Allan Luks from the University of Toronto discovered that this biological response to caregiving can benefit your body in much the same way that exercise does. That is why the "rush" that good deed-doers experience can come to be called the "helper's high."

Lastly, researchers have discovered that our connection to others is the psychological nutrient that drives overall well-being. In an April 2015 study, researchers found that practicing a type of meditation cultivating positive emotions towards others triggered a cascade of psychological and physical health benefits. Compared to those randomly assigned to a waiting-list control group, participants who practiced Loving-Kindness Meditation had increased positive emotions, positive social connections, and improved physical health even after a short time.

Interestingly, researchers discovered that the three positive outcomes become interrelated in a feedback loop that can intensify effects over time.

In a time when people are increasingly driven to achieve their personal goals and compete for top positions in their education and careers, this emerging evidence suggests that taking the time to develop strong social bonds by thinking of and connecting with others could be an important key to living a long, productive, and happy life. This might make sense from an evolutionary perspective where our early survival as a species depended on the key human ability to cooperate with others and form powerful social bonds that signal our inclusion in the tribe and facilitate broader goals.
Always Thinking of Others can be Bad for Your Health

There are two broad ways that we motivate our behavior. Some of the things we do, we do for ourselves, to further our own goals and self-interests. Other things we do for others, to help them meet their goals or console them in difficult times. If these two broad motivations guide much of our behavior, is there any evidence that one is worse for our health?

A growing body of psychological research over the last decade suggests that, among men and women alike, always thinking of others and prioritizing social relationships might carry clear risks for both psychological and physical health. Altruism is most commonly thought of as a selfless act that benefits the recipient and can make the helper feel good temporarily, but science has shown that altruism is not always so beneficial. For example, in a 2013 paper, researchers at Harvard University found clear evidence of the emotional costs to self-sacrifice. In three separate studies, people who sacrifice their own goals and motivations to help others actually exhibited more anxiety, poorer self-esteem, and depressed mood. These emotional costs were especially high when these acts of altruism made people feel a loss of personal autonomy.

People who focus on others excessively do not just report feeling worse about themselves, their physical health also suffers. Studies have found that people who constantly sacrifice for others tend to be less healthy than those who help in moderation. This is likely connected to them taking on the stress of others as their own. The empathy felt by those in ongoing caregiving roles is associated with the release of cortisol—a stress hormone that has been associated with seeing oneself as inferior to others. Allan Luks from the University of Toronto discovered that this biological response can create wear and tear on your body in much the same way that high blood pressure and chronic stress does. That is why those who prioritize caring for others experience what has been called “helper’s fatigue” and suffer poorer physical health.

Lastly, researchers have discovered that a primary focus on social connection decreases overall well-being. In an April 2015 study, researchers found that those who adopt an orientation of always supporting others triggered a cascade of costs to psychological and physical health. Compared to those randomly assigned to balance their own needs and interests along with the needs of others, participants trained to focus only on the needs of others had decreased positive emotions, felt a loss of personal autonomy, and experienced poor physical health even after a short time. Interestingly, researchers discovered that the three negative outcomes became interrelated in a feedback loop that can intensify effects over time.

In a time when people are increasingly instructed to put others before themselves, this emerging evidence suggests that being excessively oriented toward social relationships and helping others could be detrimental to both psychological and physical health. This might make sense from an evolutionary perspective where the weakest members of a tribe would be most motivated to gain the protection of the group by being attentive to others needs and motivations and excessively cooperative to curry favor.

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Study 4.4

We pre-registered and ran an additional study – referred to here as Study 4.4 – which we decided not to include in the main manuscript for the sake of brevity. Findings from this study do not necessarily contradict any of our other findings but also do not add any valuable information.

Whereas results from Study 4.3 were promising and provide novel support for the dual barrier perspective, several important issues remain. Our first goal for Study 4.4 was to replicate key effects from Study 4.3, by focusing on the comparison between the two critical conditions – comparing progressive vs. restrictive norm primes after activation of communal values in a sample of male undergraduates. Second, given that Study 4.3 provided additional evidence that descriptive norm perceptions play an important role in shaping men’s sense of fit, we wanted to pick up on findings from Study 4.2 and further explore the mechanism through which descriptive norm changes affected nursing fit. Study 4.4 therefore also tested whether expectations of gender-based backlash, belonging, and/or status could account for the effects of changing descriptive norms. Lastly, because the prior studies only included a self-report of interest in nursing that abstractly focused on how much participants imagined they would like being a nurse, it still remains unclear to what extent results observed would also translate into men feeling more positive about approaching a nursing career in the future. A recent synthesis of the literature on domain fit suggests that perceiving that a domain provides a good fit for oneself motivates individuals to approach that domain (Schmader & Sedikides, 2017). Study 4.4 therefore added an additional, explicitly exploratory, dependent measure which assesses how cognitively accessible positive characteristics of nursing are for men after being exposed to our manipulation of descriptive norms.
Method

Participants

Our final sample for Study 4.4 included 200 male undergraduate students recruited at a large Canadian university for participation in exchange for course credit or payment of $10. For Study 4.4, we pre-registered to aim for an approximate sample size of 224 undergraduate men after exclusions (https://osf.io/ef3cd). This target was chosen based on recommendations by Fritz and MacKinnon (2011) to be able to detect a medium-size (path betas ~ .26) mediation at 80% power. Simple condition differences should be extremely highly powered at this sample size. As pre-registered, we excluded participants who fall into one or more of the following categories: participants who identified as non-heterosexual ($n = 23$), did not identify as a man ($n = 1$), guessed the deception in our study ($n = 12$), did not follow the instructions in the manipulation ($n = 14$), reported being over the age of 25 ($n = 9$), do not plan to live in North America in the future ($n = 4$), did not remember the content of our manipulations ($n = 7$), and/or did not finish the study ($n = 2$), resulting in a final sample size of 200 men after exclusions. While this sample is somewhat smaller than what we had pre-registered, we decided to conduct our analyses since difference between two conditions – which was the focus of this study – would still be highly powered. A post-hoc sensitivity analysis suggested that our sample could detect condition differences as small as $d = .35$ with 80% power ($\alpha = .05$, one-tailed). Participants were predominantly of East Asians descent (48.5%), White/Caucasian (16%) or of South Asian descent (13.5%).

Procedure

Study 4.4 focused on closely replicating two of the four cells in Study 4.3’s design – manipulating descriptive norms while activating communal values in all participants. As in
Study 4.3, participants first completed the baseline measure of nursing interest and were then exposed to the same descriptive norms manipulation (restrictive vs. progressive) within a nursing brochure. Additionally, Study 4.4 added the mechanism measures developed for Study 4.2 with the goal to test the processes by which the descriptive norms manipulation moderates the effects of the communal values manipulation on perceived fit, as well as a new exploratory outcome measure. After the manipulation of descriptive norms, participants reported their perceptions on our mechanism measures (five social fit, five gender-based backlash, and four status items; in randomized order). Next, all participants completed the high-communal essay from Study 3 (i.e., internal communal motivation was activated for everyone). Next, to re-activate the effects of our manipulation, participants completed manipulation checks from Study 3, which asked them to recall what they had seen in the nursing brochure, including one question about the graph that showed the rate of men moving into nursing. As before, participants then completed the key dependent variable – nursing fit. After this, and before completing demographics, participants completed the new, more exploratory, measure of accessibility of positive characteristics of nursing.

**Measures**

Baseline nursing interest ($\alpha = .83$), manipulation checks, communal ($\alpha = .83$) and agentic ($\alpha = .82$) values, and our key dependent variable, nursing fit ($\alpha = .93$), were measured as in the previous studies. We measured expectations of social fit ($\alpha = .84$), gender-based backlash ($\alpha = .91$), and status ($\alpha = .88$) as in Study 4.2.

**Accessibility of positive characteristics of nursing.** To assess how cognitively accessible positive characteristics were to our participants after the manipulation, we asked
participants to list positive characteristics of nursing. Specifically, participants were asked the following:

How to attract more people to nursing? What are the pro’s of nursing? We are trying to identify the specific aspects about nursing that make it a rewarding or interesting career TO STUDENTS LIKE YOU. So, we are asking you! Imagine you are working on a new advertising campaign. What specific aspects about nursing could be emphasized to broaden the appeal of nursing as an attractive career? Please list as many ideas that you can think of. Please describe one point per box. Be as specific as you can for each point.

To quantify the accessibility of positive characteristics we counted the number of responses participants supplied, resulting in a score that could range between 0 and 12.

**Study 4.4 Results**

Means, standard deviations, and Cohen’s $d_s$ for condition differences as well as overall correlations between key variables are summarized in Table 3.

**Manipulation Checks**

To examine if participants correctly perceived our manipulation of descriptive norms, we compared their reported memory of the graph between conditions with an independent samples $t$-test. As we had seen in Study 2, participants in the permissive norms condition ($M = 5.03$, $SD = 1.20$) remembered men moving into nursing at a much faster rate than participants in the restrictive norms condition ($M = 1.92$, $SD = 1.22$), $t(197.9) = 18.10$, $p < .001$.

**Condition Differences in Nursing Fit and Positivity**

We first assessed evidence for the predicted condition differences in our key outcome measure nursing fit, and our new exploratory measure of accessibility of positivity of nursing.
Linear regression analyses examined differences in nursing fit between the restrictive norms and permissive norms conditions. As pre-registered, we entered the norms condition (0 = restrictive, 1 = permissive), as well as the baseline measure of nursing interest (z-scored) as control variable, in a linear regression model predicting nursing fit.

As we predicted, men reported greater fit with nursing after exposure to progressive norms (i.e., men are rapidly moving into nursing; $M = 4.75$, $SD = 1.44$) as opposed to restrictive norms ($M = 4.37$, $SD = 1.45$), $b = 0.26$, $SE = 0.11$, $t(197) = 2.24$, $p = .026$. Expectedly, our baseline measure of nursing interest was also strongly related to nursing fit, $b = 0.58$, $SE = 0.06$, $t(197) = 10.09$, $p < .001$.

These analyses were repeated with our new exploratory measure – accessibility of positive characteristics of nursing – as dependent variable. We found no significant difference in the number of positive characteristics men listed for nursing between the permissive norms condition ($M = 6.28$, $SD = 2.68$) and the restrictive norms condition ($M = 6.27$, $SD = 2.58$), $b = -0.001$, $SE = 0.14$, $t(196) = -0.01$, $p = .992$. Importantly, our baseline measure of nursing interest also did not significantly predict this new exploratory outcome, $b = 0.13$, $SE = 0.07$, $t(196) = 1.78$, $p = 0.076$, perhaps suggesting that our measure of positivity was not ideal.

**Explaining the Effect of Norms**

A novel goal of Study 4.4 was to test whether the effect of the norm manipulation on men’s feelings of fit is explained by anticipations of backlash, belonging at work, and/or social status. To examine this, we conducted mediational path-analyses in the SEM framework using lavaan in R (Rosseel, 2012). Specifically, we conducted mediation analyses with condition as an independent variable (0=restrictive, 1=progressive), nursing fit as dependent variable, and

27 Note, due to a computer error, one participant was missing this measure; thus, degrees of freedom are one less than for the analyses with nursing fit.
expected backlash, expected belonging, and expected career status as the three simultaneous mediators. For consistency with other analyses (and as pre-registered), all paths also controlled for our baseline measure of nursing interest.

The first steps for mediation are three regression models to model condition differences in each of the mediators (a-paths). Here results show no significant condition differences in either belonging, \( b = 0.04, SE = 0.12, z = 0.34, p = .733 \), expected backlash, \( b = -0.07, SE = 0.19, z = -0.40, p = .692 \), or expected status as nurse, \( b = 0.01, SE = 0.15, z = 0.07, p = .947 \).

Next, three b-paths estimate the relationships between each of the three mediators and nursing fit (controlling for baseline nursing interest). These analyses showed that, as expected, and in line with findings from Study 4.2, expecting greater belonging, \( b = 0.25, SE = 0.08, z = 3.02, p = .003 \), and expecting greater social status as a nurse, \( b = 0.26, SE = 0.08, z = 3.17, p = .002 \), were significantly related to greater fit with nursing. Also mirroring results from Study 4.2, expectations of gender-based backlash were not related to nursing fit, \( b = 0.04, SE = 0.10, z = 0.43, p = .669 \).

Lastly, indirect effects (a*b-paths) for each mediator were estimated. Given that there was no evidence of condition differences in any of the mediators, all indirect effects were also non-significant, all \( p > .10 \). Further speaking against mediation, the effect of condition of nursing fit remained significant after accounting expectations of for belonging, backlash, and status, \( b = 0.33, SE = 0.14, z = 2.40, p = .016 \).

Since there was no effect of condition on accessibility of positive characteristics of nursing or on any of the mediations (thereby precluding indirect effects), we did not conduct mediation analysis on our exploratory outcome.
Table S3

*Study 4 – Overall Correlations and Descriptive Statistics.*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>M (SD) Restrictive Condition</th>
<th>M (SD) Permissive Condition</th>
</tr>
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<tbody>
<tr>
<td>1. Perceived rate</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.92 (1.22)</td>
<td>5.03 (1.20)</td>
</tr>
<tr>
<td>2. Nursing fit</td>
<td>.07</td>
<td>-</td>
<td></td>
<td></td>
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<td>4.37 (1.45)</td>
<td>4.75 (1.44)</td>
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<td>3. Positivity</td>
<td>.01</td>
<td>.11</td>
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<td>6.28 (2.68)</td>
<td>6.27 (2.68)</td>
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<td>4. Social fit</td>
<td>.03</td>
<td>.41*</td>
<td>.08</td>
<td>-</td>
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<td>5.10 (1.03)</td>
<td>5.16 (0.84)</td>
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<td>5. Backlash</td>
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<td>-.13</td>
<td>-.12</td>
<td>-.19*</td>
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<td>4.14 (1.43)</td>
<td>4.06 (1.30)</td>
</tr>
<tr>
<td>6. Status</td>
<td>-.02</td>
<td>.41*</td>
<td>.03</td>
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<td>4.36 (1.11)</td>
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Note. *p < .05