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Countering Gender-Typicality in Occupational Choices: An Information Intervention Targeted at Adolescents

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Countering Gender-Typicality in Occupational Choices: An Information Intervention Targeted at Adolescents *

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To foster gender equality and diversity in the workplace, firms and policymakers strive to attract women and men to gender-atypical occupations. However, particularly for men, such attempts have been of limited success. We theorize (a) that identity threat-related barriers hinder gender-atypical occupational choices, (b) that these barriers differ for women and men, and (c) that therefore the success of policy interventions aiming to encourage gender-atypical occupational choices differs for women and men. We conduct a large-scale field experiment with young women and men choosing their occupations when applying for their first job. We find that a brief intervention featuring counter-stereotypical framing and female role models in typically male jobs in STEM substantially increases women's applications for STEM jobs. However, an equivalent intervention featuring counter-stereotypical framing and male role models in typically female jobs in health and care does not increase men's applications for those jobs. Thus, strategies that work for women—such as portraying role models—do not necessarily work for men. To foster full gender equality in the workplace, firms and policymakers should not only continue investing in interventions aiming to attract women to male-dominated occupations but also develop interventions particularly focused at encouraging men to consider female-dominated occupations.

Keywords: occupational choice; gender typicality; occupational gender segregation; field experiment.

JEL Classifications: J24, J16, I24, M59

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Gender differences in occupational choices constitute a persistent feature of workplaces worldwide (Charles & Bradley, 2009; Cortes & Pan, 2018). Such gender-stereotypical occupational choices can limit the optimal matching of workers' talents to occupations, contribute to the gender pay gap, and reinforce gender stereotypes (Alonso-Villar, Del Rio, & Gradin, 2012; Blau & Kahn, 2017; Hegewisch, Liepmann, Hayes, & Hartmann, 2010). Thus both firms and policymakers are seeking ways of encouraging women and men to consider gender-atypical occupations—e.g., science, technology, engineering, and mathematics (STEM) occupations for women, and health and care occupations for men.

Drawing on social role theory (Eagly, 1987; Eagly & Wood, 2012) and focusing mainly on women in male-dominated domains, gender researchers have identified counter-stereotypical role models (e.g., male nurses) and counter-stereotypical framing of occupations (e.g., emphasizing teamwork in STEM occupations) as intervention strategies for encouraging interest in gender-atypical occupations (Dasgupta & Asgari, 2004; Del Carpio & Guadalupe, 2021; Diekman, Clark, Johnston, Brown, & Steinberg, 2011; Pietri, Johnson, Majid, & Chu, 2021). Consequently, firms and policymakers have tried to use these intervention strategies in job ads and campaigns (e.g., "Are you man enough to be a nurse" in the U.S.)—often implicitly assuming that these strategies work equally well for women and men (e.g., Meeussen, Van Laar, & Van Grootel, 2020). However, little is known so far whether such brief interventions (e.g., in job ads or on job boards) are effective at changing real-life outcomes (e.g., job applications), how large their effects are, and whether they work equally well for women and men.

Theorizing that women and men face different identity threat-related barriers to entering gender-atypical domains, we conduct a large-scale field experiment with young women and men choosing their occupations and applying for their first jobs. We integrate social role theory (Eagly, 1987; Eagly & Wood, 2012) with social identity threat theories (Breakwell, 1986; Ellemers, Spears,

& Doosje, 2002; Roberts, 2005; Steele, Spencer, & Aronson, 2002) to explain which identity threat-related barriers to choosing a gender-atypical occupation exist and how these barriers may differ by gender.

Specifically, we theorize (a) that devaluation threats (i.e., threats that arise when others devalue the characteristics of an individual's social identity group; Roberts, 2005) pose a bigger barrier to choosing gender-atypical occupations for women than for men and (b) that legitimacy threats (i.e., threats that occur when others question an individual's membership in a positively regarded social identity group; Roberts, 2005) pose a bigger barrier for men. Moreover, we argue that two widely employed intervention strategies for encouraging gender-atypical occupational choices (i.e., portraying counter-stereotypical role models and counter-stereotypical framing of gender-atypical occupations) mainly target devaluation threats. Thus we hypothesize that such intervention strategies are more effective at encouraging women to apply for male-dominated occupations than at encouraging men to apply for female-dominated occupations. We additionally analyze two boundary conditions for the effectiveness of brief counter-stereotypical interventions. First, we hypothesize that such interventions are more effective at changing low-commitment occupational choices (e.g., the choice of a gender-atypical short-term internship) rather than high-commitment occupational choices (e.g., the choice of a gender-atypical three-year training program). Second, we hypothesize that such brief counter-stereotypical interventions do not affect the occupational choices of the majority gender group.

We test our hypotheses in a large-scale field experiment, in which we randomly assign adolescent females and males engaged in the occupational choice process to brief interventions portraying counter-stereotypical role models and employing counter-stereotypical framing of STEM occupations (intervention 1) or health and care occupations (intervention 2). For our field

experiment, we needed a setting that (a) allows us to provide information to individuals during their occupational choice process and (b) provides valid measures of occupational choice.

Switzerland's unique educational and labor market setting provides an empirical setting that fulfills both conditions. Approximately two-thirds of Swiss adolescents choose a vocational education and training (VET) pathway after completing their compulsory education. This pathway requires that the adolescents apply for apprenticeship positions in one or several occupations in the universe of over 200 occupations for which firms take apprentices. During this occupational choice process, adolescents (a) process information provided on job boards and by career counselors and (b) subsequently submit applications for apprenticeship positions to firms in their chosen occupations. As almost all adolescents apply for these positions online via an apprenticeship job board, we conduct our field experiment in collaboration with the largest Swiss job board for apprenticeship positions, Yousty. This job board thus provides an ideal setting for both providing information to adolescents in the occupational choice process and for measuring changes in adolescents' detailed occupational choices in the form of applications for apprenticeship positions.

Our research contributes to management theory in three key ways. First, the majority of management theory and literature focuses on the barriers, threats, and backlash that women face in male-dominated domains (e.g., Akinola, Martin, & Phillips, 2017; Brands & Mehra, 2018; He & Kang, 2021). In contrast, we discuss not only women's but also men's barriers to occupational choice by integrating social role theory with social identity threat theories and by contributing a theoretical framework that describes both women's and men's identity threat-related barriers to entering gender atypical occupations.

Second, we offer empirical evidence demonstrating that the effectiveness of interventions to counter gender-typical choices systematically differs for women and men. We argue that typical intervention strategies for raising women's interest in male-dominated occupations mainly target

devaluation threats, which pose a bigger barrier to choosing gender-atypical occupations for women than for men. As a result, such intervention strategies are likely to be more effective in encouraging women to consider male-dominated occupations than in encouraging men to consider female-dominated occupations.

Third, our work demonstrates that focusing the majority of research and intervention efforts on opening doors to male-dominated domains for women, while neglecting specific strategies for opening doors to female-dominated domains for men, may hinder advancement toward gender equality in the workplace.

THEORY AND HYPOTHESES DEVELOPMENT

To derive our hypotheses, we proceed in several steps. First, we introduce social role theory (Eagly, 1987; Eagly & Wood, 2012) and its implications for occupational choice. Second, we integrate social role theory (Eagly, 1987; Eagly & Wood, 2012) with theories on social identity threat (Breakwell, 1986; Ellemers et al., 2002; Steele et al., 2002) and the professional image construction model (Roberts, 2005) to provide a framework that describes both women's and men's identity threat-related barriers to entering gender-atypical occupations. Third, to derive specific hypotheses, we apply this theoretical framework to the context of intervention strategies aiming to counter gender-atypical occupational choice. Finally, we describe two boundary conditions for the effectiveness of such interventions: (a) the commitment level of the occupational choice and (b) the impact on the majority gender group.

Social Role Theory, Gender Roles, and Occupational Choices

Social role theory (Eagly, 1987; Eagly & Wood, 2012) provides a social-psychological and evolutionary perspective on gender differences in occupational choice. This theory posits that

differences in both physical gender and local social conditions originally led to a division of labor between women and men (Eagly & Wood, 2012). Gender role expectations—i.e., shared expectations about the presumed attributes and behavior of women and men—thus emerged from early humans' observations of women's and men's behavior in their family and work roles. As a result, women are expected to enact "communal" behaviors (i.e., other-oriented, caring, friendly behaviors), while men are expected to enact "agentic" behaviors (i.e., action-oriented, assertive, competitive behaviors) (Eagly & Wood, 2012). As gender role expectations tend to be shared by members of a society, people receive more approval from others for gender role-consistent behavior—but are penalized when they do not conform (Eagly & Wood, 2012; Rudman, 1998; Rudman & Glick, 2001).

Occupations are likewise linked to stereotypical attributes and expected behaviors of professionals working in these occupations (White & White, 2006). For example, most people tend to associate health and care occupations with communal attributes, while they associate STEM occupations with agentic ones (Diekman et al., 2011; White & White, 2006). Consequently, the female gender role is viewed as incongruent with STEM occupations, and the male gender role as incongruent with health and care occupations. These incongruencies between gender roles and occupational roles offer a potential explanation for gender differences in occupational choices (White & White, 2006).

Nonetheless, social role theory by itself is insufficient to investigate whether women and men face different types of barriers to entering gender-atypical occupations. One literature that may help explain in more detail the specific barriers that women and man face is the literature on social identity threat (Breakwell, 1986; Ellemers et al., 2002; Steele et al., 2002) and the professional image construction model (Roberts, 2005).

Differences in Identity Threat-Related Barriers to Enter Gender-Atypical Occupations

According to Roberts' (2005) professional image construction model, social identities (e.g., gender, ethnicity) are central in building an individual's professional identity. Identity threats may cause people to experience discrepancies between their *perceived* professional image (e.g., how STEM professionals think that others at work perceive them) and their *desired* professional image (e.g., how a particular STEM professional would like to be perceived by others at work). The two types of social identity threats are devaluation threat and legitimacy threat (Breakwell, 1986; Ellemers et al., 2002; Roberts, 2005).

Devaluation threats occur when others devalue the characteristics of an individual's social identity group in a given context (Breakwell, 1986; Ellemers et al., 2002; Roberts, 2005). In the context of occupational choice, women may experience a devaluation threat when they feel that merely being a woman makes others regard them as unsuitable for engaging in a male-dominated occupation (He & Kang, 2021). Conversely, men may experience a devaluation threat when they feel that merely being a man makes others regard them as unsuitable for engaging in a female-dominated occupation.

In contrast, legitimacy threats occur when others question an individual's membership in a positively regarded social identity group (Breakwell, 1986; Ellemers et al., 2002; Roberts, 2005). In the context of occupational choice, a woman may experience a legitimacy threat when she feels that others perceive her as less feminine if she chooses a male-dominated occupation. Conversely, a man may experience a legitimacy threat when he feels that others perceive him as less masculine if he chooses a female-dominated occupation.

Drawing on both social role theory and identity threat theories, we argue that role incongruities between a person's gender (e.g., man) and an occupation (e.g., health and care worker) keep people from entering that occupation due to devaluation threat, legitimacy threat, or both. We further argue that the devaluation threat is more closely tied to the work context and the fear of not living up to the ideals of the occupational role, whereas the legitimacy threat is more closely tied to the non-work context and the fear of not living up to the ideals of the gender role.

We argue that with devaluation threat, people feel that their gender role prevents them from living up to the ideals associated with the occupational role. For example, people may think that their gender (a) makes their colleagues regard them as less suitable for engaging in an occupation dominated by the other gender or (b) makes both them and others doubt their abilities to develop the skills and complete the tasks required (Colbeck, Cabrera, & Terenzini, 2001; He & Kang, 2021; Koch, Sackett, Kuncel, Dahlke, & Beatty, 2022). In contrast, with legitimacy threat, people feel that their occupational role prevents them from living up to the ideals associated with their gender role. For example, they may fear that if they work in an occupation dominated by the other gender, their friends would make fun of them or perceive them as less feminine or masculine (He & Kang, 2021; Lupton, 2000; Simpson, 2004).

Moreover, we argue that the extent to which people experience these two identity threats depends on their gender role. In line with He and Kang (2021), we argue that the devaluation threat is the major threat experienced by women who are considering choosing a male-dominated occupation. Given that in most societies, women have traditionally had lower status and power than men (Rashotte & Webster, 2005; Ridgeway, 1997; Ridgeway & Correll, 2004), women are likely to experience a negative incongruity between their gender role and the occupational role in a male-dominated occupation (He & Kang, 2021). Women are likely to feel that their gender and associated attributes and behaviors are unsuitable or "not good enough" for succeeding in male-

dominated occupations (e.g., women may think that they are not good enough at math or that their colleagues will not take them seriously).

Likewise, men may also experience an incongruity between their gender role and their occupational role in a female-dominated occupation. However, given that men have traditionally had higher social status and power than women (Rashotte & Webster, 2005; Ridgeway, 1997; Ridgeway & Correll, 2004), this incongruity is likely to be positive (He & Kang, 2021). Consistent with this argument, research on careers of men in female-dominated occupations provides evidence for the careers of men progressing faster than those of women in female-dominated occupations (Schwiter, Nentwich, & Keller, 2021; Williams, 1992, 2015). Therefore, men are likely to worry less about not being taken seriously or not being good enough at work in female-dominated occupations. We thus argue that, for women, the devaluation threat poses a major barrier to entering gender-atypical occupations—but not for men.

In contrast, we argue that the legitimacy threat is the major threat experienced by men when they consider choosing a female-dominated occupation. The literature on precarious manhood (Vandello & Bosson, 2013; Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008) has shown that most societies perceive manhood as a precarious status that, in contrast to womanhood, must be repeatedly proven. Examples are manhood rituals in some societies or common expressions such as "to man up," "be a real man," "man enough," or "you're such a girl". Thus men tend to feel more anxious about their gender status than women do (Vandello et al., 2008). Building on this literature and given that men belong to the traditionally more valued gender group, we argue that the legitimacy threat poses a major barrier for men wishing to enter female-dominated occupations. Indeed, even though men in female-dominated occupations are likely to be valued by their colleagues, they risk not being taken seriously or even being ridiculed for their occupational choice by their friends, family, and acquaintances (Lupton, 2000; Simpson, 2004).

We argue that women are less likely than men to experience a legitimacy threat when they consider choosing a male-dominated occupation, for the following two reasons. First, because they belong to the traditionally less valued gender group, others are less likely to question their membership in that group (He & Kang, 2021). Second, most societies perceive womanhood as a permanent, biologically assigned status that does not need continual proving (Vandello et al., 2008). Therefore, we argue that while women may worry about not being valued in a male-dominated occupation, they are less worried that friends or family will ridicule them for that occupational choice (e.g., engineering).

If women and men face different identity threat-related barriers to choosing gender-atypical occupations, these differences have important consequences for how firms, policymakers, and researchers need to design job ads, campaigns, and interventions for countering gender-typical occupational choices. We argue that, for such interventions to be effective, they need to factor in the type of identity threat-related barrier most relevant for women and men.

An Identity-Threat Perspective on Intervention Strategies for Encouraging Gender-Atypical Occupational Choice

Research on gender-atypical choice has predominantly focused on women in male-dominated occupations and domains (e.g., Dasgupta & Asgari, 2004; Diekman et al., 2011; Pietri et al., 2021). Consequently, almost all intervention strategies for encouraging gender-atypical occupational choice stem from research focusing on women. The two most well-known strategies applied in a wide range of contexts—including job ads and campaigns—are portraying counter-stereotypical role models (e.g., portraying female IT specialists) and framing counter-stereotypical aspects of careers (e.g., emphasizing teamwork in STEM occupations).

Given that both intervention strategies mainly target people's perception of the occupational role in the work context, we argue that these intervention strategies should reduce the devaluation threat. If firms or policymakers portray female role models and use counter-stereotypical framing of male-dominated occupations in their job ads or campaigns, they signal that (a) they value females working in male-dominated occupations, (b) women can be successful in these occupations, and (c) communal skills (e.g., being a team player) are both necessary and valuable in these occupations (e.g., Diekman et al., 2011; Pietri et al., 2021). As all of these messages counter the devaluation threat, they should be effective in attracting women to male-dominated occupations. We therefore hypothesize as follows:

Hypothesis 1. Interventions that portray counter-stereotypical role models and employ counter-stereotypical framing of male-dominated occupations increase women's applications for male-dominated occupations.

However, neither intervention strategy directly targets the legitimacy threat. If firms or policymakers portray male role models (e.g., male nurses) and employ counter-stereotypical framing of female-dominated occupations (e.g., emphasize the challenging aspects of care occupations), these strategies do not take into account men's potential anxiety about not being respected as "a real man." Given that, for men, we assume the legitimacy threat to be the bigger barrier to entering female-dominated occupations, we hypothesize as follows:

Hypothesis 2. Interventions that portray counter-stereotypical role models and employ counter-stereotypical framing do not significantly increase men's applications for female-dominated occupations.

Boundary Condition: Low-commitment versus high-commitment occupational choices

For women, we additionally expect the effect of counter-stereotypical interventions on their applications for male-dominated occupations to be stronger for low-commitment than for high-commitment occupational choices. We define low-commitment occupational choices as choices, which can easily be reversed, whereas high-commitment occupational choices bind an individual to an occupation for several years. Examples for low-commitment occupational choices are internships of a few days up to a few months. These internships allow individuals to get to know an occupation and a firm and have a natural ending upon which individuals decide whether they want to continue on that occupational path or whether they do not. An example for high-commitment occupational choices are training programs with a duration of several years.

Because low-commitment occupational choices allow individuals to try out an occupation without a long-term commitment, we argue that the barriers to entering a male-dominated occupation are lower for such low-commitment opportunities. We argue that while counter-stereotypical interventions can signal the valuation of females working in these occupations and thereby reduce devaluation threat, low-commitment opportunities such as internships allow women to learn in-person whether these signals are actually true—with the possibility to choose another occupation if this is not the case. Therefore, we hypothesize:

Hypothesis 3. The effect of an intervention that portrays counter-stereotypical role models and employs counter-stereotypical framing of male-dominated occupations is stronger for women's low-commitment than for women's high-commitment applications for male-dominated occupations.

If, as we previously argued, the legitimacy threat is (a) men's major identity threat when considering choosing a female-dominated occupation and (b) more closely tied to the non-work context and the fear of not living up to the ideals of the gender role (versus the occupational role), learning more about such an occupation through low-commitment opportunities will be unrelated to legitimacy threat. Therefore, we do not expect the effect of counter-stereotypical interventions on men's applications for female-dominated occupations to differ between low- and high-commitment occupational choices.

Intervention effects on the majority gender group

Given that in real life (in contrast to the laboratory) campaigns and counter-stereotypical interventions are rarely seen by only one gender, we argue that it is important to study how interventions targeted at the gender minority in an occupation affect the gender majority in that occupation. That is, how do men react to interventions that portray female role models and employ communal framing of male-dominated occupations? Likewise, how do women react to interventions that portray male role models and employ agentic framing of female-dominated occupations?

Theoretically, there are arguments both for a negative effect as well as for a null effect. If such interventions would reverse individuals' perception of the gender representation (e.g., an individual perceives a traditionally male-dominated occupation as female-dominated after the intervention), we would, in line with our previous argumentation, expect men to experience legitimacy threat and women to experience devaluation threat. However, while brief counter-stereotypical interventions are likely to change the perceived gender representation to some degree, they are unlikely to reverse it (Delfino, 2021). Therefore, we do not expect such counter-stereotypical interventions to elicit social identity threats and hypothesize:

Hypothesis 4. Interventions that portray counter-stereotypical role models and employ counter-stereotypical framing of male-dominated occupations have no effect on men's applications for male-dominated occupations.

Hypothesis 5. Interventions that portray counter-stereotypical role models and employ counter-stereotypical framing of female-dominated occupations have no effect on women's applications for female-dominated occupations.

THE SWISS SETTING

This section provides the background information necessary for understanding our experimental design. We start by describing Switzerland's education and labor market setting, which—due to its vocational education and training (VET) system—allows us to analyze the detailed, real-life occupational choices of adolescents. We then describe the job board, Yousty, whose job application data has the advantage of revealing adolescents' true occupational preferences, which are not yet confounded by firms' hiring decisions.

Institutional Setting

In Switzerland, after nine years of compulsory schooling, students choose between three types of upper secondary education: vocational education and training (VET), specialized professional schools, and baccalaureate schools. The vast majority of Swiss adolescents (approximately two-thirds) choose VET in one of over 200 training occupations. VET programs, which typically last three to four years, combine an on-the-job apprenticeship at a training firm (3.5 to 4 weekdays) with formal education at a vocational school (1 to 1.5 weekdays). The choice

of a training occupation typically occurs between eighth and ninth grade (primarily ages 14–15), with schools giving students weekly lessons in career choice preparation and requiring them to complete short-term internships called "trial apprenticeships" (Wüthrich, 2021).

To start a VET program, adolescents need to apply for apprenticeship positions offered by training firms in their preferred occupation. Their application process for apprenticeship positions is similar to that of adult workers looking for regular jobs. Adolescents typically search online for apprenticeship positions and largely apply online by uploading their application documents, i.e., a cover letter, a curriculum vitae, and school transcripts (Granato, 2013; Tschümperlin, 2022). Once they receive a position, they are automatically enrolled in the corresponding vocational school.

The Apprenticeship Job Board Yousty

To conduct our field experiment, we collaborated with the apprenticeship job board Yousty. Founded in 2009, Yousty has become the largest private online job board for apprenticeship positions in Switzerland, covering approximately 90 percent of all online job advertisements for apprenticeship positions and trial apprenticeships[1]. For the majority of job advertisements posted on Yousty (about 70 percent), adolescents can apply directly on the job board via a standardized application form.

Yousty not only posts job advertisements but also offers application advice, templates for application documents, and youth-oriented information about the over 200 training occupations (e.g., video clips in which current apprentices present their training occupation and their training

[1] These apprenticeships are short-term internships that typically last one to five days and allow students to learn about a specific occupation and a specific training firm.

firm). While firms pay to advertise their apprenticeship positions, adolescents can use Yousty for free.

METHOD

Field Experiment Design

Development. We developed two brief counter-stereotypical interventions in collaboration with Yousty, with one intervention focusing on STEM occupations and the other focusing on health and care occupations. We developed the content of the treatments in several steps: First, we reviewed the literature to identify possible content that might encourage gender-atypical choices. Specifically, we drew on the literature on nudging and information treatments in education (Baker, Bettinger, Jacob, & Marinescu, 2018; O'Hara & Sparrow, 2019), the literature on the importance of role models for counter-stereotypical career choice (e.g., Porter & Serra, 2020), and the literature on counter-stereotypical reframing of STEM careers (e.g., Diekman et al., 2011).

Second, we used focus groups to see how the results of (a) previous studies and (b) different interventions that we suggested were relevant for our particular target group of young adolescents. We led focus group discussions with five groups of 12-to-15-year-old students who had not yet entered VET, seeking their feedback on different versions of possible interventions. Third, we used the results from these discussions to revise the design of the interventions and refine them together with Yousty, whose staff has extensive experience in designing content that appeals to adolescents. Fourth, to optimize the revised interventions, we presented them again to a focus group of adolescent students and subsequently finalized the treatments.

Content. Figures A1 and A2 in Appendix A show the content of the brief counter-stereotypical interventions. These interventions, which were provided via pop-up windows on the

job board Yousty, consist of a picture, a short 40-second informational video, a short informational text, and an occupation list. Specifically, the STEM treatment contains a picture of a counter-stereotypical role model (i.e., a female apprentice working with computer-assisted machinery in a STEM occupation), a short text using counter-stereotypical framing (e.g., highlighting the importance of team player skills for STEM occupations), and a list of the seven largest apprenticeship occupations in STEM. Similarly, the health and care treatment also contains a picture of a counter-stereotypical role model, (i.e., a male apprentice working with a patient at a healthcare facility), a short text using counter-stereotypical framing (e.g., highlighting career opportunities in health and care occupations), and a list of the seven largest apprenticeship occupations in health and care.

Timeline. The field experiment started in September 2021 and ended Mid-July 2022. This time period corresponds to the school year and thus captures the main application time for students.

Randomization. We used the last two digits of Yousty's unique user ID to randomize adolescents into the treatment and control groups. Because this six-digit ID depends purely on the timing of a student's first registration on the platform, the last two digits of this ID are as good as random and thus constitute an ideal randomization instrument. We randomly assigned all registered users to three almost equally sized groups: (1) the STEM treatment group, (2) the health and care treatment group, or (3) the control group. Control group members received no pop-up window. Users assigned to one of the two treatment groups received the pop-up window with a counter-stereotypical intervention when they fulfilled four conditions that Yousty defined for ensuring a good user experience. They must (a) log in to their Yousty account, (b) use Yousty from a desktop (i.e., not from a mobile device), (c) visit an informational subpage of Yousty (i.e., any subpage that provides information on any vocational occupation or provides application tips and templates), and (d) stay on one of these subpages for at least 10 seconds. To ensure the same

treatment intensity across users, we sent the treatment only when users fulfilled these conditions for the first time.

Our analyses include all users within the typical age range of apprenticeship applicants (13 to 16) for whom we observe at least one apprenticeship application (our outcome measure) during the period of the experiment (N = 29,481 experiment participants). Figure 1 summarizes the randomization and sampling.[2]

Insert Figure 1 about here.

Outcome Measures

Our outcome of interest is the occupational choice of apprenticeship applicants. We operationalize adolescents' occupational choices by adolescents' real-life applications for apprenticeship positions or trial apprenticeships. The application data we use is the full universe of process-generated data during the period of the experiment.

Specifically, to evaluate the effect of having received the STEM treatment on occupational choices of women, we measure the share of STEM applications out of all applications an adolescent sent. For example, if an adolescent sent four applications in total—two applications for a position as IT specialist (i.e., a STEM occupation) and two applications for a position as commercial

[2] The user IDs have been assigned consecutively since 2009. Because our experiment focuses only on adolescents searching for apprenticeships during the period of the experiment (September 2021 through July 2022), the number of registered users is much larger than the number of participants.

employee (i.e., a non-STEM occupation) this adolescent's outcome measure has the value .5.[3] To evaluate the effect of having received the health and care treatment on occupational choices of men, we measure the share of health and care applications out of all applications an adolescent sent. For treatment group members, we only consider applications that they created after receiving the information treatment.

Analytic Strategy

As previously described, while we randomly assigned adolescent users to one of the treatment groups or to the control group, not everyone assigned to a treatment group (step 3 in Figure 1) actually received a counter-stereotypical intervention (step 4 in Figure 1). Thus we use a methodology commonly used in the policy intervention literature whenever not everyone assigned to an intervention actually received it (Muralidharan & Sundararaman, 2015; Schwerdt, Messer, Woessmann, & Wolter, 2012): Two-stage least-squares (2SLS) regression (Cunningham, 2021; Maydeu-Olivares, Shi, & Rosseel, 2019; Wooldridge, 2010). Specifically, we estimate a 2SLS model with the random treatment group assignment as an instrument for having actually received a counter-stereotypical intervention. The resulting instrumental variable (IV) estimate is an unbiased estimate for the average effect of having received a counter-stereotypical intervention on occupational choice for assigned treatment group members who actually received the intervention.

To test Hypotheses 1 and 2, we estimate the model separately for women and men by analyzing the effect of having received a gender-atypical treatment on occupational choice, i.e., the

[3] Our outcome measure of STEM occupations includes the STEM occupations shown in the STEM treatment, plus all occupations classified as "Technical and IT occupations" in the Swiss Standard Classification of Occupations (SBN2000).

effect of a STEM treatment for women's and the effect of a health and care treatment for men's occupational choices.[4]

Our 2SLS model can be described by the following two-equation system,

(1) $T_i = \pi_0 + \pi_1 Z_i + \pi_2 X_i + \mu_i$

(2) $Y_i = \beta_0 + \beta_1 \hat{T}_i + \beta_2 X_i + \varepsilon_i$

where T_i is an indicator for whether adolescent i actually received the counter-stereotypial intervention (step 4 in Figure 1) and Z_i is an indicator for whether adolescent i was assigned to the treatment group (step 3 in Figure 1). X_i represents a vector of individual and application characteristics (including age and a dummy each for rural regions, for whether an adolescent applied for at least one trial apprenticeship, for whether an adolescent has any search subscriptions on Yousty, and for whether an adolescent completed Yousty's interest test). Y_i is the dependent variable for adolescent i (the share of STEM applications for women; the share of health and care occupations for men). $\hat{T}_i$ is the predicted probability that adolescent i received the counter-stereotypical intervention resulting from equation (1). To test Hypothesis 3, we estimate the model separately for trial apprenticeships (i.e., short-term internships), and regular apprenticeships (i.e., three- to four-year VET programs). To test Hypotheses 4 and 5, we proceed as with Hypotheses 1 and 2, but this time we analyze the effect of having received a health and care treatment for women and the effect of having received a STEM treatment for men.

RESULTS

The 2SLS results in Tables 1 and 2 show that while women who received the counter-stereotypical STEM intervention applied significantly more frequently for STEM occupations, the counter-

[4] For ease of interpretation, we exclude women assigned to the health and care treatment group and men assigned to the STEM treatment group (i.e., adolescents who received a treatment targeted at the opposite gender) in our main analyses. However, results remain robust when we estimate a model including these groups (available upon request).

stereotypical health and care intervention showed no effects on men's applications for health and care occupations.

STEM Intervention Effects on Women's Occupational Choice

Column 2 of Table 1 shows the second-stage estimate of the effect of having received the counter-stereotypical STEM intervention on women's applications for STEM occupations (i.e., the share of STEM applications out of all applications a woman sent). The coefficient of 0.058 is positive and statistically significant (b = 0.058, SE = 0.029, p = 0.041). Having received the counter-stereotypical STEM intervention led to a 5.8 percentage point increase in women's share of STEM applications. Given that the average share of STEM applications out of all applications a woman sent is 9.9 percent, this corresponds to a 63 percent increase. The counter-stereotypical STEM intervention thus substantially increased women's applications for STEM occupations. This result is consistent with our hypothesis that interventions that portray counter-stereotypical role models and employ counter-stereotypical framing of male-dominated occupations increase women's applications for male-dominated occupations (Hypothesis 1).

Insert Table 1 about here.

Health and Care Intervention Effects on Men's Occupational Choice

Column 2 of Table 2 shows the second-stage estimate of the effect of having received the counter-stereotypical health and care intervention on men's applications for health and care occupations (i.e., the share of health and care applications on all applications a man sent). The coefficient of -0.017 is not statistically significant (b = -0.017, SE = 0.016, p = 0.281). Thus having

received the counter-stereotypical health and care intervention did not significantly impact men's applications for health and care occupations. This result is consistent with our hypothesis that interventions that portray counter-stereotypical role models and employ counter-stereotypical framing of female-dominated occupations do not significantly increase men's applications for female-dominated occupations (Hypothesis 2).

Insert Table 2 about here.

Low-Commitment versus High-Commitment Occupational Choices

The 2SLS results in Table 3 show that while the effect of having received the counter-stereotypical STEM intervention is positive and significant for low-commitment STEM applications (b = 0.094, SE = 0.035, p = 0.007), it is insignificant for high-commitment STEM applications (b = -0.000, SE = 0.033, p = 0.989). This result is consistent with our hypothesis that the effect of an intervention that portrays counter-stereotypical role models and employs counter-stereotypical framing is stronger for women's low-commitment applications for male-dominated occupations than for women's high-commitment applications for male-dominated occupations (Hypothesis 3). Table 4 shows that for men, the effect of having received the counter-stereotypical health and care intervention is insignificant both for low-commitment and high-commitment health and care applications.

Insert Table 3 about here.

Insert Table 4 about here.

Intervention Effects on the Majority Gender Group

The 2SLS results in Tables 5 and 6 show that men who received a brief intervention featuring female role models and counter-stereotypical framing of STEM occupations applied neither less nor more frequently for STEM occupations (b = 0.004 , SE = 0.036, p = 0.907). Likewise, women who received a brief intervention featuring female role models and counter-stereotypical framing of health and care occupations applied neither less nor more frequently for health and care occupations (b = 0.037, SE = 0.047, p = 0.437). These results are consistent with our hypotheses that brief counter-stereotypical interventions do not change the application behavior of the majority gender group (Hypotheses 4 and 5).

Insert Table 5 about here.

Insert Table 6 about here.

DISCUSSION

The goal of our paper was to examine whether brief counter-stereotypical interventions are effective in countering gender-typicality in occupational choices and, if so, whether the same intervention strategies work for both women and men. In a field experiment with young women

and men choosing their occupations and applying for their first jobs we found that women who received a brief intervention featuring female role models and counter-stereotypical framing of STEM occupations applied more frequently for STEM occupations after the intervention. However, an equivalent intervention on health and care occupations, targeting men, showed no effects on men's applications. Our findings also revealed that such brief interventions do not change the application behavior of the majority gender group. That is, men who received a brief intervention featuring female role models and counter-stereotypical framing of STEM occupations applied neither less nor more frequently for STEM jobs and the same was true for women who received an intervention on health and care occupations, which targeted men. Finally, we identified the commitment-level of an occupational choice as an important boundary condition of the intervention effect on women's applications to STEM occupations with brief interventions being more effective in changing low-commitment rather than high-commitment occupational choices.

Implications for Theory and Research

Our study advances the management literature on gender and occupational choice in several ways. First, this literature has predominantly focused on how to break the barriers that women face in male-dominated domains (e.g., Akinola et al., 2017; Brands & Mehra, 2018; Del Carpio & Guadalupe, 2021; He & Kang, 2021), while being largely silent on how to break possible barriers men face in female-dominated domains—often implicitly assuming that intervention mechanisms work equally well for women and men. Our research advances this literature by systematically comparing how strategies for raising women's or men's interest in gender-atypical occupations affect both women's and men's occupational choices. By integrating social role with social identity threat theories, we theorize and show that the effectiveness of interventions using two widely employed intervention strategies—portraying counter-stereotypical role models and employing

counter-stereotypical framing of occupations—differs substantially between women and men. Our results suggest that women and men face different barriers to entering gender-atypical occupations and, consequently, intervention strategies that work for one gender do not necessarily work for the other.

Second, we add to the literature on gender and occupational choice by investigating how brief counter-stereotypical interventions targeted at the gender minority in an occupation affect the gender majority in that occupation. Even though in real life (in contrast to the laboratory) interventions and campaigns are rarely seen by only one gender, this question has received little attention in the literature and public discussion so far (for an exception for the specific case of social workers see Delfino, 2021). We find that brief counter-stereotypical interventions targeting the gender minority (e.g., STEM interventions targeting women and health interventions targeting men) do not affect the job application behavior of the gender majority (e.g., STEM job applications of men and health job applications of women). Together with our main finding, this suggests that brief counter-stereotypical interventions can help increasing women's applications for male dominated occupations while not decreasing men's applications for those occupations.

Third, our findings contribute to the conversation on occupational gender segregation. Our results show that brief interventions of only a few seconds can change real-life job application behavior of women. This finding is noteworthy given that gender norms and stereotypes are typically very persistent (Gruneau, 2022; Janssen, Tuor Sartore, & Backes-Gellner, 2016). This finding demonstrates that the supply-side of occupational gender segregation (i.e., individuals' occupational choices) can not only be addressed with long-term campaigns aimed at changing social norms in society but also with simple nudges—at least in the case of women's occupational choices. This conclusion is in line with a recent study by Del Carpio and Guadalupe (2021) who find that simple informational nudges can be successful in increasing women's applications to a

five-month software-coding program in Mexico and Peru and conclude that nudges can help change the occupational gender segregation. However, our research adds to the study of Del Carpio and Guadalupe (2021) by showing that researchers should not generalize findings on the effectiveness of brief interventions for women's occupational choices to men. Thus, to encourage gender-atypical occupational choices of men, simple counter-stereotypical nudges may not be enough.

Fourth, we identify the commitment level of an occupational choice as an important boundary condition of the intervention effect on women's applications for male-dominated occupations. Brief counter-stereotypical interventions are more effective in changing women's low-commitment occupational choices rather than high-commitment occupational choices (e.g., the choice of a short internship vs. the choice of a multiple-year training program). This finding highlights the importance of low-commitment opportunities that allow individuals to get to know and try out gender-atypical occupations.

Implications for Practice

Our research offers several practical implications in a world where reducing gender inequality is still a big issue—with recent discussions raising awareness that gender inequality not only negatively affects women but also men (e.g., Kotsonis & Chakrabarti, 2022). For women, our research—along with prior theory and research—suggests that portraying counter-stereotypical role models and counter-stereotypical framing of male-dominated occupations are effective strategies for encouraging women to apply for male-dominated occupations. Firms can employ these strategies in job postings and on job boards to signal that (a) they value females working in male-dominated occupations, (b) women can be successful in these occupations, and (c) communal skills (e.g., being a team player) are both necessary and valuable in these occupations. For example,

firms can do so by including pictures of female professionals and emphasizing communal aspects of the male-dominated occupation (e.g., teamwork). Professional associations and policymakers can employ these strategies in campaigns and informational interventions.

As our research shows that brief counter-stereotypical interventions with a duration of under one minute are effective, this finding suggests that such interventions do not necessarily need to be time-intensive and costly. Moreover, because the commitment level of an occupational choice moderates the effect of counter-stereotypical interventions on women's applications for male-dominated occupations, our research suggests that firms and professional associations should offer low-commitment opportunities such as short-time internships for women to learn more about and try out male-dominated occupations.

Our results for men, however, have different implications. For men, our findings imply that firms, professional associations, and policymakers should not expect strategies that are effective in encouraging women to apply for male-dominated occupations—such as counter-stereotypical role models—to be equally effective in encouraging men to apply for female-dominated occupations. For women, several decades of research, campaigns, and programs on overcoming women's barriers to male-dominated domains have led to the knowledge researchers and practitioners have today about what kind of strategies and interventions are effective. In contrast, both researchers and policymakers have paid much less attention on how to overcome men's barriers to female-dominated domains (Forsman & Barth, 2017).

Our research, along with a very small but emerging stream of literature on men in female-dominated occupations (Delfino, 2021; Forsman & Barth, 2017), point to the conclusion that men face different barriers to entering gender-atypical occupations than women. As a result, different approaches—and most likely a cooperation of firms, researchers, and policymakers in gradually changing masculinity norms in society—are needed to encourage men's interest in female-

dominated occupations. If firms and policymakers exclusively rely on strategies that stem from decades of research on women in male-dominated domains, they may inadvertently slow advancement toward full gender equality in the workplace.

Limitations and Future Directions

Our research is not without limitations, many of which offer promising directions for future research. First, while our research offers specific implications on how to encourage women's interest in male-dominated occupations, which specific strategies work to encourage men's interest in female-dominated occupations remains a question for future research.

Second, while we offer a theoretical explanation based on social identity threats, we cannot directly observe identity threats and therefore could not test the mechanisms directly for why interventions that portray counter-stereotypical role models and employ counter-stereotypical framing are less effective at increasing men's applications for female-dominated occupations than they are at increasing women's application for male-dominated occupations. Future studies could explore these mechanisms in more detail.

Third, we conducted our field experiment in Switzerland, a country with a strong vocational education and training system, in which most individuals decide on an occupation at a young age of about 15 years. Although our theory and hypotheses are not restricted to the context of Switzerland, future research could explore how our findings generalize to other contexts and other career stages (e.g., for students' first job choices after they graduate from college and first enter the labor market).

Finally, while our data did not allow us to identify gender nonbinary or gender fluid individuals, it is important for future research to explore the barriers gender nonbinary or gender fluid individuals face to entering male dominated or female dominated occupations. Additionally,

future studies can explore how strategies such as portraying role models are effective for these individuals and whether, and if so how, such strategies need to be adapted.

CONCLUSIONS

While both firms and policymakers strive to attract women and men to gender-atypical occupations, little is known about whether brief interventions are effective in changing real-life occupational choices and, if so, whether the same intervention strategies work for both women and men. Our findings suggest that brief interventions portraying counter-stereotypical role models and employing counter-stereotypical framing of male-dominated occupations are effective in increasing women's applications for male-dominated occupations. However, our findings also suggest that the effectiveness of these strategies—which resulted from decades of research on women in male-dominated domains—cannot be generalized to men in female-dominated domains. Our research points to the need to not only continue focusing on and investing in policies, interventions, and research targeted at attracting women to male-dominated occupations, but also to increasingly research and design interventions for encouraging men to consider female-dominated occupations in high-growth sectors such as health and care.

FIGURE 1

Randomization and Sampling

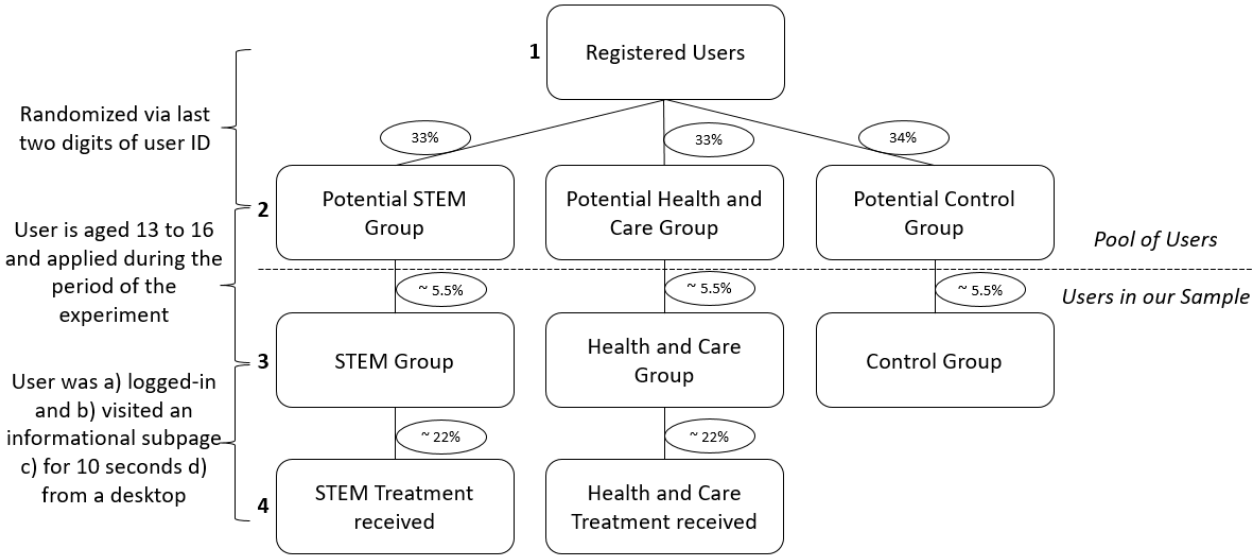

TABLE 1

STEM treatment effects on women's applications for STEM occupations

Variable	(1) 1st stage	(2) reduced form	(2) 2nd stage
STEM treatment received		0.012**	0.058**
		(0.006)	(0.029)
STEM treatment group	0.210***		
	(0.006)		
Controls	yes	yes	yes
N	8774	8774	8774

Notes: 2SLS regression. Robust standard errors are reported in parentheses. The dependent variable is the share of STEM applications out of all applications an individual sent. The 1st stage coefficient (0.210) shows the rate of women who actually received the STEM treatment out of all women who were assigned to the STEM treatment. The reduced form coefficient (0.012) shows the average effect of being assigned to the STEM treatment group on applying for STEM occupations. The 2nd stage coefficient (0.058) shows the unbiased estimate for the average effect of having received the STEM treatment on applying for STEM occupations for assigned treatment group members who actually received the STEM treatment. We provide a table including the coefficients of all the control variables in Appendix B, Table B1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

TABLE 2

Health and care treatment effects on men's applications for health and care occupations

Variable	(1) 1st stage	(2) reduced form	(2) 2nd stage
Health and care treatment received		-0.004	-0.017
		(0.004)	(0.016)
Health and care treatment group	0.231***		
	(0.006)		
Controls	yes	yes	yes
N	11088	11088	11088

Notes: 2SLS regression. Robust standard errors are reported in parentheses. The dependent variable is the share of health and care applications out of all applications an individual sent. The 1st stage coefficient (0.231) shows the rate of men who actually received the health and care treatment out of all men who were assigned to the health and care treatment. The reduced form coefficient (-0.004) shows the average effect of being assigned to the health and care treatment group on applying for health an care occupations. The 2nd stage coefficient (-0.017) shows the unbiased estimate for the average effect of having received the health and care treatment on applying for health and care occupations for assigned treatment group members who actually received the health and care treatment. We provide a table including the coefficients of all the control variables in Appendix B, Table B2. *** p < 0.01, ** p < 0.05, * p< 0.10.

TABLE 3

STEM treatment effects

on women's low- versus high-commitment applications for STEM occupations

Variable	(1) DV: low-commitment STEM applications	(2) DV: high-commitment STEM applications
STEM treatment received	0.094***	-0.000
	(0.035)	(0.033)
Controls	yes	yes
N	5372	5211

Notes: 2nd stage estimates of 2SLS regression. Robust standard errors are reported in parentheses. The dependent variables are (1) the share of low-commitment STEM applications (i.e., short-term internships) out of all low-commitment applications an individual sent and (2) the share of high-commitment STEM applications (i.e., 3- to 4-year training programs) out of all high-commitment applications an individual sent. *** p < 0.01, ** p < 0.05, * p< 0.10.

TABLE 4

Health and care treatment effects on men's

low- versus high-commitment applications for health and care occupations

Variable	(1) DV: low-commitment health and care applications	(2) DV: high-commitment health and care applications
STEM treatment received	-0.012 (0.017)	0.000 (0.020)
Controls	yes	yes
N	7015	6521

Notes: 2SLS regression. Robust standard errors are reported in parentheses. The dependent variables are (1) the share of low-commitment STEM applications (i.e., short-term internships) out of all low-commitment applications an individual sent and (2) the share of high-commitment STEM applications (i.e., 3- to 4-year training programs) out of all high-commitment applications an individual sent. *** p < 0.01, ** p < 0.05, * p< 0.10.

TABLE 5

STEM treatment effects on men's applications for STEM occupations

	(1) 1st stage	(2) reduced form	(2) 2nd stage
Health and care treatment received		0.001 (0.008)	0.004 (0.036)
Health and care treatment group	0.227*** (0.006)		
controls	yes	yes	yes
N	11219	11219	11219

Notes: 2SLS regression. *** p < 0.01, ** p < 0.05, * p< 0.10. Robust standard errors are reported in parentheses. The dependent variable is the share of STEM applications on all applications an adolescent sent.

TABLE 6

Health and care treatment effects on women's applications for health and care occupations

	(1) 1st stage	(2) reduced form	(2) 2nd stage
Health and care treatment received		0.007 (0.010)	0.037 (0.047)
Health and care treatment group	0.202*** (0.006)		
controls	yes	yes	yes
N	8799	8799	8799
centered R^2			0.064

Notes: 2SLS regression. *** p < 0.01, ** p < 0.05, * p< 0.10. Robust standard errors are reported in parentheses. The dependent variable is the share of STEM applications out of all applications an adolescent sent.

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APPENDIX A

Figure A1. STEM treatment (with English translation)

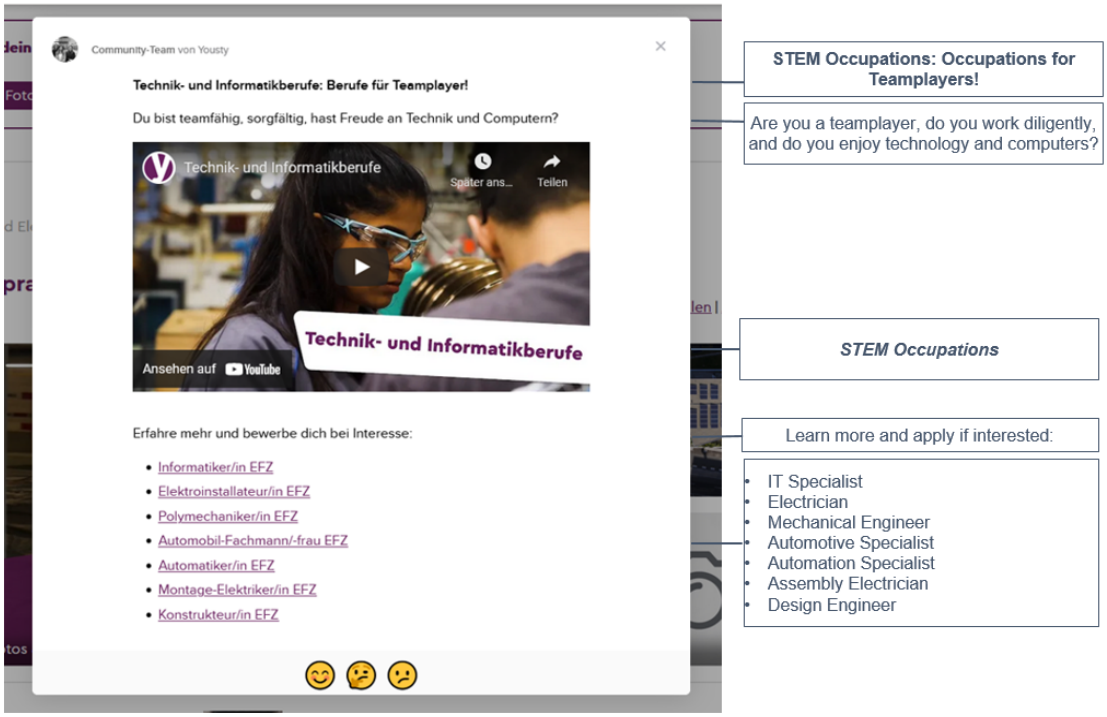
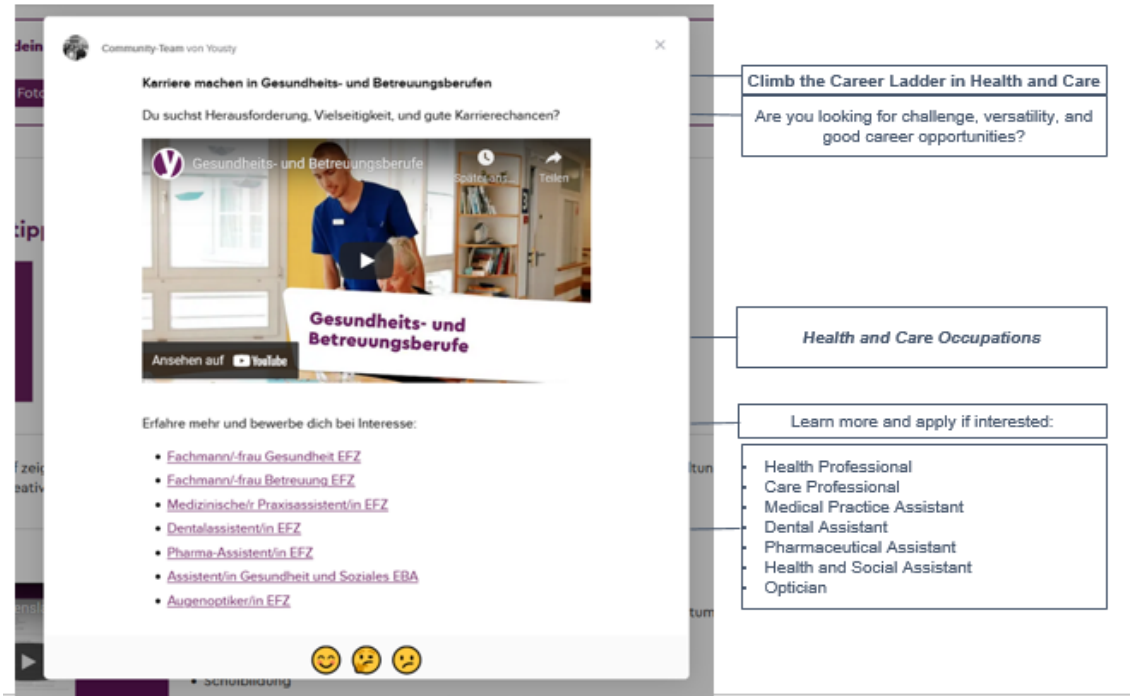


Figure A2. Health and care treatment (with English translation)



APPENDIX B

TABLE B1

STEM treatment effects on women's applications for STEM occupations

Variable	(1) 1st stage	(2) reduced form	(2) 2nd stage
STEM treatment received		0.012**	0.058**
		(0.006)	(0.029)
STEM treatment group	0.210***		
	(0.006)		
age	-0.007*	-0.015***	-0.015***
	(0.004)	(0.004)	(0.004)
rural	-0.025***	0.004	0.006
	(0.008)	(0.009)	(0.009)
trial apprenticeship	0.030***	0.050***	0.049***
	(0.006)	(0.006)	(0.006)
occupation finder	0.051***	0.003	-0.000
	(0.007)	(0.006)	(0.007)
search subscriptions	0.065***	0.006	0.003
	(0.015)	(0.013)	(0.013)
high ability	0.040***	0.043	0.041***
	(0.007)	(0.008)	(0.008)
low ability	0.037***	-.023***	-0.025***
	(0.007)	(0.007)	(0.007)
N	8774	8774	8774

Notes: 2SLS regression. Robust standard errors are reported in parentheses.
*** p < 0.01, ** p < 0.05, * p< 0.10.

TABLE B2

Health and care treatment effects on men's applications for health and care occupations

Variable	(1) 1st stage	(2) reduced form	(2) 2nd stage
Health and care treatment received		-0.004	-0.017
		(0.004)	(0.016)
Health and care treatment group	0.231***		
	(0.006)		
age	0.001	0.009***	0.009***
	(0.004)	(0.003)	(0.003)
rural	-0.020**	-0.005	-0.005
	(0.008)	(0.005)	(0.005)
trial apprenticeship	0.038***	0.003	0.004
	(0.006)	(0.004)	(0.004)
occupation finder	0.049***	0.005	0.006
	(0.007)	(0.004)	(0.004)
search subscriptions	0.079***	-0.002	-0.000
	(0.014)	(0.007)	(0.007)
high ability	0.044***	-0.023***	-0.023***
	(0.007)	(0.005)	(0.005)
low ability	0.051***	-0.006	-0.005
	(0.007)	(0.005)	(0.005)
N	11088	11088	11088

Notes: 2SLS regression. Robust standard errors are reported in parentheses.
*** p < 0.01, ** p < 0.05, * p< 0.10.