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How to reduce the IT gender gap in occupational preferences?

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As the demand for information technology (IT) skills increases, occupational gender segregation has gained new relevance. A large body of research suggests that women are less attracted to technology-reliant occupations (*things*) than men are. Instead, women prefer occupations that emphasize social interactions (*people*). This study adds to the literature on the people versus things trade-off in occupational preferences by examining the underlying role of individuals' perceptions of IT. We argue that perceptions of IT are socially constructed, which allows for different presentations of occupational tasks and skill requirements. Surveying the occupational preferences of 2,500 eighth-grade students in Switzerland, we find that while girls prefer occupations with frequent social interactions but low reliance on IT, boys do not perceive a trade-off between working with people and working with things. Additionally, we show that boys and girls associate different features with IT and that these associations matter for their occupational preferences. Specifically, associating IT with frequent social interactions makes IT-reliant occupations more attractive for both genders, although girls are less likely than boys to associate IT with social interactions. Finally, we demonstrate that IT-reliant occupations become more attractive to girls when the presentation emphasizes the interactive and social aspects of work.

Introduction

Across modern societies, occupational gender segregation remains persistently high, especially in technical fields (Charles and Bradley, 2009). Occupations that rely heavily on information technology (IT) are a prime example. In 2023, women accounted for only 19 per cent of IT specialists in the European Union, compared to 81 per cent of men, and there has been little indication of convergence (Eurostat, 2025). As such, the increasing demand for technical skills in the labour market (Liu and Grusky, 2013: 1350) could exacerbate existing gender inequalities.

In recent years, policy initiatives have tried to address (IT-related) skill shortages (e.g., European Commission, 2023). One of the main goals of these initiatives is to close existing occupational gender gaps. Since gender stereotypes limit young people's occupational preferences, early interventions are necessary to effectively challenge these stereotypes (Beyer *et al.*, 2004). However, the content of occupational stereotypes is still subject to debate (He *et al.*, 2019). Thus, the question of how to mitigate IT-related gender gaps in occupational preferences is of paramount importance to policymakers and researchers.

To address segregation, we first need to understand what explains gender differences in occupational preferences. This paper engages with an influential argument in the literature, which suggests that women prefer working with people, while men prefer working with things such as technological devices (Prediger, 1982; Lippa, 2001; Su and Rounds, 2015). For example, research on gender segregation in student major choices finds that women choose majors in fields such as care and the humanities (*people*), while men choose technical subjects (*things*) (Barone, 2011; Cech, 2013; Combet, 2024). Similar observations have been made regarding occupational preferences in vocational education and training (Kuhn and Wolter, 2022).

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Some authors relate this difference to different cognitive styles (Cech, 2013; Güdel *et al.*, 2019), but empirical research shows that gender differences in skills and reasoning styles are in fact small. Such differences are thus insufficient to explain the female underrepresentation in technical fields (Hyde *et al.*, 2008; Mann and DiPrete, 2013).

Instead, the literature highlights how gendered socialization shapes men's and women's occupational preferences. Gender is defined 'as an institutionalized system of social practices based on widely shared hegemonic cultural beliefs about male and female traits, competences and behaviours,' which lead to 'gender differences in values, interests and perceived skills' (Kriesi and Imdorf, 2019: 199). Gendered socialization prescribes that individuals behave according to their gender identity and in line with gender stereotypes, resulting in gendered occupational preferences (Correll, 2004; Charles and Bradley, 2009; Gabay-Egozi *et al.*, 2015).

This paper adds to this literature by examining how *perceptions of occupations* contribute to gendered occupational preferences. Occupations are often depicted and perceived in stereotypical ways (Cheryan, 2012). For instance, Edwards (1990: 104) argues that IT-related activities are portrayed as 'highly impersonal' and technical, which is more akin to the things dimension and therefore expected to be more attractive to men. Importantly, however, these depictions are social constructions and filled with gendered stereotypes about occupations rather than factual differences in occupational tasks and skill requirements (Edwards, 1990; Charles and Bradley, 2009; Cheryan *et al.*, 2009; Hsiung, 2022). In contrast to widely held stereotypes, Cheryan (2012: 186) shows that activities in IT-reliant fields are often strongly people-oriented, as they are 'fundamentally about helping society and involve frequent collaborations with others.' In short, ideas about occupations might not be accurate.

This paper examines whether a more social framing makes IT-reliant occupations more appealing to women. It does so by exploring three related research questions. First, do gender differences in occupational preferences indeed reflect a preference among women to work with people and among men to work with things? This question has already received considerable attention in the literature. However, in line with the original formulation by Prediger (1982), the literature typically assumes a trade-off between working with people and working with things because social and technical tasks are conceptualized as mutually exclusive attributes of the same underlying dimension (Faulkner, 2000). This view requires that occupations can be clearly placed in one of the two categories, and while this may be true for some occupations, there are many others that consist of both social and technical tasks (Hsiung, 2022). In other words, there may be no strict trade-off between working with people and working with things, allowing for the possibility that individuals like working with things if it *also* involves working with people.

Second, are there gender differences in how occupations are perceived? Individuals choose occupations in situations of imperfect information. Therefore, occupational preferences are informed by what individuals (stereotypically) believe these occupations to entail. The existing literature has shown that gendered occupational preferences are influenced by individual-level factors such as exposure to role models, self-concepts, personal interests, and self-efficacy. For all these factors, gendered expectations and perceptions can push individuals in gender-typical directions. However, the literature has yet to investigate if the gender gap in IT-related occupational preferences can also be (at least partially) explained by what individuals associate with IT-related activities.

Finally, do different portrayals of IT-related activities impact occupational preferences? If women prefer occupations that emphasize social interactions, and if occupational preferences are influenced by how occupations are portrayed, then providing additional information on skill requirements and typical activities of occupations could potentially change occupational preferences. Building on the experimental literature on misperceptions and information treatments (Bursztyn and Yang, 2022), we investigate whether a more social framing of IT-reliant occupations makes these occupations more appealing to women.

To examine gendered occupational preferences, we rely on two experiments embedded in a survey of 2,500 eighth-grade students (14-year-olds) in Switzerland. These young adolescents are in the process of making their first choice for training occupations in vocational education and training (VET) at the upper-secondary level and are at an age when gender role stereotypes are influential (Kriesi and Imdorf, 2019). Switzerland lends itself well to the purposes of our study because two-thirds of adolescents enter the VET track, and there are only minimal formal admission restrictions on training choices, meaning that we can examine the full range of occupational preferences among participants.

Existing research on gendered occupational preferences has mainly focused on field of study choices at the tertiary level or university students' occupational preferences (e.g., Barone, 2011; Su and Rounds, 2015; Wiswall and Zafar, 2015; Combet, 2024). However, a focus on gender differences in preferences for VET tracks at the upper-secondary level offers methodological

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advantages. These young adolescents typically choose their training occupations within the next year, which makes their preferences more concrete. In addition, occupational choices in VET systems are more consequential than major choices at the university level because the latter allow for more occupational mobility. Finally, at this age, individuals are still free from pre-existing job experiences that create unique biases towards an occupation (He *et al.*, 2019).

Empirically, our discrete choice experiment shows that girls prefer occupations with frequent social interactions but low reliance on IT. In contrast, boys do not perceive a trade-off between people and things; they instead value working with both. Second, we find that boys and girls associate different features with IT and that these associations matter for their occupational preferences. Specifically, associating IT with frequent social interactions makes IT-reliant occupations more attractive (for both genders), but girls are less likely than boys to associate IT with social interactions. Third, we show that IT-reliant occupations become more appealing to girls when, in the presentation of the occupation, the focus is on the interactive and social aspects rather than on the technical elements. Moreover, we find that boys are, in their strong preference for IT-reliant occupations, not negatively affected by a more social framing of such occupations.

This paper is organized as follows. The next section reviews the literature and develops our theoretical expectations. Subsequently, we introduce the survey and the experimental design before presenting the empirical results. A final section concludes.

Inserting 'people' into IT-reliant occupations

Why are women less likely than men to consider occupations that strongly rely on IT and technology? Scholars from various disciplines have contributed unique theories and perspectives to explain occupational preferences that are made under conditions of uncertainty and imperfect information (e.g., Adya and Kaiser, 2005; Cheryan *et al.*, 2009; Gabay-Egozi *et al.*, 2015). Scholars have found that individuals' abilities only explain a small part of gendered preferences among young adults (Cech, 2013; Wiswall and Zafar, 2015; Ochsenfeld, 2016). Instead, the literature points to gender stereotypes and roles, which influence self-concepts, self-assessments, and personal interests as the most plausible explanation for the observed differences (e.g., Akerlof and Kranton, 2000; Kriesi and Imdorf, 2019). In this view, gender stereotypes and roles are typically the result of gendered socialization processes (Correll, 2004), but they can also be due to gender-essentialist ideology in combination with a self-expressive value system (Charles and Bradley, 2009).

People versus things

In this paper, we focus on a prominent argument in this literature, which suggests that men and women prefer different occupations due to varying interests, particularly along the things-versus-people dimension. This research typically finds a negative association between interest in social interactions and enrolment into technical majors (Lippa, 2001; Su and Rounds, 2015; Kuhn and Wolter, 2022). In the interest of simplicity, we do not differentiate between gendered interests and self-concepts in the following since previous studies have shown that individuals' interests in certain activities, their self-concepts, and their beliefs about their abilities in such activities are highly correlated (Nauta *et al.*, 2002; Kriesi and Imdorf, 2019).

The things-versus-people argument builds on Holland's (1973, 1997) seminal RIASEC model of occupational interests, which is 'the most widely adopted framework for interest measurement' (Su *et al.* 2009: 862). Prediger (1982) subsequently collapsed Holland's six original occupational themes into two dimensions: things-versus-people and data-versus-idea. Empirical research has repeatedly demonstrated that the things-versus-people dimension is a powerful predictor of gendered occupational interests, including in fields such as IT, with women preferring to work with people, and men preferring to work with things (e.g., Lippa, 2001; Su and Rounds, 2015; Kuhn and Wolter, 2022; Combet, 2024). Lippa *et al.* (2014) show that the predictive power of the people-versus-things distinction has even increased over time.

Empirical studies in this tradition typically measure the extent to which occupations' task content, skill requirements, and work environments feature a people-orientation or a things-orientation. Occupations are then arranged on a single dimension, capturing the extent to which they emphasize working with things or working with people (Kuhn and Wolter, 2022). For example, focusing on women's representation in different science, technology, engineering, and mathematics (STEM) fields, Su and Rounds (2015) find considerable variation in the extent to which these fields feature a things-orientation or a people-orientation. They also show that these orientations are strongly correlated with the percentage of female students in these fields.

However, it is often difficult to neatly divide occupations along the single dimension of things versus people. As Su and Rounds (2015: 13) demonstrate, some fields exhibit both a things orientation *and* a people orientation,

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with medical science being the most prominent example among STEM fields. In fact, strong empirical evidence suggests that typically 'feminine' and 'masculine' skills often occur together (Charles and Bradley, 2009; Hsiung, 2022). The O*NET database, which also categorizes occupations based on Holland's RIASEC model, classifies several dozens of occupations as having both a things-orientation ('realistic' in Holland's terminology) and a people-orientation ('social' in Holland's terminology), including occupations such as bus drivers, engineering teachers, radiation therapists, and surgical technologists.[1]

For this reason, although we hypothesize that women prefer occupations that emphasize social interactions, and that men prefer occupations that rely on IT, we allow for the possibility that individuals may prefer to work with people *and* things. We expect that the latter is more common among men than among women for two reasons. First, recent research suggests that women are more influenced by gender stereotypes than men in their occupational preferences (Combet, 2024). Second, and more specific to the field of IT, we argue that men, on average, display a higher level of interest in technology and are therefore more exposed to IT-related activities. This higher exposure allows men to develop a more nuanced perception of IT-related work. We therefore expect that men are less likely than women to experience a trade-off between working with things and working with people.

Perceptions of occupations

Individuals develop occupational preferences under conditions of uncertainty and imperfect information. Preferences are thus based on individual's *perceptions* of occupations. But how accurate are these perceptions? Much research argues that individuals have misperceptions because their knowledge of occupations is based on occupational stereotypes and biased information, which result from the complex process of matching individual preferences with highly differentiated work environments (Eccles, 2011; Busch-Heizmann, 2015; Gabay-Egozi *et al*., 2015; Wiswall and Zafar, 2015). For instance, Adya and Kaiser (2005) argue that women eschew IT-related fields because of misperceptions about what professionals in the field do and the skills required (see also Carter, 2006). Put differently, when explaining occupational preferences, we must also consider what people associate with these occupations.

Cheryan *et al.* (2009: 1045) have forcefully argued that research should not only focus on how stereotypes associated with the target's identity (e.g., men are good with technology) shape occupational preferences but also 'how stereotypes of a field drive gender differences.' IT-related work is a case in point. Edwards (1990: 104) shows that IT-related work is often portrayed as 'highly impersonal' and full of 'specific goals, formalisms, and abstracts,' although 'in practice, of course, the image is false' (see also Margolis and Fisher, 2002; Wajcman, 2010). In fact, a recent Delphi study on skill requirements for software engineers shows that engaging and collaborating with other people are the two most important skills—even before more technical skills such as systematically verifying assumptions and validating results (Groeneveld *et al.*, 2020: 1099). These stereotypes create an occupational culture that is more attractive to men because it depicts IT-related work as tools-oriented and socially isolated (Cheryan, 2012), although more realistic depictions of IT work could increase interest in such occupations by individuals who otherwise worry about their cultural fit (Guzman and Stanton, 2009).

Based on these considerations, we expect that people's associations with IT-related work influence their occupational preferences. Importantly, we see such associations as distinct from the concept of self-efficacy, which captures individuals evaluating their abilities based on self-images. Self-assessments are often influenced by gender stereotypes, which lead to gender-stereotypical occupational preferences (Correll, 2004). Against this background, we do not argue that self-efficacy does not matter for occupational preferences. Instead, we argue that what individuals associate with IT *also* matters.

Specifically, we hypothesize that men are more likely than women to associate IT-related work with frequent social interactions. The reason is that, as argued above, men's generally stronger *initial* interest in technology leads to greater exposure to IT-related activities, giving them a more nuanced view of IT-related work. Moreover, we hypothesize that individuals who associate IT-related work with frequent social interactions are more likely to prefer occupations that rely on IT than individuals who do not make this association. This is particularly important for women because the literature expects women to value frequent social interactions more strongly.

Addressing misperceptions

Perceptions of occupations may be informed by occupational stereotypes, which have several sources, including media portrayals. However, such stereotypes can be altered by changing the representation of the workers, tasks, and required skills (Cheryan *et al.*, 2009). In general, there is a lack of research on social interventions that aim to address the underrepresentation of women in IT fields (Zarrett and Malanchuk, 2005), although there is a broad consensus that interventions should occur

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before first occupational choices are made (Beyer *et al.*, 2004). Research on the effect of information treatments in case of misperceptions suggests that such interventions can be effective (Bursztyn and Yang, 2022).

In the case at hand, such an information treatment would have to address stereotypical depictions of IT-related work, which portray such activities as socially isolated and tool-oriented. We therefore hypothesize that an information treatment that portrays IT-related work as invoking frequent social interactions increases interest in such occupations among both genders, but in particular among women, because women value frequent social interactions more strongly. In contrast, an information treatment that highlights the technological challenges of IT-related work does not increase interest in such occupations among women.

Research design

To examine gendered occupational preferences, we have surveyed 2,500 eighth-grade students (14-year-olds) in two Swiss cantons, Luzern and St.Gallen. 36 per cent of all lower-secondary schools (levels A, B, and C) located in these two cantons accepted to participate. Both cantons have a comparatively diverse economy, moderately conservative gender norms, and are therefore representative of Switzerland. They both feature a growing IT sector and have similar socio-geographic structures, combining rural and urban areas. In addition, the school model is comparable in both cantons, and starting an apprenticeship is the most common choice (see section A2 in the Supplementary appendix for more information). The survey was administered during school hours and in the same school subject (Media & Information). In this way, every student had access to a computer, thereby limiting biases due to differences in access to technical infrastructure.

In these two cantons, most eighth-grade students make their first occupational decision (i.e., choosing a specific apprenticeship) by the end of the school year (in the case of our sample, summer 2023). However, counselling often begins earlier in the school year, as preliminary choices regarding trial apprenticeships start in February. Hence, we collected our data in the first part of the school year, from October to December 2022. The participants could win a lottery prize (bookstore vouchers). Participation was optional, as respondents could individually opt out of the survey. The non-participating respondents (61 students) received an alternative task (a logical reasoning test).

The survey was pre-tested and pre-registered, and received ethics committee approval from the University of St.Gallen. The final sample includes an equal number of female and male respondents as well as a representative share of adolescents with migratory backgrounds. Most respondents are 14 years old. The data suggest that the sample is representative of the relevant population (for more details, see section A of the Supplementary appendix).

We rely on two survey experiments to analyse the research questions. First, we conducted a conjoint analysis to determine whether there are gender differences in occupational preferences. In addition, we examined whether these gendered occupational preferences are conditional on participants' associations with IT. To measure what respondents associate with IT, we asked them the following question: 'Not everyone associates the same things with the term 'information technology.' What do you associate it with?' We then provided possible associations, and respondents could answer with 'I see a link,' 'I don't see a link,' or 'I don't know.' We are particularly interested in the association with 'working with people,' here understood as entailing frequent social interactions. Second, we conducted a video experiment to determine if evoking social associations with IT could alter participants' occupational preferences.[2] In the following, we present the two survey experiments.

Conjoint experiment: measuring occupational preferences

Our first experiment examines gendered occupational preferences. Occupational preferences are complex processes influenced by various factors. To be able to operationalize them comprehensively, we relied on Holland's (1973, 1997) renowned RIASEC model. It lends itself well to our purposes since it focuses on explaining occupational preferences across vocational fields, in contrast to other theories of occupational preferences, such as the Social Cognitive Career Theory, which explains career development decisions.

In the empirical analysis, we are primarily interested in respondents' preferences for working with people versus working with things. We operationalize these preferences as separate but not exclusive dimensions. The things dimension is represented by reliance on IT and new technologies (high or low) in the occupational profile. IT-related occupations feature prominently in the literature on occupational gender segregation and are generally considered representative of the broader STEM category (Edwards, 1990; Cheryan *et al.*, 2009; Su and Rounds, 2015). IT-reliant occupations feature a clear things-orientation (Su and Rounds, 2015: 13) and are characterized by a strong gender imbalance (Eurostat, 2025). We capture the people dimension with the frequency of social interactions on the job (many or few).

We complement the occupational profiles with three additional dimensions from the RIASEC model as well

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as three workplace characteristics. This approach enables us to present the respondents with plausible occupational profiles. At the same time, these additional dimensions serve as control variables, mitigating the risk of confounding. Next to reliance on IT and new technologies (Realistic, R, in the RIASEC model) and social interactions (Social, S), we also include creative (Artistic, A), entrepreneurial (Entrepreneurial, E), and routine tasks (Conventional, C) in the conjoint experiment.[3] Finally, our occupational profiles also consider the role of three workplace characteristics. Meaningful work reflects post-materialistic preferences, while salary expectations reflect materialistic preferences. Family friendliness captures issues related to reconciling work and family life. Each occupational attribute has two levels, following the logic of having a high or low specification (for the exact operationalization, see section B in the Supplementary appendix). The entire conjoint analysis is the focus of a separate paper (Bajka *et al*., 2025) .

Traditional survey-based methods are not ideal for revealing multi-dimensional trade-offs, as they often fail to isolate underlying preferences (Street and Burgess, 2007). Hence, they struggle to unravel the interdependent nature of occupational attributes because they depend on observational data alone. However, occupational attributes often influence each other, complicating efforts to estimate their independent role. In contrast, experimental designs can cope with multi-dimensional scenarios due to the inherent computer-assisted randomizing of all the relevant attributes. They allow researchers to isolate the effect of single occupational attributes.

Across social science disciplines, conjoint experiments are increasingly popular. Studies on occupational preferences are no exception (Jost and Möser, 2023; Seehuus, 2023; Combet, 2024). Besides addressing issues of collinearity, their strength lies in the capacity to address knowledge gaps among respondents and social desirability biases (Street and Burgess, 2007; Hainmueller *et al.*, 2014). One of the most externally valid ways of conducting a conjoint experiment is to use a paired choice-based conjoint (Hainmueller *et al.*, 2015). Hence, we presented respondents with pairs of artificial profiles of occupations (for respondents' view, see section C of the Supplementary appendix). The sequence of the eight occupational attributes (e.g., frequency of social interactions) as well as the attributes' levels (many or few) were randomized.

We decided to use generic forms of occupations instead of real ones (e.g., carpenter) because the features of real occupations are not independent of each other and cannot be robustly disentangled. This approach also allows us to consider respondents' characteristics, such as what they associate with IT, when exploring the contribution of single occupational attributes to the (full) choice. After exposing the participants to the randomly generated profiles, we prompted them to choose between the two profiles.

The randomized sequence of attributes within each profile enables us to break down the attractiveness of the profiles, estimating the relative importance of each occupational attribute and level. With pre-tests, we could determine that adolescents could effectively handle eight occupational attributes, each with two levels. The decision to use two levels instead of four was made to avoid overly complicated choice sets. The presentation of choice sets took the form of tables. Participants were required to make four consecutive choices. A brief introductory text clarified the nature of the choice task.[4]

Conjoint experiments are commonly assessed using regression models such as conditional logit or random effects, where the dependent variable reflects respondents' choices among different profiles. Against this background, we adopt the approach established by Hainmueller *et al.* (2015) and Leeper *et al.* (2020), employing Linear Probability Models (LPM) to estimate average marginal component effects, provided specific technical assumptions are met (see section C of the Supplementary appendix for the conjoint diagnostics and the full regression results).

To conduct our subgroup analysis, we utilized Leeper's (2018) R package 'cregg,' which is specifically designed for binary choice outcomes. In-built commands generate results in the form of marginal means. Given that each attribute involves two options, the mean is consistently 0.5, and values can range from 0 to 1. Higher (above 0.5) marginal means indicate that certain attributes increase the likelihood of choosing a particular occupation when that attribute is present (vice versa for values below 0.5), *ceteris paribus*. The presentation of marginal means facilitates the interpretation of results by making preference values for attributes independent of reference categories. Hence, this approach ensures direct comparability between attributes.

Video experiment: measuring information treatment effects

Our second experiment examines the effect of new information on occupational preferences. The dependent variable measures how strongly respondents agree with the statement: 'My future job should involve IT' (scale 0 = 'I fully disagree,' 6 = 'I fully agree'). We presented the respondents with this item before and after they watched a short video.[5] We randomly distributed the two versions of the video among the survey respondents. The 'technical' version of the video showed participants a rather technical presentation of an IT occupation, wherein a young female and a young male apprentice were

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captured going about their daily tasks (e.g., programming alone and checking cable connections). The 'social' version portrayed the same two apprentices introducing their IT occupation, but in this video, their tasks were presented in a more socially interactive way (e.g., team meetings and exchanges with co-workers).[6] The two apprentices had a similar amount of screen time. They dressed and acted in a way that was both approachable and professional. The videos had the same introduction and conclusion, but the middle part varied. Additional information was displayed as subtitles (for a schematic presentation of the videos, see section E of the Supplementary appendix).

The use of visual media, such as short videos, to treat respondents in an experimental setting is an alternative to popular text-based experimental settings (Krysan *et al.*, 2009). We followed the approach proposed by Hillen *et al.* (2013) in designing our video treatment. First, we decided whether using video vignettes was appropriate. Given the high exposure to video content adolescents experience nowadays (e.g., on social media or apprenticeship search portals), we view the application of short videos as a suitable format to keep respondents engaged. Second, we developed a script and made sure the manipulation was valid and impactful. Finally, we converted the script into videos and included them in our online survey. The duration of both videos was 1 minute and 24 seconds.

This approach allows us to use a simple *t*-test of subgroup means to evaluate whether the treatment influences respondents' preferences for a future job that involves IT (Kalleitner *et al.*, 2022). The four treatment groups are of approximately equal size (social framing and technical framing, female and male respondents). The average outcome among the group receiving the treatment is used as a counterfactual for the average outcome among the control units (within each of the four subgroups) to calculate the Average Treatment Effect (ATE). The ATE represents the differences between the two, aggregated for each of the four subgroups, and is thus technically conditional on membership in the subgroup (CATE). However, we are mainly interested in the female subgroup that saw the social version of the video. As the treatment is assigned fully at random (control trial) and the sample is highly representative of the population, confounding factors are balanced between the different groups and no further weighing or corrections were undertaken.

We acknowledge that occupational preferences are the result of complex causal processes that involve a multitude of individual and environmental variables. Given the small subgroup sample sizes, we do not aim to causally claim that the videos have—through awakening a particular social association with IT alone—increased female respondents' preferences for IT-reliant occupations. The goal of this study is rather to test whether a more social framing could make IT-reliant occupations more appealing.

Empirical results

People versus things

Do gender differences in occupational preferences reflect gendered preferences for working with people versus working with things? Our conjoint analysis suggests that this is indeed the case, though with an important caveat. Panel A of Figure 1 shows that, on average, girls disapprove of strong IT reliance by −2 percentage points (pp). Since characteristics have only two levels, the marginal mean of one level is always mirrored by the other. Thus, a profile signalling weak IT reliance increases the likelihood of being preferred by girls by 4 pp compared to a profile signalling strong IT reliance. Additionally, the figure shows that, on average, boys are 8 pp more likely to prefer an occupation that relies heavily on IT compared to one with weak IT reliance. Panel B of Figure 1 depicts a significant gender difference of 6 pp for strong IT reliance.

Regarding social interactions, girls are 18 pp more likely to prefer a training occupation that requires frequent social interactions (Panel A in Figure 1). The results further suggest that social interactions also affect boys' preferences by 10 pp. However, contrary to what the people versus things theory suggests, we find that the probability of preferring a job profile increases for both girls *and* boys if the profile signals frequent social interactions. Nevertheless, we still find a significant gender difference of 4 pp, as shown in Panel B of Figure 1, because social interactions are even more important to girls than for boys. In sum, girls prefer to work with people, while boys prefer to work with things. But unlike girls, boys do not perceive a trade-off between these preferences (see section F2 in the Supplementary appendix for a discussion of effect sizes).

Perceptions of occupations

As a next step, we ask whether gender differences in occupational preferences are conditional on what respondents associate with these occupations. To examine this question empirically, we create subgroups for both genders depending on whether respondents associate IT with frequent social interactions. The analysis of the descriptives reveals interesting gender differences that are statistically significant ($\chi^2 = 21.79$, $P < 0.001$). Approximately 61

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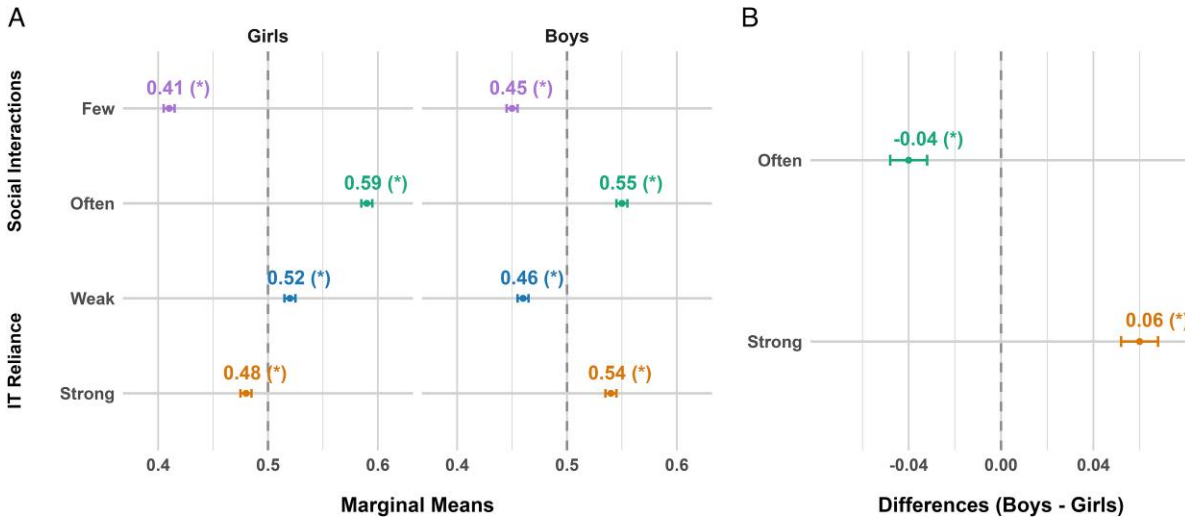

Figure 1 Gender differences in occupational preferences (conjoint analysis). *Notes*: Coefficient plot based on LPM regression of average marginal component effects, presented as marginal means. *$P < 0.05$ or smaller. For the results in tabular form, including all the occupational attributes, see section C of the Supplementary appendix

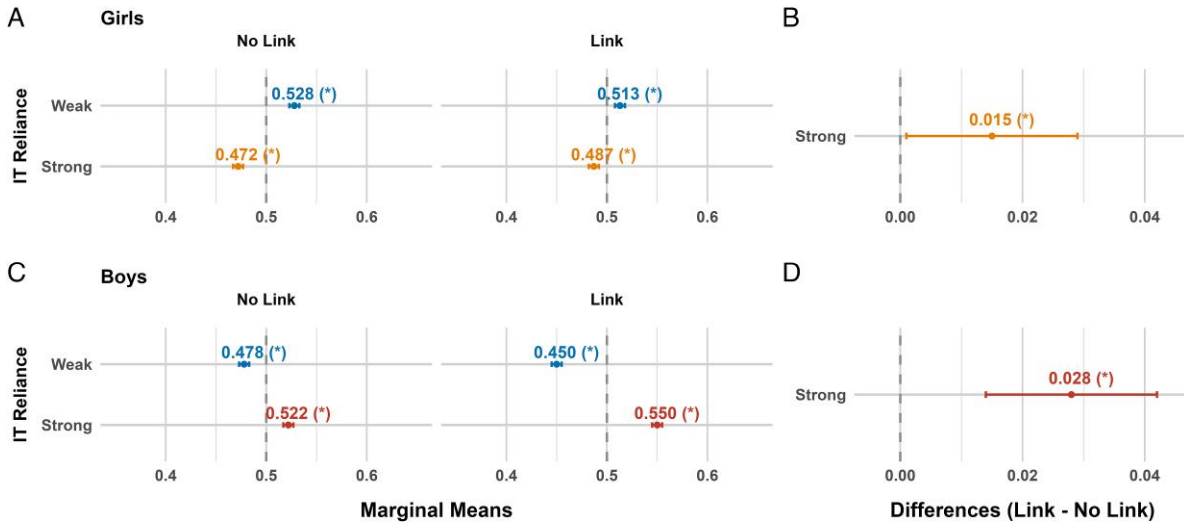

Figure 2 Associations between frequent social interactions and IT reliance influence occupational preferences. *Notes*: See Figure 1. With bootstrapped standard errors (500 iterations). The effect shown in Panel B is only significant at the 0.1 level, the other effects are significant at the 0.05 level

per cent of female respondents ($N = 668$) stated that they do *not* see a link between IT and working with other people, while only 39 per cent argued that they see the link ($N = 422$). In contrast, male respondents are evenly split, with 49 per cent making the association between IT and working with people ($N = 520$), while 51 per cent do not make this association ($N = 545$).

Next to gender differences in these associations, we are interested in examining whether these associations moderate occupational preferences. Figure 2 depicts the participant groups that either make an association between social interactions and IT, or do not (make association = 1; do not make association = 0). As shown in Panel A of Figure 2, for the girls who make the link between frequent social interactions and IT, weak IT reliance loses most of its positive effect, while girls who do not associate IT with frequent social interactions continue to prefer occupational profiles featuring weak IT reliance. Panel B of Figure 2 shows that the difference between the two female subgroups is 2 pp and

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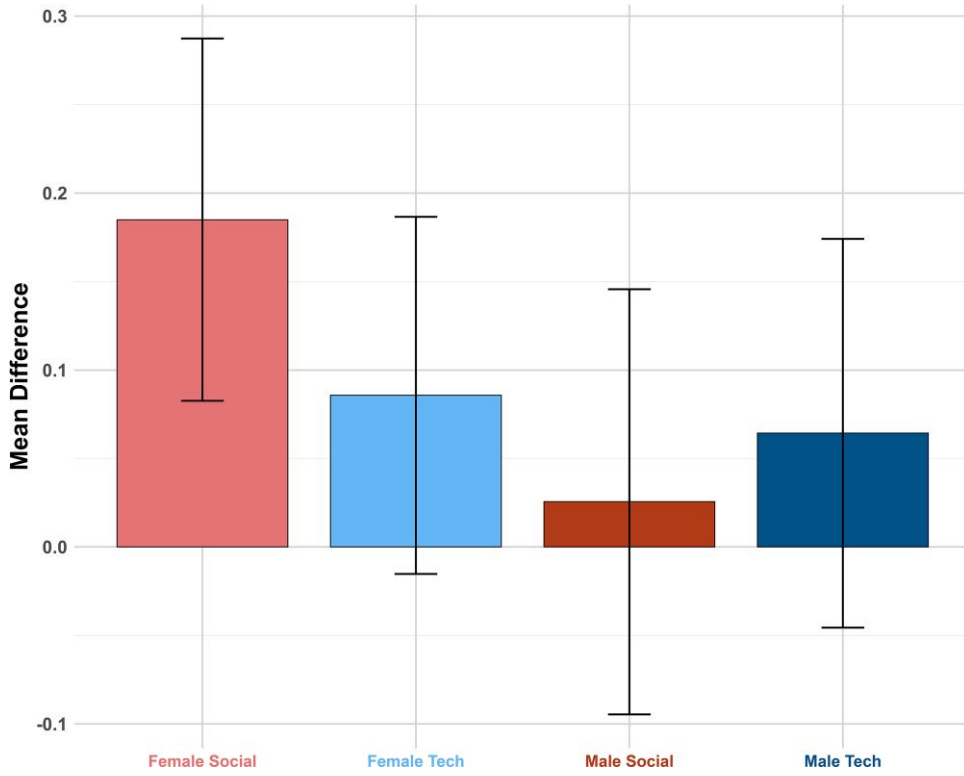

Figure 3 Effects of the different video treatments (red: social framing; blue: technical framing) by gender (women on the left; men on the right). *Notes*: Whiskers indicate 95 per cent confidence intervals, $N = 2{,}144$. The random allocation to the groups worked (see Table E1 in the Supplementary appendix)

statistically significant. Put differently, girls who do *not* see the link between IT and working with people have a clear preference for occupations that do not rely on IT. In contrast, among girls who see the link between IT and working with people, reliance on IT loses much of its negative effect on occupational preferences.

Interestingly, we find a similar pattern for boys. Panel C in Figure 2 shows that associating IT with frequent social interactions makes strong IT reliance for boys even *more* attractive. As illustrated by Panel D in Figure 2, the difference between the male subgroups is 3 pp and statistically significant. These findings provide additional evidence supporting the idea that there is not necessarily a strict trade-off between working with people and working with things. Furthermore, the results imply that girls find IT-related occupations more appealing if they perceive such work as involving frequent social interactions.[7]

Addressing misperceptions

Finally, we turn to the video experiment to examine whether our setting allows us to evoke social associations with IT so that girls receiving the treatment (socially framed video) adapt their occupational preferences. We use a simple *t*-test of the aggregated subgroup differences in treatment means. The results show a significant effect only for girls who saw the social version of the video.[8] For all the other groups, the effect seems to be positive too, but the treatment effect is not only substantially smaller but also statistically insignificant at the 0.05 level (see Figure 3).[9]

In other words, girls react differently when exposed to a social framing of IT-reliant occupations than a technical one. This difference suggests that a social framing makes IT-reliant occupations more appealing to girls. Conversely, boys react similarly to both framings. Despite both male subgroup effects being positive, neither is statistically significant. The reason for this might be that in the case of boys, interest in IT-reliant occupations was already comparatively high before the video experiment. In addition, as we have shown above, for boys, frequent social interactions also increase the attractiveness of IT-reliant occupations. Hence, in light of our previous findings, it is not surprising that boys react positively to both the social and the technical framing.

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Conclusion

Although demand for IT skills is rapidly increasing (Liu and Grusky, 2013), occupational gender segregation in IT-related fields remains high and may even be growing (Cheryan *et al.*, 2009). Such segregation matters because it tends to reinforce stereotypes, is typically associated with gender inequalities, and is likely to result in severe skill shortages (Charles and Bradley, 2009). Cheng *et al.* (2019) find that the increasing reliance on programming helps to explain the stalled convergence in the gender wage gap after the mid-1990s. While the rise of generative artificial intelligence (AI) may change skill requirements in IT-reliant occupations (Autor, 2024), undesirable biases of existing AI technologies (e.g., so-called gender shades) demonstrate the importance of diverse development teams (Buolamwini and Gebru, 2018).

Driven by the necessity to address the IT gender gap, this study sought to identify strategies that increase the attractiveness of IT-reliant occupations and overcome stereotypes through minimal social interventions. Exploring the occupational preferences of eighth-grade students we showed that girls prefer working with people while they tend to decide against working with things such as technology. Second, few girls associate IT-related work with few social interactions. However, the girls who do are more likely to prefer occupations that rely on IT. Finally, using an information treatment experiment, we demonstrated that portraying IT-related activities as involving frequent social interactions increased girls' interest in IT-reliant occupations. Together, our results suggest that the perceived people versus things trade-off can be mitigated by challenging gendered stereotypes about occupations.

Turning to boys' occupational preferences, we found that they prefer to work with things *and* people. Hence, similar to girls, regular social interactions make an occupation more attractive to boys, although the effect is stronger among girls. We also found that boys are more likely than girls to associate IT-related work with social interactions, and those who do find IT-reliant occupations more attractive. This finding suggests that changing stereotypes about occupations may also encourage more boys to pursue IT-reliant occupations, in particular those boys who struggle with some of the same stereotypes that many girls struggle with.

This study thus supports the recent sociological literature that has highlighted how gendered socialization shapes occupational preferences by prescribing that individuals behave according to their gender identity and in line with gender stereotypes (e.g., Gabay-Egozi *et al.*, 2015; Combet, 2024). However, while most of this research has focused on how stereotypes associated with the target's identity shape occupational preferences, this study has emphasized, following Cheryan *et al.* (2009), the important role of *stereotypes about occupations* in driving gender differences. We argue that addressing gendered stereotypes about occupations is a promising but underexplored way to explain occupational gender segregation, because misperceptions about occupations (and occupational cultures more generally) are probably easier to address than individuals' self-concepts (e.g., by providing additional information about occupations or by developing new work routines), although we must leave it to future research to examine whether individuals react to stereotypical perceptions of occupations because they represent cultural beliefs about ability (e.g., Correll, 2004) or whether these occupational stereotypes conflict with individuals' gendered identities (e.g., Charles and Bradley, 2009).

Our research also has important practical implications. While acknowledging that other factors (e.g., existing levels of gender representation in a field) play a distinct role in shaping occupational preferences, this study suggests that (early) interventions fostering positive associations between IT and social interactions can help to address women's underrepresentation in IT-reliant occupations. We argue that such interventions should be best thought of as addressing misperceptions about IT work. Research has shown that spreading wrong ideas about future work can be counterproductive (Sultan *et al.*, 2024). However, as we have argued, IT-reliant occupations are more socially interactive and people-oriented than common stereotypes suggest (Edwards, 1990; Cheryan, 2012; Groeneveld *et al.*, 2020). Proactively addressing misperceptions and stereotypes about occupations, for example in the context of career counselling, is likely to increase women's (and possibly also men's) interest in IT-reliant occupations. Similarly, compulsory school subjects devoted to occupational choices could provide early, detailed, and accurate information on occupations and encourage questioning of occupational cultures.[10]

We encourage future research to explore whether similar patterns hold in later adolescence and in different cultural contexts. This is because older adolescents and adults might be less receptive to new information and because stereotypes are not fixed across place. Moreover, we invite researchers to replicate our study in field trials with repeated post-tests. While we are encouraged by the fact that a minimal intervention, such as a video vignette, was able to trigger a significant change in occupational preferences, important questions remain as to whether such an effect can be sustained over time (Stantcheva, 2023: 228). Finally, we suggest that future research examines whether similar patterns can also be observed for other occupations. While we expect our findings to travel to

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other STEM occupations, it would be particularly interesting to explore whether addressing misperceptions can also increase interest among men for occupations that are stereotypically associated with social interactions and where men are underrepresented (e.g., health care work).

Notes

1. Source: https://www.onetonline.org/explore/interests/Realistic/Social/ (accessed on 10 April 2025).
2. The association item was placed after the conjoint experiment but before the video experiment. Moreover, the sequencing of the experiments ensured that the occupational preferences measured with the conjoint experiment were not affected by the video experiment (see section A of the Supplementary appendix for further documentation).
3. Our analysis does not consider the Investigate type because it is primarily linked to research activities and emphasizes academic training.
4. In conjoint experiments, unrealistic combinations can occur. We ensured that in our design, attributes did not result in such combinations. Hence, there was no need to weigh levels, as we did not want to present respondents with an ideal world free of biases. The design intentionally avoided limiting the universe of potential profiles. To address the external validity of our experimental setup, we show in section D of the Supplementary appendix that our eight attributes are also among the characteristics informing adolescents' choices for training positions on Switzerland's leading online apprenticeship search portal.
5. The pre-treatment item was included in a short battery measuring IT attitudes after a longer battery on IT usage and knowledge. We also asked respondents after the video to answer a question that tested whether they had understood the content of the video (see section E of the Supplementary appendix for an overview).
6. Link to technical video version https://www.youtube.com/watch?v=yae_mHVkEOo; link to social video version https://www.youtube.com/watch?v=4XFuBLGdfFU.
7. The female subgroup differences are similar in magnitude to the male subgroup differences but only significant at the 0.1 level. We suggest that this lower level of statistical significance is due to the comparatively smaller number of girls who associate social interactions with IT.
8. The differences are normally distributed (tested with the Shapiro test: female/social $W = 0.91$, $P < 0.01$; female/technical $W = 0.9$, $P < 0.01$; male/social $W = 0.91$, $P < 0.01$; male/technical $W = 0.9$, $P < 0.01$). We could therefore refrain from using a Mann-Whitney U test. The measured effects and their significance indicate whether the pre- and post-differences are significant within a subgroup and not the difference between women and men. Thus, we can assume with certainty that none of the groups remembered the pre-test item and would, for reasons of satisficing, adapt their post-item responses. Results: *Female social*: $t = -2.12$, P-value $= 0.03$, pre mean $= 1.76$, post mean 1.94; *Female technical*: $t = -0.93$, P-value $= 0.35$, pre mean $= 1.76$, post mean 1.85; *Male technical*: pre-/post difference $t = -0.56$, P-value $= 0.58$, pre mean $= 2.92$, post mean $= 2.98$; *Male social*: pre-/post difference $t = -0.23$, P-value $= 0.82$; pre mean $= 2.85$, post mean $= 2.88$. *Gender difference* pre: $t = -11$, p-value < 0.01, mean pre female 1.76; mean pre male 2.88; gender difference post: $t = -11$, P-value < 0.01, mean post female 1.89; mean post male 2.93.
9. However, we capture a significant gender gap in occupational preferences between women and men both before and after the video experiment.
10. In both Luzern and St.Gallen, such school subjects (called 'berufliche Orientierung') are compulsory.

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Supplementary data

Supplementary data are available at *ESR* online.

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Data availability

The dataset and a replication file will be made available in a public repository.

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