



Article scientifique

Article

2022

Published version

Open Access

This is the published version of the publication, made available in accordance with the publisher's policy.

---

Hegemonic masculinity, sexism, homophobia, and perceived  
discrimination in traditionally male-dominated fields of study: A study in  
Swiss vocational upper-secondary schools

---

Blonde, Jérôme; Gianettoni, Lavinia; Gross, Dinah; Guilley, Edith

#### How to cite

BLONDE, Jérôme et al. Hegemonic masculinity, sexism, homophobia, and perceived discrimination in traditionally male-dominated fields of study: A study in Swiss vocational upper-secondary schools. In: International journal for educational and vocational guidance, 2022. doi: 10.1007/s10775-022-09559-7

This publication URL: <https://archive-ouverte.unige.ch/unige:166140>

Publication DOI: [10.1007/s10775-022-09559-7](https://doi.org/10.1007/s10775-022-09559-7)



# Hegemonic masculinity, sexism, homophobia, and perceived discrimination in traditionally male-dominated fields of study: A study in Swiss vocational upper-secondary schools

Jérôme Blondé<sup>1</sup> · Lavinia Gianettoni<sup>1</sup> · Dinah Gross<sup>1</sup> · Edith Guilley<sup>2</sup>

Received: 2 July 2021 / Accepted: 15 June 2022  
© The Author(s) 2022

## Abstract

The current research investigated the endorsement of hegemonic masculinity, sexism, and homophobia, and the perceptions of discrimination, among samples of heterosexual male and female, and LGB students who had entered into traditionally male-dominated and female-dominated fields of study. Specifically, students from vocational and educational training in Swiss upper-secondary schools were recruited. Results revealed that adherence to hegemonic masculinity, sexism, and homophobia is higher in male-dominated fields of study (vs. female-dominated). Furthermore, heterosexual female and LGB students enrolled in male-dominated fields of study have been found to experience and anticipate more discrimination than heterosexual male students. Implications of these results are discussed.

**Keywords** Male-dominated fields of study · Sexual orientation · Hegemonic masculinity

## Résumé

**Masculinité hégémonique, sexisme, homophobie et discrimination perçue dans les domaines d'études traditionnellement dominés par les hommes: Une étude dans les écoles professionnelles suisses**

La présente recherche a examiné l'adhésion à la masculinité hégémonique, au sexisme et à l'homophobie, ainsi que les perceptions de discrimination, parmi des échantillons d'étudiant-e-s hétérosexuel-le-s, hommes et femmes, et LGB, qui se sont engagé-e-s dans des domaines d'études traditionnellement dominés par les hommes et par les femmes. Plus précisément, des étudiant-e-s de la formation professionnelle dans des écoles secondaires supérieures suisses ont été recruté-e-s. Les résultats ont

---

✉ Jérôme Blondé  
[Jerome.blonde@unil.ch](mailto:Jerome.blonde@unil.ch)

<sup>1</sup> Institute of Social Sciences, University of Lausanne, Lausanne, Switzerland

<sup>2</sup> Service de la Recherche En Education, Geneva, Switzerland

révélé que l'adhésion à la masculinité hégémonique, au sexisme et à l'homophobie est plus élevée dans les filières à dominante masculine (par rapport aux filières à dominante féminine). En outre, il a été constaté que les étudiantes hétérosexuelles et les étudiants LGB inscrit-e-s dans des domaines d'études à dominante masculine subissent et anticipent davantage de discriminations que les étudiant-e-s hétérosexuel-le-s. Les implications de ces résultats sont discutées.

## **Zusammenfassung**

### **Hegemoniale Männlichkeit, Sexismus, Homophobie und wahrgenommene Diskriminierung in traditionell männerdominierten Studienbereichen: Eine Studie in Schweizer Berufsschulen**

Die aktuelle Studie untersuchte das Billigen von hegemonialer Männlichkeit, Sexismus und Homophobie sowie das Wahrnehmen von Diskriminierung unter heterosexuellen männlichen und weiblichen sowie LGB-Studierenden, die in traditionell männer- und frauendominierte Studienbereiche eintraten. Konkret wurden Studierende aus der beruflichen und schulischen Ausbildung in Schweizer Schulen der Sekundarstufe II rekrutiert. Die Ergebnisse zeigen, dass hegemoniale Männlichkeit, Sexismus und Homophobie in männerdominierten Studienrichtungen stärker ausgeprägt sind als in frauendominierten. Außerdem wurde festgestellt, dass heterosexuelle weibliche und LGB-Studenten, die in männerdominierten Studiengängen eingeschrieben sind, mehr Diskriminierung erfahren und erwarten als heterosexuelle männliche Studenten. Implikationen dieser Ergebnisse werden diskutiert.

## **Resumen**

### **Masculinidad hegemónica, sexismo, homofobia y discriminación percibida en campos de estudio tradicionalmente dominados por hombres: Un estudio en escuelas vocacionales suizas**

La investigación actual investigó el respaldo de la masculinidad hegemónica, el sexismo y la homofobia, y las percepciones de discriminación, entre muestras de hombres y mujeres heterosexuales, y estudiantes LGB que habían entrado en campos de estudio tradicionalmente dominados por hombres y mujeres. En concreto, se reclutó a estudiantes de formación profesional y educativa de escuelas secundarias superiores suizas. Los resultados revelaron que la adherencia a la masculinidad hegemónica, el sexismo y la homofobia es mayor en los campos de estudio dominados por los hombres (frente a los dominados por las mujeres). Además, se ha encontrado que las estudiantes heterosexuales femeninas y LGB inscritas en campos de estudio dominados por hombres experimentan y anticipan más discriminación que los estudiantes masculinos heterosexuales. Se discuten las implicaciones de estos resultados.

## **Introduction**

In Switzerland, recent decades have witnessed increased entrance of female and LGB (Lesbian, Gay, Bisexual) students into traditionally male-dominated fields of study (MDFS). The proportion of women embarking in STEM fields (Science,

Technology, Engineering, and Math) in high schools and universities, for example, has increased from 16.5 to 31.6% between 1990 and 2016 (OFS, 2019a). However, despite such positive changes, female and LGB students are still under-represented in MDFS. Although there is significant variation between disciplines with some being more strongly gender-segregated than others, male heterosexual students still predominate in most of them, including informatics, technology, and construction (OFS, 2019a). MDFS remain also a high-risk environment for female and LGB students who do engage in them. A large body of research has shown that these students are more likely than their male heterosexual counterparts to face a variety of obstacles in the course of their educational pathway in MDFS, possibly leading to school disengagement and dropout (e.g., Casad et al., 2019; Ceci et al., 2009; Hugues, 2017, 2018).

Discrimination is one of the hurdles that female and LGB students may confront in entering into traditionally MDFS. Research has extensively shown that typically male professional fields are hostile environments for women (e.g., Heilman & Wallen, 2010; Inzlicht & Ben-Zeev, 2000; O'Brien et al., 2016; see also Pew Research Center, 2018). More specifically, prejudice and discrimination against women are largely more prominent in most MDFS than in female-dominated fields of study or gender-balanced fields (e.g., Dresden et al., 2018; Robnett, 2016; Settles et al., 2006; Steele et al., 2002). Female students are regularly the target of sexist jokes, harassment (including cyberharassment), sexual assault, and physical abuse, because of their sex. For example, Settles et al. (2006) have shown that women enrolled in natural science fields, compared with women enrolled in social sciences fields, experienced more sexual harassment and discrimination. More specifically, a higher prevalence of discriminatory experiences in the course of women' school careers, including negative remarks about their abilities, patronizing tones used by instructors, or poor efforts to help in case of need, has been reported in disciplines such as biology (Brown, 2008), engineering (Murray et al., 1999; Seron et al., 2016), or medicine (Kisiel et al., 2020). In turn, encountering discrimination is likely to undermine STEM self-concept (Robnett, 2016) and development of a sense of belongingness with the field (Good et al., 2010; Moss-Racusin et al., 2018a, b), which may constitute strong deterrents in pursuing male-dominated careers (see Ahlqvist et al., 2013).

Similarly, studying in MDFS may reveal to be highly challenging for LGB students. Past studies have shown that they are often victims of discrimination, harassment, and violence, because of their sexual orientation (e.g., Cech & Waidzunas, 2011; Hugues, 2017; Parnell et al., 2012; Yoder & Mattheis, 2016). Similar to female students, this has been found to reduce the development of a sense of belongingness and motivation for pursuing STEM fields (Stout & Wright, 2016). In contrast, traditionally female-dominated fields of study (e.g., nursing or education) are more welcoming and supportive for male heterosexual students, who can easily assimilate with the occupational culture and develop their careers (Cottingham et al., 2015; Simpson, 2004; Williams, 1992).

Despite that important research has documented experiences of discrimination among female and LGB students in MDFS, much remains to be discovered to improve our understanding of the reasons for their discrimination. Ultimately, this

can contribute to uncovering the mechanisms underlying the attrition of female and LGB students in fields traditionally dominated by men. Although previous research has mostly focused on the influence of gender/STEM stereotypes to account for women's discrimination (e.g., Carli et al., 2016), little is known about students' ideologies related to masculinity and how they affect their attitudes toward women and LGB students. With this goal in mind, we sought to investigate endorsement of a culturally idealized conception of masculinity—hegemonic masculinity (HM)—along with sexism and homophobia, among samples of heterosexual males and females, and LGB students enrolled in MDFS. In parallel, we measured their discrimination experiences and expectations. By comparison, we also considered fields of study that are traditionally dominated by women (e.g., health, social care).

## Hegemonic masculinity, sexism, and homophobia

HM portrays a culturally valued form of masculinity that preserves and legitimizes the dominant position of men over women, as well as the superiority of heteronormativity (i.e., a vision of sexuality which states that sexual desire is normal and natural only to the extent it is expressed for a person of the opposite sex) over other forms of sexuality (Kite & Deaux, 1987). Along with attainment of high status and dominance, one of the central aspects of HM is anti-femininity (Bem, 1981; Kimmel, 2012). What is masculine is not feminine. To be a “real man” implies repressing traits or behaviors that are culturally coded as feminine. Since men feel continual pressure to prove their masculinity and demonstrate they are “real men” (Vandello & Bosson, 2013; Vandello et al., 2008), stereotyped feminine traits and behaviors are actively avoided, notably by those men who endorse such a conception of masculinity, in a way to affirm their masculine identity (Bosson & Michniewicz, 2013). This may lead them to exhibit sexist attitudes and behave aggressively against women (e.g., Glick & Fiske, 1996; Kilianski, 2003; Smith et al., 2015), especially when their masculinity is threatened (Bosson et al., 2009; Michniewicz & Vandello, 2015). For example, O'Connor et al. (2017) have shown that, in response to a threat to masculinity, men endorsing HM seek to reaffirm their masculinity by expressing more amusement in sexist jokes.

Moreover, because homosexuals (and especially gay men) are symbolically associated with femininity and are perceived to possess more traditionally feminine traits than heterosexual men (Kite & Deaux, 1987), avoidance of femininity is closely related to the avoidance of homosexuality. Being “a real man” means not to be feminine and also to be straight. As a result, a consistent body of research has shown that greater conformity to hegemonic masculinity can result in increased anti-LGB prejudice, which, similar to sexism, allows heterosexual men to affirm their masculinity (Herek, 1986, 1988; Parrott et al., 2011). Thus, adherence to HM may entail sexism and homophobia, which both may serve as strategies for affirming heterosexual men's dominant social status and distinctiveness of the masculine identity (Falomir-Pichastor & Hegarty, 2014; Falomir-Pichastor & Mugny, 2009).

Past research has shown that typically male occupational environments are characterized by high adherence to HM and willingness to protect men's privileged

status by excluding women and LGB people (Bosson & Vandello, 2011; Vandello & Bosson, 2013). However, only little research has been done in this respect regarding MDFS. Yet, MDFS nurture a masculine culture that valorises traits and behaviors matching well the definition of HM (e.g., dominance and competition; Cheryan et al., 2009, 2017). There is consistent evidence in research that STEM fields are strongly associated with stereotypically masculine traits (e.g., Cejka & Eagly, 1999; Nosek et al., 2009). Moreover, while a few studies have shown that female students perceive that there is sexism in STEM environments (Fernández et al., 2006; Kuchynka et al., 2018), and that LGB students perceive that there is a heterosexist climate (Cech & Waidzunus, 2011; Hugues, 2017), little research has examined endorsement of both sexism and homophobia from the perspective of heterosexual male students. In the present research, we contended that students in typically MDFS, and notably heterosexual male students, would adhere strongly to HM and, in turn, to sexism and homophobia, which would then account for female and LGB students' experiences of discrimination. By creating overtly hostile climates against women and LGB students in MDFS, heterosexual men seek to make them feel that they do not fit in with the culture of the field and that they should not 'intrude' in typically male strongholds. In doing so, they find a way to protect masculine identity and heterosexual men's higher status in the workplace.

## Goals and hypotheses

This research has three main objectives. First, we sought to evaluate the ideological climate that prevails in MDFS in terms of HM, sexism, and homophobia. We hypothesized that students in these fields, and more particularly heterosexual male students, would report strong adherence to HM, sexism, and homophobia. Second, we examined students' experience and anticipated discrimination. Owing to the hostile ideological climate that excludes female and LGB students from MDFS, one may expect that they perceive and anticipate higher levels of discrimination (vs. male heterosexual students). Even though the present research did not examine *stricto* sensu whether heterosexual male students' sexism and homophobia affect female and LGB students' perceptions of discrimination, we, however, expected that high levels of HM, sexism, and homophobia should be reported by heterosexual male students in MDFS, along with high levels of perceived discrimination by female and LGB students. Third, in line with the idea that enrollment in MDFS would lead to greater conformity with HM, which in turn would result in higher sexist and homophobic attitudes, we examined whether HM mediates the effects of study fields on both sexism (hostile and benevolent) and homophobia.

To our knowledge, this is the first study that concomitantly investigates the ideological climate prevailing in MDFS fields among heterosexual male students and discrimination perceptions among female and LGB students. By comparison, we also examined students' beliefs and perceived discrimination in female-dominated fields of study. In contrast, we predicted that HM, sexism, homophobia, and discrimination should not differ by sex or sexual orientation, given that masculine norms

are less salient in these fields and that the pressure for heterosexual male students to prove their masculinity is less acute.

## The current research

The current research was conducted on a sample of students who had chosen a male-dominated or female-dominated career and who were enrolled in VET in Swiss upper-secondary schools. In Switzerland, VET is an educational system and school environment in which gender segregation is particularly noticeable and persistent. As an illustration, in 2017, less than 8% of secondary school students enrolled in the field of construction were women, while only 14% of students who enrolled in the fields of social care were men (OFS, 2019b). In Switzerland, most of VET students pursue a 3-year apprenticeship combining both work at school and in a company. It is worthwhile mentioning that previous studies have already addressed gender issues in VET in Switzerland and have notably pointed out forms of discrimination against women in STEM career fields (e.g., Lamamra, 2011; Makarova et al., 2016).

## Method

### Participants

We recruited 331 students in vocational upper-secondary schools of Canton Geneva in Switzerland.<sup>1</sup> Mean age was 20.36, with a majority being aged 15 to 25. There were 114 females (34.4%) and 217 males (65.6%). 287 were heterosexual (86.7%), while 44 declared not to be heterosexual (13.3%). Most of them were 2<sup>nd</sup> year students (81.9%) and had Swiss nationality (65.3%). They reported that 34.4% ( $n=114$ ) of mothers had a baccalaureate-level degree and 20.5% ( $n=68$ ) a university-level degree, while 35.9% ( $n=119$ ) of fathers had a baccalaureate-level degree and 16.9% ( $n=56$ ) a university-level degree.

There was a higher number of male students in male-dominated occupation training disciplines ( $n=173$ ; 88.3%) than female students ( $n=23$ ; 11.7%). Conversely, female-dominated occupation training disciplines comprised more female students ( $n=91$ ; 67.4%) than male students ( $n=44$ ; 32.6%). There was a similar proportion of non-heterosexual students in male-dominated disciplines ( $n=28$ ; 11.9%) than in female-dominated disciplines ( $n=16$ ; 14.3%). In male-dominated disciplines, we also observed a nearly equivalent proportion of male non-heterosexual ( $n=16$ ; 8.2%) and female non-heterosexual students ( $n=12$ ; 6.1%). In female-dominated

<sup>1</sup> To ensure that our total sample size was convenient to test the predicted interactions, we performed a *sensitivity power analysis* using G\*Power. We found that the minimum effect size that could be detected at 80% power (0.05 alpha level) with a total sample of 331 participants was  $f=0.15$ . This indicated that our sample size was large enough to detect small-to-medium effect sizes.

disciplines, the share of female non-heterosexual students ( $n = 12$ ; 8.9%) is higher than that of male non-heterosexual students ( $n = 4$ ; 3%).

## Procedure

The study was conducted within the students' classrooms during the course of a normal school day. All the participants were provided with paper-and-pencil questionnaires and were asked to complete them individually. The questionnaire contained measures of HM, sexism, homophobia, and perceived discrimination. Finally, participants had to report demographic information, including sex and sexual orientation. They were told that confidentiality of their responses was fully guaranteed and their consent to participate was obtained prior to beginning the study. Participants' responses were all anonymized and no personal identifiers accompanied the data so that participants' identities could not be known at any stages of the research. Each completion session lasted approximately 20 to 30 min and was supervised by a research assistant whose role was to ensure instructions were correctly understood and to answer any questions if needed. Ethical approval for the present research, based on the voluntary participation of students, was obtained first from an independent committee of the education research service of Geneva Canton and then was validated by the education department of Geneva Canton. A committee of experts on youth-related issues was also consulted for further guidance.

## Independent variables

### Sex/sexual orientation

We asked students to report their sex (male or female), such as indicated on their identity card. We measured sexual orientation by asking whether students were exclusively attracted by either women or men, to a larger extent by women or men, or equally by women and men. By matching answers with their sex, we coded whether they were either heterosexuals or non-heterosexuals, with heterosexuals considered as those who are exclusively attracted by the opposite sex.

### Study fields

In Switzerland, VET schools are organized by occupational disciplines (e.g., business, health). To compare MDFS with female-dominated fields of study, we recruited students from schools that differed by the sex type of the disciplines, based on the gender distribution at the time the study was conducted. An occupational discipline was labeled as male-dominated or female-dominated when the proportion of men or women enrolled in that discipline was above 70%.<sup>2</sup> For MDFS, we

---

<sup>2</sup> As we were only interested in comparing male-dominated with female-dominated fields, none of those included in this study were gender-balanced.



approached students who specialized in disciplines related to construction (e.g., carpenter) and technical occupations (e.g., electrician). For female-dominated fields of study, we surveyed students who specialized in disciplines related to health and social care occupations (e.g., social and educational assistant). In Canton Geneva in 2018, 95.2% of students enrolled in construction-related disciplines were men, while 74.3% of students in health and social care-related disciplines were women (OFPC, 2019).

## Dependent variables

### Hegemonic masculinity

To assess HM, we adapted the Conformity to Masculine Norms Inventory (CMNI-22), which is a short form of the original 94-item CMNI (Mahalik et al., 2003). This scale was designed to tap into personal adherence to the dominant masculine ideology. The adaption of the CMNI-22 to a population of students whose age ranges from 15 to 25 led us to remove several items that we thought were rather inappropriate (e.g., “I would feel good if I had many sexual partners”). In total, 18 items were retained, such as “My work is an important part of my life,” “I like to talk about my feelings” (reverse-coded;  $\alpha=0.76$ ).<sup>3</sup> Responses were given on a 6-point scale going from 1 (=Do not agree) to 6 (=Totally agree).

### Sexism

To assess sexist attitudes, we used the Ambivalent Sexism Inventory (Glick & Fiske, 1996), which distinguishes hostile sexism (i.e., openly antagonistic and negative attitudes against women) from benevolent sexism (i.e., seemingly positive but inequalitarian attitudes toward women). We used the French-validated scale of Dardenne et al. (2006), which comprises 10 items and two subscales of hostile and benevolent sexism ( $\alpha_{HS}=0.85$ ;  $\alpha_{BS}=0.76$ ).<sup>4</sup> Each item was answered on 6-point rating scales ranging from 1 (=Do not agree) to 6 (=Totally agree). Examples of hostile sexism items are as follows: “Women exaggerate problems they have at work,” “When

<sup>3</sup> We performed a principal axis factor analysis with oblique (oblimin) rotation. Unlike the 11-dimensions structure of Mahalik et al. (2003), five factors with an eigenvalue greater than 1 were extracted from the analysis: first one accounted for 19.72% of the total variance and included 5 items that reflected the dimensions of dominance, winning, and disdain for homosexuals, second one accounted for 15.95% and included 3 items that reflected the dimensions of power over women and risk taking, third one accounted for 7.44% of the total variance and included 3 items that reflected the dimensions of emotional control and self-reliance, fourth one accounted for 6.09% of the variance and included 3 items that reflected the dimensions of violence and primacy of work, and fifth one accounted for 5.99% of the variance and included 4 items that reflected the dimensions of risk-taking and pursuit of status.

<sup>4</sup> Here again, we performed a principal axis factor analysis with oblique (oblimin) rotation. Consistent with the factorial structure of Glick and Fiske (1996), two factors with an eigenvalue greater than 1 were extracted from the analysis: first one accounted for 42.12% of the total variance and included all the items of benevolent sexism, while second one accounted for 14.20% and included all the items related to hostile sexism.

women lose to men in a fair competition, they typically complain about being discriminated against.” Examples of benevolent sexism items are as follows: “In a disaster, women ought to be rescued before men,” “No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman.”

## Homophobia

We measured homophobia with 10 items on 6-point rating scales ranging from 1 (=Do not agree) to 6 (=Totally agree). This was adapted from the Attitude Toward Homosexuality Scale (Anderson et al., 2018). Examples of items are as follows: “I would be embarrassed if a gay person made sexual advances toward me,” “I consider marriage between homosexuals is acceptable” (reverse-coded).<sup>5</sup> The Cronbach alpha was 0.86.

## Perceived discrimination

Adapted from Schmitt et al. (2002), we measured experienced discrimination with two items: “Have you personally been a victim of discrimination in the context of your apprenticeship because of your sex?”, “Have you personally been a victim of discrimination in the context of your schooling because of your sex?” ( $r=0.66$ ,  $p<0.001$ ). Regarding sexual orientation-based discrimination, we used identical items as previously mentioned but changed “because of your sex” for “because of your sexual orientation” ( $r=0.85$ ,  $p<0.001$ ). Answers were given on scales ranging from 1 (=never) to 6 (=regularly). Anticipated discrimination was assessed with one single item (one for gender discrimination and one for sexual orientation discrimination): “Do you think you might be a victim of discrimination in your future occupational life because of your sex/sexual orientation?”. Responses were given on a 6-point scale going from 1 (=No, not likely at all) to 6 (=Yes, very likely).

## Results

Due to small sample sizes in some subgroups (e.g., there were only 4 LGB male students in female-dominated disciplines), it was statistically unreliable to cross sex and sexual orientation by the fields of study. Thus, for both male-dominated and

---

<sup>5</sup> On this variable, two factors with an eigenvalue greater than 1 were extracted from the analysis: first one accounted for 46.16% of the total variance and included the reverse-coded items, while second one accounted for 18.56% of the total variance and included the other remaining items. Given that it is quite frequent that reverse-coded items all load on the same factor (as they share one commonality that results from the measurement strategy) and that no other factor emerged from the analysis, we concluded that there is no subscale in the measure of homophobia (such as shown in the original development of this measure; see Anderson et al., 2018).

female-dominated fields of study, we compared heterosexual male students with the other students by grouping together heterosexual women, LGB men, and women.<sup>6</sup>

A MANOVA with study field and student groups (groups were coded as follows: male heterosexual = +3, female heterosexual = -1, male non-heterosexual = -1, female non-heterosexual = -1) as independent variables was performed on HM, hostile and benevolent sexism, homophobia, and experienced/anticipated sex-based and sexual orientation-based discrimination.<sup>7</sup> Table 1 shows means and SDs by condition, while Table 2 displays the statistical values of the main effects and interactions.

## Main analyses

This analysis showed significant main effects of student groups on HM, hostile sexism, benevolent sexism, homophobia, anticipated sex-based discrimination, and anticipated sexual orientation-based discrimination. Main effects of student groups are marginally significant on experienced sex-based discrimination and experienced sexual orientation-based discrimination. Compared with female/LGB students, male heterosexual students reported more HM ( $M=3.27$ ,  $SD\ 0.43$  vs.  $M=2.82$ ,  $SD\ 1.05$ ), hostile sexism ( $M=3.88$ ,  $SD\ 1.18$  vs.  $M=2.90$ ,  $SD\ 1.21$ ), benevolent sexism ( $M=3.46$ ,  $SD\ 1.00$  vs.  $M=2.91$ ,  $SD\ 1.06$ ), and homophobia ( $M=3.37$ ,  $SD\ 1.05$  vs.  $M=2.47$ ,  $SD\ 1.05$ ).

Compared with male heterosexual students, female/LGB students reported more experienced sex-based discrimination ( $M=1.47$ ,  $SD\ 0.65$  vs.  $M=1.31$ ,  $SD\ 0.51$ ), anticipated sex-based discrimination ( $M=2.30$ ,  $SD\ 1.30$  vs.  $M=1.51$ ,  $SD\ 0.86$ ), experienced sexual orientation-based discrimination ( $M=1.15$ ,  $SD\ 0.58$  vs.  $M=1.08$ ,  $SD\ 0.46$ ), and anticipated sexual orientation-based discrimination ( $M=1.89$ ,  $SD\ 1.12$  vs.  $M=1.54$ ,  $SD\ 0.93$ ).

We also found significant main effects of study field on HM, hostile sexism, benevolent sexism, homophobia, and anticipated sex-based discrimination. Compared with their counterparts from female-dominated fields of study, students from MDFS reported more adherence to HM ( $M=3.28$ ,  $SD\ 0.45$  vs.  $M=2.81$ ,  $SD\ 0.44$ ), hostile sexism ( $M=3.86$ ,  $SD\ 1.27$  vs.  $M=3.02$ ,  $SD\ 1.24$ ), benevolent sexism ( $M=3.60$ ,  $SD\ 0.99$  vs.  $M=2.80$ ,  $SD\ 1.05$ ), homophobia ( $M=3.39$ ,  $SD\ 1.13$  vs.  $M=2.66$ ,  $SD\ 1.01$ ), and less anticipated sex-based discrimination ( $M=1.77$ ,  $SD\ 1.25$  vs.  $M=1.98$ ,  $SD\ 1.07$ ).

Moreover, we found significant interactions between study field and student groups on experienced sex-based discrimination (Figure 1), anticipated sex-based discrimination (Figure 2), and experienced sexual orientation-based discrimination (Figure 3). A marginally significant interaction was also found on anticipated sexual

<sup>6</sup> We acknowledge that pooling these student groups into one is not ideal while we have reasons to believe they may differ with regard to our outcomes. This is discussed as a limitation of our research.

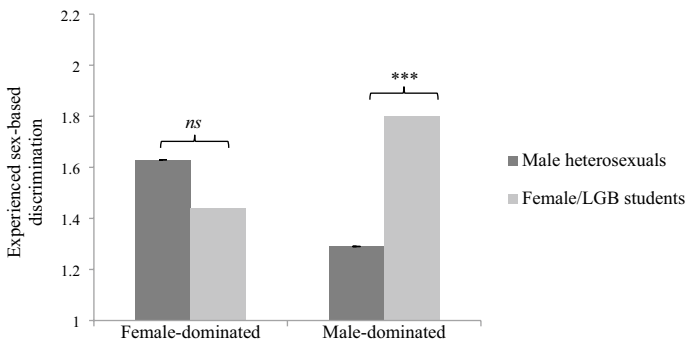
<sup>7</sup> Note that this analysis was re-run with age included as a covariate. We found that age was not significantly associated with any of the DVs (all  $ps < .18$ ), and all the effects described here remained unchanged with this covariate.

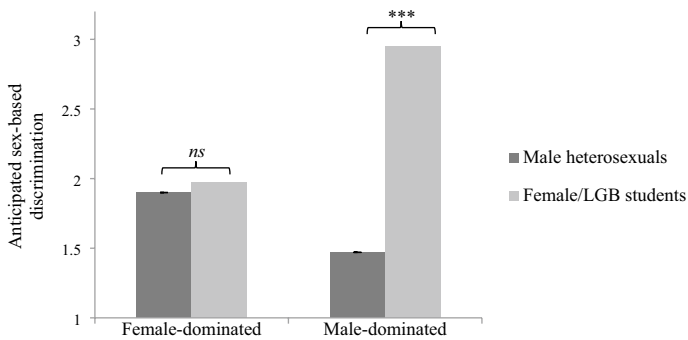
**Table 1** Means (and SDs) of hegemonic masculinity, sexism, homophobia, and perceived discrimination as a function of fields of study and student groups

	Female-dominated field		Male-dominated field	
	Male heterosexuals ( <i>n</i> = 40)	Female/LGB students ( <i>n</i> = 95)	Male heterosexuals ( <i>n</i> = 157)	Female/LGB students ( <i>n</i> = 39)
HM	3.02 (0.29)	2.72 (0.46)	3.32 (0.43)	3.14 (0.49)
Benevolent Sexism	2.97 (1.04)	2.74 (1.05)	3.69 (0.97)	3.23 (0.98)
Hostile Sexism	3.55 (1.26)	2.79 (1.17)	4.07 (1.14)	3.05 (1.47)
Homophobia	3.19 (0.88)	2.43 (0.98)	3.56 (1.06)	2.73 (1.17)
Experienced Sex-based Discrimination	1.63 (0.70)	1.44 (0.57)	1.29 (0.50)	1.80 (1.11)
Anticipated Sex-based Discrimination	1.90 (1.02)	1.97 (1.02)	1.47 (0.87)	2.95 (1.75)
Experienced sexual orientation-based discrimination	1.19 (0.79)	1.13 (0.46)	1.07 (0.43)	1.42 (1.05)
Anticipated sexual orientation-based discrimination	1.77 (1.06)	1.90 (1.15)	1.55 (0.98)	2.21 (1.28)

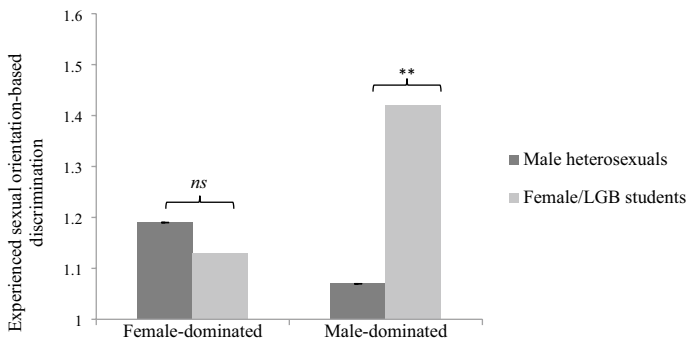
**Table 2** Main effects of student group and fields of study and their interactions

<b>Student groups</b>	
Hegemonic Masculinity	$F(1, 323) = 16.98, p < 0.001, \eta_p^2 = 0.05$
Benevolent Sexism	$F(1, 323) = 6.88, p = 0.009, \eta_p^2 = 0.02$
Hostile Sexism	$F(1, 323) = 31.60, p < 0.001, \eta_p^2 = 0.09$
Homophobia	$F(1, 323) = 34.25, p < 0.001, \eta_p^2 = 0.10$
Experienced Sex-based Discrimination	$F(1, 323) = 3.77, p = 0.053, \eta_p^2 = 0.01$
Anticipated Sex-based Discrimination	$F(1, 323) = 30.54, p < 0.001, \eta_p^2 = 0.09$
Experienced sexual orientation-based discrimination	$F(1, 323) = 3.45, p = 0.064, \eta_p^2 = 0.01$
Anticipated sexual orientation-based discrimination	$F(1, 323) = 7.82, p = 0.005, \eta_p^2 = 0.02$
<b>Fields of study</b>	
Hegemonic Masculinity	$F(1, 323) = 40.57, p < 0.001, \eta_p^2 = 0.11$
Benevolent Sexism	$F(1, 323) = 21.22, p < 0.001, \eta_p^2 = 0.06$
Hostile Sexism	$F(1, 323) = 6.01, p = 0.015, \eta_p^2 = 0.02$
Homophobia	$F(1, 323) = 6.15, p = 0.014, \eta_p^2 = 0.02$
Experienced Sex-based Discrimination	$F(1, 323) = 0.02, p = 0.878, \eta_p^2 < .01$
Anticipated Sex-based Discrimination	$F(1, 323) = 3.93, p = 0.048, \eta_p^2 = 0.01$
Experienced sexual orientation-based discrimination	$F(1, 323) = 1.23, p = 0.268, \eta_p^2 < .01$
Anticipated sexual orientation-based discrimination	$F(1, 323) = 0.08, p = 0.773, \eta_p^2 < .01$
<b>Student groups*Fields of study</b>	
Hegemonic Masculinity	$F(1, 323) = 1.13, p = 0.289, \eta_p^2 < .01$
Benevolent Sexism	$F(1, 323) = 0.78, p = 0.379, \eta_p^2 < .01$
Hostile Sexism	$F(1, 323) = 0.67, p = 0.414, \eta_p^2 < .01$
Homophobia	$F(1, 323) = 0.06, p = 0.806, \eta_p^2 < .01$
Experienced Sex-based Discrimination	$F(1, 323) = 17.37, p < 0.001, \eta_p^2 = 0.05$
Anticipated Sex-based Discrimination	$F(1, 323) = 25.27, p < 0.001, \eta_p^2 = 0.07$
Experienced sexual orientation-based discrimination	$F(1, 323) = 7.42, p = 0.007, \eta_p^2 = 0.02$
Anticipated sexual orientation-based discrimination	$F(1, 323) = 3.45, p = 0.064, \eta_p^2 = 0.01$

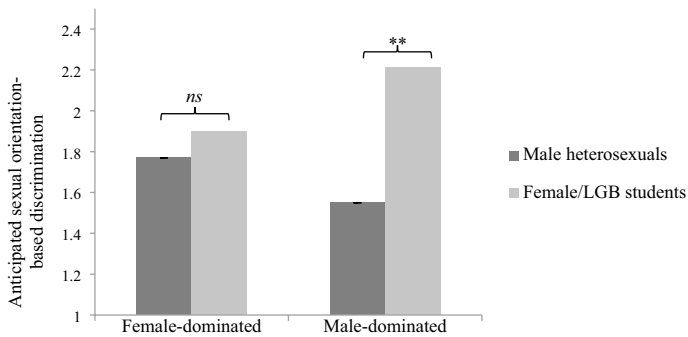

**Figure 1** Experienced sex-based discrimination as a function of fields of study and student groups



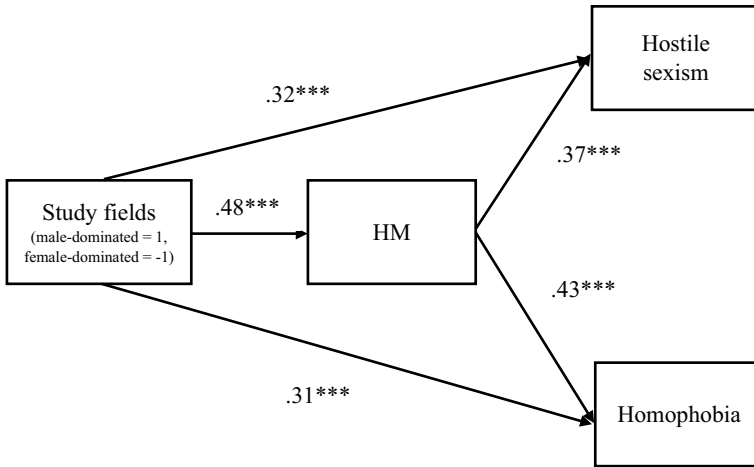
**Figure 2** Anticipated sex-based discrimination as a function of fields of study and student groups



**Figure 3** Experienced sexual orientation-based discrimination as a function of fields of study and student groups



**Figure 4** Anticipated sexual orientation-based sex-based discrimination as a function of fields of study and student groups



**Figure 5** Mediations. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

orientation-based discrimination (Figure 4). No interaction effects were found on HM, sexism, and homophobia.

Decompositions of these interactions showed that, in MDFS, female/LGB students experienced more sex-based discrimination than heterosexual male students,  $F(1, 323) = 19.93$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.06$ , anticipated more sex-based discrimination than heterosexual male students,  $F(1, 323) = 59.60$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.16$ , experienced more sexual orientation-based discrimination than heterosexual male students  $F(1, 323) = 11.24$ ,  $p = 0.001$ ,  $\eta_p^2 = 0.03$ , and anticipated more sexual orientation-based discrimination than heterosexual male students,  $F(1, 323) = 11.59$ ,  $p = 0.001$ ,  $\eta_p^2 = 0.04$ . In female-dominated fields of study, we did not find any differences between student groups on experienced sex-based discrimination,  $F(1, 323) = 2.33$ ,  $p = 0.128$ ,  $\eta_p^2 = 0.007$ , anticipated sex-based discrimination,  $F(1, 323) = 0.42$ ,  $p = 0.520$ ,  $\eta_p^2 = 0.001$ , experienced sexual orientation-based discrimination,  $F(1, 323) = 0.352$ ,  $p = 0.554$ ,  $\eta_p^2 = 0.001$ , and anticipated sexual orientation-based discrimination,  $F(1, 323) = 0.416$ ,  $p = 0.520$ ,  $\eta_p^2 = 0.001$ .

### Mediation analyses

Given that we predicted that enrollment in MDFS would lead to greater conformity with HM, which in turn would result in higher sexist and homophobic attitudes, we tested whether HM mediates the effects of study fields on both sexism (hostile and benevolent) and homophobia. We run mediation analyses by using the PROCESS macro with 5,000 bootstrap re-samples (Model 4). As hypothesized, we found that HM mediated the relationship between fields of study and hostile sexism,  $B = 0.39$ ,  $SE = 0.07$ , 95% CI [0.267, 0.521], and homophobia,  $B = 0.36$ ,  $SE = 0.08$ , 95% CI [0.200, 0.539]; see Figure 5). The effect of benevolent sexism was not mediated by HM,  $B = 0.02$ ,  $SE = 0.06$ , 95% CI [-0.106, 0.142].

## Discussion

The present research examined the endorsement of HM, sexism, and homophobia, and perceived discrimination among heterosexual male and female, and LGB students enrolled in typically male-dominated study fields (vs. female-dominated) in VET upper-secondary schools. Our results showed that heterosexual male students adhered more to HM, sexism, and homophobia than female and LGB students. This is in line with extensive past literature (e.g., Glick & Fiske, 1996; Herek, 1986). Moreover, we found that students from MDFS reported higher adherence to HM, sexism, and homophobia than those from female-dominated fields of study. This is also consistent with previous studies showing that male-dominated occupational environments tend to promote a masculine culture and typical masculine traits (e.g., Cheryan et al., 2017), and cultivate sexist and heterosexist climates (Cech & Waidzun, 2011; Fernández et al., 2006; Hugues, 2017; Kuchynka et al., 2018). Interestingly, MDFS students were found with higher HM, sexism, and homophobia, regardless of their sex and sexual orientation. This suggests that MDFS are environments sharing a consensus about masculine ideologies and attitudes toward women and LGB people. Not only heterosexual men hold and accept them, but also female and LGB students who equally seek to defend a widespread conception of masculinity and, more broadly, gender differences (see Connell, 1995). Through the endorsement of HM, sexism, and homophobia in MDFS, it may well be that female and LGB students internalize their stigmatization and justify heterosexual men's dominance in male-dominated occupational domains (see Glick et al., 2000; Jost & Kay, 2005; Pacilli et al., 2011). Moreover, we found that adherence to HM mediated the relationships between fields of study and both hostile sexism and homophobia. This indicates that explicitly sexist and homophobic climates in MDFS partly result from conformity to a broader cultural ideology that defines masculinity through rejection of femininity and homosexuality in a way to legitimize masculine domination and maintain gender differentiation.

As predicted, we found that female and LGB students who were enrolled in MDFS experienced and anticipated more discrimination than heterosexual male students. This is in line with a large body of research emphasizing high levels of discrimination among women (e.g., Dresden et al., 2018; Settles et al., 2006) and LGB students in STEM fields (e.g., Cech & Waidzun, 2011; Hugues, 2017). Despite that we did not examine directly whether heterosexual male students' sexism and homophobia predict female and LGB students' perceived discrimination, we nevertheless add to the literature by showing that discrimination occurred along with an overall sexist and homophobic climate prevailing in MDFS. Paradoxically, although female and LGB students may adhere to and contribute to the maintenance of this climate as much as heterosexual men do, they are more likely to suffer from its consequences and to be rejected. In female-dominated fields of study, in contrast, perceived discrimination did not differ between heterosexual male students and the other students. Because traditional male identity is less salient in these fields and there is a reduced need to defend masculinity, sexist, and homophobic attitudes



are then less prominent, which, in turn, reduces discrimination experiences among female and LGB students.

Taken as a whole, these results suggest that not only stereotypes about MDFS may come into play in women and LGB students' experiences of discrimination, but also sexist and homophobic attitudes that most students share within MFDS and that create a hostile climate for the minority student groups. In addition, our research has demonstrated that masculine ideologies are important factors to understand why such attitudes and climate develop in MFDS. In traditional masculine environments, both women and men seek to defend an idealized definition of masculine identity that rejects women and LGB people in order to maintain gender differentiation and status quo.

By shedding light on the psychological factors that contribute to slowing down the pursuit of female and LGB students in MFDS, the present work has also important practical implications on aspects of career development and may reveal particularly useful for career counsellors. Even though the current investigation did not address students' career trajectories, we reasonably assume that a discriminatory climate can lead female and LGB students to increased school disengagement and dropout (e.g., Casad et al., 2019; Ceci et al., 2009; Hugues, 2017, 2018). In this perspective, students' normal career advancements may be strongly jeopardized by discrimination experiences encountered at school, and also, more generally, by the beliefs that underlie discrimination. Therefore, in the prospect of promoting the integration and retention of female and LGB students in MFDS, particular attention should be paid to gender-based and sexual orientation-based discrimination, and significant efforts should focus on tackling students' endorsement of homophobic and sexist ideologies.

More specifically, the current findings suggest opting for the development of interventions aimed at deconstructing traditional conceptions of masculinity and raising students' awareness of how such conceptions end up affecting the health and educational background of the minority student groups. We recommend implementing educational programs that can be able to modify hostile and stereotypical beliefs against women and LGB people as a means to create a favorable climate for them and, ultimately, help them develop a greater sense of school belongingness and pursue successful careers in MDFS. For example, Moss-Racusin et al. (2018a, b) demonstrated that the use of short videos that depict empirical findings from gender-related scientific research can be effective in improving awareness of gender bias, fostering better attitudes toward women in STEM, and supporting gender parity in STEM. Similarly, educational resources or interventions designed to raise teachers' or any instructors' awareness about discrimination and give them instructions about how to act to prevent the spread of sexism and homophobia should be provided. This would allow them to be adequately equipped to counteract discrimination, hinder the development of a sexist or homophobic climate in the classroom, and reduce the risks of disengagement and dropout among the minority student groups.

## Limitations and future research directions

Our research must be considered in light of some limitations. A first limitation is that our participants were upper-secondary students, enrolled in VET-schools in Switzerland (where men and socioeconomically disadvantaged students are over-represented, regardless of the sex-type of the fields). Therefore, it may be imprudent to generalize our results to the general population of students. Future research would need thus to be conducted on other populations and in other school settings. A second limitation pertains to our sample sizes. Due to low initial samples sizes, we decided to group together heterosexual women, LGB men and women. However, this has prevented us from considering an intersectional approach including sex, sexual orientation, and field of study. Yet, one may assume that perceived discrimination in MDFS may differ between gay men and lesbian women for example. As lesbian women are more associated with masculine traits than gay men (Kite & Deaux, 1987), they may not transgress norms in accessing a MDFS to the same extent as gay men, and may therefore be better accepted. It is important to note that this limitation could hardly be addressed. These low sample sizes are a reflection of reality in vocational schools in Switzerland and the results of gender inequalities in students' career choices. Moreover, achieving larger sample sizes with these populations would probably require recruiting students outside VET, which did not match our prior research objectives. A third limitation is that our research was not able to probe whether endorsement of HM, sexism, and homophobia results from a self-selection or socialization effect. Do students with greater conformity to HM self-select into MDFS, or does entering a MDFS incite students to conform to HM and develop sexist and homophobic attitudes? Further research with longitudinal designs is needed to address this issue and differentiate between both effects. Finally, it should be noted that we exclusively used a quantitative methodology and self-reported measures, which can increase the risk that participants respond in a way "to look good", that is, in line with egalitarian gender norms. Using alternative methods, such as qualitative methods or implicit measures, should be considered for future research to enrich the understanding of issues of concern and bypass the problems of social desirability.

## Conclusion

Despite positive evolutions, the choice of MDFS remains marginal for female and LGB students. It has therefore become a necessity for education policies to invest further efforts into promoting diversity. Indeed, MDFS, as well as all fields in general, can receive numerous benefits to be more inclusive of students from minority groups. Fostering diversity in the classroom is important for minority students to create safe learning environments (Juvonen et al., 2018) and, as a result, improve a sense of school belonging, performance, and graduation. By bringing divergent opinions and perspectives, the presence of diversity can also be beneficial to students from majority groups for developing critical thinking and cognitive skills

(Pascarella et al., 2014). For example, Nielsen et al. (2017) have shown that the integration of women in science has been profitable for developing scientific knowledge and encouraging innovation and creativity within work teams. More broadly, diversity and inclusivity allow tackling inequalities in the job market by offering opportunities for minority groups to access highly valued positions and to reduce prejudice and discrimination practices.

Another concern is to encourage the retention of minority populations in MDFS and prevent them from dropping out. As our results showed, discrimination that women and LGB students experience in these fields is particularly strong. This may then be decisive in students' motivation for leaving school. Therefore, it is central to question students' discriminatory experiences in order to limit the risks of drop-out. As we have demonstrated here, taking into account the role of the ideological climate is fundamental to improving our understanding of the causes of discrimination and dropout motivations. Dropping out from MDFS does not only reflect an individual choice or a personal disinterest in the career but may also reflect the adverse consequences of social norms and hegemonic conceptions about gender and masculinity.

**Acknowledgements** We would like to thank Mikael Chappatte, Julien Chevillard, and Anaïs Frossard for their help in collecting data.

**Funding** Open access funding provided by University of Lausanne. The authors received no financial support for this research.

## Declarations

**Conflict of interest** No potential competing interest was reported by the authors.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Ahlqvist, S., London, B., & Rosenthal, L. (2013). Unstable identity compatibility: How gender rejection sensitivity undermines the success of women in science, technology, engineering, and mathematics fields. *Psychological Science*, 24(9), 1644–1652. <https://doi.org/10.1177/0956797613476048>
- Anderson, J. R., Koc, Y., & Falomir-Pichastor, J. M. (2018). The English version of the Attitudes Toward Homosexuality Scale. *Swiss Journal of Psychology*, 77(3), 117–126. <https://doi.org/10.1024/1421-0185/a000210>
- Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, 88(4), 354–364. <https://doi.org/10.1037/0033-295X.88.4.354>

- Bosson, J. K., & Michniewicz, K. S. (2013). Gender dichotomization at the level of ingroup identity: What it is, and why men use it more than women. *Journal of Personality and Social Psychology*, 105(3), 425–442. <https://doi.org/10.1037/a0033126>
- Bosson, J. K., & Vandello, J. A. (2011). Precarious manhood and its links to action and aggression. *Current Directions in Psychological Science*, 20(2), 82–86. <https://doi.org/10.1177/0963721411402669>
- Bosson, J. K., Vandello, J. A., Burnaford, R. M., Weaver, J. R., & Arzu Wasti, S. (2009). Precarious manhood and displays of physical aggression. *Personality and Social Psychology Bulletin*, 35(5), 623–634. <https://doi.org/10.1177/0146167208331161>
- Brown, H. (2008). Gender bias remains prevalent in the biological sciences. *Molecular Oncology*, 2(4), 293–295. <https://doi.org/10.1016/j.molonc.2008.07.006>
- Carli, L. L., Alawa, L., Lee, Y., Zhao, B., & Kim, E. (2016). Stereotypes about gender and science: Women ≠ scientists. *Psychology of Women Quarterly*, 40(2), 244–260. <https://doi.org/10.1177/0361684315622645>
- Casad, B. J., Petzel, Z. W., & Ingalls, E. A. (2019). A model of threatening academic environments predicts women STEM majors' self-esteem and engagement in STEM. *Sex Roles*, 80(7–8), 469–488. <https://doi.org/10.1007/s11199-018-0942-4>
- Cech, E. A., & Waidzun, T. J. (2011). Navigating the heteronormativity of engineering: The experiences of lesbian, gay, and bisexual students. *Engineering Studies*, 3(1), 1–24. <https://doi.org/10.1080/19378629.2010.545065>
- Ceci, S. J., Williams, W. M., & Barnett, S. M. (2009). Women's underrepresentation in science: Socio-cultural and biological considerations. *Psychological Bulletin*, 135(2), 218–261. <https://doi.org/10.1037/a0014412>
- Cejka, M. A., & Eagly, A. H. (1999). Gender-stereotypic images of occupations correspond to the sex segregation of employment. *Personality and Social Psychology Bulletin*, 25(4), 413–423. <https://doi.org/10.1177/0146167299025004002>
- Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, 97(6), 1045–1060. <https://doi.org/10.1037/a0016239>
- Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, 143(1), 1–35. <https://doi.org/10.1037/bul0000052>
- Connell, R. W. (1995). *Masculinities*. Polity Press.
- Cottingham, M. D., Erickson, R. J., & Diefendorff, J. M. (2015). Examining men's status shield and status bonus: How gender frames the emotional labor and job satisfaction of nurses. *Sex Roles*, 72(7–8), 377–389. <https://doi.org/10.1007/s11199-014-0419-z>
- Dardenne, B., Delacollette, N., Grégoire, C., & Lécocq, D. (2006). Latent structure of the French validation of the Ambivalent Sexism Inventory. *L'année Psychologique*, 106(2), 235–264. <https://doi.org/10.4074/S0003503306002041>
- Dresden, B. E., Dresden, A. Y., Ridge, R. D., & Yamawaki, N. (2018). No girls allowed: Women in male-dominated majors experience increased gender harassment and bias. *Psychological Reports*, 121(3), 459–474. <https://doi.org/10.1177/0033294117730357>
- Falomir-Pichastor, J. M., & Hegarty, P. (2014). Maintaining distinctions under threat: Heterosexual men endorse the biological theory of sexuality when equality is the norm. *British Journal of Social Psychology*, 53(4), 731–751. <https://doi.org/10.1111/bjso.12051>
- Falomir-Pichastor, J. M., & Mugny, G. (2009). “I’m not gay. . . . I’m a real man!”: Heterosexual men's gender self-esteem and sexual prejudice. *Personality and Social Psychology Bulletin*, 35(9), 1233–1243. <https://doi.org/10.1177/0146167209338072>
- Fernández, M. L., Castro, Y. R., Otero, M. C., Foltz, M. L., & Lorenzo, M. G. (2006). Sexism, vocational goals, and motivation as predictors of men's and women's career choice. *Sex Roles*, 55(3–4), 267–272. <https://doi.org/10.1007/s11199-006-9079-y>
- Glick, P., & Fiske, S. T. (1996). The Ambivalent Sexism Inventory: Differentiating hostile and benevolent sexism. *Journal of Personality and Social Psychology*, 70(3), 491–512. <https://doi.org/10.1037/0022-3514.70.3.491>
- Glick, P., Fiske, S. T., Mladinic, A., Saiz, J. L., Abrams, D., Masser, B., Adetoun, B., Osagie, J. E., Akande, A., Alao, A., Brunner, A., Willemsen, T. M., Chipeta, K., Dardenne, B., Dijksterhuis, A., Wigboldus, D., Eckes, T., Six-Materna, I., Expósito, F., . . . López López, W. (2000). Beyond prejudice as simple antipathy: Hostile and benevolent sexism across cultures. *Journal of Personality and Social Psychology*, 79(5), 763–775. <https://doi.org/10.1037/0022-3514.79.5.763>

- Good, J. J., Woodzicka, J. A., & Wingfield, L. C. (2010). The effects of gender stereotypic and counter-stereotypic textbook images on science performance. *The Journal of Social Psychology, 150*(2), 132–147. <https://doi.org/10.1080/00224540903366552>
- Heilman, M. E., & Wallen, A. S. (2010). Wimpy and undeserving of respect: Penalties for men's gender-inconsistent success. *Journal of Experimental Social Psychology, 46*(4), 664–667. <https://doi.org/10.1016/j.jesp.2010.01.008>
- Herek, G. M. (1986). On heterosexual masculinity: Some psychical consequences of the social construction of gender and sexuality. *American Behavioral Scientist, 29*(5), 563–577. <https://doi.org/10.1177/000276486029005005>
- Herek, G. M. (1988). Heterosexuals' attitudes toward lesbians and gay men: Correlates and gender differences. *Journal of Sex Research, 25*(4), 451–477. <https://doi.org/10.1080/00224498809551476>
- Hugues, B. E. (2017). Managing by not managing: How gay engineering students manage sexual orientation. *Journal of College Student Development, 58*(3), 385–401. <https://doi.org/10.1353/csd.2017.0029>
- Hugues, B. E. (2018). Coming out in STEM: Factors affecting retention of sexual minority STEM students. *Science Advances, 4*(3), eaao6373. <https://doi.org/10.1126/sciadv.aao6373>
- Inzlicht, M., & Ben-Zeev, T. (2000). A threatening intellectual environment: Why females are susceptible to experiencing problem-solving deficits in the presence of males. *Psychological Science, 11*(5), 365–371. <https://doi.org/10.1111/1467-9280.00272>
- Jost, J. T., & Kay, A. C. (2005). Exposure to benevolent sexism and complementary gender stereotypes: Consequences for specific and diffuse forms of system justification. *Journal of Personality and Social Psychology, 88*(3), 498–509. <https://doi.org/10.1037/0022-3514.88.3.498>
- Juvonen, J., Kogachi, K., & Graham, S. (2018). When and how do students benefit from ethnic diversity in middle school? *Child Development, 89*(4), 1268–1282. <https://doi.org/10.1111/cdev.12834>
- Kilianski, S. E. (2003). Explaining heterosexual men's attitudes toward women and gay men: The theory of exclusively masculine identity. *Psychology of Men & Masculinity, 4*(1), 37–56. <https://doi.org/10.1037/1524-9220.4.1.37>
- Kimmel, M. S. (2012). *Manhood in America*. Oxford University Press.
- Kite, M. E., & Deaux, U. (1987). Gender belief systems: Homosexuality and the implicit inversion theory. *Psychology of Women Quarterly, 11*(1), 83–96. <https://doi.org/10.1111/j.1471-6402.1987.tb00776.x>
- Kisiel, M. A., Kühner, S., Stolare, K., Lampa, E., Wohlin, M., Johnston, N., & Andersen, A. R. (2020). Medical students' self-reported gender discrimination and sexual harassment over time. *BMC Medical Education, 20*, 503. <https://doi.org/10.1186/s12909-020-02422-9>
- Kuchynka, S. L., Salomon, K., Bosson, J. K., El-Hout, M., Kiebel, E., Cooperman, C., & Toomey, R. (2018). Hostile and benevolent sexism and college women's STEM outcomes. *Psychology of Women Quarterly, 42*(1), 72–87. <https://doi.org/10.1177/0361684317741889>
- Lamamra, N. (2011). La formation professionnelle en alternance, un lieu de transmission des normes de genre ? [Alternate vocational education and training, a place of gender standards transmission?]. *Psychologie Du Travail Et Des Organisations, 17*(4), 330–345. [https://doi.org/10.1016/S1420-2530\(16\)30106-6](https://doi.org/10.1016/S1420-2530(16)30106-6)
- Mahalik, J. R., Locke, J. D., Ludlow, L. H., Diemer, M. A., Scott, R. P. J., Gottfried, M., & Freitas, G. (2003). Development of the conformity to masculine norms inventory. *Psychology of Men & Masculinity, 4*(1), 3–25. <https://doi.org/10.1037/1524-9220.4.1.3>
- Makarova, E., Aeschlimann, B., & Herzog, W. (2016). Why is the pipeline leaking? Experiences of young women in STEM vocational education and training and their adjustment strategies. *Empirical Research in Vocational Education and Training, 1*. <https://doi.org/10.1186/s40461-016-0027-y>
- Michniewicz, K. S., & Vandello, J. A. (2015). People judge male sexism more leniently when women emasculate men. *Social Psychology, 46*(4), 197–209. <https://doi.org/10.1027/1864-9335/a000227>
- Moss-Racusin, C. A., Pietri, E. S., Hennes, E. P., Dovidio, J. F., Brescoll, V. L., Roussos, G., & Handelsman, J. (2018a). Reducing STEM gender bias with VIDS (video interventions for diversity in STEM). *Journal of Experimental Psychology: Applied, 24*(2), 236–260. <https://doi.org/10.1037/xap0000144>
- Moss-Racusin, C. A., Sanzari, C., Caluori, N., & Rabascpo, H. (2018b). Gender bias produces gender gaps in STEM engagement. *Sex Roles, 79*, 651–670. <https://doi.org/10.1007/s11199-018-0902-z>
- Murray, S. L., Meinholdt, C., & Bergmann, L. S. (1999). Addressing gender issues in the engineering classrooms. *Feminist Teacher, 12*(3), 169–183.

- Nielsen, M. W., Alegria, S., Börjeson, L., Etzkowitz, H., Falk-Krzesinski, H. J., Joshi, A., Leahey, E., Smith-Doerr, L., Woolley, A. W., & Schiebinger, L. (2017). Opinion: Gender diversity leads to better science. *Proceedings of the National Academy of Sciences of the United States of America*, 114(8), 1740–1742. <https://doi.org/10.1073/pnas.1700616114>
- Nosek, B. A., Smyth, F. L., Sriram, N., Lindner, N. M., Devos, T., Ayala, A., Bar-Anan, Y., Bergh, R., Cai, H., Gonsalkorale, K., Kesebir, S., Maliszewski, N., Neto, F., Olli, E., Park, J., Schnabel, K., Shiomura, K., Tulbure, B. T., Wiers, R. W., ... Greenwald, A. G. (2009). National differences in gender–science stereotypes predict national sex differences in science and math achievement. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, 106(26), 10593–10597. <https://doi.org/10.1073/pnas.0809921106>
- O'Brien, K. R., McAbee, S. T., Hebl, M. R., & Rodgers, J. R. (2016). The impact of interpersonal discrimination and stress on health and performance for early career STEM academicians. *Frontiers in Psychology*, 7, 615. <https://doi.org/10.3389/fpsyg.2016.00615>
- O'Connor, E. C., Ford, T. E., & Banos, N. C. (2017). Restoring threatened masculinity: The appeal of sexist and anti-gay humor. *Sex Roles*, 77(9–10), 567–580. <https://doi.org/10.1007/s11199-017-0761-z>
- Office pour l'Orientation, la Formation Professionnelle et Continue. (2019). *Formation professionnelle: Objectifs 2019–2023*. Retrieved from <https://www.ge.ch/document/formation-professionnelle-objectifs-2019-2023-office-orientation-formation-professionnelle-continue-ofpc-geneve/telecharger>.
- Office Fédéral de la Statistique. (2019a). *Entrées dans les hautes écoles universitaires au niveau diplôme bachelor selon le groupe de domaines d'études*. Retrieved from <https://www.bfs.admin.ch/bfs/fr/home/statistiques/situation-economique-sociale-population/egalite-femmes-hommes/formation/choix-professionnels-etudes.assetdetail.9887042.html>.
- Office Fédéral de la Statistique. (2019b). *Formation professionnelle initiale: Tableaux de base*. Retrieved from <https://www.bfs.admin.ch/bfs/fr/home/statistiques/education-science/diplomes/degre-secon-daire-II/professionnelle-initiale.assetdetail.12307127.html>.
- Pacilli, M. G., Taurino, A., Jost, J. T., & van der Toorn, J. (2011). System justification, right-wing conservatism, and internalized homophobia: Gay and lesbian attitudes toward same-sex parenting in Italy. *Sex Roles*, 65, 580. <https://doi.org/10.1007/s11199-011-9969-5>
- Parnell, M., Lease, S., & Green, M. (2012). Perceived career barriers for gay, lesbian, and bisexual individuals. *Journal of Career Development*, 39(3), 249–268. <https://doi.org/10.1177/0894845310386730>
- Parrott, D. J., Peterson, J. L., & Bakeman, R. (2011). Determinants of aggression toward sexual minorities in a community sample. *Psychology of Violence*, 1(1), 41–52. <https://doi.org/10.1037/a0021581>
- Pascarella, E. T., Martin, G. L., Hanson, J. M., Trolan, T. L., Gillig, B., & Blaich, C. (2014). Effects of diversity experiences on critical thinking skills over 4 years of college. *Journal of College Student Development*, 55(1), 86–920. <https://doi.org/10.1353/csd.2014.0009>
- Pew Research Center. (2018). *Women and men in STEM often at odds over workplace equity*. Retrieved from [https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2018/01/PS\\_2018.01.09\\_STEM\\_FINAL.pdf](https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2018/01/PS_2018.01.09_STEM_FINAL.pdf).
- Robnett, R. D. (2016). Gender bias in STEM fields: Variation in prevalence and links to STEM self-concept. *Psychology of Women Quarterly*, 40(1), 65–79. <https://doi.org/10.1177/0361684315596162>
- Schmitt, M. T., Branscombe, N. R., Kobrynowicz, D., & Owen, S. (2002). Perceiving discrimination against one's gender group has different implications for well-being in women and men. *Personality and Social Psychology Bulletin*, 28(2), 197–210. <https://doi.org/10.1177/0146167202282006>
- Seron, C., Silbey, S. S., Cech, E., & Rubineau, B. (2016). Persistence is cultural: Professional socialization and the reproduction of sex segregation. *Work and Occupations*, 43(2), 178–214. <https://doi.org/10.1177/0730888415618728>
- Settles, I. H., Cortina, L. M., Malley, J., & Stewart, A. J. (2006). The climate for women in academic science: The good, the bad, and the changeable. *Psychology of Women Quarterly*, 30(1), 47–58. <https://doi.org/10.1111/j.1471-6402.2006.00261.x>
- Simpson, R. (2004). Masculinity at work: The experiences of men in female-dominated occupations. *Work, Employment and Society*, 18(2), 349–368. <https://doi.org/10.1177/09500172004042773>
- Smith, R. M., Parrott, D. J., Swartout, K. M., & Tharp, A. T. (2015). Deconstructing hegemonic masculinity: The roles of antifemininity, subordination to women, and sexual dominance in men's perpetration of sexual aggression. *Psychology of Men & Masculinity*, 16(2), 160–169. <https://doi.org/10.1037/a0035956>

- Steele, J., James, J. B., & Barnett, R. C. (2002). Learning in a man's world: Examining the perceptions of undergraduate women in male-dominated academic areas. *Psychology of Women Quarterly*, 26(1), 46–50. <https://doi.org/10.1111/1471-6402.00042>
- Stout, J., & Wright, H. (2016). Lesbian, gay, bisexual, transgender, and queer students' sense of belonging in computing: An intersectional approach. *Computing in Science & Engineering*, 18(3), 24–30. <https://doi.org/10.1109/MCSE.2016.45>
- Vandello, J. A., & Bosson, J. K. (2013). Hard won and easily lost: A review and synthesis of theory and research on precarious manhood. *Psychology of Men & Masculinity*, 14(2), 101–113. <https://doi.org/10.1037/a0029826>
- Vandello, J. A., Bosson, J. K., Cohen, D., Burnaford, R. M., & Weaver, J. R. (2008). Precarious manhood. *Journal of Personality and Social Psychology*, 95(6), 1325–1339. <https://doi.org/10.1037/a0012453>
- Williams, C. (1992). The glass escalator: Hidden advantages for men in the “female” professions. *Social Problems*, 39(3), 253–267. <https://doi.org/10.2307/3096961>
- Yoder, J. B., & Mattheis, A. (2016). Queer in STEM: Workplace experiences reported in a national survey of LGBTQA individuals in science, technology, engineering, and mathematics careers. *Journal of Homosexuality*, 63(1), 1–27. <https://doi.org/10.1080/00918369.2015.1078632>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.