SOCIAL SCIENCES

The intersectional privilege of white able-bodied heterosexual men in STEM

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A foundational assumption of science, technology, engineering, and math (STEM) inequality research is that members of the most well represented demographic group—white able-bodied heterosexual men (WAHM)—are uniquely privileged in STEM. But is this really the case? Using survey data of U.S. STEM professionals (*N* = 25,324), this study examines whether WAHM experience better treatment and rewards in STEM compared with members of all 31 other intersectional gender, race, sexual identity, and disability status categories. Indicating systematic advantages accompanying WAHM status, WAHM experience more social inclusion, professional respect, and career opportunities, and have higher salaries and persistence intentions than STEM professionals in 31 other intersectional groups. Decomposition analyses illustrate that these advantages operate in part as premiums—benefits attached to WAHM status that cannot be attributed to variation in human capital, work effort, and other factors. These findings motivate research and policy efforts to move beyond a single axis paradigm to better understand and address intersectional (dis)advantages in STEM.

INTRODUCTION

The diversification of science, technology, engineering, and math (STEM) fields has largely stagnated over the past 2 decades, despite substantial national and institutional investments aimed at recruiting and retaining underrepresented populations (*1*, *2*). This trend is concerning not only because more diverse groups of problem solvers tend to produce more innovative and creative solutions (*3*–*5*) but also because it indicates that STEM is failing to live up to its goals of equity in opportunities and outcomes.

Scholars have made important strides in documenting the extent and forms of disadvantage that women and members of minoritized racial/ethnic groups face in STEM (*6*–*10*) and have started to demonstrate that similar disadvantages exist for lesbian, gay, bisexual, transgender, and queer (LGBTQ)–identifying persons and persons with disabilities (*11*–*15*). Such research reveals that inequality in STEM not only is an issue of (under)representation but also involves processes of marginalization and devaluation at the structural, cultural, and interpersonal levels (*9*, *16*).

Despite these advancements, STEM inequality research has largely operated within a single-axis paradigm, focusing on only one dimension of inequality (e.g., gender or race or LGBTQ status) at a time. Scholarship in the single-axis paradigm has been vital for revealing sexism, racism, heteronormativity, and ableism in STEM education and STEM workplaces, yet reliance on this paradigm has facilitated two gaps in STEM inequality research: lagged attention to intersectional patterns of inequality and lack of investigation into structural and cultural processes of privilege (*17*, *18*).

These gaps have meant that a fundamental assumption of STEM inequality research has largely gone untested: that the most well-represented and presumed most socially advantaged population in STEM—white heterosexual men without disabilities—experience the most respect and rewards in STEM, compared with all other demographic groups. Although the culmination of existing research would seem to suggest that persons privileged along each of these axes would be best able to avoid negative work experiences in STEM, little research has investigated these intersectional (dis)advantages directly. Do white able-bodied heterosexual men (WAHM) really experience privileges in the STEM workforce unique to their intersectional status? If so, can these privileges be explained by systematic differences between WAHM and non-WAHM in qualifications and job type, or do these differences operate in part as premiums on WAHM status—social rewards that accompany this particular demographic status that cannot be accounted for by differences in human capital, job characteristics, work effort, or other factors? Drawing insight from intersectionality and social privilege literatures, this study uses a large, national-level dataset of U.S. STEM professionals to compare the work experiences of WAHM to STEM professionals in 31 other intersectional gender, race, LGBTQ status, and disability status categories.

Intersectional privilege in STEM

In contrast to the single-axis paradigm, the analytic tool of intersectionality considers how inequalities and privileges operating simultaneously along multiple axes of social status create an intersecting matrix of (dis)advantage (*19*, *20*). Rooted in theoretical advancements originating in Black feminist scholarship (*21*), intersectionality emphasizes the role of interconnected power relations and social and cultural structures in processes of inequality (*22*, *23*). Intersectional approaches to inequality attend both to divergent experiences within specific axes of disadvantage (e.g., how gendered processes are also racialized) (*22*) and to the convergence of experiences of disadvantage among different marginalized or minoritized groups compared to intersectionally dominant groups (*22*–*24*). Intersectional approaches have been used by social scientists to study other patterns of social inequality for decades (*25*, *26*) but have only recently begun to make their way into investigations of inequality in STEM (*17*, *18*, *27*–*29*). Yet, intersectionality is indispensable for understanding how sexism, racism, ableism, and heteronormativity are entwined in ways that reinforce intractable patterns of inequality in STEM.

Investigating the experiences of WAHM vis-à-vis other professionals also requires explicit consideration of processes of privilege in STEM. In most STEM inequality research and policy efforts,

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WAHM are taken as the neutral (often unspoken) standard against which the experiences of women, people of color, LGBTQ persons, and persons with disabilities are believed to deviate. However, privilege is not simply an absence of the disadvantages experienced by marginalized and minoritized persons (*30*–*32*); it involves distinct opportunities and benefits that only members of that group have full access to. In STEM, such privilege may be anchored in the historical and contemporary overrepresentation of WAHM, which facilitates processes such as homophily, opportunity hoarding, and "old boys" networks (*33*, *34*). WAHM privilege may also be tied to particular embodiments that are historically and culturally believed to most closely align with definitions of excellence, genius, and objectivity (*35*, *36*). For example, WAHM in STEM are more likely to be assumed by default to be intelligent and to produce work that is free from ulterior motives (*37*–*39*). Thus, WAHM privilege is not only the outcome of being spared from the sexism, racism, ableism, and heterosexism that non-WAHM STEM professionals may encounter, but WAHM may also experience unearned advantages that are culturally attached to their demographic status.

It is not a settled matter that WAHM would experience the greatest levels of inclusion, respect, and rewards in STEM, however. Groups marginalized along multiple axes of difference may experience certain intersectional freedoms that lead to better work experiences, rewards, and respect (*40*), while socially dominant groups may experience constraints on their behaviors and affect that can lead to more negative outcomes (*41*, *42*). Also, not every heterosexual white man without disabilities will experience advantages associated with intersectional privilege. Some WAHM may encounter prejudice and discrimination on the basis of other disadvantaged statuses (e.g., age, nationality, and/or socioeconomic background). Others may be targets of negative workplace treatment disconnected from social status, such as generalized bullying or incivility (*43*).

This study examines whether, in the aggregate, WAHM experience intersectional privileges compared with members of other demographic groups along multiple dimensions of STEM workplace treatment. Empirical limitations of existing data have previously made comprehensive investigation of intersectional privilege difficult (*17*). Past national surveys (e.g., Scientists and Engineers Statistical Data System and U.S. Census supplemental surveys) have insufficient sample sizes of STEM professionals, lack a full suite of demographic measures (e.g., do not include LGBTQ status), or include too few work experience measures to allow for the analysis undertaken here.

The present study uses data from a large national-level survey of 25,324 STEM professionals employed full time in the Unites States, collected as part of the STEM Inclusion Study [SIS; principal investigators (PIs): E.A.C. and T. Waidzunas]. The SIS dataset is composed of representative samples of the members of 21 STEM professional societies, including 8 national flagship societies in the physical, natural, and life sciences and mathematics; 6 interdisciplinary STEM societies; 5 national flagship disciplinary societies in engineering; and 2 STEM teaching–focused societies. The survey encompasses detailed demographic measures, multiple dimensions of work experiences and rewards, and a robust set of job characteristics. Questions include previously validated items as well as novel measures that were pretested and validated for this survey. See Methods and Materials for details.

Hypotheses

Intersectional privileges of WAHM status may manifest within many aspects of STEM work. To capture the possible scope of this privilege, this study examines four dimensions of work experience identified by past research as particularly consequential for STEM careers (*9*, *14*): (i) social inclusion and harassment experiences; (ii) professional respect by colleagues; (iii) career rewards, including salary and advancement opportunities; and (iv) intentions to stay in one's STEM career long term (i.e., persistence intentions). These dimensions are interconnected and mutually reinforcing but conceptually distinct. Their breadth reveals whether WAHM privilege exists only in specific domains (e.g., respect) or whether this privilege is evident across a spectrum of STEM work experiences.

To assess intersectional variation along these dimensions, the sample is disaggregated into 32 intersecting demographic groups by gender (men and women), race [Asian, Black, Latinx and Native American/Pacific Islander (NAAPI), and white], disability status (persons with disabilities and persons without disabilities), and LGBTQ status (LGBTQ and non-LGBTQ). The analyses below compare WAHM's work experiences to those of STEM professionals in the 31 other intersectional groups. See Methods and Materials for detailed operationalization and results from more fine-grained desegregation by gender (including transgender and gender nonbinary persons), race/ethnicity (including multiracial persons), sexual minority status, and disability status.

The culmination of evidence from single-axis paradigm research referenced above would suggest that WAHM may be more likely on average than members of all other groups to experience social inclusion (e.g., to feel like they fit in among colleagues) and less likely to encounter harassment in their STEM jobs (*44*). Reflecting gendered, racialized, heteronormative, and ableist notions of STEM competence and excellence noted above, WAHM may also be more likely on average than members of the 31 other intersectional demographic groups to report that their professional contributions and expertise are respected.

Third, WAHM may enjoy greater work rewards than other STEM professionals. Previous research has identified salary discrepancies in STEM by gender and race (*45*, *46*), and systematic salary gaps may exist by disability and LGBTQ status as well. Alongside monetary rewards, WAHM may be more likely to report career advancement opportunities in their STEM jobs (e.g., access to leadership roles) than their non-WAHM peers. Fourth, due in part to such differences in inclusion, respect, and rewards, WAHM may have the highest persistence intentions of any other group (*8*, *16*). These differences in inclusion, respect, rewards, and persistence may be evident even after accounting for possible variation among groups by education level, age, STEM field, and employment sector. Formally stated:

H1: Compared to WAHM, members of 31 other intersectional gender, race/ethnicity, LGBTQ status, and disability status groups will be less likely to report experiencing social inclusion and more likely to encounter harassment at work, will report less professional respect and career opportunities, will have lower average salaries, and will have lower persistence intentions (controlling for variation among respondents in education level, age, STEM field, and employment sector).

If such WAHM status advantages are identified, the next analytic task to understand WAHM status privilege is to examine whether WAHM's more positive work experiences can be attributed to differences between WAHM and non-WAHM in work and employment characteristics like human capital, work effort, and job type. Perhaps, WAHM tend to work more hours, are more dedicated to their jobs, or have more education on average than other STEM professionals, and this explains their greater inclusion, respect, rewards, and persistence intentions.

Using decomposition analysis, a second set of models examines the extent to which these privileges by WAHM status can be accounted for by systematic differences between WAHM and non-WAHM STEM professionals along five categories of explanatory predictors: human capital, background characteristics, job characteristics, work effort and attitudes, and family responsibilities. Table 1 lists the specific predictors included in each category. Although differences in these characteristics may account for some of the variation in work experiences between WAHM and others, given the cultural and structural processes of privilege and bias noted above, WAHM advantages in inclusion, respect, rewards, and persistence may act in part as premiums—unearned benefits attached to WAHM status that are not accounted for by these explanatory factors.

Table 1. Explanatory predictors by category included in Blinder-Oaxaca decomposition models. See Materials and Methods section for measurement details on each item.

Category	Explanatory factors
Human capital	STEM field (life sciences, physical sciences, mathematics, computer science, engineering, other)
	Highest degree
	Tenure in employing organization
Background characteristics	Age
	Whether born in the United States
	Parents' highest level of education
Job characteristics	Employment sector (industry, university or college, government, nonprofit, primary or secondary education, and other)
	Employer size
	Extent that respondent's job is related to their highest degree
	Primary job responsibility—core technical versus noncore technical
	Supervisory responsibilities
	Whether they primarily work in teams
Work effort and attitudes	Average hours worked per week
	Willing to put in extra effort beyond what is required of job
	Personally care about fate of organization
	Whether their work is an important part of their identity
Family responsibilities	Has young or school-aged children
	Has primary responsibility for childcare
	Has eldercare responsibilities

H2: WAHM advantages in social inclusion, respect, rewards, and persistence intentions will not be fully accounted for by differences between WAHM and non-WAHM in human capital, background characteristics, job characteristics, work effort and attitudes, and family responsibilities.

The robustness of these analyses is tested with several alternative analytic strategies, which are described in detail in Methods and Materials. Supplemental decomposition analyses examining intersectional variation in these premiums among non-WAHM are discussed in the "Supplemental analysis" section in Materials and Methods.

RESULTS

Figures 1 to 6 present results from the tests of H1. The bar graphs represent means on each outcome for the 32 intersectional demographic groups, holding constant variation in respondents' education level, age, STEM field, and employment sector. The values in each figure are centered at the mean for WAHM on that measure (represented by the *x* axis), so that the height of each bar represents the divergence of that group's mean from the mean for WAHM. Intersectional groups are listed in order from smallest to largest differential. Error bars indicate 95% confidence intervals (CIs = 1.96 × SE), illustrating the significance of the difference in means between WAHM and each focal group, net of controls. As described in detail in the "Operationalization of demographic measures" section in Materials and Methods, several smaller groups were aggregated (Native American and Pacific Islander with Latinx respondents, persons across LGBTQ categories, and persons across disability types) to protect the confidentiality of respondents in particularly minoritized groups and to ensure statistical power. Table S6 presents disaggregated means on each outcome for subgroups within these aggregated categories.

Figure 1 presents results on the social inclusion scale for each intersectional group, centered at the mean for WAHM. As illustrated by the negative values and CIs, members of all other 31 intersectional groups experience significantly less social inclusion in their STEM jobs on average than WAHM experience, net of differences by STEM field, sector, education level, and age. There is wide variation in each group's average departure from WAHM's inclusion experiences. The divergence from WAHM's social inclusion experiences is smallest (but still significantly more negative) for heterosexual Asian men without disabilities, and largest for LGBTQ Black women with disabilities. Patterns across specific gender, race, LGBTQ, and disability status groups are summarized below and detailed in the "Supplemental analysis" section in Materials and Methods.

As shown in Fig. 2, 30 of the 31 intersectional groups experience significantly higher rates of harassment than WAHM (LGBTQ white men without disabilities experienced slightly higher rates of harassment [11.8%] than WAHM [9.9%], but this difference is only marginally statistically significant [$P < 0.10$, two-tailed test]). Fourteen percent of heterosexual Latinx/Native American men without disabilities (the next lowest) experienced harassment, while more than one in three (38%) LGBTQ-identifying Latinx and Native American women with disabilities faced harassment in the last year—over three times the harassment rate experienced by WAHM.

A second hypothesized dimension of WAHM privilege is greater access to professional respect. Figure 3 presents bar graphs for group averages on the professional respect scale, centered at the mean for WAHM. Consistent with H1, all 31 other intersectional

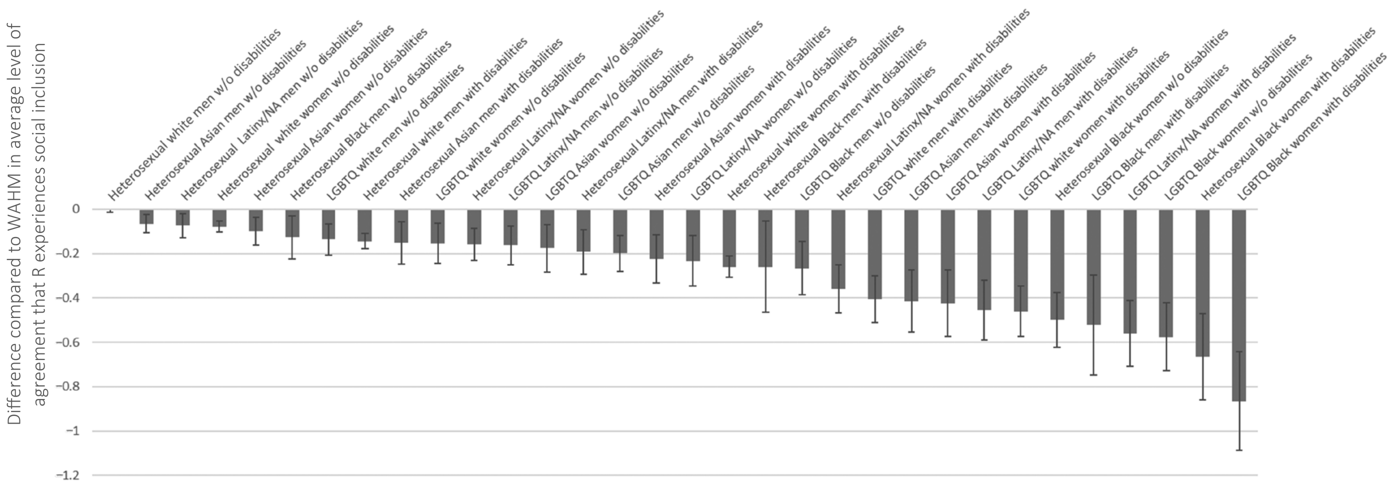

Fig. 1. Social inclusion at work among STEM professionals, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted means for each category, holding constant variation by STEM field, employment sector, highest education, and age. Scale on the "social inclusion" measure ranges from 1 (strongly disagree) to 5 (strongly agree), with higher number representing stronger agreement. Values represent the average divergence of each group's experiences from those of WAHM. Values were produced by ordinary least squares (OLS) regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. *N* = 25,324. WAHM, white heterosexual men without disabilities; NA, Native American and Pacific Islander.

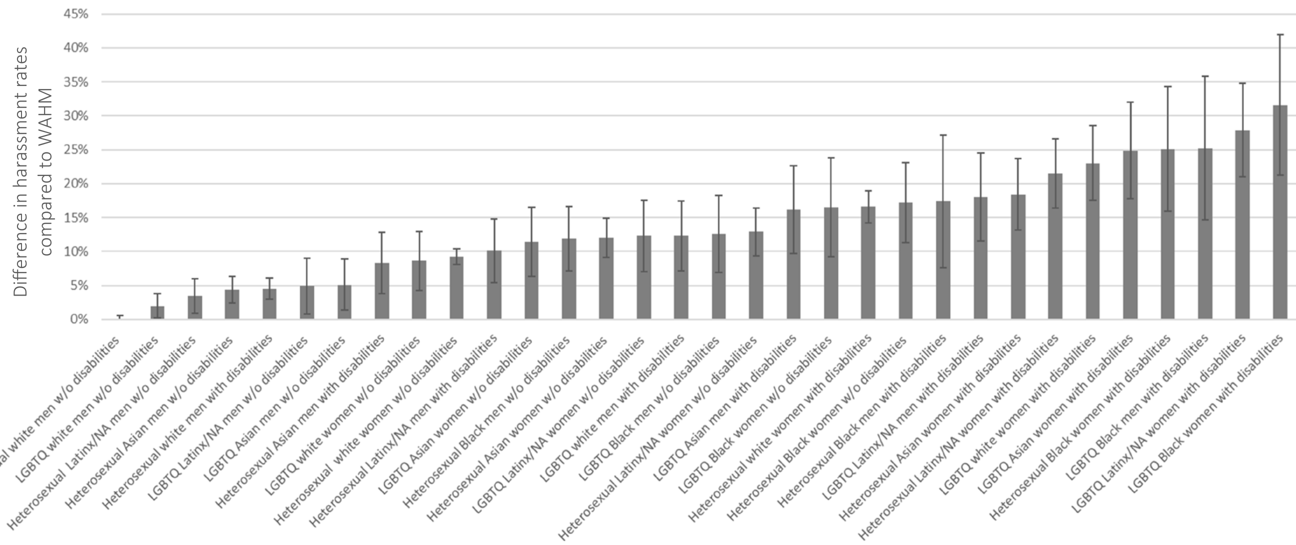

Fig. 2. Proportion of STEM professionals experiencing harassment at work in the last year, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted rates of harassment experiences for each category, holding constant variation by STEM field, employment sector, highest education, and age. Values represent the average divergence of each group's experiences from those of WAHM. Values were produced by logistic regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. *N* = 25,324.

groups reported experiencing significantly less professional respect in their STEM jobs than WAHM reported experiencing, net of controls.

Figures 4 and 5 present results for the salary and professional opportunity measures. Holding constant variation in respondents' STEM field, sector, education level, and age, WAHM have significantly higher salaries on average compared with every other intersectional group (Fig. 4). These salary gaps are largest for Latinx and Native American women and men across disability and LGBTQ statuses: each of these groups has average salaries that are at least $30,000 lower than WAHM employed in the same STEM fields and sectors and with the same education level and age. In addition, persons with disabilities across gender, race, and LGBTQ status experience a $20,000 average salary deficit compared with WAHM peers. Figure 5 illustrates similar patterns in respondents' access to career opportunities: compared with WAHM, all other intersectional groups reported significantly lower advancement opportunities in their STEM jobs, holding constant employment sector, field, age, and education level.

The final outcome of interest in H1 is persistence intentions. Figure 6 presents the results for STEM professionals' intentions

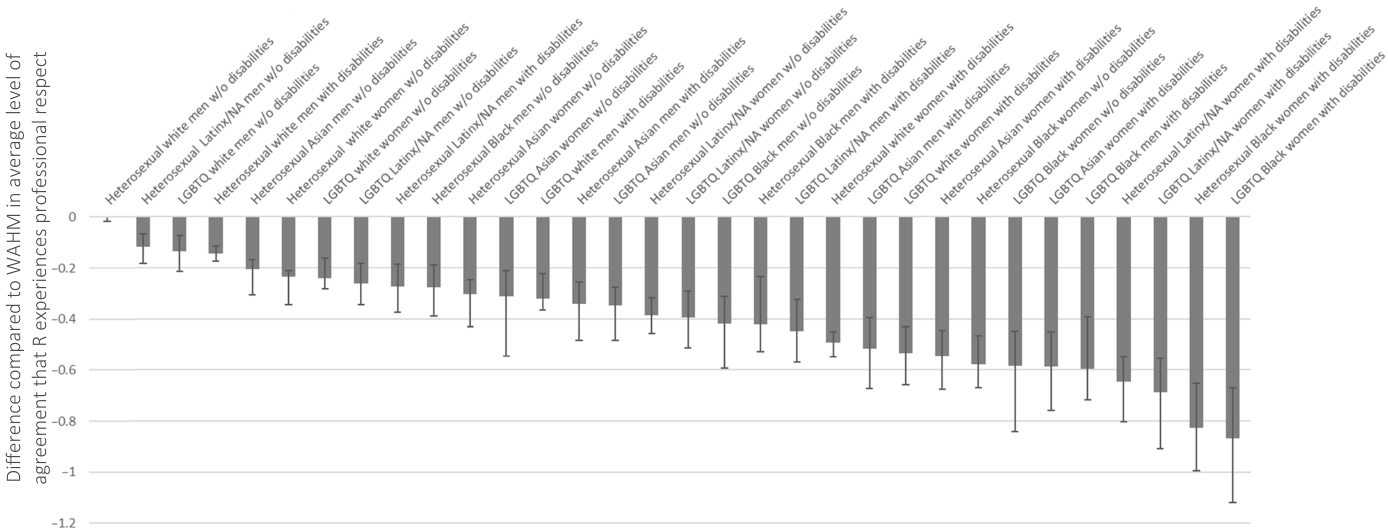

Fig. 3. Experiences of professional respect at work among STEM professionals, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted means for each category, holding constant variation by STEM field, employment sector, highest education, and age. Scale on the experiences of professional respect measure ranges from 1 (strongly disagree) to 5 (strongly agree), with higher number representing stronger agreement. Values represent the average divergence of each group's experiences from those of WAHM. Values were produced by OLS regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. $N = 25,324$.

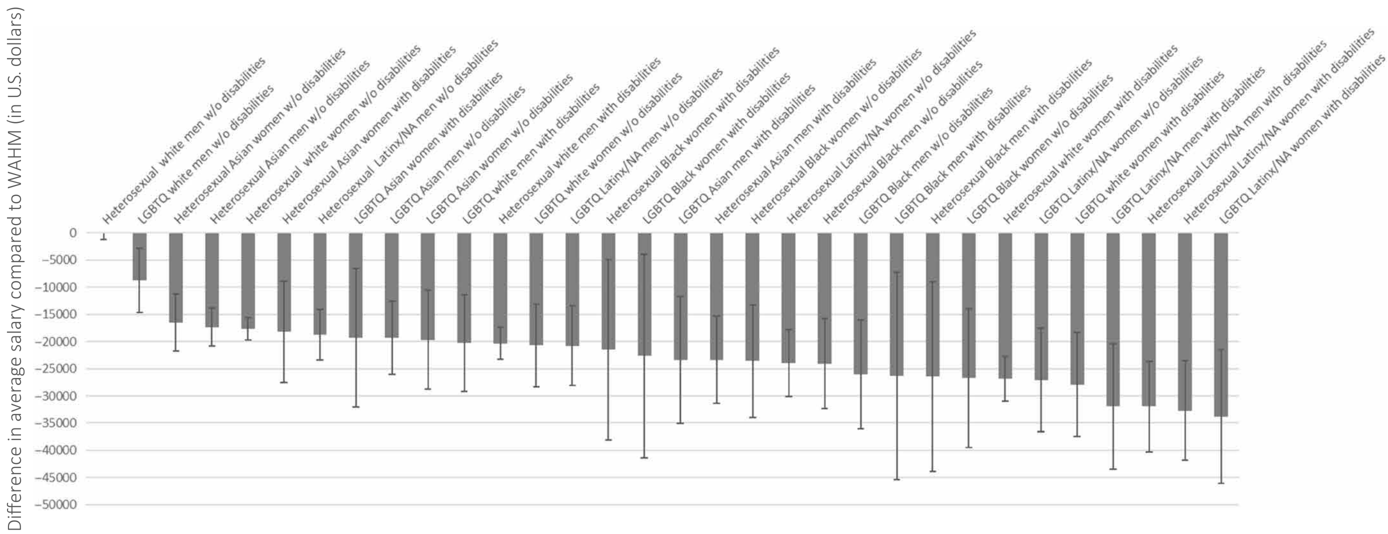

Fig. 4. Average annual salary of STEM professionals, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted means for each category, holding constant variation by STEM field, employment sector, highest education, and age. Values represent the salary differences of each group compared to WAHM. Values were produced by OLS regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. $N = 25,324$.

to remain in their STEM field for the rest of their career by demographic group, centered at the mean for WAHM. Here, all other groups except heterosexual white men with disabilities have significantly lower persistence intentions than WAHM. Persistence intentions are particularly low for LGBTQ-identifying nonwhite STEM professionals compared with WAHM, and for nonwhite persons with disabilities.

The intersectional patterns of disadvantage revealed by these figures are discussed in more detail in the "Supplemental analysis" section in Materials and Methods. Together, these figures show that the work experiences of LGBTQ-identifying Black women, Latinx and Native American women, and persons with disabilities tend to diverge the most from the experiences of WAHM. Yet, these intersectional processes are not consistently additive: marginalization along the greatest number of demographic axis is not always accompanied by the highest degree of difference from the experiences of WAHM. Furthermore, supplemental analyses assessed the effect sizes of individual identity dimensions in the context of the other

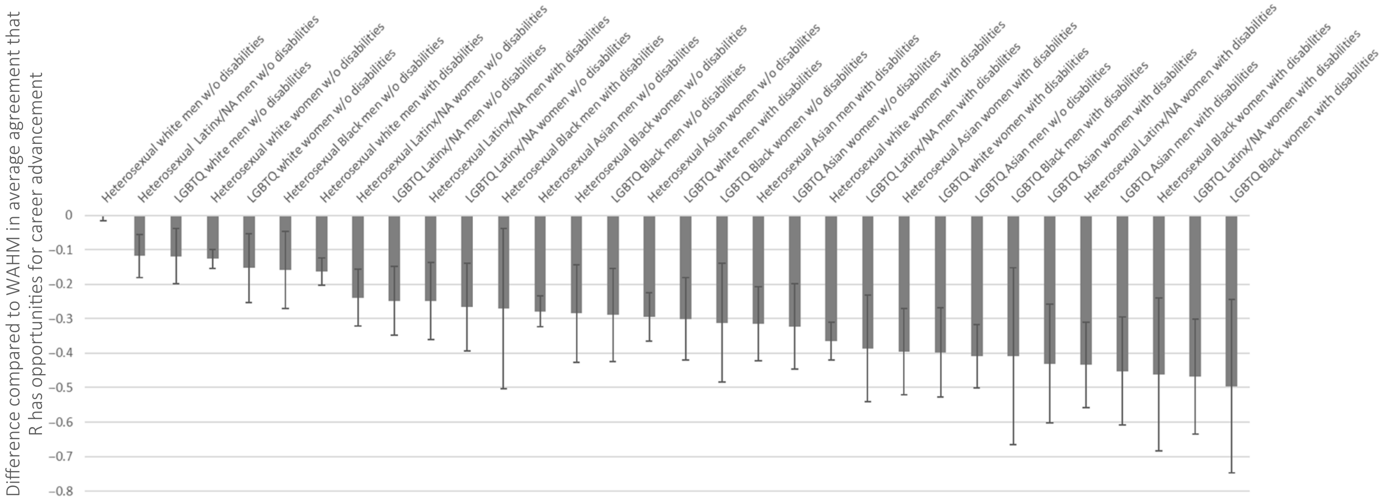

Fig. 5. Career advancement opportunities among STEM professionals, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted means for each category, holding constant variation by STEM field, employment sector, highest education, and age. Scale on the career advancement opportunities measure ranges from 1 (strongly disagree) to 5 (strongly agree), with higher number representing stronger agreement. Values represent the average divergence of each group's experiences from those of WAHM. Values were produced by OLS regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. *N* = 25,324.

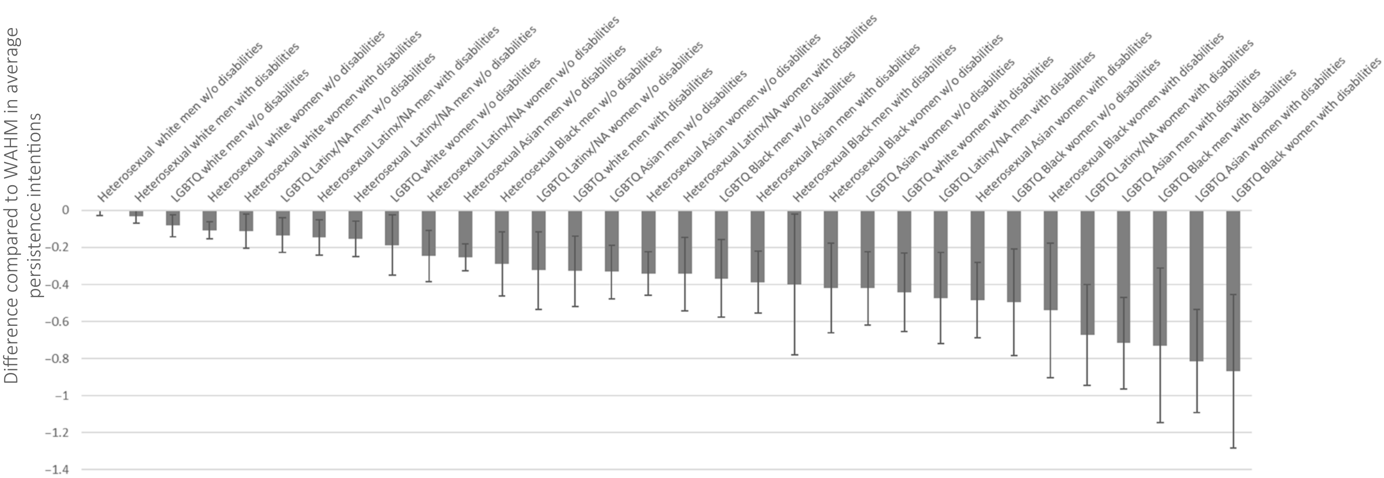

Fig. 6. Persistence intentions among STEM professionals, by intersectional demographic category, centered at mean for WAHM and arranged by size of differential from WAHM. Predicted means for each category, holding constant variation by STEM field, employment sector, highest education, and age. Scale on the persistence intentions measure ranged from 1 (less than 5 years) to 5 ("the rest of my career"), with higher number representing stronger agreement. Values represent the average divergence of each group's experiences from those of WAHM. Values were produced by OLS regression models with gender × race × LGBTQ status × disability status interaction terms. See the "Supplemental analysis" section in Materials and Methods for details. Error bars represent 95% confidence intervals. *N* = 25,324.

intersectional categories. Those results revealed that which identity category had the greatest consequence for workplace experiences depends on the outcome in question. Variation by gender incurred the greatest consequences for experiences of harassment and turnover intentions, while race/ethnicity incurred the greatest consequence for experiences of social inclusion, respect, and professional opportunities (see table S5). These analyses are discussed in more detail in Materials and Methods and underscore the need for more research into the nuances of intersectional patterns.

Together, Figs. 1 to 6 illustrate that WAHM, compared to 31 other intersectional demographic groups, are advantaged across all four workplace experience dimensions. Can these privileges be explained by variation in employment-related factors such as human capital and work commitment, or WAHM's potentially greater likelihood of working in sectors where positive work experiences are more abundant?

H2 hypothesized that WAHM advantages across the four work experience dimensions operate in part as premiums—benefits that accompany WAHM status that do not accrue to other groups of STEM professionals when they have identical traits like human capital, job characteristics, and work effort. Blinder-Oaxaca decomposition analysis allows for the partitioning of the gap between WAHM and their non-WAHM peers on each outcome into an explained portion (attributed to variation between groups) and the portion of the gap that cannot be accounted for by variation in these characteristics.

Each decomposition model includes explanatory predictors from five categories of factors shown in STEM inequality literature to be important drivers of work experiences: human capital (e.g., education level, organizational tenure); job characteristics (e.g., employment sector, supervisory status, primary work responsibility); background characteristics (e.g., parental education, whether born in the United States); work effort and attitudes (e.g., hours worked, personal commitment to STEM job); and family responsibilities (e.g., having a young or school-aged child or eldercare responsibilities) (*2*, *9*, *47–50*). See Table 1 for the list of factors in each category. It may be, for example, that WAHM work more hours on average than non-WAHM professionals, are more committed to their work, or tend to be more likely to do work aligned with their highest degree than non-WAHM STEM professionals, and this explains WAHM's greater likelihood of experiencing inclusion, respect, and rewards.

Figure 7 presents bars that partition the gap between WAHM and non-WAHM on each outcome into the portion accounted for by variation in the explanatory factors (the shaded segments of each bar) and the portion of the differences that remain after these factors are accounted for (the unshaded segments). Table S2 presents detailed decomposition results, including the proportion of the explained variation attributable to each specific explanatory factor.

The leftmost bar in Fig. 7 represents the decomposition of the WAHM/non-WAHM gap in social inclusion experiences into

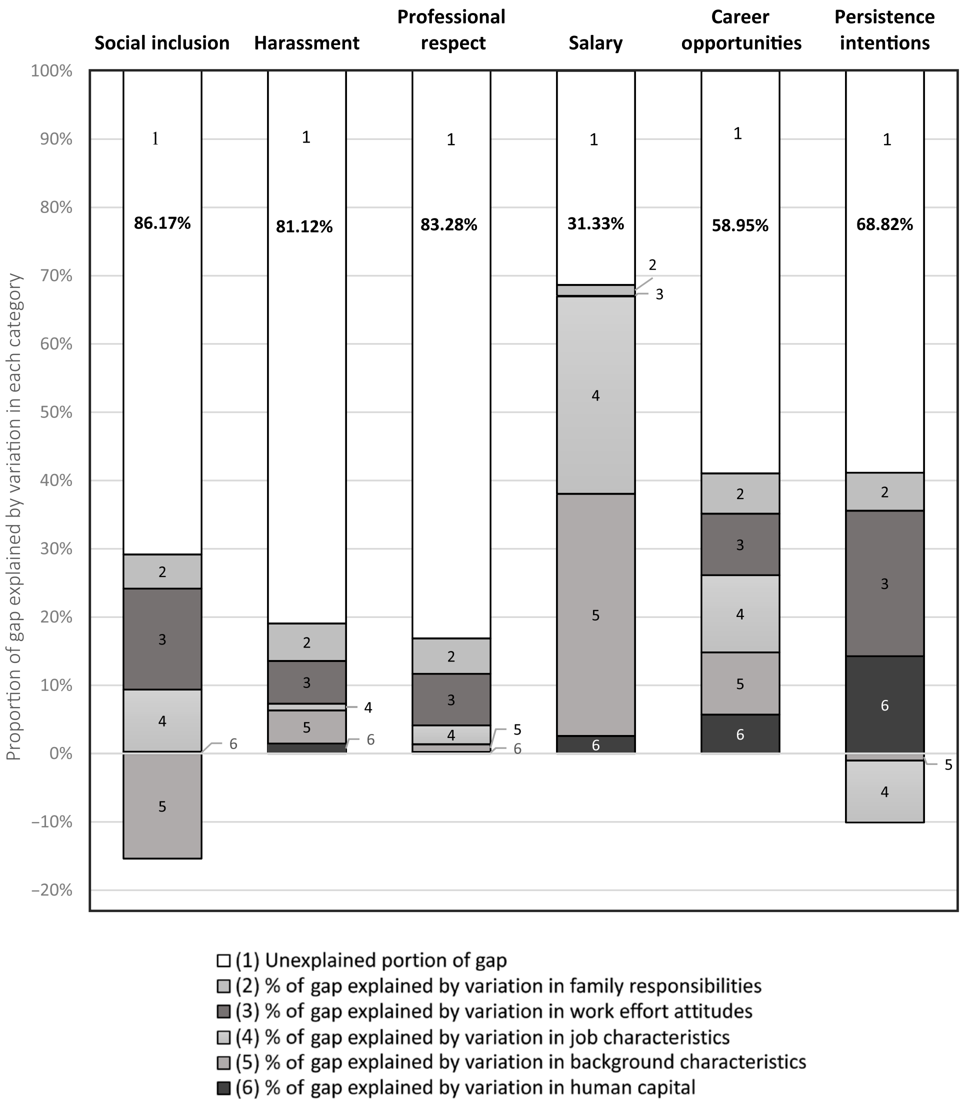

Fig. 7. Unexplained and explained portions of the difference between WAHM and non-WAHM STEM professionals on each work experience measure, produced by Blinder-Oaxaca decomposition. Shaded segments represent the portion of the difference between WAHM and non-WAHM STEM professionals explained by variation in human capital, background characteristics, job characteristics, work effort and attitudes, and family responsibilities (shaded segments), and the unshaded segments and accompanying percentages represent the portion that remains unexplained by variation in these factors. *N* = 25,324. See table S2 for full decomposition models.

explained (shaded) and unexplained (unshaded) portions. Here, the total portion of the gap between WAHM and non-WAHM in social inclusion experiences that can be accounted for by all explanatory measures combined is less than 14%. Variation in work attitudes and effort (segment 3) explains the greatest portion of this gap. The unexplained portion of the gap in social inclusion experiences is more than six times as large as the explained portion; even if non-WAHM were identical to WAHM on each factor across the five categories, 86% of the gap in inclusion experiences would still remain. As shown in table S2 and explained below, variation in background characteristics, particularly age, has an offsetting contribution to the gap in social inclusion (i.e., WAHM are older on average than non-WAHM, but older STEM professionals tend to experience less social inclusion than younger professionals), and thus, this segment sits below the zero line.

Similar to social inclusion, only small portions of the differences in harassment experiences (second bar in Fig. 7), professional respect (third bar), and career opportunities (fifth bar) by WAHM status can be explained by variation between WAHM and non-WAHM in human capital, job characteristics, work effort, family responsibilities, and the other factors. The rest of the variation (81.1% for harassment experiences, 83.3% for professional respect, and 59.0% for career opportunities) are benefits accompanying WAHM status that cannot be attributed to these factors.

The average salary gap between WAHM and non-WAHM STEM professionals is $24,994. Variation in work-related characteristics between WAHM and non-WAHM accounts for 68.7% of this gap. Yet, 31.3% of the salary gap remains unexplained: WAHM earned $7831 more on average than non-WAHM STEM Professionals even when non-WAHM had the same human capital, job characteristics, work effort, background work-related characteristics, and family responsibilities and when they worked in the same STEM fields and sectors.

Last, regarding persistence intentions, variation between WAHM and non-WAHM on the explanatory predictors accounts for less than a third of WAHM's greater intentions to stay in STEM. Thus, even with identical values on these work-related characteristics, non-WAHM are still significantly less likely to intend to persist in their STEM jobs than their WAHM peers.

In sum, and supporting H2, sizable portions of the WAHM advantages in inclusion, respect, rewards, and persistence intentions shown in Figs. 1 to 6 appear to operate as premiums attached to WAHM status itself—benefits that cannot be attributed to these differential job and work characteristics between WAHM and non-WAHM. Differentials were most fully accounted for by the explanatory predictors in the case of salary because salary is heavily determined by structural and labor market positions, which are also highly sociodemographically differentiated. Yet, even there, nearly a third (over $7800) of the $25,000 average salary differential remained once these differences were accounted for. The unexplained portions of the gap on the other outcomes ranged from 59 to 86% of the total differential—two to six times larger than the explained portions. Although decomposition analysis cannot capture all possible factors that may help account for these differences, in well-crafted decomposition models with robust sets of explanatory predictors, such large portions of unexplained variance are typically attributed to premiums attached to membership in a privileged social category (*51*–*53*).

The "Supplemental analysis" section in Materials and Methods below explores variability within the non-WAHM groups with a series of decomposition models that examine WAHM premiums vis-à-vis specific disaggregated non-WAHM groups. These models reveal similar patterns of intersectional variability as those highlighted above. Specifically, the premium for WAHM status is largest in comparison to Black women across LGBTQ and disability statuses, and for persons with disabilities across gender, race/ethnicity, and LGBTQ status. These analyses provide further motivation for nuanced, multimethod intersectional analyses of workplace experiences among STEM professionals.

The "Supplemental analysis" section in Materials and Methods also reports the results of robustness tests that rerun the central models of the study using several alternative analytic approaches. Results are fully consistent with those above and provide greater detail on these intersectional patterns. For example, to test the alternative explanation that these patterns are driven by uniformly more negative work attitudes among non-WAHM STEM professionals (rather than a reflection of WAHM privilege), all models were rerun controlling for respondents' job satisfaction. Doing so does not explain away these patterns (see table S3). Supplemental analysis also examines the contribution of WAHM's advantages in social inclusion and respect to their greater persistence intentions. The Supplementary Materials provides additional details on these intersectional and disaggregated patterns among non-WAHM (see tables S4 and S5).

It is important to note that decomposition analyses produce conservative estimates of the possible intersectional premiums attached to WAHM status because they do not account for processes of privilege or bias that may have affected selection into these explanatory characteristics in the first place (e.g., WAHM's possible preferential access to supervisory responsibilities; see table S1). Decomposition results reflect the benefits that WAHM status may confer on top of WAHM's potentially greater likelihood of occupying the most well-respected and rewarded arenas of STEM (*45*, *47*).

DISCUSSION

This study investigated a foundational question of STEM inequality scholarship: Are WAHM uniquely privileged in STEM compared with those who occupy different gender, racial/ethnic, LGBTQ status, and/or disability status categories? Analyses using a large national-level dataset of STEM professionals found that WAHM were more likely on average to experience social inclusion, respect, and rewards and were more likely to intend to stay in their STEM professions long term, compared with members of 31 other intersectional gender, race, LGBTQ status, and disability status groups. Decomposition analysis with a robust set of explanatory predictors showed that these privileges could not be accounted for by differences between WAHM and others in human capital, work effort and attitudes, job characteristics, background characteristics, or family responsibilities. Rather, substantial portions of these advantages remained as premiums attached to WAHM status itself.

These results have important theoretical and empirical implications for STEM inequality scholarship. They show that the benefits in workplace inclusion, respect, and rewards that WAHM enjoy cannot be fully (or even mostly) accounted for by differences in education level, sector, field, job characteristics, or work effort. Thus, these privileges cannot be dismissed as merely meritocratic rewards for more training, greater work devotion, or divergent employment circumstances among WAHM compared with their peers.

Second, privilege premiums were evident across multiple dimensions of STEM work experiences. WAHM are not just advantaged in their social interactions with colleagues, but in the respect and rewards they enjoy at work. The breadth of outcomes covered by these analyses—from social inclusion to salary to persistence intentions—suggests that WAHM privileges may exist along many other dimensions in the STEM workforce (e.g., belonging, professional networks, hiring, and promotion); more research is needed to examine these possibilities.

Furthermore, these results underscore the importance of investigations that go beyond the single-axis paradigm of STEM inequality research. Here, disentangling the experiences of STEM professionals along multiple axes of difference not only revealed how such experiences converged and diverged across different groups but also allowed for clearer illustration of work experience advantages among the most well-represented and culturally dominant demographic group. Supplemental analyses investigating variation among non-WAHM groups revealed that WAHM's advantages in workplace experiences are especially pronounced when compared with the experiences of LGBTQ-identifying women of color, especially Black women, and for persons with disabilities across gender, race, and LGBTQ status. This underscores the need for detailed (particularly multimethod) investigations into these patterns.

These results also highlight the need for research that identifies the cultural, institutional, and interactional mechanisms that buoy this intersectional privilege. Advancing understanding in this area requires recognition that it is sexism, racism, heteronormativity, and ableism in STEM—not individuals' race, gender, disability, and/or LGBTQ identity per se—that are the catalysts of these patterns (*54*).

From a policy perspective, efforts to address STEM inequality must tackle mechanisms of privilege as well as disadvantage. Most organizational and institutional efforts to reduce inequality seek to address disadvantages faced by marginalized and minoritized persons in STEM as though they were variants from a neutral baseline, without explicitly attending to the cultural, structural, and institutional systems that may unfairly advantage WAHM over all others (*9*). The findings here require institutions, organizations, employers, and professional societies to reckon with the premiums of inclusion, respect, reward, and persistence that accompany socially dominant demographic status in STEM.

Policy solutions that seek to rectify these complex patterns of privilege must take seriously the intersectional nature of STEM inequality (*17*, *27*). Equitable representation alone will not solve these differentials. Organizational and institutional efforts aimed at shoring up inequities and promoting more diverse representation will have limited success without addressing the cultural and structural systems of privilege in STEM.

MATERIALS AND METHODS

Data and participants

The analyses presented here use survey data from the STEM Inclusion Study (PIs: E.A.C. and T. Waidzunas). Between winter 2017 and spring 2019, the study team surveyed the U.S.-based membership of 21 STEM professional societies and organizations. These 21 societies represent STEM professionals from across the physical and life sciences, mathematics, and engineering (excluding social sciences). They encompass eight U.S. national flagship disciplinary societies in the natural, life, and physical sciences and mathematics; five U.S. national flagship disciplinary societies in engineering; four interdisciplinary STEM societies; two STEM teaching–focused societies; and two demographic-focused professional societies. To protect respondent confidentiality, the names of these societies are not specified.

Analyses for this paper use data from the 25,324 U.S.-based full-time STEM professionals who participated in the survey. A third (33%) of the sample work in industry, 39.9% work in higher education, and 26% work in nonprofit, government, or other sectors. The average response rate was 20.1%, which is typical of surveys of voluntary organizations (*55*). The survey was approved by the human subjects board at the University of Michigan. Respondents were informed about the study on the survey's landing page, and only those who consented were allowed to continue to the survey. Further details on survey distribution and validity and reliability testing are provided in the Supplementary Materials.

Operationalization of outcome measures

Social inclusion is a scale measure (alpha = 0.734) assessing respondents' agreement with the following statements regarding their workplace: "Overall, I feel I 'fit in' with the other people in my workplace," "I feel included in casual conversations among my colleagues," and "When my coworkers get together socially at lunch or after work, I am usually included in the invitation" [1 = strongly disagree (SD) to 5 = strongly agree (SA)].

The *harassment* measure is a variable that indicates whether they responded that they had been "harassed verbally or in writing on the job" once or more during the last 12 months (1 = yes, 0 = no).

Professional respect is a scale measure (alpha = 0.753) that averages respondents' agreement with the following five statements: "In my workplace, my work is respected," "My colleagues treat me as an equally skilled professional," "I am held to the same standards as others for promotion or advancement," "I have to work harder than my colleagues to be perceived as a legitimate professional (reverse coded)," and "My colleagues sometimes think I am less productive than I actually am (reverse coded)" (1 = SD to 5 = SA). Items are reverse coded where appropriate to maintain consistent positive-to-negative numerical scaling on items within this scale. Reverse coding is used for interpretive ease only; it does not change the strength of the statistical relationships between dependent and independent variables.

Annual salary is a salary range variable that asked respondents to indicate their yearly income in their primary STEM job in the following ranges: less than \$15,000; \$15,001 to \$25,000; \$25,001 to 50,000; \$50,001 to 75,000; \$75,001 to 100,000; \$100,001 to 125,000; \$125,001 to 275,000; \$275,001 to 300,000; \$300,001 to \$350,000; \$350,001 to \$400,000; \$400,001 to \$500,000; and \$500,001 or more. Respondents were assigned the median value for the range in which they fell. As salary is a culturally sensitive topic, asking salary as a range rather than a number improves response rates and leads to more accurate data (*56*).

Career opportunities are a scale variable (alpha = 0.633) that averages two questions that asked respondents' level of agreement, based on their experiences in their current STEM job, that "I have been given opportunities to take on a leadership role" and "I have limited opportunities to develop my skills (reverse coded)" (1 = SD to 5 = SA).

Persistence intentions are measured by a question that asked how long respondents plan to "stay in your current profession (even if you change jobs)?" (1 = less than 5 years; 2 = 5 to 9 years; 3 = 10 to 15 years; 4 = 16 to 20 years; 5 = the rest of my career).

Operationalization of demographic measures

Race/ethnicity was measured through a self-identification question. Respondents were asked "What is your race/ethnicity (choose all that apply)": Latinx/Hispanic, Black, Asian, Native American/Asian Pacific Islander, white, and other racial/ethnic category (1 = yes, 0 = no). Respondents could identify as multiple racial/ethnic categories. Because of the extreme minoritization of Native American and Asian Pacific Islander persons in STEM, Native American and Asian Pacific Islander respondents were aggregated with Latinx respondents in the main analysis to protect confidentiality. In supplemental analyses in table S6, the means for these groups are presented separately on each outcome. Because sample size and data presentation complexity made presenting the results in Figs. 1 to 6 for each combination of multiracial identities infeasible, those figures present results for each racial/ethnic category separately. Multiracial individuals are represented by the combination of bars that represent the specific racial/ethnic categories that constitute their racial identity. Supplemental analysis in table S6 presents means on each outcome for nonwhite multiracial respondents (i.e., respondents whose multiracial identity does not include white), white-nonwhite multiracial respondents (i.e., respondents who identify as white and one or more nonwhite racial/ethnic identity), and those who marked "other race/ethnicity" on the race measure.

Disability status was measured by a question that asked respondents whether they have any of the following (they could mark all that apply): "vision difficulties beyond what can be corrected by eyeglasses or contacts," "hearing difficulties beyond what can be corrected with hearing aids," "speaking difficulties," "walking difficulties," "chronic illness," "mental health difficulties," or "none of the above." Respondents who answered affirmatively to one or more of these measures were coded as persons with disabilities. To protect the confidentiality of members of groups that are particularly small in number (e.g., Asian women with mobility difficulties), the main analysis relies on a dichotomous measure of disability status (yes = 1, 0 = no). Table S6 presents means on each outcome separately for respondents with physical disabilities, mental illness, and chronic illness. Disability status is a socially constructed status category, not an actual dichotomy of human capability; consistent with Disability Studies literature, these difficulties are coded as disabilities because individuals with such differences are typically interpreted by others (colleagues and supervisors) as having disabilities and are often treated as such (*57*, *58*).

LGBTQ status was measured using a set of indicators that asked separately about gender identity and sexual identity. Respondents were first asked, "Please mark the category that best matches your sexual identity," and could choose between the following options: "straight or heterosexual," "gay or lesbian," "bisexual," "queer," "something else (please specify)," or "I don't know how to answer." Persons who marked "straight or heterosexual" were coded as heterosexual. Persons who marked "gay or lesbian," "bisexual," or "queer" were included within the LGBTQ category. Respondents who marked "do not know" or "something else" were asked a follow-up question, "Do you identify as part of the LGBTQ community?" Those who answered affirmatively to this follow-up were included in the LGBTQ category as well. Table S6 disaggregates transgender and gender nonbinary respondents from cis-gender lesbian, gay, bisexual, and queer-identifying respondents on each outcome measures.

Gender identity was measured with a sequence of three questions. The first question asked was "How do you currently describe yourself?": "male," "female," "transgender male (FTM)," "transgender female (MTF)," "something else," or "I don't know how to answer." Respondents who indicated that their current gender identity is female (whether they identified as cis-gender or transgender) were coded as women (1 = yes, 0 = no); respondents who indicated their current gender identity as male (whether they are cis- or transgender) were coded as men (1 = yes, 0 = no). Respondents who marked "something else" or "I don't know" in the current gender identity question were marked as "gender nonbinary" for their current gender identity category and were given the follow-up question, "Do you identify as part of the LGBTQ community?" Those who answered affirmatively were included in the LGBTQ category. See the work of Cech and Waidzunas (*14*) for more detailed description of the pretesting protocols used for this gender identity measure. To protect the confidentiality of the small proportion of gender nonbinary respondents, results are not presented graphically in Figs. 1 to 6 for gender nonbinary respondents as a separate category.

A second question asked "What sex were you assigned at birth?": "male" or "female." Respondents whose answer on the second question was different than their answer on the first were asked a follow-up question: "Just to confirm, you were assigned a different sex at birth than how you currently describe yourself. Is that correct?": "yes" or "no." This confirmation question limits the number of false positives on transgender or gender nonbinary status—an important step for capturing proportionally small populations. Respondents who answered yes to this confirmation question were included in the transgender and gender nonbinary category and the overarching LGBTQ category.

WAHM status was coded as 1 = yes if respondents met all the following criteria: man = 1; white = 1 and all other racial/ethnic identity variables = 0; disability status = 0; and LGBTQ status = 0. All other respondents were coded as WAHM = 0.

Control measures

The regression models used to produce values for Figs. 1 to 6 included the following controls: respondent age (in years), highest degree (1 = high school or less to 8 = PhD), respondents' STEM field (life science, physical science, computer science and mathematics, engineering, or other STEM field), and employment sector (for-profit industry, university/college, nonprofit, government, K-12 education, or other employment sector).

Decomposition models (Fig. 7 and tables S2 and S4) include the following human capital measures: highest degree (1 = high school or less to 8 = PhD), respondents' STEM field (life science, physical science, computer science and mathematics, engineering, or other STEM field), and their tenure at their employing organization (in years). Background characteristics include whether respondent was born in the United States (1 = yes, 0 = no), the highest degree attained by a parent (1 = high school degree or less to 8 = PhD), and respondent age (in years). Job characteristic measures include employment sector (university/college, nonprofit, government, K-12 education, private sector, or other employment sector), employer size (1 = less than 10 to 8 = over 25,000 employees), the extent to which their job is related to their highest degree (1 = not at all related to 3 = very related), whether their primary work responsibility is a culturally valued core technical task of basic research, design, or computer programming (1 = yes, 0 = no), whether they have supervisory responsibilities (1 = yes, 0 = no), and whether their work is primarily done in teams (1 = yes, 0 = no). Work effort and attitude measures include average hours worked per week (in hours) and, as separate measures, the extent to which respondents agreed with the following statements: "I am willing to put in a great deal of extra effort into my work beyond that normally expected in my job" (1 = SD to 5 = SA), "I really care about the fate of my organization" (1 = SD to 5 = SA), and "The specific work I engage in is an important part of my personal identity" (1 = SD to 5 = SA). Last, family responsibility measures include whether they have young or school-aged child(ren) living in their household (1 = yes, 0 = no); whether there is anyone (whether living with them or not) for whom they provide special care due to illness, mental or physical disability, or old age (1 = yes, 0 = no); and whether they are the primary caretaker for young or school-aged child(ren) in their household and do not share this responsibility with another adult (1 = yes, 0 = no).

Analytic strategy

Descriptive statistics are provided in table S1. Figures 1 to 6 present predicted values on each measure, with STEM professionals disaggregated into 32 gender × race × LGBTQ status × disability status categories. In each figure, the bars are mean centered to the average for WAHM, such that the bar for each intersectional group represents that group's value above or below the mean for WAHM. These bars are ordered by magnitude from smallest to largest gap. These values hold constant possible variation across these groups by STEM field, employment sector, education level, and age. To produce these values, ordinary least squares or logistic regression models (as appropriate for each outcome) were used to predict the outcome measure with gender × race × LGBTQ status × disability status interactions, along with controls for STEM field, sector, age, and education level. Margin values were calculated from the resulting regression equations for each corresponding combination of characteristics (e.g., women = 1, Asian = 1, disability status = 0, and LGBTQ = 1 for the bars representing LGBTQ-identifying Asian women without disabilities). Values for controls were held at the mean. Error bars represent two-tailed 95% CIs for the significance of the difference of each group's mean from the mean for WAHM on that outcome. Per recommended practice (*59*), multiple imputation was used to handle missing data, specifically the multiple imputation chained technique in Stata 16 with 20 imputations.

While the raw means on each outcome variable show the same patterns as the predicted means presented in Figs. 1 to 6, raw means are more difficult to interpret given the potential for variation by confounding variables (e.g., education level and age). Hence, Figs. 1 to 6 present predicted means for each intersectional group that control for this variation. Although these figures are unable to represent all possible disaggregated identity categories (see table S6 for means for disaggregated race, disability, and LGBTQ status groups), they allow for detailed examination of intersectional variation.

Blinder-Oaxaca decomposition is used to examine the extent to which the divergence in workplace experiences between WAHM and other STEM professionals can be explained by standard factors related to human capital, job characteristics, background characteristics, work effort, and family responsibilities (see Table 1). Although traditionally used in analyses of wage inequality, Blinder-Oaxaca decomposition has increasingly been used in research examining experiential, attitudinal, and health outcomes (*52*, *60*). In decomposition models with robust controls for human capital, attitudinal, and job measures, residual differentials of the size and scope of those found here are attributed to processes of social bias (*51*, *53*, *61*).

Figure 7 presents the proportion of the variation between WAHM and non-WAHM explained by each category of explanatory factors (shaded segments), as well as the portion of the gap that remains unexplained after those factors are accounted for (unshaded segments). Details of the decomposition models are presented in table S2.

Robustness checks

To test the robustness of these findings to alternate analytic approaches, the models were rerun using four additional modeling strategies. First, instead of including individual dichotomous measures for each professional society, as done above, analyses were rerun as hierarchical linear models with respondents nested in professional societies. Second, instead of using multiple imputation, as is standard practice, models were rerun with listwise deletion. Third, the models were rerun using a weighting variable that adjusted the distribution of respondents in the sample by demographic and employment characteristics (gender, race/ethnicity, STEM field, and sector) to match the distribution that exists in the U.S. STEM workforce nationally (represented by the National Science Foundation data in table S1). Fourth, the three Likert scale outcomes that are measured on disagree-to-agree scales (social inclusion, professional respect, and professional opportunities) were rerun with an alternate operationalization of the proportion of each group that agreed on average with the items in each scale. The result patterns documented above were replicated using each of these alternative modeling strategies, indicating that the results are robust to this variation in analytic approach.

Next, decomposition models were run separately for each STEM field (life sciences, physical sciences, mathematics, computer sciences, and engineering) and separately by employment sector (for-profit industry, nonprofit, government, and university/college). The patterns of advantage by WAHM status documented in table S2 were mirrored in each STEM subfield and employment sector. See detailed description of field- and sector-specific patterns in the Supplementary Materials.

In addition, to assess a possible alternative explanation that WAHM just have more positive attitudes about their work generally that are unrelated to experiences of privilege, each decomposition model was rerun controlling for respondents' job satisfaction. Job satisfaction is strongly correlated with experiences of social inclusion, professional respect, and persistence intentions in the workforce generally (*62*) and in this sample specifically (correlation coefficients: 0.235 to 0.449). Hence, the inclusion of a control for job satisfaction in the decomposition models would sharply reduce or eliminate the unexplained portion of the gap between WAHM and non-WAHM on each outcome if these gaps were just a reflection of non-WAHM STEM professionals' general unhappiness with, or greater propensity to "complain about," their work. Table S3 presents the total explained and unexplained portions of the gap on each outcome from the original decomposition models (table S2) and the supplemental models controlling for job satisfaction. Most of the previously unexplained portions of the WAHM/non-WAHM gap remained unexplained even after controlling for job satisfaction. In other words, while WAHM have higher job satisfaction than all other groups on average (which is tied to their more positive treatment at work), even among non-WAHM STEM professionals who were equally satisfied with their job, there still exists substantial premiums on WAHM status. This suggests that the privileges documented above cannot simply be attributed to WAHM professionals' more uniformly positive assessments of their jobs.

Last, as a point of reference for the work experience outcomes above, fig. S1 graphs the means by intersectional group for the work effort measure, "I am willing to put in a great deal of extra effort into my work beyond that normally expected in my job." As with Figs. 1 to 6, results are centered at the mean for WAHM and are net of controls for education, age, field, and sector. As shown in table S1, there is no average difference on this work effort measure between WAHM and non-WAHM. Accordingly, there is not a systematic pattern of variation between WAHM and all other STEM professionals in the amount of extra effort they are willing to put in to their work. This is in stark contrast to the highly consistent patterns of difference for non-WAHM groups on the inclusion, respect, rewards, and persistence intentions measures presented in Figs. 1 to 6.

Supplemental analysis

To examine the role that WAHM advantages in social inclusion and professional respect might play in their greater persistence intentions, the decomposition analysis for persistence intentions was rerun with inclusion, harassment, and professional respect measures included as additional predictors. Suggesting that WAHM's advantage in inclusion and respect helps drive their higher persistence intentions, WAHM's greater likelihood of experiencing social inclusion among their colleagues accounts for 8% of the total variance in persistence intentions, and their greater likelihood of experiencing professional respect from colleagues accounts for a full 39% of the gap. As shown in Fig. 7, all other explanatory predictors combined accounted for only 38% of the variation in persistence intentions. In other words, WAHM's greater persistence intentions are more fully explained by their likelihood of encountering inclusive treatment and respect from their colleagues than by their human capital, background characteristics, field, sector, work effort and identity, job circumstances, and family responsibilities combined.

Intersectional patterns in workplace outcomes

Figures 1 to 6 reveal several important patterns of variability among non-WAHM groups within and across each outcome. Although a detailed analysis of these patterns is beyond the scope of this paper, three important trends emerged: (i) In all six outcomes, Black and Latinx and Native American women across LGBTQ and disability status tended to face the greatest disadvantages in experiences of inclusion, respect, rewards, and persistence compared with WAHM. This is likely driven by gendered and racialized beliefs about competence and excellence in STEM described in the main text, as well as the consequences of extreme representational minoritization and exclusion. (ii) Across gender, race, and LGBTQ status, STEM professionals with disabilities faced persistent disadvantages on these six outcomes compared to STEM professionals without disabilities. Comparatively, little STEM inequality research has attended to the experiences of persons with disabilities (*15*). Yet, these gaps in workplace experiences by disability status, especially in professional respect and experiences with harassment, demand scholarly attention. (iii) Gender, race, and LGBTQ status inequalities are complexly related. Although groups who are marginalized across multiple axes often have more divergent experiences from WAHM's experiences, as shown in other intersectionality research outside the STEM context, disadvantages by gender, race, LGBTQ, and disability status are not strictly additive (*23*, *32*).

The decomposition analyses used to test H2 reveal overarching privilege premiums attached to WAHM status compared with the aggregate of non-WAHM groups. Yet, there is likely variability in WAHM's advantages among these non-WAHM groups. Although a nuanced examination of these disaggregated results is outside the scope of this paper, table S4 summarizes results from separate decomposition models that compare WAHM to specific non-WAHM intersectional groups on each outcome. A more detailed description of table S4 and related analyses are included in the Supplementary Materials.

These disaggregated decomposition models reveal several patterns. First, across groups, the premiums for WAHM status are largest on social inclusion, harassment, and professional respect. Second, across the groups, the premium for WAHM status tends to be largest compared to Black women, especially those who identify as LGBTQ. The premiums for WAHM status on harassment experiences and professional respect are particularly large compared with the experiences of Black and Latinx/NAAPI women across LGBTQ and disability status. Third, and consistent with the patterns in tests for H1, WAHM premiums are consistently large for persons with disabilities, compared with those with the same race-gender-LGBTQ status without disabilities. Last, there is notable variability in the salary premiums. The unexplained salary premium for WAHM compared with all non-WAHM respondents was $7831 (see table S2). Yet, the salary premium for WAHM status is $31,879 when compared with LGBTQ Latinx/NAAPI women with identical values on the explanatory predictors, and $34,421 when compared with LGBTQ Black men.

Supplemental analyses explored whether some identity dimensions incur greater workplace experience penalties than others. Table S5 summarizes the effect sizes (i.e., difference in means/pooled SD) of variation on each identity dimension in the context of the other intersectional categories (see the Supplementary Materials for more details on table S5). The final row in each section of table S5 presents the average effect size of that identity dimension across the intersectional groups. These results suggest that no one identity category had the largest effect across all workplace experience outcomes; rather, different identity categories incur the largest consequence for different outcomes. Variation by gender had the greatest average effect on experiences of harassment and turnover intentions; variation by LGBTQ status had the greatest average effect on salary; and variation by race/ethnicity—particularly for Black compared to white respondents—had the largest consequences for social inclusion, professional respect, and professional opportunities.

The supplemental analyses in tables S4 and S5 are intended to point to the variability and complexity among groups within the non-WAHM category. Fully unpacking this complexity is beyond the scope of this paper. Yet, these results underscore that examining privilege within STEM demands focused attention to patterns of advantage experienced by the most culturally and numerically privileged group while also considering intersectional variability in how these privileges play out among nondominant groups.

Disaggregated results for race, disability status, and LGBTQ status categories

To protect respondent confidentiality, the main analyses in Figs. 1 to 6 aggregated persons with disabilities into a single disability status category, grouped all LGBTQ-identifying persons into the same LGBTQ category, and did not present data separately for certain racial/ethnic identities. However, it is important to assess whether the patterns described in the Results are similar across groups within these aggregated categories.

Table S6 presents the predicted means on each outcome, centered at the means for WAHM, for five disaggregated racial categories (Latinx, Native American and Pacific Islander, multiracial white/nonwhite, multiracial nonwhite, and those who marked "other"), three disaggregated disability categories [physical differences (hearing, vision, speaking, and walking difficulties), mental illness, and chronic illness], and three disaggregated LGBTQ categories (transgender and gender nonbinary, queer, and bisexual identities). To accommodate the small sample sizes in each subgroup, means are averaged across all other demographic categories. As in Figs. 1 to 6, these means hold constant variation by STEM field, sector, education level, and age. The patterns in table S6 reflect the patterns of the aggregate categories in Figs. 1 to 6 of which they are a part, and the means for each disaggregated group are all in the same direction as the mean for their aggregate groups. Such patterns should be further explored in research using qualitative or multimethod approaches, which are particularly well suited to explicate these nuanced intersectional processes.

Limitations

While the STEM Inclusion Study data are unmatched in their usefulness for testing the hypotheses here in terms of their availability of LGBTQ and disability status measures alongside gender and race indicators, their multidimensional measures of work experiences, and their robust sets of explanatory factors, they have three limitations of note. First, while the 21 organizations included in the study represent a wide array of STEM professionals, they do not represent every subdiscipline or interdisciplinary community in STEM. Compared to the U.S. workforce, the sample overrepresents those employed in academia and in engineering and underrepresents STEM professionals in computer science. However, as noted above, supplemental analysis using weights that adjusted the sample to mirror the population of STEM professionals in the United States by demographics, subfield, and sector revealed that the patterns documented above remain when the SIS data are weighted to match the U.S. STEM population. In addition, as noted above, there was little variation in the decomposition effects across STEM fields or employment sectors, suggesting that over- or underrepresentation of respondents in certain subfields or sectors would not meaningfully affect the core patterns of results.

Second, the survey included over two dozen explanatory predictors across five categories. Yet, as with all surveys, there may be other factors not included in the decomposition that contribute to the gap between WAHM and non-WAHM. However, given the substantial portions of the WAHM/non-WAHM gap left unexplained after major points of variation such as education level, subfield, and job characteristics were accounted for, the inclusion of unmeasured supply-side variables would likely still leave large portions of the gaps unexplained.

Last, the survey does not include precise measurements of respondents' detailed career trajectories or organizational advancement histories, so it cannot account for the over-time accumulation of privilege. Despite these limitations, these analyses are a critical step in documenting intersectional privilege in STEM. Future research should expand this work, with careful attention to mechanisms producing these outcomes.

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at https://science.org/doi/10.1126/sciadv.abo1558

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