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Do Scales Measuring Sexist Attitudes have Equivalent Meaning for Sexual Minorities and Majorities?

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Abstract

Ambivalent Sexism Theory (Glick & Fiske, 1996) has revolutionised understanding of sexism and generated a new way of examining sexist attitudes using the Ambivalent Sexism Inventory (ASI). One key goal in sexism research is to compare sexist attitudes across different groups, including people with different genders and sexual identities. Before doing so, researchers must be confident that the construct(s) they are comparing are invariant across groups. Given assumptions of *hetero*sexuality, and the central role of heterosexual interdependence, we expected the ASI would be variant across people with different genders and sexual orientations. We conducted multigroup measurement invariance tests between heterosexual women, heterosexual men, lesbian women, and gay men (total $N = 1614$). Results indicated that hostile sexism and benevolent sexism emerged as separate, related, forms of sexism across groups (i.e., configural invariance was met), but item loadings and intercepts were not equivalent (i.e., loading and intercept invariance was not met). Accordingly, the ASI is not a suitable measurement tool to compare sexist attitudes across sexual minorities (lesbian women and gay men) and majorities (heterosexual women and men). We discuss implications for the centrality of heterosexual interdependence in ambivalent sexism, practical implications for the use of ASI, and we encourage researchers to develop new scales to assess sexism across diverse gender and sexual identities.

Keywords Hostile Sexism · Benevolent Sexism · Measurement Invariance · Sexual Minorities · Lesbian Women · Gay Men

Glick and Fiske's (1996) Ambivalent Sexism Inventory (ASI) is the foremost measure of sexist attitudes, being cited over 5500 times. Ambivalent Sexism Theory advanced understanding of sexist attitudes (see Connor et al., 2016 for review) by conceptualizing two interrelated forms of sexism: *hostile sexism* and *benevolent sexism*. However, modern research measuring sexist attitudes held by people with diverse sexualities assumes that the measurement of ASI is equivalent to heterosexual people. Indeed, a growing research trend is to compare the relative endorsement of sexist attitudes across heterosexual, gay, and lesbian people (e.g., Blumell & Rodriguez, 2020; Cowie et al., 2019; Warriner et al., 2013), and generalize research on heterosexual populations to inform theorizing about sexual minorities' sexist attitudes (see Li & Zheng, 2021; Xiao & Wang, 2021; Zhao & Zheng, 2020). Yet, theory and empirical practice suggest that the ASI will be *variant* across people with different gender and sexual orientations. In the current research, we conducted the first measurement invariance test of the ASI across a large sample of heterosexual women, heterosexual men, lesbian women, and gay men. Measurement invariance testing is a necessary precursor to any research assuming that the ASI is comparable across different gender and sexual orientation groups. Moreover, investigating measurement differences across gender and sexual orientation groups tests key principles of ambivalent sexism theory, including the extent to which hostile sexism and benevolent sexism emerge as separate forms of sexism, and which specific ideological components of sexism (e.g., beliefs about heterosexual intimacy or complementary

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gender roles) are interpreted differently across sexual majority and minority people.

Ambivalent Sexism Theory and Heterosexuality

Ambivalent sexism theory (Glick & Fiske, 1996) describes how two sexist ideologies function to maintain gender inequality (see Glick et al., 2000, 2004). *Hostile sexism* encompasses the hostile derogation of women who are seen to challenge men's power and threaten the gender hierarchy (e.g., feminists, career women), including beliefs that women use their sexuality to manipulate men (Glick & Fiske, 1996). Hostile sexism threatens women who deviate from traditional gender roles (Glick et al., 1997; Sibley & Wilson, 2004), but simultaneously undermines intimate *heterosexual* relationships. For example, women view men who endorse hostile sexism as unattractive (Bohner et al., 2010; Cross & Overall, 2018; Kilianski & Rudman, 1998), and men who strongly endorse hostile sexism view their female partners more negatively, behave more aggressively, and experience more problems in their intimate relationships (Cross et al., 2017, 2019; Cross & Overall, 2019; Hammond & Overall, 2013; Herrero et al., 2017). By contrast, *benevolent sexism* encompasses attitudes that idealize and revere women, and are theorized to be endorsed alongside hostile sexism to overcome the relational costs associated with hostile sexism (see Glick & Fiske, 1996; Hammond & Overall, 2017). Subfactors of benevolent sexism involve praise for women's positive interpersonal qualities (e.g., warmth, empathy) that complement men's competence and strength (*gender differentiation*), prescriptions for women to be cherished, protected, and provided for by men (*protective paternalism*), and emphasize men's dependence on women to live a happy and fulfilled life (*heterosexual intimacy*). Despite their subjective romanticism, endorsement of benevolent sexism consistently undermines women's competencies, ambition, and independence (see Barreto & Ellemers, 2005; Barreto et al., 2010; Becker & Wright, 2011; Dardenne et al., 2007; Dumont et al., 2010; Feather, 2004; Rudman & Heppen, 2003).

The content of ambivalent sexism is intentionally rooted in heterosexuality. Glick and Fiske (1996, p. 293) note that "Heterosexuality is, undoubtedly, one of the most powerful sources of men's ambivalence towards women." Indeed, both hostile sexism and benevolent sexism emphasize heterosexuality, including insecurities that women use their sexuality to humiliate men (e.g., "Many women get a kick out of teasing men by seeming to be sexually available and then refusing male advances", hostile sexism item) or that men need women to be fulfilled (e.g., "A man is not truly complete unless he has the love of a woman"; benevolent

sexism item; Glick & Fiske, 1996). At face value, sexual minorities are likely to have a fundamentally different way of answering these items as the items describe heterosexuality as an inherent norm and do not reflect sexual minorities' lived experiences. Indeed, the ASI was designed (and validated) for heterosexual samples (see Glick & Fiske, 1996). It remains an open question whether people with different sexualities have different interpretations (and different patterns of responding) to items on the ASI.

The Need to Test Measurement Differences Across Gender and Sexual Orientation

There is a practical need to establish the comparability of the measurement of sexism across people with varying sexual identities. A growing number of studies are using the ASI to examine sexist attitudes in sexual minority populations, including comparing mean-level differences across people with differing sexualities (e.g., Blumell & Rodriguez, 2020; Cowie et al., 2019; Dierckx et al., 2017; López-Sáez et al., 2020; Warriner et al., 2013). These studies interpreted the differences in sexist attitudes as evidence that gay men and lesbian women endorse sexism *less* than heterosexual men and women (cf. gay men appear as hostilely sexist as heterosexual men; Cowie et al., 2019). Similarly, recent research generates inferences from heterosexual people's ambivalent sexism to sexual minorities' sexism, including drawing comparisons between hostile sexism and intimate partner violence across heterosexual and gay men (Li & Zheng, 2021), and testing whether sexism differentially predicts attitudes towards same-sex parenting (Zhao & Zheng, 2020) and beauty ideals and the objectification of women (Xiao & Wang, 2021) across heterosexual, gay and/or lesbian samples. Yet, none of these claims are robust without evidence for measurement invariance as any differences or correlates potentially represent differences in the measurement of sexism rather than the endorsement of sexism (see Milfont & Fischer, 2015).

Testing measurement invariance of the ASI across sexual minorities and majorities is a theoretical test of the internalization of sexism. Gendered attitudes are rooted in social and biological differences between men and women across cultures (see Glick & Fiske, 1996) and are transmitted through socialization (see Eagly et al., 2000; Gutierrez et al., 2020; Hammond & Cimpian, 2021). Specifically, the ambivalent nature of sexism is theorized to emerge from the "gender relationship paradox:" heterosexual men's societal advantages coexist with intimate interdependence on women, and thus heterosexual men's societal power is constrained by dependence on women for love, sex, and domestic labor (Glick & Fiske, 1996). However, theory on the transmission of societal attitudes states that people will internalize distinct

forms of sexism (i.e., hostile sexism and benevolent sexism) *regardless* of their personal experiences (e.g., Eagly et al., 2000). In other words, sexism should still be "ambivalent" even for people who do not personally experience needs for romantic interdependence between men and women that are specific to heterosexual relationships (see Cowie et al., 2019; Gutierrez et al., 2020; Hammond & Cimpian, 2021). If the structure of sexism is ambivalent across sexual minority and majority groups, then future scale development that is designed to be generalizable (e.g., "Inclusive Sexism Scale"; Cultice, 2020) should consider indexing facets of hostile sexism and benevolent sexism simultaneously.

Investigating measurement invariance of the ASI also tests the theorized centrality of heterosexuality to sexist beliefs. Ambivalent sexism theory claims that heterosexuality is a fundamental driver of sexist attitudes (see Glick & Fiske, 1996) and a growing body of work supports that people's endorsement of sexism is enmeshed with their needs for intimate heterosexual relationships (see Hammond & Overall, 2017; Hammond et al., 2020 for reviews). For example, heterosexual women endorse benevolent sexism more strongly when its benefits, such as the promise of being cared for by a devoted male partner, are more readily available in their relationship (Becker, 2010; Cross & Overall, 2018; Hammond et al., 2016). Thus, one potential strategy to accurately measure gay people's sexism is to remove items directly assuming heterosexuality (e.g., Blumell & Rodriguez, 2020 omitted four items measuring "*heterosexual intimacy*" from benevolent sexism). Yet, interdependence between men and women is theorized to underpin *all* sexist attitudes, not just specific beliefs about romantic and sexual fulfillment (Glick & Fiske, 1996; Hammond & Overall, 2017). For instance, hostile sexism involves men feeling insecure about intimate interdependence (e.g., Fisher & Hammond, 2019; Hammond et al., 2020), and the protective paternalism subfactor of benevolent sexism emphasizes that men should protect and provide for female partners (Glick & Fiske, 1996). Thus, in the current research, we test whether heterosexual dynamics underlie *all* sexist attitudes by examining evidence that people with different gender/sexual identities have a different interpretation of hostile sexism *and* all subfactors (i.e., gender differentiation, protective paternalism, heterosexual intimacy) of benevolent sexism.

Testing Measurement Invariance of the Ambivalent Sexism Inventory

Measurement invariance tests provide evidence that group comparisons can be meaningful and valid. That is, tests of measurement invariance examine whether the accuracy of a measurement tool is influenced by conditions outside of the construct (i.e., group characteristics or individual differences, like gender and/or sexuality). Establishing measurement invariance across groups allows researchers to establish that (1) the latent variable of interest has the same conceptual meaning across each group; (2) regardless of group membership (e.g., gender and/or sexual orientation) the latent variable varies in the same systematic way; and (3) external factors influence the latent variable in the same way across groups (see Sakaluk et al., 2021; Vandenberg & Lance, 2000). These three conclusions are based on three statistical "levels" of measurement invariance: configural invariance (also known as form), loading invariance (also known as metric), and intercept invariance (also known as scalar or strong; see Rudnev et al., 2018; Vandenberg, 2002; Vandenberg & Lance, 2000).

Configural Invariance tests whether the general factor structure is the same across groups, including the number of factors and items that correspond to each factor (Putnick & Bornstein, 2016). In other words, across all groups, items that are designed to reflect hostile attitudes towards women load onto a latent hostile sexism factor, and items that are designed to reflect benevolent attitudes towards women to load onto a latent benevolent sexism factor. Configural invariance of the ASI means that hostile sexism and benevolent sexism are consistently structured across gender/sexual orientation groups (i.e. sexism is ambivalent across groups; hostile and benevolent sexism emerge as two forms of sexism across groups). If configural invariance is not met, then the structure of hostile sexism and benevolent sexism are different across groups (e.g., one or more groups' pattern of attitudes is not ambivalent).

Loading Invariance a higher level of measurement invariance, indicates whether item loadings are equivalent across groups, or put another way, whether the linear association between an item and a latent variable is similar across groups. Practically, loading invariance is often taken as evidence that items are important expressions of the latent variable and tests whether there is non-uniform item bias. Loading invariance implies that unit increases in response to a sexism item (e.g., answering 2 versus 3 on a 7-point Likert scale) is associated with the same increase in the latent variable (hostile or benevolent sexism) across groups (Fischer & Karl, 2019). In the current research, if loading invariance is met this indicates that items *similarly* load onto hostile sexism and benevolent sexism factors across groups (i.e., the slopes between items and latent variables are identical). If loading invariance is *not* met, then hostile sexism or benevolent sexism factors are more strongly represented by different items for different groups. Importantly, loading invariance is required to indicate that correlates of sexist attitudes (e.g., associations with intimate partner violence) and regression slopes are comparable across gender/sexual orientation groups.

Intercept Invariance The highest level of measurement invariance, indicates that people have the same intercepts or similar "starting points" when answering the items. For instance, one group's starting-point for a set of items may be

"neutral" and they vary above or below, but another group may start consistently at "disagree." Practically, intercept invariance indicates evidence that items are similarly easy or difficult to answer across groups and that the scales lack uniform item bias (see Fischer & Karl, 2019). If intercept invariance is met (i.e., item intercepts are the same across groups) this indicates that the latent factor means (i.e., hostile and benevolent sexism) capture the same amount of variation in each group and that mean-level differences across groups are interpretable (Putnick & Bornstein, 2016). If intercept invariance is violated, then evidence indicates variation in the item "starting point" across groups, and thus any group differences in hostile sexism and benevolent sexism potentially represent differences in the *measurement* rather than differences in *sexism*. Thus, intercept invariance is a prerequisite for researchers to make comparisons of mean differences between gender/sexual orientation groups (see Milfont & Fischer, 2015; Vandenberg & Lance, 2000). Only when intercept invariance is met can researchers test for mean-level differences in hostile sexism and benevolent sexism between gender/sexual orientation groups.

Current Research

The current research aimed to test the measurement invariance of the ASI across sexual minority and majority populations. Comparisons of group means, variances, correlations, and/or regression slopes involving latent constructs, like sexism, rely on an assumption of measurement invariance: latent variables have equivalent meaning and measurement across groups (Sakaluk et al., 2021). Thus, establishing measurement invariance across different gender/sexual orientation groups is a prerequisite for comparing endorsement of sexist attitudes, generalizing the correlates of sexist attitudes across gender/sexual orientation groups,

and developing new scales for specific gender and sexuality groups. We compared four groups: heterosexual women, heterosexual men, lesbian women, and gay men to assess a combination of gender and sexual identities and align with previous investigations of sexism and sexual orientation (e.g., Cowie et al., 2019; Warriner et al., 2013). We selected these four groups as an *initial* investigation recognizing that future research needs to examine non-binary and fluid forms of sexuality and gender identity (Andersen & Zou, 2015; Hyde et al., 2019). Our analytical strategy required a large balanced sample across groups, restricting us from assessing other gender and sexuality groups at this stage.

Our analytical strategy involved four steps. First, we examined measurement invariance of the ASI as it is typically used: Two constructs assessing hostile sexism and benevolent sexism (i.e., first-order factor structure, see Fig. 1, Panel A). Second, we tested measurement invariance in the theorized structure of hostile sexism, benevolent sexism, and the three benevolent sexism subfactors (i.e., first-and-second-order factor structure, see Fig. 1, Panel B). Third, to replicate the original validation of the ASI we conducted the same tests on heterosexual men and women. Finally, we conducted exploratory analyses (not pre-registered) examining people's experiences of evaluating the ASI items (e.g., whether items were confusing or inapplicable).

Consistent with the theorized structure of sexist ideologies (Glick & Fiske, 1996), the different valences, and distinct tone of hostile versus benevolent sexism items, we expected *configural invariance would be met*: hostile and benevolent sexism would emerge as distinct constructs across groups. However, we expected measurement differences to emerge because many items index concepts of heterosexuality and close interdependence between men and women which should not hold equivalent meaning for heterosexual men, heterosexual women, gay men, or lesbian women. Thus, we expected tests of loading invariance
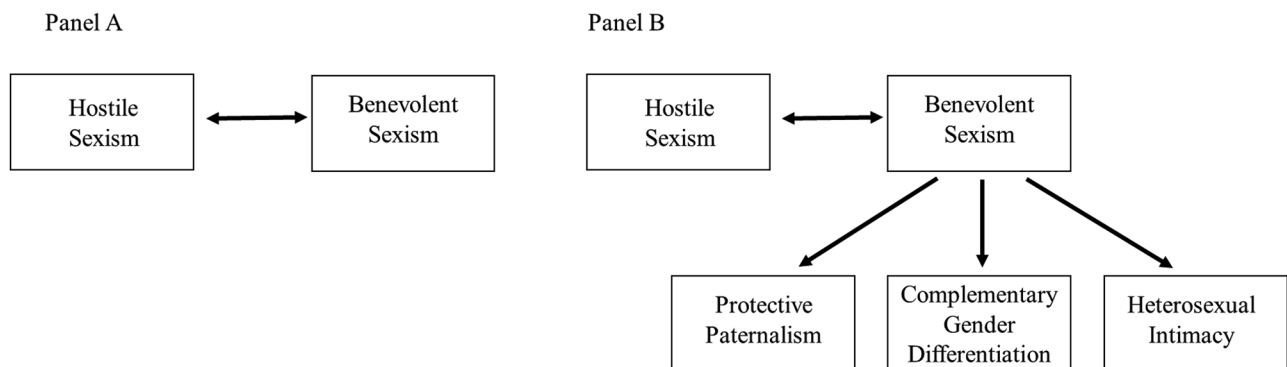
Panel A   Panel B

Fig. 1 Confirmatory Factor Analyses Models of the Ambivalent Sexism Inventory. Panel **A** presents a conceptual model for the First Order Factor Structure of Ambivalent Sexism, and Panel **B** presents

a conceptual model of the First-and-Second-Order Factor Structure of Ambivalent Sexism

would fail; items would load differently onto the hostile and benevolent sexism constructs across groups (i.e., the slopes between items and latent variables would not be identical), and subsequently intercept invariance would fail: the item starting points would be different across groups.

Method

Our procedure, aims, methods, materials, and planned analyses were all preregistered on the Open Science Framework (OSF), and approved by the Ethics Committee on Human Research (No. e2020-015).

Participants and Procedure

Participants were recruited via the online crowdsourcing platform Prolific for "a study about gender." Eligibility criteria required being fluent in English, aged 18 years or older, and holding a 90–100% approval rate on Prolific. (See Sect. 1 in the online supplement for recruitment details). Participation was open to participants across countries as our goal was to gather the largest sample available and given that we were already targeting participants with specific gender and sexual identities. We included responses across countries in our analyses given that the ambivalent nature of sexism is theorized to emerge from a combination of patriarchy, gender role differentiation, and female-male interdependence that is apparent across countries (Glick & Fiske, 1996, 2001).

Our target sample size was 400 responses from each group (i.e., heterosexual women, heterosexual men, lesbian women, gay men), double the suggested minimum for statistical power in a multi-group CFA (Milfont & Fischer, 2015). We oversampled from each group because we did not restrict survey participation according to sexual orientation or gender identity: Our stopping-points were 470 participants who identified as gay men, 470 lesbian women, 430 heterosexual men, and 430 heterosexual women. Participants who did not complete the questionnaire in the prespecified timeframe (> 3 min, see OSF, $n = 13$), indicated dishonest responses or lack of attention ($n = 85$) or whose gender and/or sexual identity ($n = 93$) fell outside the scope of the study, were excluded from analyses ($N = 191$, 10.6% of total sample), leaving the final sample described below. (See Recruitment, Eligibility, and Exclusion in the online supplement for eligibility and exclusion details).

The final sample included 1614 participants across four groups (381 lesbian women, 393 gay men, 430 heterosexual women, 410 heterosexual men). Participants were 29.82 years old on average ($SD = 10.38$), primarily based

in the United Kingdom ($n = 557$, 34.4%), in North America (United States, $n = 262$, 16.2%; Canada, $n = 45$, 2.8%), and 46% from various other countries (Portugal, $n = 167$, 10.3%, Poland, $n = 144$, 8.9%, Greece, $n = 56$, 3.5% Spain, $n = 55$, 3.4%, Italy, $n = 46$, 2.9%, Mexico, $n = 32$, 2%, Hungary, $n = 31$, 2%). Participants were asked to type their ethnicity, the majority identified as "White," "Caucasian" or "European" ($n = 1087$, 67.3%), "Polish" ($n = 54$, 3.3%), "Greek" ($n = 52$, 3.2), "British" ($n = 50$, 3.1%), and "Latina," "Latino," or "Latinx" ($n = 36$, 2.2%). (See Tables SM1-2 in the online supplement for summaries of participants ethnicity.) Most participants (59%) had a College Degree (including Masters, Doctoral, or Professional Degree), 20.2% had completed some college education, 19.5% had their GED/High School Diploma, and 1.3% did not complete High School. Most of the sample earned below $29,000 (64.5%), $30,000-$49,999 (16.8%), $50,000—$69,999 (7.5%), $70,000—$89,999 (3.4%) and more than $90,000 (2.1%). (See Table SM3 in the online supplement for demographics). Due to sample sizes restrictions and the need for balanced samples across groups for a multi-group CFA (min 200 per group, see Milfont & Fischer, 2015) we were unable to assess whether the ASI was invariant across countries of origin, education, or income.

Measures

Sexist Attitudes

Participants completed the Ambivalent Sexism Inventory (ASI; Glick & Fiske, 1996). Eleven items assessed endorsement of *hostile sexism* ("Women are too easily offended," "Most women fail to appreciate fully all that men do for them") and 11 items assessed endorsement of *benevolent sexism*, which includes the three subcomponents: *heterosexual intimacy* (4 items, e.g., "No matter how accomplished he is, a man is not truly complete unless he has the love of a woman"), *protective paternalism* (4 items, e.g., "Women should be cherished and protected by men") and *gender differentiation* (3 items, e.g., "Women, compared to men, tend to have greater moral sensibility;" -3 = *strongly disagree* to 3 = *strongly agree*). Higher mean scores indicate more agreement/endorsement.

Gender

Participants were asked "What is the gender with which you identify?" and could choose from options; "Male," "Female," "Trans-Identifying Male," "Trans-Identifying Female," or could specify another identity if they wished.

Sexual Orientation

Participants were asked "What is your sexual orientation?" and could choose from options; "Bisexual," "Gay," "Lesbian," "Straight/Heterosexual," "Pansexual, "Queer," "Asexual," or could specify another identity if the wished.

Subjective Evaluations of ASI and ASI Items

For our exploratory research questions, the final section of the survey asked participants the extent to which the ASI was (1)"… worded in a confusing way that made it hard to agree or disagree," (2) "…did not apply to me personally," and (3)"…make assumptions that do not apply to my life," using a rating scale from 1 (*Strongly Disagree)* to 7 (*Strongly Agree*). Participants who selected any level of agreement (i.e., somewhat agree, agree, strongly agree) were then asked to identify the number of items from the ASI that corresponded to those evaluations. (See Additional Analyses Comparing Groups in Evaluations of ASI Items of the online supplement for additional analyses comparing evaluations of ASI items across groups).

Results

Table 1 displays descriptive statistics and reliabilities for averaged scale scores. The general pattern appeared consistent with prior research indicating that sexual majority groups endorsed sexism more strongly than sexual minority groups, *assuming* that measurement is identical across those groups. Before assessing any mean-level differences, measurement invariance needs to be established (see Milfont & Fischer, 2015). To formally test measurement invariance, we conducted a series of multigroup structural equation models in MPlus 8.4 using full-information maximum likelihood estimation (Muthén & Muthén, 1998–2017), following specifications described by Milfont and Fischer (2015) and Rudnev et al. (2018).

To test measurement invariance, we conducted a series of multigroup models that separately and simultaneously modeled the latent factor structure of the ambivalent sexism inventory for the four genders/sexual orientation groups (i.e., heterosexual women, heterosexual men, lesbian women, and gay men). The three models comprised increasingly restrictive equality constraints across the four gender/sexual orientation groups. *Configural invariance* was specified by restricting item loadings so that manifest indicators for each sexist ideology loaded on the corresponding latent sexist ideology across all the groups (see Fig. 1) adapted from Glick & Fiske, 1996). *Loading invariance* was specified by restricting the item loadings to equality across all groups. *Intercept invariance* was specified by restricting *both* item loadings and item intercepts to equality across all groups.

Assessing whether assumptions of loading invariance were met involved comparing the model fit indices from the preceding configural model. Assessing intercept invariance involved comparing the model fit indices from the preceding loading model. We followed Cheung and Rensvold's (2002) guidelines to assess comparisons of model fit: A difference greater than 0.01 in the comparative fit indices (CFI) of two models indicates violations of measurement invariance. However, we also examined other model fit indices (i.e., root-mean-square error of approximation [RMSEA]; the Tucker-Lewis Index [TLI] and the standardized root-mean-square residual [SRMR]), given that no one value is sufficient evidence to determine fit (see Fischer & Karl, 2019; Milfont & Fischer, 2015). Chi-square tests of model fit were not utilized to judge model fit given that the large sample size rendered all tests significant (see Chen, 2007; Cheung & Rensvold, 2002; Fischer & Karl, 2019). If the overall model fit is significantly worse in the loading (versus configural) invariance model, then this indicates that at least one item loading is not equivalent across groups, and loading invariance is not supported (see Putnick & Bornstein, 2016). If the overall model fit is significantly worse in the intercept (versus loading) invariance model, then this indicates that at

Table 1 Descriptive Statistics and Reliabilities of Averaged Scale Scores for the Ambivalent Sexism Inventory

| | Hostile Sexism | | | Benevolent Sexism | | | Benevolent Sexism Subfactors | | | | | | | | |
| | | | | | | | Heterosexual Intimacy | | | Protective Paternalism | | | Gender Differentiation | | |
	M	*SD*	*α*	*M*	*SD*	*α*	*M*	*SD*	*α*	*M*	*SD*	*α*	*M*	*SD*	*α*
Heterosexual Women	−.92	1.08	.88	−.67	1.00	.83	−.76	1.25	.71	−.74	1.12	.63	−.45	1.27	.73
Heterosexual Men	−.12	1.04	.87	−.29	.91	.78	−.25	1.26	.71	−.35	1.01	.50	−.26	1.20	.72
Lesbian Women	−1.79	.99	.89	−1.25	.88	.80	−1.81	0.98	.63	−1.22	1.10	.66	−.55	1.34	.77
Gay Men	−1.05	1.25	.92	−1.20	.87	.77	−1.70	1.02	.57	−1.08	1.05	.59	−.70	1.32	.76

All sexism items were measured on a –3 (*strongly disagree*) to 3 (*strongly agree*) scale with 0 being the midpoint of the scale. *N*s were relatively even across groups, Heterosexual Women (*N* = 430), Heterosexual Men (*N* = 410), Lesbian Women (*N* = 381), Gay Men (*N* = 393)

least one item intercept differs across groups, and intercept invariance is not supported (see Putnick & Bornstein, 2016).

First Order Factor Structure of Ambivalent Sexism

Our first measurement invariance tests examined the ambivalent sexism inventory as it is conventionally used—an average of 11 items for hostile sexism and 11 items for benevolent sexism (see Fig. 1, Panel A). As shown in the upper section of Table 2, the *configural* model demonstrated acceptable fit, indicating that across groups the benevolent sexism items and hostile sexism items loaded on their respective factors. The loading model indicated a violation of measurement invariance (ΔCFI = 0.011) according to our preregistered criterion (< 0.010). Finally, the intercept model indicated a violation of measurement invariance (ΔCFI = 0.044). In sum, configural measurement invariance best fit the data: Hostile sexism and benevolent sexism emerged as distinct forms of sexism across gender/sexual orientation groups, but there was no evidence that item loadings were comparable between groups or that the groups used the scale midpoint equivalently. Practically, these tests suggest that any differences in sexism or the associations with sexism for different gender/sexuality groups could be due to measurement differences rather than due to those groups' sexist attitudes.

First and Second-Order Factor Structure of Ambivalent Sexism

We next assessed measurement invariance for the theorized structure of ambivalent sexism in which first and second-order factors are modeled together (see Fig. 1, Panel B). In these analyses, latent hostile sexism has 11 indicators and benevolent sexism is a second-order factor with three sub-factors of 3–4 indicators each. We followed Rudnev et al. (2018) to conduct five sequential measurement invariance tests for models with a second-order factor. Configural invariance was specified by restricting item loadings so that manifest indicators for each sexist ideology exclusively loaded on the corresponding latent factor or subfactor across all of the gender/sexuality groups. First-order loading invariance was specified by restricting the item loadings to equality across all groups, and second-order loading invariance additionally restricted the subfactor loadings on the second-order benevolent sexism factor to equality. First-order intercept invariance was specified by restricting item loadings and item intercepts to equality across all groups, and second-order intercept invariance additionally restricted subfactor loadings and means to equality across groups.

Results are displayed in the lower section of Table 2. As expected, Model 1 indicated configural invariance of the first-order factors and suggested that the structure of benevolent sexism and hostile sexism was the same across gender/sexuality groups. Models 2 and 3 displayed good fit without deterioration in the CFI value, indicating that the variances of the items *and* the three subfactors of benevolent sexism were comparable across groups. However, intercept invariance of the first-order factors in Model 4 showed a deterioration in model fit in terms of the CFI difference (0.025), indicating no evidence for first-order intercept invariance across gender/sexuality groups, and thus no second-order intercept invariance (see Model 5). Importantly, Model 5 failed to converge until the loading of the *heterosexual intimacy* subfactor on the second-order factor was free to vary across groups (versus being constrained to be equal across groups). Indeed, once allowed to vary, the *heterosexual intimacy* subfactor loaded more strongly on benevolent sexism

Table 2 Results for Measurement Invariance Tests on the Ambivalent Sexism Inventory across Gender and Sexuality Groups (i.e., heterosexual women, heterosexual men, lesbian women, and gay men)

	χ^2	df	RMSEA	CFI	ΔCFI	TLI	SRMR
First Order Factor Structure: HS and BS							
Configural invariance	2512.821*	823	.071	.869		.854	.063
Loading invariance	2709.977*	892	.071	.858	−.011	.853	.070
Intercept invariance	3336.098*	952	.079	.814	−.044	.819	.083
First and Second Order Factor Structure: HS, BS, and BS Subfactors							
Configural invariance	2257.499*	824	.066	.888		.874	.115
Loading invariance of the first-order factors	2395.729*	878	.065	.881	−.007	.875	.124
Loading invariance of the first and second-order factors	2401.394*	881	.065	.881	.000	.875	.124
Intercept invariance of the first-order factors	2780.664*	935	.070	.856	−.025	.858	.133
Intercept invariance of the first- and second-order factors	3195.166*	940	.077	.824	−.032	.827	.172

χ^2 chi-square, *df* degrees of freedom, *RMSEA* root mean square error of approximation, *CFI* comparative fit index, *ΔCFI* difference in CFI from the prior model, *TLI* Tucker-Lewis Index, *SRMR* standardized root mean square residual

*p < .001. See Rudnev et al. (2018) for a full description of models and associated example syntax for the test of *First and Second Order Factor Structure*. Rudnev et al. use the terms metric and scalar invariance, here we adopt the labeling loading and intercept invar variance, respectively

for heterosexual women (loading = 1.51) and heterosexual men (loading = 1.88) than for lesbian women (loading = 0.91) and gay men (loading = 0.94) suggesting that *heterosexual intimacy* items varied substantially between heterosexual women and men and lesbian women and gay men. This finding suggests that the measurement of the heterosexual intimacy items was particularly variant across the gender/sexuality groups.

Results from the second-order measurement invariance did not support our preregistered prediction of failed loading invariance. Instead, the assumption of loading invariance was met; items loaded similarly onto benevolent sexism—made up of three subfactors—and hostile sexism across gender/sexuality groups. Consistent with our expectations, there was no support for intercept invariance of the first or second-order factors, meaning there was no evidence that the groups used the scale midpoint/starting point equivalently. In sum, means scores of hostile and benevolent sexism, and the three benevolent sexism subfactors, cannot be compared with confidence across these gender and sexuality groups.

Additional Analyses: Invariance Between Heterosexual Men and Women

We conducted measurement invariance analyses to replicate and extend the initial validation of the ASI (see Glick & Fiske, 1996). The original scale validation presented statistical evidence that measurement was comparable across heterosexual men and women, but no researcher has replicated these analyses with modern measurement invariance tests (i.e., first-and-second order tests). As shown in the upper section of Table 3, tests of the first-order factor structure assessing hostile and benevolent sexism revealed that intercept invariance was the best fitting model; the variances and the starting point on the ambivalent sexism inventory were comparable across heterosexual men and heterosexual women. However, tests of the first-and-second order factor structure (lower section, Table 3) indicated that loading invariance best fit the data (i.e., model fit deteriorated when testing intercept invariance), and thus intercepts are not equivalent for heterosexual men and heterosexual women when considering the full model of ambivalent sexism (i.e., including subfactors). The differences across the first versus first-*and-* second order tests (upper vs lower sections, Table 3) suggest that measurement of the ASI as it is commonly used (i.e., average scores of hostile and benevolent sexism) is fully invariant (and thus acceptable) between heterosexual men and women, but intercepts are different for the full ASI model, suggesting intercept differences in the theoretical underpinnings of benevolent sexism (see Rudnev et al., 2018).

For completeness, we also conducted separate pairwise invariance tests across all gender and/or sexual orientation combinations. (See Tables SM4-7 in the online supplement for details). Tests of intercept invariance (either first or first and second order factors) failed across all gender and/or sexual orientation combinations. Taken together, these results indicate that between-group mean differences are not interpretable across any of the group comparisons as it is unclear whether differences represent group differences or differences in the measurement itself (Milfont & Fischer, 2015; Vandenberg & Lance, 2000).

Table 3 Results for Measurement Invariance Tests on the Ambivalent Sexism Inventory across Heterosexual Women and Heterosexual Men (replicating Glick & Fiske, 1996 Original Study)

	χ^2	*df*	RMSEA	CFI	ΔCFI	TLI	SRMR
First Order Factor Structure: HS and BS							
Configural invariance	1195.872*	416	.067	.872		.855	.058
Loading invariance	1218.405*	436	.065	.872	.000	.864	.060
Intercept invariance	1308.287*	456	.067	.860	−.008	.858	.063
First and Second Order Factor Structure: HS, BS, and BS Subfactors							
Configural Invariance	967.830*	411	057	.909		.897	.054
Loading invariance of 1st-order factors	986.176*	429	.056	.909	.000	.901	.055
Loading invariance of 1st-and 2nd-order factors	986.185*	430	.055	.909	.000	.902	.055
Intercept invariance of 1st-order factors	1066.296*	448	.057	.898	−.011	.895	.058
Intercept invariance of 1st-and 2nd-order factors	1188.745*	452	.062	.879	−.019	.876	.084

χ^2 chi-square, *df* degrees of freedom, *RMSEA* root mean square error of approximation, *CFI* comparative fit index, *ΔCFI* difference in CFI from the prior model, *TLI* Tucker-Lewis Index, *SRMR* standardized root mean square residual

[*]*p* < .001. See Rudnev et al. (2018) for a full description of models and associated example syntax for the test of *First and Second Order Factor Structure*

Exploratory Analyses: Evaluation of the Ambivalent Sexism Inventory and Specific Items

Finally, we conducted exploratory analyses to investigate participants' evaluations of the ASI in general, and specific items. (See OSF and Additional Analyses Comparing Groups in Evaluations of ASI Items in the online supplement for full details). As shown in Fig. 2, 416 participants (25.7%) rated that they "somewhat agreed," "agreed," or "strongly agreed" that the ASI was "…worded in a confusing way that made it hard to agree or disagree." 789 participants (48.8%) stated the ASI "…did not apply to you personally," and 904 (56.0%) stated the ASI "… make assumptions that do not apply to your life."

A series of one-way ANOVAs tested differences between gender/sexuality groups in the number of items selected as being confusing, not personally applicable, or making assumptions about their life. Results indicated significant differences in 11 of 15 tests. Post hoc analyses revealed a general pattern whereby lesbian women and gay men (and in some cases heterosexual women) identified a greater number of ASI items inapplicable to their lives compared to heterosexual men. In particular, the largest group difference emerged in which a greater number of heterosexual intimacy items were highlighted as confusingly worded, not applying to participants' lives, and making assumptions about participants' lives. (See Tables SM7-9 in the online supplement for details). There were only four cases in which there was no evidence for group differences: (1) evaluating hostile sexism items as confusingly worded, and evaluating the complementary gender differentiation items as (2) confusing, (3) personal applicable, or (4) making assumptions about participants' lives. In sum, exploratory analyses suggested that the ASI is relatively more applicable for heterosexual men and women and their lives, whereas lesbian women and gay men found that ASI items (particularly items concerning heterosexuality) did not apply to themselves or their lives.

Discussion

Sexism influences all people, in a variety of ways, yet sexual minorities have largely been left out of sexism research. Research examining sexual minorities' attitudes toward gender is urgently needed to tackle gender inequality, but researchers first need to know whether current sexism measures are appropriate to assess their sexist attitudes. We conducted the necessary tests of whether the Ambivalent Sexism Inventory (ASI; Glick & Fiske, 1996) is invariant across people with varying gender and sexual orientations. Our preregistered hypotheses were supported: people's pattern of responses differentiated between hostile sexism and benevolent sexism as distinct components of sexism (configural invariance). However, as predicted, results revealed that the item loadings and intercepts were not equal across people with varying gender and sexual orientations. Thus, we did not have evidence to suggest the ASI has equivalent meaning across people with different gender and sexual orientations. These findings help inform research practices and scale development, and advance theoretical understanding of sexism.

Theoretical Insights Gained from Testing Measurement Invariance

Testing measurement invariance of the ASI across groups of people with varying gender and sexual orientations supports tenets of ambivalent sexism theory. First, all tests indicated acceptable model fit for *configural invariance*—participants' responses to items robustly differentiated hostile sexism from benevolent sexism. If the tests had failed to meet configural invariance, then the pattern of results would have indicated systematic variability in the ambivalence of sexism (e.g., some groups express gender prejudice in subjectively positive *and* antagonistic ways,
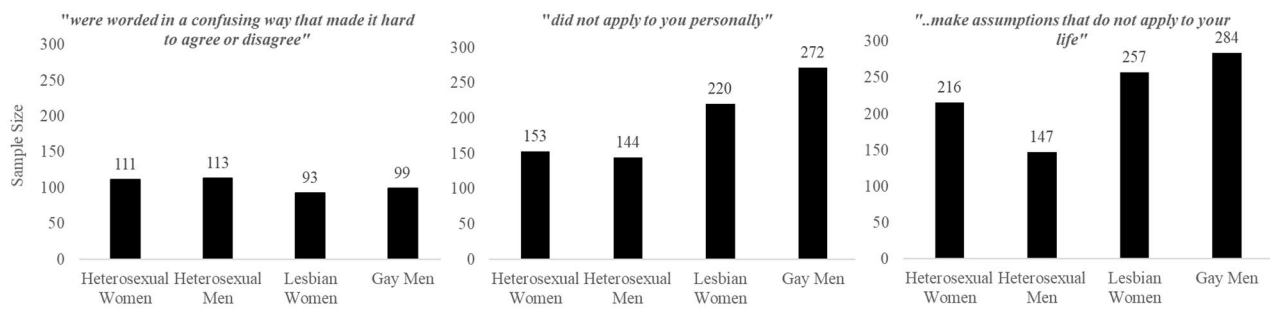

Fig. 2 Series of bar graphs showing participants split across gender/sexuality groups who responded as "*somewhat agreed*," "*agreed*," or "*strongly agreed*" to items regarding the applicability of the ASI; "*In general the are worded in a confusing way that made it hard to agree or disagree*" (*n*=416, 25.7% of total sample, left panel), "…*did not apply to you personally*," (*n*=789, 48.8% of sample, middle panel), and "… *make assumptions that do not apply to your life*" (*n*=904, 56% of total sample, left panel)

whereas other groups' gender prejudice is univalent). However, people's endorsement (or rejection) of sexism discriminated between its two forms, regardless of their gender or sexual orientation, and thus provided novel evidence that sexism is ambivalent because it is inherently made of two distinct ideologies (Glick & Fiske, 1996). Second, ambivalent sexism theory states that people's heterosexual relationship needs and insecurities are a fundamental source of sexism (Glick & Fiske, 1996; Hammond & Overall, 2017, 2020). For instance, relationship processes in which people idealize—or feel idealized by—a romantic partner share conceptual overlap with subjectively romantic content of benevolent sexism for heterosexual people (e.g., that women "complete" men romantically or that men put women "on a pedestal"; Cross & Overall, 2018; Cross et al., 2016). The different interpretations of items, particularly prominent for "heterosexual intimacy," among people with varied gender/sexual orientations is novel evidence for the importance of investigating how relationship needs underpin sexist attitudes.

Our research highlights the need for more investigation to understand sexual minorities' attitudes about gender. Sexist attitudes disproportionally harm sexual minorities (Capezza, 2007; Davies, 2004; Kerns & Fine, 1994; Kite & Whitley, 1996; Meyer, 2003, 2015), including how the expression of sexist attitudes exclude groups via heterosexism, expressions that men and women each occupy a complementary relationship role, as well as explicit aggression, such as derogating people who reject traditional gender role norms (Glick et al., 2015). Despite the harm of sexism, people do not necessarily have to be advantaged by sexist attitudes to endorse sexism. Indeed, lesbian women and gay men show different patterns of endorsement of gender prejudices (Johnson & Samdahl, 2005; Taywaditep, 2002; Ward, 2000), consistent with theorized processes in which advantaged *and* disadvantaged societal groups adopt prejudices to cope with the distress of inequality (e.g., Jost & Banaji, 1994). Adopting an intersectional approach to examining sexism will advance understanding about how societal power depends on multiple identities (see Glick, 2014). For example, gay men's *gender* identity may afford greater structural power, yet their sexual identity clashes with the heteronormative gender roles underpinning sexism. Equally, expressions of sexism may offer lesbian women limited advantages based on their gender (e.g., benevolently sexist men are friendlier in non-romantic cross-sex interactions; Goh & Hall, 2015), but only to the extent they conceal their sexuality or "pass" as heterosexual (e.g., lesbian women are subjected to more hostile derogation; Glick et al., 1997, also see Cowie et al., 2019; Pfeffer, 2014). Investigating the complexities of gender attitudes as held by diverse groups of people will generate new insights into the content and structure of sexism.

Practice Implications

Ambivalent sexism research has focused on heterosexual people's sexism, but the need to understand sexual minorities' sexist attitudes is apparent in a recent growth of research examining the sexist attitudes held by gay men and lesbian women (e.g., Blumell & Rodriguez, 2020; Dierckx et al., 2017; López-Sáez et al., 2020; Warriner et al., 2013; Xiao & Wang, 2021). The current findings identify a need for caution in this growing body of work. We conducted the measurement tests that are prerequisites of comparing or generalizing groups' endorsement of ambivalent sexism. However, the ASI did not have the same meaning across sexual majorities (heterosexual women and men) and sexual minorities (lesbian women and gay men). Violation of intercept invariance indicated that the "starting point" was not similar across people with different gender and sexual orientations, and thus we cannot determine whether differences across those groups reflect differences in sexism endorsement/rejection or differences in the *measurement* of sexism. Furthermore, the failure of loading invariance for first-order tests highlights that variance in hostile sexism and benevolent sexism were not comparable across gender/sexual orientation groups. Thus, we cannot recommend inferring findings from sexism research with sexual majority samples to construct predictions for samples of sexual minorities (e.g., Li & Zheng, 2021; Xiao & Wang, 2021). Indeed, prior research on measures that fail invariance tests suggest that the comparisons do not share theoretical meaning and tend to inflate rates of false-positive findings (see Sakaluk et al., 2021).

No tests can confirm *why* assumptions of invariance are not met. We cannot determine whether measurement differences across groups are conceptual (e.g., differences in the perceived meaning of items) or methodological (e.g., consistent item biases due to reactivity to the content of items; Fischer & Karl, 2019). However, consistent with our theorizing, exploratory analyses indicated that lesbian women and gay men identified a greater number of ASI items as unapplicable to themselves or their lives. Thus, lesbian women and gay men may have different interpretations of gender-based attitudes because the items contain heteronormative ideas or ideas that undermine acceptance of their sexuality (see Davies, 2004; Kerns & Fine, 1994), which are not apparent to heterosexual men and women. Indeed, heterosexual men selected the fewest ASI items as being personally unapplicable. In sum, the exploratory tests affirmed measurement invariance testing and reiterated the need for understanding gender attitudes across gender/sexual orientation groups. Future studies could develop qualitative information about sexual minorities' attitudes about gender, mirroring procedures in the initial scale development

(e.g., Glick & Fiske, 1996) to identify generalizable attitudes across different genders and sexual orientations. Our results encourage these efforts to explicitly consider the validity of *benevolent* sexism in understanding groups' attitudes regardless of their identity. The subfactors of heterosexual intimacy *and* protective paternalism appeared incongruent for gay men and lesbian women, but all groups differentiated hostile sexism from benevolent sexism. Thus, researchers developing scales to assess sexual minorities' sexist attitudes should try to identify the forms of patronizing, paternalistic, and romantic-sounding gender attitudes that are applicable across sexual majority and minority populations. Lastly, we expect that more detailed investigations into the relevance and meaning of these ideologies across different groups will facilitate the design of more nuanced and tailored sexism interventions.

Limitations and Future Research Directions

A key strength of this research was the large and balanced sample of heterosexual men, heterosexual women, lesbian women, and gay men that provided high statistical power to test measurement invariance. Yet, our sample did not represent the diversity of gender or sexual orientations and identities, or their intersections, so we cannot generalize beyond the groups in our sample. Nonetheless, we do not expect measurement of the ASI to be variant across other groups that represent diversity in gender, sexual orientations, and identities, or relationship structure based on the same rationale—the content of ambivalent sexism places primacy on the societal differences and intimate relations between men and women specifically, and thus the items have specific meaning and personal relevance for cisgender heterosexual people. Given our theorizing about the centrality of heterosexual intimacy and heteronormativity to sexist attitudes, we expect the ASI to be variant for people who identify as asexual or aromantic, transgender people and people whose gender or sexual identities are fluid, and people whose relationship structures do not mirror the prescriptions of sexism (e.g., people in consensually non-monogamous relationships or people who prefer singlehood; Balzarini & Muise, 2020; Pepping & MacDonald, 2019). Future research considering scale development or initiating grounded theory into the generalizable content of sexist attitudes should capitalize on the broad diversity of gender, sexuality, and relationship structures.

In addition, we were unable to assess cross-cultural differences or consider culturally-specific norms regarding gender, sexuality, and relationships that may arise through different socialization processes. We sampled across countries given that the foundation of sexist attitudes—patriarchy and heterosexual interdependence—are strikingly common across countries (Harris, 1991; Pratto, 1996) and the ASI is used across

countries (Glick et al., 2000; Napier et al, 2010). Although we expect the ASI to be less applicable to sexual minority (versus majority) groups across countries, future research should explore whether country-level and/or individual-level factors exacerbate (or weaken) this association. For example, sexual minorities may find the ASI especially irrelevant to their lives in more egalitarian societies that hold more accepting attitudes of, and equal rights for, lesbian women and gay men (Henry & Wetherell, 2017). Examining individual factors, such as differences in political or religious ideology across different sexual identity groups (Kowalski & Scheitle, 2020) is also an important direction for future work that may inform why sexual minority participants did not find the ASI items applicable to their lives.

Finally, understanding diverse perspectives on sexism may offer new avenues for sexism reduction. Interventions targeting sexism are rarer than for other prejudices (Becker et al., 2014) and predominantly focus on changing people's sexist attitudes via education (see Stewart et al., 2021 for a systematic review). Understanding sexist attitudes from the groups we studied might open new doors to tackling sexism and gender inequality. For example, challenging the gender binary and instead understanding gender as a diverse and fluid identity—untied from specific roles, appearances, or behavior—should undercut the binary ideological emphasis on men *versus* women that underpins sexism (see Dierckx et al., 2017; Lee et al., 2020; Saguy et al., 2021; Şahin & Yalcinkaya, 2021; Zell et al., 2016). Examining whether increased de-gendering (e.g., replacing "he" or "she" with "they") and multi-gendering (e.g., replacing "he" or "she" with "he," "she," or "ze;" see Morgenroth et al., 2021) undermines essentialist thinking, and in turn, sexist attitudes is another direction for future work. Additionally, challenging traditional concepts about relationships, including the need for distinct relationship-based roles that are often divided along gendered-lines (i.e., women as relationship caretakers, men as providers), may also destabilise sexist attitudes by disassociating specific roles and tasks with gender. Lastly, we expect that having more diverse voices in the field of sexism research will undoubtedly inform investigations of sexual minorities' sexism and strengthen scholarship around how to reduce sexism.

Conclusion

The ASI is the foremost measure of sexist attitudes and has unquestionably advanced understanding of sexist attitudes and gender relations. But is it an appropriate measure to examine and compare sexist attitudes across different groups, including people with different genders and sexual identities? Our measurement invariance tests suggest that the ASI does not have equal meaning across heterosexual women, heterosexual men, lesbian women, and gay men.

Practically, these results suggest that the ASI cannot be used to compare mean-level differences in sexism, or compare patterns of the covariates and outcomes of sexism, across heterosexual women and men (sexual majority) and lesbian women and gay men (sexual minorities). However, these results affirm two core tenets of ambivalent sexism theory: the ambivalent nature of sexism is generalizable across people with diverse gender/sexual orientations (i.e., configural invariance), and heterosexual needs, fears, and desires are critical components to understanding people's endorsement (or rejection) of both hostile sexism and benevolent sexism. These results also highlight the importance of the intersection of gender and sexuality for sexism research. Lastly, these results strongly encourage the inclusion of measurement invariance tests into ongoing research and broadening the scope of sexism research to better understand and measure sexist and gender-based attitudes of sexual minorities.

Data and Code Availability Data and Code are available on OSF.

Declarations

Ethics Approval Ethical approval for the current research was obtained from [BLIND] University and approved by the Ethics Committee on Human Research (No. e2020-015).

Consent to Participate Participants provided informed consent before the study.

Conflicts of Interest Not applicable.

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