

# When Diversity Measures Are Nonequivalent:

## Advice for Practitioners

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### Introduction

Surveys help organizations assess employee attitudes, particularly regarding employee reactions to new organizational initiatives (Saari & Judge, 2004; Saari & Scherbaum, 2011). When addressing diversity, equity, and inclusion initiatives, organizations often focus on group differences in attitudes to identify areas for improvement (Grice et al., 2021). However, groups do not always interpret surveys in the same way, causing measurement nonequivalence (Somaraju et al., 2022). Measurement nonequivalence makes it difficult, if not impossible, to compare group differences (Nye et al., 2019) presenting a problem for organizations.

### Method

We assessed measurement invariance across five diversity-related measures. Data were collected across three organizations (N = 732) from different industries (i.e., healthcare, construction, information technology). We used 5 steps outlined by Somaraju et al. (2021) to examine measure nonequivalence:

1. Estimate the CFA model fit for each individual group. If each individual model has good fit, move to step 2
2. Estimate the CFA model fit for a multigroup model. The CFI will be used as the base fit score when determining item-level nonequivalence
3. Estimate a constrained CFA model fit (i.e., intercepts and loadings are constrained). The CFI provides the baseline for determining a referent item
4. Identify the referent item. Iteratively free one item from until you find  $\Delta CFI < .002$  using CFI from Step 3
5. Assess item-level nonequivalence. Specify models in which one item, in addition to the referent item, are separately fixed to be equal. Compare model CFI to the baseline CFI identified in Step 2

Analyses were run in R Studio using the lavaan package for estimating CFA fit and dmacs to estimate  $d_{MAC}$  effect sizes

# Finding:

Multiple diversity measures were

found to be nonequivalent across

gender and race, explaining most of

the observed mean difference

between groups.

# Takeaway:

The use of effect sizes can provide

corrected group mean differences

## Results

Results indicate that for all five measures, there was significant measurement nonequivalence across organizations such that all but the referent item were found to be nonequivalent. We also examined measurement invariance across race and gender where all measures in all organizations were nonequivalent. Interestingly, these effects were not similar across organizations. The construction company had strong gender effects across measures ( $d_{MAC} = -.64$  to  $-.13$ ), but weak racial effects ( $d_{MAC} = -.08$  to  $.34$ ). In contrast, the healthcare company had relatively stronger racial effects ( $d_{MAC} = -.62$  to  $-.35$ ) than gender ( $d_{MAC} = -.43$  to  $-.01$ ). The information technology company had low effects for both race ( $d_{MAC} = -.29$  to  $.04$ ) and gender ( $d_{MAC} = -.20$  to  $.09$ ).

Table 1] Demographic Statistics – Race and Ethnicity

	IT	Construction	Healthcare
White	137 (68.16%)	131 (68.95%)	169 (64.02%)
Black	9 (4.48%)	10 (5.26%)	34 (12.88%)
Latinx	19 (9.45%)	9 (4.74%)	7 (2.65%)
Asian	6 (2.99%)	2 (1.05%)	0
Indigenous or Native Alaskan	1 (.5%)	0	0
Native Hawaiian or Pacific Islander	0	0	1 (.38%)
Multiracial	5 (2.49%)	3 (1.58%)	6 (2.27%)
Prefer not to respond	23 (11.44%)	35 (18.42%)	45 (17.05%)
Prefer to self-describe	1 (.5%)	0	2 (.76%)

Table 2] Demographic Statistics - Gender

	IT	Construction	Healthcare
Men	122 (61%)	49 (25.93%)	212 (80.92%)
Women	58 (29%)	111 (58.73)	14 (5.3%)
Non-binary	1 (.5%)	1 (.5%)	1 (.3%)
Prefer not to respond	18 (9%)	27 (14.29%)	34 (12.98%)
Self-identify	1 (.5%)	1 (.5%)	1 (.3%)

Table 3 Scale Means – Attitudes Towards DEI

	Full Sample		Men		Women		M Diff		White Employees		Racial Minorities		M Diff	
	M	SD	M	SD	M	SD	Exp.	True	M	SD	M	SD	Exp.	True
IT	24.88	4.77	25.01	4.85	25.55	4.13	-.72	.96	25.53	4.07	24.03	5.85	-1.33	-.20
Construction	24.70	4.65	23.75	4.59	25.64	3.95	-1.58	3.49	24.90	4.37	25.96	3.59	.72	.34
Healthcare	22.55	5.41	22.75	5.36	24.50	3.90	-1.57	3.32	23.46	5.07	20.81	5.52	-2.82	-.17

Note: The expected and true mean differences are reported for each group comparison. Expected mean difference refers to the differences in means caused by measurement nonequivalence. True mean difference subtracts the expected mean difference from the observed mean difference.

Table 4 Scale Means – Career Development

	Full Sample		Men		Women		M Diff		White Employees		Racial Minorities		M Diff	
	M	SD	M	SD	M	SD	Exp.	True	M	SD	M	SD	Exp.	True
IT	16.38	3.07	16.24	3.09	16.81	2.63	-0.37	0.94	16.44	2.83	16.46	3.24	0.02	0.00
Construction	16.25	3.00	15.43	3.4	16.65	2.62	-1.10	2.32	16.33	2.92	16.29	3.1	-0.04	0.00
Healthcare	15.49	3.76	15.74	3.69	16.14	2.98	-0.32	0.72	16.1	3.44	14.32	3.81	-1.89	0.11

Table 5 Scale Means – Discrimination and Harassment

	Full Sample		Men		Women		M Diff		White Employees		Racial Minorities		M Diff	
	M	SD	M	SD	M	SD	Exp.	True	M	SD	M	SD	Exp.	True
IT	24.94	4.50	25.02	4.65	25.26	4.00	-0.18	0.42	25.29	4.17	24.38	5.27	-0.89	-0.03
Construction	24.70	4.65	22.00	5.48	25.38	3.51	-2.28	5.66	24.32	4.56	24.3	5.50	-0.01	-0.01
Healthcare	23.20	4.98	23.51	4.95	23.86	4.20	-0.26	0.61	24.1	4.79	21.3	4.63	-2.51	-0.29

Table 6 Scale Means – Hiring, Recruitment, and Retention

	Full Sample		Men		Women		M Diff		White Employees		Racial Minorities		M Diff	
	M	SD	M	SD	M	SD	Exp.	True	M	SD	M	SD	Exp.	True
IT	16.04	3.40	15.95	3.19	16.13	3.53	0.17	0.01	16.31	3.19	15.58	4.11	-0.79	0.06
Construction	15.96	3.50	16.74	2.95	14.5	3.96	-2.34	0.10	15.92	3.39	17.08	3.42	1.18	-0.02
Healthcare	14.53	3.93	14.28	3.81	14.52	4.02	0.23	0.00	15.07	3.60	12.64	4.38	-2.85	0.42

Table 7 Scale Means – Sense of Belonging and Inclusion

	Full Sample		Men		Women		M Diff		White Employees		Racial Minorities		M Diff	
	M	SD	M	SD	M	SD	Exp.	True	M	SD	M	SD	Exp.	True
IT	24.31	5.09	24.19	5.07	24.76	4.66	-0.35	0.92	24.5	4.75	23.68	5.62	-0.89	0.07
Construction	24.47	4.10	24.35	3.95	24.87	3.79	-0.22	0.74	24.89	3.8	24.5	3.95	-0.26	-0.13
Healthcare	22.75	5.40	23.28	5.14	24.29	5.78	-0.83	1.84	23.9	4.87	21.64	5.4	-1.82	-0.44

Table 8] Observed and Predicted Cohen's D

Cohen's D	Observed	IT		Construction		Healthcare			
		Observed	Predicted	Observed	Predicted	Observed	Predicted	Corrected	
Attitudes	.12	-.47	.59	.46	-.69	1.15	.33	-.68	1.01
Gender	-.33	-.58	0.25	.25	.56	-0.31	-.51	-.75	0.24
Race	.05	.44	-0.39	.80	-.78	1.58	.07	-.57	.64
Discrimination	.21	.51	-0.30	.00	.39	-0.39	.59	-.72	1.31
Race	.19	-.46	.65	.43	-.56	.99	.11	-.44	.55
Gender	-.01	.35	-0.36	.01	-.42	.43	.50	-.70	1.20
Hiring	-.05	.37	-0.32	.68	-.76	1.44	-.06	-.33	-.27
Gender	.22	-.48	-0.26	-.34	.55	-0.89	.63	-.74	1.37
Race	.12	-.47	.59	.14	-.45	.59	.19	-.53	.72
Sense of Belonging	.17	-.43	.59	.10	-.44	.54	.45	-.52	.97
Gender	.12	-.47	.59	.14	-.45	.59	.19	-.53	.72
Race	.17	-.43	.59	.10	-.44	.54	.45	-.52	.97

Note: All predicted effect size use the majority group as the referent.

Table 9 Scale Average D<sub>obs</sub> and Expected MDE Effect

	IT		Healthcare		Construction	
	Ave. Obs.	% of Mean	Ave. Obs.	% of Mean	Ave. Obs.	% of Mean
DEI Attitudes	-.29	83%	-.54	106%	.36	69%
Gender	-.11	78%	-.43	90%	-.44	83%
Career Development	.04	87%	-.56	106%	-.15	102%
Race	-.20	62%	-.17	81%	-.35	90%
Discrim. & Harass.	.09	97%	-.49	90%	.00	45%
Gender	.09	76%	-.27	74%	-.58	67%
Hiring, Reten. & Recruit.	-.23	109%	-.62	117%	.34	102%
Race	.06	97%	-.01	100%	-.65	104%
Sense of Belong. & Inclusion	-.03	108%	-.35	81%	-.09	67%
Gender	-.12	61%	-.22	82%	-.13	43%

Note: The "% of Mean" reports what percentage of the observed mean difference is accounted for by MDE.