Development of an instrument to measure awareness and mitigation of bias in maternal healthcare

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BACKGROUND: Implicit bias among maternal healthcare professionals contributes to disrespectful care and racial and ethnic disparities in patient outcomes, and there is growing consensus that implicit bias training is a key component of birth equity initiatives. A requirement for implicit bias training for healthcare professionals has become more widespread, but the impact training has is largely unknown, in part, because of a lack of validated instruments. Therefore, there is an urgent need for a psychometrically valid instrument for use in the evaluation of implicit bias training.

OBJECTIVE: This study aimed to develop a valid and reliable instrument to assess implicit bias awareness and mitigation practices among maternal care professionals and that can be used to evaluate interventions aimed at mitigating such bias in clinical practice.

STUDY DESIGN: We conducted an instrument development and validation study in 3 phases. In phase 1, item development, we generated a 43-item bank from literature and consultation and established content validity with subject matter experts. In phase 2, instrument development, we administered a revised set of 33 items to 307 nurses and midwives and conducted exploratory factor analysis to demonstrate construct validity and reliability. In phase 3, instrument evaluation, we confirmed the factor structure and compared the means of implicit bias training—exposed and—unexposed participants to further demonstrate construct validity with a representative state sample of 2096 maternal healthcare professionals (physicians, midwives, and nurses).

RESULTS: Based on phase 2 results, we retained 23 items for the Bias in Maternal Health Care scale, which showed high internal consistency (Cronbach's alpha, 0.86). We identified 3 subscales, namely a 9-item Bias Awareness subscale (Cronbach's alpha, 0.86), a 7-item Bias Mitigation Practice subscale (Cronbach's alpha, 0.82), and a 7-item Bias Mitigation Self-Efficacy subscale (Cronbach's alpha, 0.81). Validation of the Bias Awareness and Bias Mitigation Practice subscales in phase 3 demonstrated the instrument's high reliability (Cronbach's alpha 0.86 and 0.83, respectively) and discriminating performance among maternal healthcare professionals.

CONCLUSION: We developed a reliable and valid instrument for measuring awareness and mitigation of bias among maternal healthcare professionals. It can be used to evaluate implicit bias training and other bias mitigation interventions in maternal healthcare settings.

Key words: birth equity, disparities, health equity, implicit bias, inequity, maternal health, quality improvement, psychometrics, reliability, validity

Introduction

In response to profound and persistent racial and ethnic disparities in maternal health outcomes in the United States,[1–3] maternal health stakeholders have coalesced around a commitment to health equity for women and childbearing people as a public health priority.[4,5] Although racial and ethnic health disparities reflect a variety of social and institutional factors, many argue that implicit bias and its impact on patient-provider interactions is a key driver of these inequities.[6] Implicit biases are the attitudes or stereotypes that affect understanding, actions, and decisions in an unconscious manner.[7] Empirical studies suggest that healthcare professionals exhibit implicit biases based on patient characteristics, especially race and ethnicity.[8–10] In addition, implicit biases have been associated with disparate treatment decisions, poor quality of care and patient-provider interactions, and adverse patient health outcomes.[8–10]

Increased awareness of bias and racism as contributors to racial and ethnic health disparities has motivated changes in policy and training for health professionals who care for childbearing persons. Leading maternal health professional organizations, including the American College of Obstetricians and Gynecologists, have policy statements that call for maternal health professionals to build awareness of health disparities and their own biases.[11–13] The Alliance for Innovation on Maternal Health recommends that hospitals provide implicit bias training (IBT) for maternal care professionals.[14] In addition, 6 states have passed legislation mandating IBT for maternal healthcare professionals.[15]

The evidence base for IBT is limited by a lack of valid and reliable measures and consensus on evaluation methods. To date, there has been no large-scale evaluation of the effect of IBT among healthcare professionals. Three strategies have been used to assess the impact of pilot or small-scale implementation of IBT and other bias mitigation interventions, namely (1) the Implicit Association Test (IAT),[18,19] (2) participant surveys using unvalidated measures,[20–22] and (3) qualitative methods.[23] Qualitative methods and participant surveys using unvalidated measures are not reliable methods for large-scale evaluation of IBT interventions. The IAT has been used most frequently, but also has limitations.[24] It was not developed to assess changes in bias over time, and the developers have

Cite this article as: Bower KM, Kramer B, Warren N, et al. Development of an instrument to measure awareness and mitigation of bias in maternal healthcare. Am J Obstet Gynecol MFM 2023;5:100872.

2589-9333/$36.00

http://dx.doi.org/10.1016/j.ajogmf.2023.100872

AJOG MFM at a Glance

Why was this study conducted?

Implicit bias among maternal healthcare professionals contributes to racial and ethnic disparities in patient outcomes, and mandates for implicit bias training are increasing. The evaluation of implicit bias training is hampered by a lack of validated instruments.

Key findings

The Bias in Maternal Health Care scale, which contains 3 subscales that measure bias awareness, bias mitigation practice, and bias mitigation self-efficacy, demonstrated validity, reliability, and an ability to discriminate performance among maternal healthcare professionals.

What does this add to what is known?

We developed a reliable and valid instrument for measuring awareness and mitigation of bias among maternal healthcare professionals. The instrument can be used to evaluate implicit bias training and other bias mitigation interventions in maternal healthcare settings.

recommended caution with repeat measurements because previous experience with the IAT has been associated with lower subsequent scores.[25] In addition, it does not measure the theoretical outcomes of IBT—awareness and mitigation behaviors—but rather the underlying associative process of bias. For example, a clinician may associate a patient from a certain racial group with noncompliance. The purpose of IBT is not to alter that association, but to make the clinician aware of it so that it does not affect their treatment.

The use of patient experience of care and patient health outcomes has also been proposed as a method to evaluate IBT. These, however, could be impacted by several other factors, making evaluation of the impact difficult. Given the unfeasibility of connecting these distal outcomes with IBT, there is a need to measure more proximal training outcomes, like bias awareness and mitigation behaviors, along the pathway from clinician bias to patient outcomes.[26]

The Maryland Maternal Health Innovation program, or MDMOM, is a statewide maternal health improvement program offering IBT to all maternal healthcare professionals practicing in Maryland's 32 birth hospitals. Our team was unable to identify an instrument that had been psychometrically validated to measure proximal outcomes of IBT to evaluate this intervention. Consequently, we aimed to develop and validate a survey instrument that could be administered among Maryland maternal healthcare professionals to evaluate the MDMOM IBT intervention and that could be used by others to evaluate similar training and bias mitigation interventions.

Materials and Methods

Design

We used a 3-phase structured approach for instrument development and validation.[38] Phase 1, item development, included domain and item identification, content validation by a panel of experts, and item reduction and revision. Phase 2, instrument development, included administration of the instrument for extraction of latent factors and reliability analysis. Phase 3, instrument evaluation, included item validation with a representative sample of maternal healthcare professionals. The study was approved by the Johns Hopkins Medicine Institutional Review Board (#00242247).

Phase 1: item development

Identification of domains and items. This phase started with identification of content areas based on Sukhera and Watling's[26] framework to integrate implicit bias recognition into health professions curricula. We identified 7 content areas organized around knowledge (ie, knowledge of the science of implicit bias; knowledge of the effects of bias in maternal healthcare), attitude (ie, self-awareness of bias; awareness of the effects of bias; concern about bias), and practice (self-efficacy for behaviors to mitigate bias; and self-report of behaviors to mitigate bias) domains.[26] We collected and adapted items that measured these domains and content areas from surveys used to evaluate IBT interventions in other fields of medicine.[20,21,28] We also added novel items to ensure sufficient items for each domain and content area. Practice domain items measuring self-efficacy and self-report for behaviors to mitigate bias were identical except for use of "I am confident that I can" in the self-efficacy items. This process led to the creation of a 43-item bank for expert review.

Expert review. Content validation was conducted with experts engaged in research or practice related to implicit bias, healthcare disparities, or patient-provider communication who were invited to participate via email. In an online survey, experts quantitatively evaluated each item for relevance (importance to the instrument), clarity (ease of understanding), and appropriateness (fit to the domain) using a 4-point Likert agreement scale. Experts received a $50 gift card for participation.

Responses to the relevance question were dichotomized and the Item Content Validity Index (I-CVI) was calculated. The I-CVI is a quantitative method to evaluate whether items in an instrument represent adequate operationalization of a construct. Following best practice for a sample >5, the I-CVI threshold was set at >0.78 for inclusion,[30] and items that met this a priori threshold were then evaluated using clarity and appropriateness scores, qualitative comments, and suggestions for improvement of each item. Items were revised or eliminated based on this feedback, leading to a 33-item bank.

Phase 2: instrument development

We conducted a survey with members of the Association of Women's Health, Obstetric and Neonatal Nurses and the American College of Nurse-Midwives. Nurses are a critical audience for IBT because they account for the largest segment of the healthcare workforce, outnumbering physicians 3 to 1.[31] Both these leading maternal health nursing professional organizations have mechanisms to distribute surveys for research purposes.

The recruitment goal was 300 participants, based on sample size recommendations for the internal validation of psychometric scales.[32] We sent recruitment and follow-up emails to all members from the District of Columbia and 17 states in regions proximate to Maryland (Midwest, Northeast, and South) with exclusion of Maryland. The survey, which included the expert-validated 33-item bank and demographic questions, was administered via Qualtrics in November 2020 and was closed after 3 weeks. Respondents received a $10 gift card. Seventy-two participants were dropped because of incomplete responses. The characteristics of the dropped participants cannot be described because 94% were missing all the demographic data. The final sample included 307 participants.

We conducted an exploratory factor analysis (EFA) to determine the optimal number of latent factors based on underlying relationships between the measured items. Scree plots, eigenvalues, and parallel analyses were used in retaining the number of factors. We reduced redundant and inconsistent items and calculated Cronbach's alpha, a statistical measure of internal consistency, for the derived instrument and subscales.[33]

Phase 3: instrument evaluation

To confirm construct validity, we included scale item questions in a second survey administered via Qualtrics to maternal healthcare professionals (physicians, midwives, nurse practitioners, physician assistants, nurses, and patient care technicians) in Maryland, which was conducted as a baseline assessment for the MDMOM program. Maternity unit leaders sent the survey to all eligible professionals between May 2021 and November 2021. The survey remained open for 6 weeks and reminder emails and flyers were used to promote participation. Respondents received a $20 gift card.

MDMOM planned a minimum 3-month interval between IBT completion and re-administration of the survey. Given the opportunity to make practice changes, the Bias Mitigation Practice subscale was more appropriate than the Bias Mitigation Self-Efficacy subscale for this evaluation context, and we administered only the Bias Awareness and Bias Mitigation Practice subscales to reduce participant burden (items 1−9 and 17−22 in Table 2). The survey also included questions pertaining to program evaluation, including a question on the completion of IBT within the past 2 years.

After dropping 4 respondents with missing data, the analytical sample included 2096 participants. We performed an EFA and ascertained the internal reliability of the subscales with Cronbach's alpha.[34,35] To examine the use of the instrument in differentiating patterns of implicit bias awareness and mitigation practices, we examined item and subscale mean scores by self-reported previous completion of IBT. We hypothesized that IBT exposure would increase implicit bias awareness and mitigation practices, such that there would be a significant difference in scores between groups. The score was calculated by coding individual responses numerically (1=strongly disagree to 5=strongly agree). Responses were weighted to adjust for differences in nonresponse probabilities across professional roles. We tested the equality of means between IBT-exposed and -unexposed participants using linear regression t tests, and all analyses were adjusted for clustering effects at the facility level.

Results

Phase 1: item development

A total of 11 experts were invited to participate[29] and 7 accepted our invitation: 2 directors of diversity, equity, and inclusion departments within large academic medical centers, the director of a national organization focusing on disparities in women's health, 2 healthcare disparities researchers, 1 patient-provider communication researcher, and a cognitive scientist. Five experts were also physicians and 3 of them were obstetrician-gynecologists.

Of the 43 items submitted to experts for content validation, 8 were dropped based on failure to meet the a priori I-CVI threshold, and 3 more were dropped because of low clarity and appropriateness scores and negative qualitative feedback (Appendix A). Ten items were edited based on expert recommendations. The research team added a novel item in response to feedback that the concern about bias domain was not adequately captured by existing items. This process yielded 33 items for testing and evaluation in phase 2.

Phase 2: instrument development

Most of the 307 survey respondents were registered nurses (50%), practiced in an inpatient obstetrical setting (54%) and had been in practice for 11 or more years (48%) (Table 1). Of those, 56% were between 25 and 44 years old and the sample overwhelmingly identified as female (96%) and white (75%).

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.8705, indicating appropriateness for factor analysis. The EFA with promax rotation supported a 2-factor solution based on eigenvalues, scree plot, and parallel analyses. Each item only loaded meaningfully onto 1 factor and items loading onto the same factor exhibited strong conceptual coherence. All 18 items measuring the knowledge and attitude domains loaded onto factor 1, whereas all 15 items measuring the practices domain loaded onto factor 2 (Appendix B). Given the single factor loading pattern of the knowledge and attitude items, we labeled them bias awareness and these pertained to both knowledge of the theoretical mechanism of bias and acknowledgment of its existence and impact. Factor 2 items pertained to

TABLE 1
Respondent characteristics, scale development, and scale validation samples

Characteristics	Scale development sample (n=307)	Scale validation sample (n=2096)	
	n (%)	Unweighted n (%)	Weighted[a] n (%)
Professional role			
Physician[b]	—	214 (10.2)	437 (20.8)
Advanced practice nurse or physician assistant	122 (39.2)	106 (5.1)	108 (5.1)
Registered nurse	174 (55.9)	1542 (73.6)	1298 (61.9)
Technician or certified nursing assistant or other[c]	15 (4.8)	234 (11.2)	253 (12.1)
Years in practice[d]			
0–5	108 (34.7)	585 (27.9)	605 (28.8)
6–10	53 (17.1)	396 (18.9)	386 (18.4)
≥11	150 (48.1)	1115 (53.2)	1105 (52.7)
Gender			
Female	299 (96.1)	2006 (95.7)	1959 (93.3)
Male	4 (1.3)	61 (2.9)	113 (5.4)
Nonbinary	2 (0.6)	0 (0)	0 (0)
Prefer not to say	6 (1.9)	29 (1.4)	28 (1.4)
Race			
Black or African American	49 (15.8)	298 (14.2)	328 (15.6)
White	233 (74.9)	1485 (70.9)	1440 (68.6)
Other	19 (6.1)	168 (8.0)	195 (9.3)
Prefer not to say	10 (3.2)	145 (6.9)	137 (6.5)

[a] Responses were weighted to adjust for differences in response probabilities across providers of different professional qualifications; [b] The scale development sample included members of 2 nursing professional organizations; [c] Other category included lactation consultants, quality and patient safety specialists, certified medical assistants; [d] Years in practice categories were 0–5, 6–10, and ≥11 for the instrument development respondents (n=307), and 0–4, 5–9, and ≥10 for the instrument evaluation respondents (n=2096).

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performance or confidence to perform behaviors to mitigate bias, so we labeled these bias mitigation.

We grouped the factor 1 bias awareness items into a single subscale and grouped factor 2 bias mitigation items into 2 subscales representing 2 behavioral components, namely self-efficacy and practice. Following a process of item reduction guided by factor loading, item-rest correlation, and interitem correlation, we retained 9 items in the Bias Awareness subscale (Cronbach's alpha, 0.86) and 14 bias mitigation items with 7 items in a Bias Mitigation Self-Efficacy subscale (Cronbach's alpha = 0.81) and 7 items in a Bias Mitigation Practice subscale (Cronbach's alpha, 0.82) (Table 2).

Phase 3: instrument evaluation

Respondents included registered nurses (73.6%), nursing assistants and technicians (11.2%), physicians (10.2%), and advanced practice nurses or physician assistants (5.1%) (Table 1). Most had been in practice for ≥11 years (53.2%) and the majority identified as female (95.7%) and white (70.9%). The EFA suggested a 2-factor solution for the 16 items corresponding to the 2 factors identified in phase 2 (Table 3; Appendix C). Items measuring the knowledge and attitude domains primarily loaded onto factor 1, whereas items measuring the practice domain loaded onto factor 2. Each item loaded only onto 1 factor with 2 exceptions that had similar loadings on both factors; given strong conceptual coherence, those 2 items were retained in the Bias Awareness subscale. Internal consistency was confirmed for the Bias Awareness subscale (Cronbach's alpha, 0.86) and for the Bias Mitigation Practice subscale (Cronbach's alpha, 0.83). Weighted mean scores for each subscale are shown in Table 4. All 16 item scores and the mean scores for both subscales were greater for participants who reported to have been exposed to IBT than for those who did not, and the differences were statistically significant (P value <.001).

Comment

Principal findings

Using a 3-phase process, we constructed the Bias in Maternal Health Care scale to measure bias awareness and mitigation practices and to evaluate the efficacy of IBT among maternal healthcare professionals. The scale demonstrated content and construct validity and strong reliability. The scale is composed of the following 3 subscales: a 9-item Bias Awareness subscale and two 7-item bias mitigation scales, namely Bias Mitigation Self-Efficacy and Bias Mitigation Practice. Each subscale exhibits a clear factor structure and good internal consistency. The Bias Awareness subscale and the Mitigation of Bias Practice subscale also demonstrated cross-sample validity. Furthermore, item and subscale means were significantly greater among participants exposed to IBT. Whether this was a result of IBT or a difference in awareness and mitigation practices among participants seeking out IBT, the finding is indicative of the validity of the identified constructs.

Results in the context of what is known

Although there has been increased interest in recommending or even

TABLE 2
Bias in Maternal Health Care scale

Instructions: The following statements are about unconscious (also called implicit) and conscious (also called explicit) biases, which can be based on characteristics like race, ethnicity, and gender.
Please choose the option that most closely indicates your level of agreement: Strongly disagree — Disagree — Neither agree nor disagree — Agree — Strongly agree

Bias Awareness (Cronbach's alpha, 0.86)	
1	Biases can affect our behaviors towards other people based on characteristics like race, ethnicity, or gender.
2	Biases contribute to racial/ethnic disparities in maternal health.
3	I have biases.
4	I could unintentionally behave in biased ways towards patients based on characteristics like race, ethnicity, or gender.
4	The biases of my co-workers could affect patient care.
6	My biases could affect the care I provide to patients.
7	My co-workers should make an effort to prevent their biases from affecting patient care.
8	I should make an effort to prevent my biases from affecting patient care.
9	I am concerned about the effects of bias on patient care.
Bias Mitigation Self-Efficacy (Cronbach's alpha, 0.81)	
10	I am confident that I can identify my own biases while performing patient care.
11	I am confident that I can change my behavior to limit the impact of my biases on patients.
12	I am confident that I can use strategies to recognize thoughts that may have been influenced by my biases.
13	I am confident that I can use strategies to reduce bias in my communication with patients.
14	I am confident that I can speak with my coworkers about bias on our unit.
15	I am confident that I can challenge a clinical decision if I think it was influenced by bias.
16	I am confident that I can intervene if I think a patient is being treated in a biased way.
Bias Mitigation Practice (Cronbach's alpha, 0.83)	
17	I identify my own biases while performing patient care.
18	I change my behavior to limit the impact of my biases on patients
19	I use strategies to recognize thoughts that may have been influenced by my biases.
20	I use strategies to reduce bias in my communication with patients.
21	I speak with my coworkers about bias on our unit.
22	I challenge a clinical decision if I think it was influenced by bias.
23	I intervene if I think a patient is being treated in a biased way.

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requiring IBT for healthcare professionals, evidence for its effectiveness is lacking.[16] This is, in part, because of the lack of validated and reliable instruments available for evaluation. Existing evaluations use either the IAT that measures a construct that is arguably not the target of IBT,[26] surveys that lack published psychometric assessments,[20–22] or qualitative assessments that are challenging to implement on a large scale.[23] The Bias in Maternal Health Care scale measures dimensions of healthcare professional awareness and practice targeted by IBT training, has demonstrated validity and reliability, and can be deployed on a large scale. Furthermore, it has been noted that simply increasing awareness of bias without also providing concrete behavioral strategies for bias mitigation is likely to be ineffective in reducing the effects of bias on patient care.[17] By incorporating evaluation of both awareness and mitigation practices, the Bias in Maternal Health Care scale is designed to evaluate evidence-based implicit bias curricula that are responsive to these concerns.

Clinical implications

Implicit bias is only one of a range of contributors to racial and ethnic disparities in maternal health outcomes. Poor preconception health, lack of access to prenatal care, maternity care deserts, an underresourced public health system, and underfunding of Medicaid all contribute to racial and ethnic disparities in maternal morbidity and mortality in the United States.[36] Birth equity initiatives that incorporate a holistic or systems-level approach have been outlined, among others, by the Alliance for Innovation in Maternal Health.[14] Although these include IBT among a program of interventions, this educational component is nevertheless positioned to be a key step in raising awareness, building capacity and momentum for change, and providing more equitable care. Healthcare professional bias has been shown to correlate with lower quality of care, less effective patient-provider communication, and lower patient satisfaction. By building awareness of bias and promoting practice changes that mitigate its effects, IBT has the potential to improve care. This scale captures those critical training outcomes.

Research implications

Assessment of the relative effectiveness of different types of IBT and similar bias mitigation interventions has been hampered by lack of a consistent, valid, and reliable evaluation approach. This scale enables that comparison. Further validation of all subscales should be performed in state or national samples of maternal care professionals and with a more diverse study population in terms of gender, race, ethnicity, and nativity. Considering the link between healthcare professional bias and quality of care and

TABLE 3
Comparison of exploratory factor analysis results[a] for items retained in the Bias in Maternal Health Care Awareness and Mitigation Practice subscales: scale development and scale validation samples

		Scale development sample (n=307)				Scale validation sample (n=2096)			
#	Item Label	Item-rest correlation[b]	Factor 1 loadings Awareness	Factor 2 loadings Mitigation	Unique-ness[c]	Item-rest correlation[b]	Factor 1 loadings Awareness	Factor 2 loadings Mitigation	Unique-ness[c]
Bias Awareness subscale									
1	Biases can affect our behaviors	0.544	0.593		0.631	0.569	0.595		0.606
2	Biases contribute to disparities	0.618	0.686		0.538	0.638	0.654		0.516
3	I have biases	0.628	0.686		0.543	0.599	0.743		0.509
4	I could unintentionally behave in biased ways	0.666	0.738		0.470	0.679	0.818		0.396
5	Biases of coworkers affect patient care	0.645	0.690		0.492	0.634	0.622		0.563
6	Biases affect care I provide to patients	0.623	0.695		0.526	0.674	0.746		0.455
7	Coworkers should not let biases affect care	0.601	0.650		0.502	0.473	0.293		0.661
8	I should not let biases affect care	0.621	0.657		0.529	0.527	0.373		0.596
9	I am concerned about effects of bias on patient care	0.555	0.600		0.617	0.551	0.438		0.621
Cronbach's alpha		0.86 (95% CI, 0.84–0.89)				0.86 (95% CI, 0.85–0.87)			
Bias Mitigation Practice subscale									
1	Identify own biases	0.509		0.581	0.669	0.575		0.477	0.520
2	Recognize own biased thoughts	0.608		0.727	0.472	0.713		0.725	0.403
3	Change own behaviors	0.549		0.654	0.545	0.648		0.595	0.439
4	Reduce bias in communication	0.636		0.748	0.455	0.669		0.735	0.460
5	Speak about bias	0.497		0.519	0.714	0.473		0.498	0.749
6	Challenge biased decisions	0.614		0.681	0.546	0.504		0.697	0.604
7	Intervene in biased care	0.577		0.627	0.598	0.449		0.687	0.618
Cronbach's alpha		0.82 (95% CI, 0.78–0.86)				0.83 (95% CI, 0.81–0.84)			

[a] Results from 2-factor solutions with promax rotation; [b] Refers to the association of each item with the total score on the other items in each subscale; [c] Refers to the variance that is unique to each item and not shared with the other items in the subscale.

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TABLE 4
Mean response scores for items retained in the Bias in Maternal Health Care Awareness and Self-Report subscales with scale validation sample stratified by previous exposure to implicit bias training

#	Item label	Scale validation sample[a] (n=2096) Mean (95% CI) score[c]	Completed IBT[a] (n=606) Mean (95% CI) score[c]	No IBT[a] (n=1486) Mean (95% CI) score[c]	Equality of means[b] *P* value
Bias Awareness subscale					
1	Biases can affect our behaviors	4.15 (4.06–4.25)	4.30 (4.17–4.43)	4.08 (4.00–4.17)	<.001
2	Biases contribute to disparities	4.04 (3.91–4.17)	4.21 (4.03–4.38)	3.96 (3.85–4.08)	<.001
3	I have biases	3.07 (2.87–3.27)	3.37 (3.11–3.64)	2.92 (2.76–3.09)	<.001
4	I could unintentionally behave in biased ways	3.16 (2.98–3.35)	3.43 (3.19–3.67)	3.04 (2.88–3.19)	<.001
5	Biases of coworkers affect patient care	3.86 (3.76–3.97)	4.05 (3.90–4.20)	3.78 (3.69–3.86)	<.001
6	Biases affect care I provide to patients	3.22 (3.06–3.38)	3.47 (3.25–3.69)	3.10 (2.96–3.25)	<.001
7	Coworkers should not let biases affect care	4.42 (4.36–4.48)	4.53 (4.45–4.60)	4.36 (4.30–4.42)	<.001
8	I should not let biases affect care	4.39 (4.32–4.46)	4.52 (4.43–4.61)	4.33 (4.26–4.40)	<.001
9	I am concerned about effects of bias on patient care	3.86 (3.73–3.99)	4.04 (3.87–4.22)	3.78 (3.67–3.89)	<.001
	Subscale total	3.80 (3.68–3.92)	3.99 (3.83–4.15)	3.71 (3.61–3.80)	<.001
Bias Mitigation Self-Report					
1	Identify own biases	3.74 (3.66–3.82)	3.86 (3.73–3.98)	3.68 (3.62–3.75)	<.001
2	Recognize own biased thoughts	3.84 (3.78–3.90)	4.02 (3.90–4.14)	3.76 (3.71–3.81)	<.001
3	Change own behaviors	3.89 (3.81–3.96)	4.03 (3.92–4.14)	3.82 (3.76–3.89)	<.001
4	Reduce bias in communication	3.91 (3.86–3.97)	4.07 (3.95–4.19)	3.85 (3.80–3.89)	<.001
5	Speak about bias	3.16 (3.05–3.27)	3.40 (3.25–3.56)	3.05 (2.96–3.15)	<.001
6	Challenge biased decisions	3.75 (3.68–3.81)	3.87 (3.79–3.95)	3.70 (3.63–3.76)	<.001
7	Intervene in biased care	4.04 (3.99–4.09)	4.15 (4.08–4.22)	3.99 (3.94–4.04)	<.001
	Subscale total	3.76 (3.70–3.82)	3.91 (3.82–4.01)	3.69 (3.64–3.74)	<.001

CI, confidence interval; *IBT*, implicit bias training.

[a] Responses were weighted to adjust for differences in response probabilities across providers of different professional qualifications. Four individuals did not respond to the question asking whether they completed any structured, professional training on implicit bias in the past 2 years. These 4 responses were excluded; [b] Simple linear regression models tested for differences in mean implicit bias scores between training groups; [c] The mean summative score was calculated after coding responses as 1=strongly disagree, 2=disagree, 3=neither agree or disagree, 4=agree, and 5=strongly agree.

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patient experience, future studies should also include assessment of associations with patient reported outcomes.

Strengths and limitations

This instrument measures awareness and mitigation of bias among healthcare professionals in the maternal care setting and was developed using a systematic process that incorporated content validation, factor analysis, and reliability testing. Because the scale was developed in response to an evaluation need, the subscales were conceptualized as flexible tools that could be applied to diverse evaluation contexts and study designs. The Bias Mitigation Self-Efficacy and Bias Mitigation Practice subscales provide a choice of 2 measurement approaches. Although self-report may be a more accurate proxy for behavioral performance than self-efficacy, it is not suited to all measurement contexts, such as an immediate post-test design or among health professions students who have not had the opportunity to implement practice changes. In those cases, self-efficacy, the perceived capacity to perform a behavior, might be used as a predictor.[37] Conversely, the 7 practice subscale items would be appropriate for an evaluation survey administered weeks to months post-training. Finally, although the Bias in Maternal Health Care scale was conceptualized as an IBT evaluation method for maternal healthcare professionals providing care in a hospital setting, generalizability was considered, and it is adaptable to a broad range of healthcare contexts.

Our study also had limitations primarily related to sampling. Respondents in both surveys were predominantly female and White. However, these demographics are characteristic of the largest component of the United States health workforce, which are registered

nurses who, in 2020, 90.5% female and 80.6% white.[38] Respondents to the instrument development survey also belonged to professional organizations and may have differed from those who do not. Because of sampling methods for both surveys, we were unable to characterize nonrespondents. However, although the instrument development survey did not sample the full spectrum of the maternal healthcare workforce, the validation sample was professionally diverse and confirmed its findings. Finally, we administered only the Bias Awareness and Bias Mitigation Practice subscales to the validation sample and were unable to confirm factor structure and reliability for the Bias Mitigation Self-Efficacy subscale.

Conclusion

IBT for maternal health professionals is already being widely implemented, and there is a critical need to evaluate whether individual training programs have a positive effect on healthcare professionals' bias awareness and mitigation practices. Our instrument presents an opportunity to reliably assess maternal healthcare professionals' bias awareness and mitigation practices and can be adapted for use in other fields of medicine. ■

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ajogmf.2023.100872.

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Received Dec. 16, 2022; revised Jan. 3, 2023; accepted Jan. 14, 2023.

The authors report no conflict of interest.

This study received funding from the Health Resources and Services Administration (HRSA) under award number U7AMC337170100. The content is solely the responsibility of the authors and does not necessarily represent the official views of the HRSA.

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