ORIGINAL PAPER

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The Development and Validation of a Modesty Measure for Diverse Muslim Populations

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Abstract

This paper reports on the multi-phase development of an English-language modesty measure for use among Muslim populations. The process yielded a 10-item measure that has high levels of internal consistency reliability (Cronbach's α of 0.83), and has acceptable discriminant and predictive validity. Specifically although our modesty measure for Muslim women was found to be significantly correlated with measures of positive and negative religious (Islamic) coping, it was not significantly correlated with religious practice-based religiosity (discriminant validity). Further logistic modeling revealed higher modesty levels positively associated with forgoing mammography because of concerns about lack of same-sex providers (predictive validity).

Keywords Muslim health · Scale development · Women's health

Introduction

In the psychological literature, modesty is characteristically defined as an intrapsychic self-view (Sedikedes et al. 2003), as a public self-presentation (Cialdini and De Nicholas 1989), or some combination of self-view and self-presentation (Exline and Lobel 1999). More-over, modesty is a concept and value that inheres within many different cultures and societies, has several different dimensions, and impacts many different behaviors. For example, among Hispanic cultures the term *pudor* connotes modesty, and is related to the ways in which one carries and presents oneself, one's sexual mores, and interactions with others (Epstein and i Carrió 2001). In Jewish culture, notions of modesty are reflected in one's relationship to religious laws governing cross-gender interaction and dress code, as well as in the way one discusses him or herself and others (Andrews 2011). Thus, while

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modesty is not unique to specific cultures, its influence and the way it is expressed may vary from group to group (Andrews 2006; Carteret 2011; Vu et al. 2016; Yosef 2008). Nonetheless scholars note that, almost universally, the ways in which individuals dress, talk, and interact (Boulanouar 2006; Thomas 1899) are related to conceptions of modesty, and that violations of modesty can lead to psychological states of shame and guilt (Antoun 1968; Scheler 1987; Thomas 1899). Studies also show that, when norms of modesty are made salient, as in religious beliefs, individuals are more likely to engage in behavior that is consistent with those norms (Cialdini and De Nicholas 1989; Deaux and Major 1987).

With respect to the measurement of modesty, researchers have utilized several domains and concepts to measure modesty (Andrews 2011; Chen et al. 2009; Cialdini and De Nicholas 1989; Costa and McCrae 1992; Dareng et al. 2015). For example, Andrews derived a measure based on Jewish conceptions of modesty and notes three aspects to modesty: maturity-driven modesty (defined as circumstances where modesty reflects a better self-image and a higher level of self-respect), religion/cultural-driven modesty, and esteem-driven modesty (where modesty means high levels of privacy and shyness) (Andrews 2011). In contrast, Dareng and colleagues measured modesty among Christians and Muslims using questions that captured concepts such as humbleness, shyness, dress code, and levels of attention-seeking (Dareng et al. 2015). Other more general measures of modesty focus on modesty as intrapsychic self-view, public self-presentation, or combination of self-view and self-presentation. For example, the Modesty component of the NEO Personality Inventory is assessed with an eight-item scale that measures a dispositional self-view (Costa and McCrae 1992). In contrast, other researchers discuss a Modest Responding Scale, a 21-item scale that measures the tendency for individuals to under-represent their positive traits and accomplishments in public (Robert et al. 1998; Whet-stone et al. 1992).

The forgoing discussion thus illustrates that while conceptions of modesty are found across cultures, and the notion appears to influence a wide variety of behaviors, precise definitions and accurate measurement tools remain elusive (Andrews 2011). This paper therefore seeks to advance the field of modesty measurement by reporting on the development and validation of a modesty measure for use among Muslim populations within a healthcare context. We chose Muslims because modesty appears to be an important aspect of Islamic life, and healthcare because the extant literature is replete with studies that demonstrate the importance and impact of modesty.

Among Muslims, notions of modesty emerge from religious teachings (Padela and Del Pozo 2011). For example, Prophet Muhammad is reported to have said "Every *dīn* (religion/way of life) has an innate character, the character of Islam is modesty" and "*Imān* (faith) has over 70 branches, and modesty is a branch of *Imān*" (Bewley 1989; Nasa'i and bin Su'aib 2007). Accordingly, concepts of modesty impact Muslim dress, manner of prayer, codes of cross-gender interaction, and notions of self (Antoun 1968; Boulanouar 2006; Padela and Del Pozo 2011). For example, the practice of *hijab* is sourced within scriptural texts and emerges from the idea of protecting one's modesty. Similarly, the repudiation of being boastful is tied to specific verses of the Qur'an (4:36; 53:32) and aligns with the practice of modesty. Although modesty is understood in diverse ways by Muslims, and there is a wide variance in personal practices as related to modesty, modesty is integral to Muslim life across geographic, linguistic, and cultural boundaries (Boula-nouar 2006).

Numerous studies suggest that modesty influences a wide range of health-related behaviors and attitudes, including decisions about when, as well as from whom, to seek medical care, as well as attitudes toward hospitalization among Muslims and non-Muslims

alike (Andrews 2006; Austin et al. 2002; Carteret 2011; Hasnain et al. 2011; Isa Modibbo 2016; Lee and Vang 2010; Vahabi and Lofters 2016; Vu et al. 2016; Yosef 2008). While these and other studies use a variety of qualitative methods and survey tools to assess the impacts of modesty, none used a tool specific to Muslim notions of modesty.

Yet for Muslims, as noted above, modesty is tied to religion and has unique behavioral dimensions. In the healthcare arena, notions of modesty inform the preference for same-sex providers among many different Muslim populations (Carteret 2011; Hasnain et al. 2011; Isa Modibbo 2016; Padela and Del Pozo 2011; Padela et al. 2012; Vu et al. 2016). Consequently, multiple scholars suggest that this preference impacts differential healthcare-seeking behaviors and underpins healthcare disparities (Hasnain et al. 2011; Padela and Curlin 2012; Simon et al. 2009; Vahabi and Lofters 2016). For example, in a study exploring cervical cancer screening attitudes of 49 Nigerian women modesty concerns problematized cancer screening although women understood their personal risk of cancer. Muslim focus group participants were more emphatic about this barrier and had a higher prevalence of reluctance to engage with the healthcare system compared to the Christian group (Isa Modibbo 2016). Our prior research among American Muslims also supports the claim that modesty strongly influences healthcare decisions and may undergird healthcare disparities. We surveyed 97 Muslim men and women from various ethnic backgrounds attending mosque events in Michigan to find that 21% reported delaying seeking care because of the lack of sex-concordant provider availability (Padela et al. 2011). More recently, we surveyed 254 women from mosques and social service organizations in Chicago, and found that 53% of participants had delayed seeking healthcare due to a perceived lack of a same-sex provider. In this sample, participants with higher levels of religiosity had higher odds of delayed care seeking (Vu et al. 2016). In another study consisting of 13 focus groups with 102 Arab, African American, and South Asian Muslim men and women, modesty concerns under-pinned our finding of gender-concordant care to be the most commonly requested cultural accommodation across all group discussions (Padela et al. 2012).

Additionally, the importance of addressing modesty concerns in order to provide culturally sensitive and high-quality care to Muslim patients was highlighted at a conference in 2005 that brought together multiple stakeholder groups. The conference entitled *Patient-Centered Health care for Muslim Women in the United States* held in Chicago, Illinois convened physicians, researchers, hospital administrators, and Muslim women. Conference attendees issued a statement emphasizing that when the importance of modesty to Muslim healthcare preferences is not understood, acknowledged, or accommodated, clinical providers will be unable to adequately address the patients' needs and patients may suffer, resulting in increased burden on the healthcare system (Hasnain et al. 2011).

Although modesty appears to be highly valued by diverse groups of Muslims and impacts Muslim health behaviors broadly, there exists no Muslim-specific tool to measure its significance in population-based health research. Rather, prior research has often used psychological scales developed for Western cultures and applied them to Eastern contexts to assess for generalizability (Chen et al. 2009). It is worthwhile to explore the psychological construct of modesty in Muslims from an Islamically focused lens instead of the limited lens of Western or even Eastern culture because it would be more precise. In other words, such a tool is needed to better assess whether modesty impacts specific health outcomes and behaviors, whether such associations are more prevalent or prominent in certain Muslim groups than others, and to compare the relative significance of modesty with other factors that inform health decisions and outcomes. Accordingly, this paper reports on the development and initial validation of a modesty measure for Muslim populations.

Measure Development and Analytic Methods

The development and validation process of the modesty measure for Muslim women (MMM-W) involved 3 phases: (1) item development and initial internal consistency and reliability testing, (2) refinement of measure items through focus group-based cognitive testing, and (3) quantitative psychometric property and validity assessment via survey methods.

Phase 1: Initial Item-Development and Measure Characteristics

Between December 2009 and March 2010, a total of 13 focus groups were conducted with an ethnically and racially diverse population of 102 Muslim adults in the Greater Detroit area to assess the ways in which religion informed their health behaviors, as well as to identify the specific healthcare-related challenges they faced due to religious beliefs (Padela et al. 2011). In those focus groups, the importance of gender-concordant care, and the religious significance of modesty were found to be dominant themes. Using these discussions of modesty as grounding, 8 questions were developed to assess personal attitudes and practices of living out Islamic teachings about modesty.

These 8 items were rephrased for succinctness and accuracy by an expert panel of survey researchers at the University of Chicago, and by incorporating feedback from cognitive interviews with a handful of Muslim women known to researchers. After this iterative process was concluded, an 8-item measure (original) was retained for quantitative assessment. An example item read: "Please rate your level of agreement to the following statement: When I am in a mixed gender gathering or outside of the home, I cover my entire body, except my hands and face." (See Table 1: Phase 1 for a complete list of the items).

In order to assess the internal consistency and reliability characteristics of the measure, it was administered to a convenience sample of 254 Muslim women from diverse ethnic, racial, and socioeconomic backgrounds recruited through mosques and community organizations in the Greater Chicago area to participate in a cancer screening study (Padela et al. 2014, 2015). Women in this sample were English-speaking self-identified Muslims over the age of 40. Statistical analyses revealed a Cronbach's alpha of 0.83 for the scale, but also that the measure had no association with cancer screening behaviors.

Phase 2: In-Depth Cognitive Testing and Measure Refinement Through Focus Groups

In order to improve upon the measure, we added additional items from a modesty measure used among Jewish populations (Andrews 2011). Within this Jewish measure, we selected 5 items related to religion-driven modesty of a general nature, i.e., not assessing behaviors within a healthcare environment, to be added to our item pool (see Table 1).

Between August 2013 and January 2014, six focus groups were conducted with a group of ethnically and racially diverse Muslim women. A total of 50 participants were recruited from mosque sites in Greater Chicago to refine our item pool. Adapting Florez et al's (2009) methodology, the aim of the focus groups was to clarify the concept of modesty from the vantage point of communal understandings of Islam, and to assess whether proposed items captured a normative understanding of Islamic modesty. Therefore, participants were asked whether (1) someone who practices the actions in the statements would be considered to

Table 1 Final modesty measure for Muslim women (MMM-W) question stems, their origins, and refinement over study phases

Phase 1 (Initial items from focus groups and preliminary survey testing)	Phase 2 (Focus group refinement)	Phase 3 (Quantitative validation via surveys)	Female Jewish modesty measure (Andrews 2014)
When I am in a mixed gender gathering or outside of the home, I cover my entire body, except my hands and face	A woman covers her entire body except her hands and face when in a mixed-gender gathering or outside of the home	1. When I am in a mixed gender gathering or outside of the home, I cover my entire body, except my hands and face	N/A
When I have guests at my home, men and women sit separately	Someone seats men and women separately when guests are in the home	2. When I have guests at my home, men and women sit separately	N/A
I always look for a female doctor for myself	When looking for a doctor, a woman prefers a female physician	3. I always look for a female doctor for myself	N/A
I have delayed seeking medical care when no woman doctor is available to see me	A woman delays seeking medical care when no female physician is available to them	4. I have delayed seeking routine care or primary care when no woman doctor is available to see me	N/A
An unmarried man and unmarried woman should not be alone together	Someone who believes an unmarried man and unmarried woman should not be alone together	5. An unmarried man and unmarried woman should not be alone together	N/A
Hospital gowns are not modest	Someone who believes hospital gowns are not modest	6. Hospital gowns are not modest	N/A
N/A	Modesty is that you don't show your body to anyone else		I think modesty is that you don't show your body to anyone else
N/A	Being flirtatious is immodest	9. Being flirtatious is immodest	I think being flirtatious is immodest
N/A	Modesty affects a woman's physical contact with men other than her husband	8. Modesty affects a woman's physical contact with men other than her husband	I think, from a Jewish perspective, depending on your degree or background, modesty effects female physical contact with males other than your husband
N/A	Modesty is the essence of who we are as Muslims	11. Modesty is the essence of who we are as Muslims	I believe modesty is the essence of who we are
N/A	Modesty requires a separation between the sexes	10. Modesty requires a separation between the sexes in public gatherings	I believe in a separation between the sexes

Table 1 continued

Phase 1 (Initial items from focus groups and preliminary survey testing)	Phase 2 (Focus group refinement)	Phase 3 (Quantitative validation via surveys)	Female Jewish modesty measure (Andrews 2014)
My clothing demonstrates a commitment to Islamic modesty	N/A	7. My clothing demonstrates a commitment to Islamic modesty	N/A
Maintaining Islamic modesty is important to me	N/A		N/A

display a high level of Islamic modesty, and whether (2) the statements accurately reflect Islamic teachings about modesty. All items were worded from a third-person perspective in order to uncover communal views. For example, a focus group question inquired: "I want you to tell me whether someone who does the following displays a high level of Islamic modesty: A woman covers her entire body except her hands and face when in a mixed-gender gathering or outside of the home." Of the original 8 items, 6 were retained for testing through focus groups. (The 2 dropped items were "My clothing demonstrates a commitment to Islamic modesty" and "Maintaining Islamic modesty is important to me" because they could not be rephrased into the third person). In addition, the 5 potential items from Jewish measure were also tested (Andrews 2011) (see Table 1 Phase 2).

The focus group data were analyzed independently by two researchers. They assessed whether individual focus group participants voiced "agreement," "disagreement," or "ambivalence" about the item wording, and which view was dominant across all focus groups. In other words, they looked to whether the participants, in general, felt that the practice displayed a high level of Islamic modesty and/or whether the statement cohered with Islamic teachings. The independent analyses were reviewed in subsequent team meetings by a group of four researchers (both Muslim and non-Muslim), and any disagreements were resolved by reviewing the transcripts and consensus-building exercises (see "Appendix: Table 7" for a list of categorized responses to the statements). Three items were found to have high levels of "disagreement" or "ambivalence." Using data from the focus groups discussions, these were rephrased to reduce ambiguity and address the source of disagreement (see "Appendix: Table 7" for details on the focus group results and subsequent revision or retention of items). At the end of this process, the resulting modesty measure included 11 unique items: 4 originating in the measure of Jewish modesty, 6 items tested in the focus groups from the 8-item original Muslim modesty measure, and an additional item from the original 8-item measure (My clothing demonstrates a commitment to Islamic modesty) which did not undergo focus group testing because it could not be rephrased into the third person but nonetheless covered an important aspect of behavioral modesty.

Phase 3: Psychometric Analyses and Validity Assessment

Between April and August 2016, we administered the 11 items assessing modesty along a 4-point Likert scale (1=completely disagree to 4=completely agree) to a convenience sample of 58 Muslim women from Arab and South Asian backgrounds at two mosques in the Chicago area. These women were recruited to participate in a group education-based

cancer screening intervention. The participants were English-speaking, over the age of 40, and had not had a mammogram in the past 2 years.

We first computed Cronbach's alpha to determine the internal consistency reliability coefficient of the modesty measure. An exploratory factor analysis was next conducted using the principal-factor method followed by an oblique rotation using the quartimin criterion on the Kaiser/Horst normalized loading matrix, to determine the relationships among different items in the modesty measure as well as whether groups of items map onto different latent dimensions (factors) of the theoretical construct of modesty. Since all of the items loaded strongly onto a single dimension, we also tried a bifactor model using the rotation described in Jennrich and Bentler (2011). This model posits a single general factor on which all items load, plus additional factors—uncorrelated with the first—each of which is associated with non-overlapping subsets of the items (Chen et al. 2006). Finally, we fit an ordinal factor model using a logit link function to relate the responses on the observed items to the underlying factors, to verify that relaxing the assumption of multivariate normality did not change our conclusions. Sixteen individuals who did not answer all of the questions were included in these analyses using full information maximum likelihood (FIML) assuming that the missing data are missing at random (MAR).

To assess discriminant validity, we used Spearman's correlation coefficient—a rank-based measure of association that captures both linear and nonlinear relationships—to examine associations between our measure and three measures of religiosity: (1) the Duke University Religion Index (DUREL) (Koenig and Bussing 2010), a measure developed to assess religious involvement (we rephrased one item in this measure in order to be relevant to Islam) and (2 and 3) two subscales from the psychological measure of Islamic Religiousness (PMIR) (Raiya et al. 2007, 2008)—the seven-item PMIR-Positive Religious Coping and Identification subscale which assesses the extent to which respondents rely on religious coping to deal with life stressors, and the three-item PMIR-Punishing Allah Reappraisal subscale which assesses whether respondents interpret illnesses or health problems as a result of God's punishment. The Cronbach's alpha for the scales was as follows: (1) 0.45, (2) 0.96, and (3) 0.90.

To assess predictive validity, ordinal logistic regression models were used to examine relationships between the summed score from the modesty measure as an independent variable, and participant levels of agreement (along a 4-point scale) to the following two questions: (1) I have not gotten a mammogram in the past 2 years because I worry about getting a male technician, and (2) I worry about going to the emergency department because I might not be able to get a female doctor.

Results of Validity Assessment

Survey data from the 58 participants demonstrated most respondents completely or somewhat agreed with each of the 11 items (mean scores per item ranged from 2.93 to 3.77). Each item was found to be moderately correlated (>0.3) (Ratner 2009) with the overall scale formed by averaging the remaining items (the column labeled "item-rest" in Table 2), with the exception of Q9. Excluding this item yields a 10-item measure with a Cronbach's α of 0.83, while Cronbach's α for the 11-item measure was 0.79. Given the uniquely low correlation between Q9 and the other items as well as its unique pattern of loadings during the EFA, we excluded it from subsequent analyses opting to retain a 10-item measure (when present relevant statistical information on the 11-item measure is included for completeness sake).

Table 2 Item-test and item-rest correlations

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Average inter-item covariance	Alpha
Q1	54	+	0.56	0.44	0.18	0.77
Q2	57	+	0.64	0.54	0.18	0.77
Q3	58	+	0.58	0.48	0.18	0.77
Q4	58	+	0.67	0.54	0.17	0.77
Q5	56	+	0.65	0.53	0.17	0.78
Q6	58	+	0.61	0.50	0.18	0.78
Q7	57	+	0.39	0.31	0.21	0.79
Q8	52	+	0.63	0.50	0.18	0.78
Q9	51	−	0.27	0.079	0.22	0.83
Q10	52	+	0.60	0.45	0.18	0.78
Q11	52	+	0.48	0.40	0.20	0.79
Test scale					0.19	0.80

In an exploratory factor analysis performed using the principal-factor method, the first factor had an eigenvalue of 3.89 and accounted for 81% of the variance, while the second factor had an eigenvalue of 0.84 (below the commonly used cutoff of 1.0) and accounted for 18% of the variance (99% total). A test of fit of the one-factor model against the saturated model yields a χ^2 value of 50.2 on 35 degrees of freedom ($p=0.046$), while a test of the two-factor model against the saturated model yields a χ^2 value of 24.1 on 26 degrees of freedom ($p=0.568$). Similarly, comparing a two-factor ordinal logistic model against an ordinal model with only one factor yields a χ^2 value of 26.5 on 9 degrees of freedom ($p=0.002$), although this test is known to be liberal (i.e., it can lead to retaining too many factors). The Bayesian information criterion (BIC) favors the one-factor ordinal model (1037.0 vs. 1047.0 for the one-factor vs. two-factor model), while the Akaike information criterion (AIC) which penalizes additional parameters less strongly than the BIC favors the two-factor ordinal model (958.7 vs. 950.2, respectively) (Burnham and Anderson 2004). Thus, while the data provide strong evidence for at least one underlying factor, the evidence for a second factor is equivocal.

Analyses revealed that a one-factor solution is acceptable as every item loaded onto that one factor with a>0.4 magnitude. Importantly, a loading of 0.3 is often cited as the minimal threshold for adequacy (Hair et al. 1998). Ideally, however, a factor loading of ≥ 0.5 for five or more items in a scale indicates a solid factor (Costello and Osborne 2005), while factors possessing four or more items with loadings of >0.6 provide strong evidence for the latent structure factors regardless of sample size (Guadagnoli and Velicer 1988). In this single factor solution, 6 of 10 items loaded at>0.6, while 8 had a magnitude of>0.5 of loading (see Table 3(a)).

The loadings and uniquenesses for one-factor and two-factor solutions (the latter after applying an oblique rotation using the quartimin criterion on the Kaiser/Horst normalized loading matrix (Osborne 2015)) are shown in Table 3. Each factor is associated with a different, non-overlapping set of items [except for Q3 which loads nearly equally on both; see Table 3B: 2-factor model]. Items loading primarily on Factor 1 are Q1, Q5, Q6, Q7, and Q8, while Items Q2, Q4, Q10, and Q11 primarily load on Factor 2. The correlation between the rotated factors is 0.52. Grouping the items in this fashion, however, does not represent distinct interpretable aspects of modesty, nor do the items correspond to the hypothesized underlying

structure of the latent factors (one relating to modesty-related behaviors/practices and the other to modesty-related attitudes). Results from the ordinal factor model were similar (not shown).

Loadings from a bifactor model with 3 factors are shown in Table 4. Each item loads on Factor 1 with a magnitude of >0.4, which we might interpret as a generalized modesty factor (latent factor). In addition, Items Q4, Q7, and Q10 load on Factor 2, while Items Q1, Q3, Q5, and Q6 load on Factor 3; each item loads with a magnitude of >0.3. Items Q2 and Q8 do not load onto either Factor 2 or Factor 3 with a magnitude of >0.3. While there is some overlap between Factor 3 and the first factor in the previous two-factor solution in Table 3 (Items Q1, Q3, Q5, and Q6 are common to both), these two models differ with respect to Items Q2, Q7, and Q8. Moreover, the loading patterns for Factor 2 or 3 in this bifactor model do not correspond with loadings noted above for a two-factor solution. This lack of correspondence between the rotated two-factor model and the bifactor model is not surprising, since unlike the factors in the oblique rotation, the factors in the bifactor model are assumed to be uncorrelated. Regardless an intuitive interpretation of this pattern of item loading remained elusive.

Moving from psychometric testing to discriminant and predictive validity assessments, Spearman's correlation coefficients are noted in Table 5. Results demonstrate that the relationship between the 10-item version and DUREL trended toward significance ($p=0.086$) with a weak correlation ($rs=0.20$). The relationship between the 10-item modesty measure and PMIR-Positive Religious Coping and Identification subscale, however, was statistically

Table 3 Exploratory factor analysis-factor loadings (pattern matrix) and unique variances

Variable	Factor 1		Uniqueness
A: 1-factor model			
Q1	0.71		0.49
Q2	0.64		0.59
Q3	0.73		0.47
Q4	0.61		0.62
Q5	0.58		0.66
Q6	0.57		0.67
Q7	0.44		0.81
Q8	0.69		0.52
Q10	0.65		0.58
Q11	0.46		0.79
Variable	**Factor 1**	**Factor 2**	**Uniqueness**
B: 2-factor model			
Q1	0.61	0.17	0.50
Q2	0.28	0.45	0.60
Q3	0.43	0.39	0.49
Q4	−0.16	0.98	0.18
Q5	0.59	0.083	0.59
Q6	0.59	0.038	0.63
Q7	0.61	− 0.12	0.69
Q8	0.82	− 0.0087	0.34
Q10	0.033	0.77	0.38
Q11	0.18	0.37	0.76

Table 4 Bifactor rotation (loadings)

Variable	Factor 1 (latent factor)	Factor 2	Factor 3
Q1	0.62	−0.023	−0.42
Q2	0.57	0.23	−0.20
Q3	0.63	0.18	−0.40
Q4	0.62	0.63	0.005
Q5	0.54	− 0.10	−0.31
Q6	0.49	−0.098	−0.42
Q7	0.57	−0.43	0.12
Q8	0.73	−0.29	−0.21
Q10	0.70	0.42	0.12
Q11	0.58	0.037	0.29

significant ($p=0.0047$) and moderately correlated (rs=0.39). The relationship between the 10-item modesty measure and PMIR-Punishing Allah Reappraisal subscale was also statistically significant ($p=0.0008$) with a moderate correlation (rs=0.62) (Ratner 2009). The relationships between the 11-item modesty measure and the religiosity measures were similar.

Ordinal logistic regression models (Table 6) demonstrated a statistically significant association between the 10-item modesty scale and the statement "I have not gotten a mammogram in the past 2 years because I worry about getting a male technician" (OR 1.208, $p=0.015$), but not with the statement "I worry about going to the emergency department because I might not be able to get a female doctor" (OR 1.07, $p=0.3$). The associations between the 11-item modesty scale and these 2 statements follow the same pattern (data not shown).

Discussion

Islamic theology emphasizes the importance of being modest, and modesty is highly valued by Muslims across sociodemographic markers. Modesty is also reported to impact Muslim health behaviors broadly, but quantitative assessments of such impacts have been largely outreach due to the lack of a Muslim-specific measurement tool. A measure that captures Islamic notions of modesty and is valid across the ethnic and racial diversity of the

Table 5 Correlations between modesty measure and religiosity measures

	Modesty (11-item)	Modesty (10-item)	DUREL	PMIR-positive religious coping	PMIR-Punishing Allah Reappraisal
Modesty (11-item)*	1	0.93	0.16	0.39	0.57
P value		< 0.0001	0.16	0.008	0.003
Modesty (10-item)		**1**	**0.20**	**0.39**	**0.62**
P value			0.086	0.0047	0.0008
DUREL			1	0.13	0.055
PMIR-positive religious coping				1	0.19
PMIR-punishing Allah reappraisal					1

Bold values indicate the correlations for our final 10-item modesty measure

*Included for completeness; we advocate for the ten-item version

Muslim population would thus advance this area of investigation. This paper therefore reports on the development of an English-language modesty measure that was built ground up from, and tested with, a diverse Muslim population in the USA. Our project yielded a 10-item measure that has high levels of internal consistency reliability (Cronbach's α of 0.83), has a single factor structure, and has discriminant and predictive validity. In what follows, we comment on some of our salient findings and implications for future work.

With respect to psychometric properties of the 10-item measure, we had anticipated developing a measure with two subscales that would test for attitudinal and behavioral components of Islamic modesty. Accordingly, some items inquired about individual habits of dress and gender segregation, and others inquired whether participants felt Islamic modesty required certain codes of dress, cross-gender interaction, and general perceptions of how modesty defined an Islamic identity. Our exploratory factor analyses (with both oblique and bifactor rotations) yielded equivocal results. The 10 items all load strongly on a single factor, presumably measuring overall modesty. Yet, the data are less clear on whether a second factor exists, especially since the breakdown does not follow the hypothesized attitudinal and behavioral factor distribution. The interpretation we are most inclined to promote is that our measure primarily captures a single factor. The variable results could be attributed to redundancy in some items such that both personal practices and attitudes about the same behavior are being evaluated, e.g., Items 1 and 7, thereby reducing the ability to separate dimensions of modesty into subscales. To better separate and measure aspects of Islamic modesty, researchers may want to add additional items related to modesty in speech, dress, and behavior, and assess whether a factor structure that corresponds to these domains can be discovered. Alternatively, researchers could incorporate modesty within a wider theory about attitudes, beliefs, and values and seek to generate a measure whose subscales correspond to these domains. Such studies would enhance and build upon our provisional measure of Islamic modesty.

With respect to predictive validity, logistic regression models demonstrated a statistically significant association between the modesty measure and statement "I have not gotten a mammogram in the past 2 years because I worry about getting a male technician," but not with the statement "I worry about going to the emergency department because I might not be able to get a female doctor." This finding may signify that our measure is better at assessing associations between preventive health behaviors than urgent ones, or that notions of modesty implicate preventive health actions more than urgent ones among Muslims. Supporting the notion that preventive health is more affected by modesty than urgent care is that Islam permits contravening religious law under duress. For example, the Islamic ethico-legal maxim, al-ḍarūrāt tubī` al-maḥẓūrāt, supports the performance of normatively prohibited actions under dire circumstances and a perceived threat to life (Kamali 2007; Mahmassani 1961; Padela and Del Pozo 2011). Islamic jurists use this maxim to support the performance of abortion under extenuating circumstances (al-Qaradawi 2013) and for Muslims to obtain porcine-based vaccines (Isa 2015). Thus, seeking emergency medical care would appear to

Table 6 Logistic regression

	Odds ratio	95% Confidence interval	P value
I have not gotten a mammogram in the past 2 years because I worry about getting a male technician			
10-item modesty measure	1.2	1.1–1.4	0.015
I worry about going to the emergency department because I might not be able to get a female doctor			
10-item modesty measure	1.1	0.95–1.2	0.30

be a situation where a perceived life threat exists and adhering to conventions of modesty in cross-gender interaction contingently waived. Further correlational studies are needed to assess how our measure predicts a wide variety of health behaviors among Muslims.

With respect to future work, our tool can assist in assessing the contributions of modesty to Muslim health and healthcare disparities. Although there is scant empirical study of American Muslim health disparities (Padela and Raza 2015), modesty is believed to undergird many health behaviors among Muslims from receipt of cancer screening (Hasnain et al. 2011; Isa Modibbo 2016; Salman 2012; Vahabi and Lofters 2016) to decisions about going to the emergency room (Padela 2007). Hence, our measure can allow for assessing the extent to which modesty correlates with health attitudes and behaviors among Muslims, and also describe disparities in care. In addition to description, should notions of modesty underlie different healthcare-seeking patterns an area for intervention is also disclosed. Healthcare systems could seek to provide healthcare accommodations that address modesty-related expectations of Muslim patients, such as different gowns ("Modesty gowns for female patients," 2006) or same-sex providers where possible (Padela et al. 2012) if modesty concerns are found to impact healthcare-seeking behaviors in the surrounding community. At the same time, religious leaders could also teach the importance of health in Islam and how modesty may be preserved in healthcare encounters. Thus, our measure could be used to both help explain and intervene upon healthcare disparities.

While our findings are encouraging, we recognize that further validation studies are needed prior to wide usage of our measure. Although our study population incorporated African American, South Asian, and Arab Americans in both the qualitative and quantitative phases, we restricted our sample to English-speaking, female participants above the age of 40. Thus, our measure likely is not appropriate to non-English-speaking populations unless adapted, and may not be relevant to children. Furthermore, our participant sampling was primarily conducted through convenience sampling at mosques, thereby introducing selection bias toward a more religious participant pool. Accordingly, further validation studies need to broaden the population of study to assess measure characteristics among a larger sample of the Muslim community. Finally, our survey analytics should be interpreted in light of possible acquiescence bias; all items were positively worded, and future research should vary the phraseology in order to confirm measure characteristics.

Appendix

See Table 7.

Table 7 Phase 2: focus group analyses

Questions	Nigerian mosque (9 participants)	Predominantly South Asian Mosque (8 participants)	Indigenous African American Mosque (7 participants)	Arab American Mosque (8 participants)	Arab American Mosque (8 participants)	Predominantly South Asian Mosque (10 participants)	Analytic results across focus groups and potential revision of item
I want you to tell me whether someone who does the following displays a high level of Islamic modesty							
A woman covers her entire body except her hands and face when in a mixed-gender gathering or outside of the home							
Agree	2	2	7	6	2	3	Most participants agreed with the statement; the original wording was retained
Disagree				1			
Ambivalent				1			
Someone seats men and women separately when guests are in the home							
Agree	2	3	1	1	2	5	Although, a significant proportion of participants disagreed with, or were ambiguous, to the statements, the disagreement or ambiguity arose from respondents considering gender separation in settings other than home, such as at school or the workplace. Thus, the original wording was retained
Disagree	2	3		2	2	1	
Ambivalent		1			2	2	
When looking for a doctor, a woman prefers a female physician							
Agree	2	4	7	1	4	3	Most participants agreed with the statement; the original wording was retained
Disagree	1	1		1	2		
Ambivalent							
A woman delays seeking medical care when no female physician is available to them							

Table 7 continued

Questions	Nigerian mosque (9 participants)	Predominantly South Asian Mosque (8 participants)	Indigenous African American Mosque (7 participants)	Arab American Mosque (8 participants)	Arab American Mosque (8 participants)	Predominately South Asian Mosque (10 participants)	Analytic results across focus groups and potential revision of item
Agree	1	1	1	3	1	1	Most participants either disagreed with or were ambivalent about the statement, stating that from an Islamic viewpoint, most women would likely consider it religiously permissible to seek care in the emergency room regardless of the physician's gender. Hence, the statement was revised to specify routine care or primary care
Disagree			3	1	3	2	
Ambivalent	1	3	2			1	
Someone who believes an unmarried man and unmarried woman should not be alone together							
Agree	3	4	4	1	4	3	Most participants agreed with the statement; the original wording was retained
Disagree							
Ambivalent							
Someone who believes hospital gowns are not modest							
Agree	5	5	1	1	5	3	Most participants agreed with the statement; the original wording was retained
Disagree							
Ambivalent			3				
Tell me if the following statements are true about modesty from an Islamic perspective							
Modesty is that you do not show your body to anyone else							
Agree	3	3	7	1	5	3	Some participants were ambivalent about the statement and suggested that Islamic modesty is more complex than clothing. Due to this level of ambiguity, we decided to not use this item from the Jewish modesty measure. Instead we reintroduced the Phase 1 item: "My clothing demonstrates a commitment to Islamic modesty"
Disagree							
Ambivalent				3	3	1	

Table 7 continued

Questions	Nigerian mosque (9 participants)	Predominantly South Asian Mosque (8 participants)	Indigenous African American Mosque (7 participants)	Arab American Mosque (8 participants)	Arab American Mosque (8 participants)	Predominately South Asian Mosque (10 participants)	Analytic results across focus groups and potential revision of item
Being flirtatious is immodest							
Agree	2	3	3	1	3	3	Most participants agreed with the statement; the original wording was retained
Disagree							
Ambivalent							
Modesty affects a woman's physical contact with men other than her husband							
Agree	2	4	2	2	1	3	Most participants agreed with the statement; the original wording was retained
Disagree							
Ambivalent				2		1	
Modesty is the essence of who we are as Muslims							
Agree	2	3	7	1	2	2	Most participants agreed with the statement; the original wording was retained
Disagree							
Ambivalent				1			
Modesty requires a separation between the sexes							
Agree	2	3	1	3	3	1	A significant proportion of participants were ambivalent about the statement and stated that the item was confusing because it did not specify a location. Accordingly this item was rephrased to specify in public gatherings

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