Published in final edited form as:

J Pers Assess. 2010 November ; 92(6): 568–576. doi:10.1080/00223891.2010.513300.

Revision, Criterion Validity, and Multi-group Assessment of the Reactions to Homosexuality Scale

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Abstract

Internalized homonegativity encompasses negative attitudes toward one's own sexual orientation, and is associated with negative mental and physical health outcomes. The Reactions to Homosexuality scale (Ross & Rosser, 1996), an instrument used to measure internalized homonegativity, has been criticized for including content irrelevant to the construct of internalized homonegativity. We revised the scale using exploratory and confirmatory factor analyses, and identified a seven-item, three-factor reduced version that demonstrated measurement invariance across racial/ethnic categorizations and between English and Spanish versions. We also investigated criterion validity by estimating correlations with hypothesized outcomes associated with outness, relationship status, sexual orientation, and gay community affiliation. The evidence of measurement invariance suggests that this scale is appropriate for pluralistic treatment or study groups.

Key terms

internalized homonegativity; invariance; multi-group modeling; gay men

Shidlo (1994) defined internalized homonegativity as the acceptance of negative attitudes towards one's own same-sex attraction and behavior. Relevant to both psychology and public health, researchers have identified associations between internalized homonegativity and mental health outcomes (Meyer, 2003; Williamson, 2000), low self-esteem (Nungesser, 1983), poorer sexual health outcomes (Rosser, Bockting, Ross, Miner, & Coleman, 2008), and behaviors that predispose individuals to the transmission of HIV (Ross et al., 2001). Specific to HIV risk behavior, a recurrent relationship is the one between internalized homonegativity and substance use (Ross et al., 2001; Ross, Rosser, & Neumaier, 2008), with the latter acting as a mediator between homonegativity and unprotected intercourse.

The etiology of internalized homonegativity can be understood through the framework of stigma proposed by Goffman (1963). As children, individuals learn negative stereotypes and attitudes about gay people from society at large. These attitudes then contribute to a negative

impression of oneself upon identifying as gay, lesbian, or bisexual later in life (Shidlo, 1994). Nungesser (1983) built on Goffman's general framework of stigma, and identified three traits that would indicate the presence of internalized homonegativity: (1) a dislike for one's own sexual orientation, (2) a discomfort associating with others who share the same sexual orientation, and (3) a willful avoidance of being identified as gay, lesbian, or bisexual by the public at large.

Ross and Rosser (1996) developed a 28-item scale of internalized homonegativity to capture the theorized dimensions of internalized homonegativity. The scale included four factors: (1) "public identification as gay," (2) "perceptions of stigma associated with being gay," (3) "social comfort with gay men," and (4) "moral and religious acceptability of being gay." Although the scale demonstrated moderate construct validity in the initial study, there are several limitations, both practical and conceptual, that inhibit its application in current research.

In terms of practical usage, the current scale is long, which makes it difficult to include in surveys where overall length of the survey is a concern. In addition, there are items in the scale that are redundant, which artificially inflate estimates of scale reliability (Stein, Lee, & Jones, 2006). Conceptually, the scale includes items beyond the scope of Nungesser's (1983) theory of internalized homonegativity which may not be appropriate indicators (Currie, Cunningham, & Findlay, 2004). In particular, the items associated with the "perception of stigma" factor capture endorsements of active discrimination and stereotypes of gay men. These perceptions and stereotypes are etiologically relevant to internalized homonegativity. Since latent variable models attempt to capture a construct by using proximal outcomes as indicators of the latent variable, the inclusion of items that are determinants of the latent variable is inappropriate. Finally, the inclusion of an item that makes a direct reference to God presupposes a religious or spiritual affiliation that is neither universal nor theoretically necessary in the assessment of internalized homonegativity.

Currie et al. (2004) published a revision to the Reactions to Homosexuality measure to circumvent some of the aforementioned limitations. In this revision, they omitted "perceptions of stigma" factor prior to implementing the analysis. They also included a series of items generated to capture a new dimension, sexual comfort. The final revised scale included 12 items loading on three factors: (1) "public identification as gay," (2) "sexual comfort with gay men," and (3) "social comfort with gay men." The items included in the sexual comfort factor addressed a series of stereotypes related specifically to the sexuality of gay men as a class. As such, these items introduce the same confound of etiology and outcome that occurred with the "perceptions of stigma" factor in the original measure. Moreover, acceptance and endorsement of stereotypes cannot be expected to be a uniform response among all individuals in a stigmatized class (Crocker, Major, & Steele, 1998), so the inclusion of these items may introduce differential misclassification.

In addition to theoretical and psychometric considerations of measuring internalized homonegativity, there is a growing need for measures that capture the same latent variables across population strata. Given the high risk of HIV transmission for young Black and Hispanic men who have sex with men (CDC, 2009), researchers are trying to identify relevant risk factors and compare racial/ethnic groups on the relative contribution of each. Stratifying Hispanic men even further, comparisons of men who speak predominantly Spanish versus men who speak predominantly English are of interest in assessing risk. For both comparisons – race/ethnicity and language – the use of invariant measures will allow for unbiased comparisons of the latent variables of interest (Brown, 2006).

There are two major considerations in exploring possible measurement noninvariance as a function of race/ethnicity: balancing multiple stigmatized identities and specific cultural

attitudes about gay men. The etiologic theory of internalized homonegativity focuses on the development of a single stigmatized identity. For African American and Latino men who have sex with men, there is a need to negotiate stigmatized identities related to both sexuality and race/ethnicity, which can alter identity development and subsequent response to societal attitudes (Ramirez-Valles, 2007; Battle & Crum, 2007; Stokes & Peterson, 1998; Szymanski & Gupta, 2009). Differences in response to attitudes could, in turn, influence the way scale items relate to one another in assessing the factor structure of the latent variables.

Aside from managing multiple identities, there are also specific attitudes within racial/ethnic communities that can influence the magnitude of endorsement of particular items included in a scale of internalized homonegativity. For African American men who have sex with men, there are expectations to maintain silence about sexuality (Stokes & Peterson, 1998), fears of appearing weak or serving as an embarrassment to one's community (Brooks, Etzel, Honojos, Henry, & Perez, 2005), and strong community ties to the church which contribute to observed differences in the prevalence of homonegative attitudes within the African American community (Negy & Eisenmann, 2005; Schulte & Battle, 2004). For Latino men who have sex with men, unique influences include gender norms (Ramirez-Valles, 2007), pressure to remain silent about a gay or bisexual identity (Flores, Mansergh, Marks, Guzman, & Colfax, 2009; Greene, 1994), and family influences (Brooks et al., 2005; Greene, 1994). These factors suggest that item endorsement may be greater than expected in a measurement model, resulting in biased mean comparisons between groups.

In regards to invariance by language, the major concern rests in the cultural context and the fact that certain statements or words may not directly translate from one language to another (Greene, 1994). Even if items can be translated syntactically, there may be semantic differences that introduce variance to the measurement model that is not related to the latent variable of interest. As such, evaluating measurement invariance can add evidence to the equivalence of measurement between populations that vary by survey language.

Because of the practical and theoretical limitations associated with both the Ross and Rosser (1996) Reactions to Homosexuality scale and the revised version by Currie et al. (2004), and the need to evaluate the measurement properties by racial/ethnic and linguistic strata, we proposed two broad aims for this study: (1) to revise and shorten the Reactions to Homosexuality scale and (2) to test for measurement invariance by race/ethnicity and survey language (English or Spanish). As a component of the scale revision, we assessed criterion validity using a series of hypothesized correlates. From the theoretical and empirical literature, we hypothesized that men with higher internalized homonegativity would be less open about their sexual orientation, less likely to be in an intimate relationship with another man, less affiliated with gay social groups, and less likely to identify as exclusively gay (Herek, Cogan, Gillis, & Glunt, 1997; Meyer, 1995, 2003; Meyer & Dean, 1998; Szymanski & Chung, 2001). Furthermore, given the outcomes relevant to psychological distress identified in the literature (Meyer, 1995; Williamson, 2000), any valid measure of internalized homonegativity should yield a positive correlation with a measure of psychological distress. In the absence of such a measure, however, we used compulsive sexual behavior as a proxy measure. Compulsive sexual behavior manifests as an inability to control one's desires or urges to act out sexually (Coleman, Miner, Ohlerking, & Raymond, 2001), which arises as a coping mechanism to handle distress. Empirically, Dew and Chaney (2005) have identified a positive association between internalized homonegativity and compulsive sexual behavior. Given the plausibility that internalized homonegativity can influence compulsive sexual behavior as a function of distress, and the empirical evidence of a direct association, we hypothesized that men with higher internalized homonegativity would report higher compulsive sexual behavior.

Method

Study Design

The samples for this study included participants from two cycles of the Men's INternet Study (MINTS). The first cycle (MINTS-I) included only self-identified Latino men who have sex with men; the second (MINTS-II) included men of multiple racial/ethnic backgrounds who self-identified as men who have sex with men. The data collection methods for both studies have been detailed elsewhere (Rosser, Miner, et al., 2009; Rosser, Oakes, et al., 2009), and are summarized here. Data from both cycles were collected using Internet-based surveys developed as risk behavior and needs assessments for future HIV-prevention efforts. Inclusion criteria specified that all participants be male, at least 18 years of age, and report at least one sexual encounter with another male during the year preceding the survey. There were two differences in subject recruitment for the two studies. First, respondents to MINTS-I had the opportunity to complete the survey in either English or Spanish, whereas respondents to MINTS-II only completed an English-language version. Second, to have sufficient sample size for analytic comparisons within and between racial/ethnic categorizations, participants in MINTS-II were oversampled by race/ethnicity. Inclusion criteria for this analysis specified that the men had to provide valid data on race/ethnicity and complete all items in the Reactions to Homosexuality scale. The former criterion was necessary for multi-group modeling; the latter since the estimator used in modeling to account for nonnormality, the Satorra-Bentler corrected χ^2 (Satorra & Bentler, 1994), requires a listwise deletion (Muthén & Muthén, 1998–2007).

Participants

Of the 1,026 men who completed MINTS-I, and 2,716 who completed MINTS-II, we retained 733 and 2,392, respectively, who had complete data on all items from the Reactions to Homosexuality measure and who provided valid data on race/ethnicity. Their demographic characteristics are summarized in Table 1. Of the men in MINTS-I, 88.4% completed the survey in English. Overall, the men in MINTS-I were younger and well-educated. The men included in MINTS-II showed a similar distribution of age and education as compared to the men in MINTS-I. In terms of race/ethnicity, the distribution was approximately equivalent across Asian, Black, and Latino men. A slightly greater proportion of men identifying as White were in the sample. The Other category includes men who did not identify in the other categories, or who endorsed multiple racial identities. We did not identify any statistically significant differences in demographics when comparing those included to those excluded from MINTS-I; however, those included in the analyses from MINTS-II had higher incomes ($p=.01$), were older ($p<.01$), and had more education ($p=.03$) than those excluded.

Measures

Internalized homonegativity—The Reactions to Homosexuality scale (Ross & Rosser, 1996) includes four first-order factors measured by 26 scale items (see Table 2). All items were measured as a 7-point Likert-type scale (1=strongly disagree, 7=strongly agree). Twelve items in the scale were reverse-coded. All items were scaled to show an increase in internalized homonegativity with an increased manifest score. Internal consistency reliability overall in the training/confirmation set ($n=686$) was 0.84, and for the four factors in the was as follows: public identification as gay (0.84), perceptions of stigma associated with being gay (0.56), social comfort with gay men (0.54), and moral and religious acceptability of being gay (0.62).

Compulsive sexual behavior—This was measured using the Compulsive Sexual Behavior Inventory (Coleman, Minder, Ohlerking, & Raymond, 2001). The original scale included 28 items measuring three dimensions: control, violence, and abuse. Work by Raymond, Lloyd, Miner, and Kim (2007) indicated that the control subscale had the strongest theoretical

relationship with the construct in question, so we focused our analyses on that particular subscale. The subscale included 13 items measured using a 5-point Likert-type response format (1=very frequently, 5=never). Sample items include, “How often have you had trouble controlling your sexual urges,” and, “How often have you felt emotionally distant when you were engaging in sex with others.” All items were scored so that a higher scale score indicated a higher presence of the trait. Internal consistency reliability in this study was 0.92. We calculated an average score for the thirteen items for the external validity assessment.

Sexual orientation—Following the guidelines established by Kinsey, Pomeroy, and Martin (1948), we assessed sexual orientation using three 7-point Likert-type items (1=exclusively women, 7=exclusively men) that asked participants about the gender of persons to whom they had been attracted, with whom they had had sex, and about whom had fantasized in the three years prior to the survey. Internal consistency reliability for the three items was 0.81. We calculated an average score for the three items for the external validity assessment.

Other measures—As part of the demographics in the needs assessment, we included a series of binary variables relevant to these dimensions. These items included one question about ever being a member of a gay organization, one question on whether or not the men had disclosed to their physician their sexual orientation, and one question on whether or not they were currently in a committed relationship with another man. For external validity, we assessed each item individually.

Scale Revision

We randomly divided the White subgroup into two split halves. Using the men in the first split half, we conducted a principal axis factor extraction following the general guidelines outlined in DeVellis (2003). The “perceptions of stigma” factor from the scale and one item that made specific reference to God were removed (item 23) *a priori*. We used a parallel analysis (Zwick & Velicer, 1986) following O’Connor’s (2000) SPSS macro to ascertain the appropriate number of factors to retain. Criteria for retention were based on the 95th percentile distribution of the randomly-generated eigenvalues over 1,000 iterations. A quartimin rotation was utilized to obtain simple structure. After rotation, we inspected the pattern coefficients to ensure that all indicators obtained a pattern coefficient of 0.40 or greater on only one of the three factors (Thompson, 2004). We used the pattern coefficients as opposed to the structure coefficients since the former reflect a direct relationship between the indicator and the factor while the latter incorporate both the direct association as well as any indirect associations that are the result of the correlations between the factors (Nunnally & Bernstein, 1994). We iteratively removed items that did not achieve the minimum pattern coefficient on any of the extracted factors, beginning with the items with the smallest loadings. We then iteratively removed items with cross-loadings between two or more factors, beginning with those with the cross-loading of the greatest magnitude.

After the initial exploratory factor analysis, we replicate the measurement model using a confirmatory factor analysis of the mean and covariance matrix (Byrne, 2005; Ullman, 2006). We set the scale of the measurement model by constraining the variance of each latent variable to unity. Modification indices were used as a guide to misspecified parameters in the measurement model. Of primary concern were item cross-loadings onto multiple factors and residual covariances. The former would indicate a nondiscriminating item; the latter, a possible indication of item redundancy which artificially inflates reliability (Stein, Lee, & Jones, 2006). We considered only the largest modification values and their conceptual reasonableness prior to implementing any model respecifications.

Model fit was evaluated using the Satorra-Bentler corrected χ^2 (Satorra & Bentler, 1994), the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), the root mean squared error of approximation (RMSEA; Steiger, 1990), the Akaike information criterion (AIC; Akaike, 1987), and the sample size-adjusted Bayes information criterion (SABIC; Rissanen, 1978). For the first two indices, we followed Hu & Bentler's (1999) recommendation of values between .95 and 1 as indicative of good fit; for the RMSEA, we identified values below .05 as a marker of good model fit, while values at or below .08 were considered to reflect an acceptable fit. Models with lower values on the AIC and SABIC were regarded as having superior fit.

Multi-group Models

We estimated a series of nested multi-group models to both validate the parameter estimates from the measurement model and to compare the model by race/ethnicity and language using the mean and covariance matrix. Several authors have provided detailed instructions on this procedure (e.g., Brown, 2006; Stein, Lee, & Jones, 2006; Wu, Li, & Zumbo, 2007), and it will be briefly summarized here. The first level of invariance, configural invariance, allowed for the free estimation of the factor loadings, latent variances and covariances, and item intercepts. Scale was set by constraining the path between each latent variable and its first indicator to unity for all groups to allow for comparison of the latent variable variances. To assess metric invariance, we constrained all factor loadings to be equal across groups, followed by latent variances, and then latent covariances. For the third and final level of invariance, scalar invariance, we constrained the item intercepts to be equal across groups. We did not assess strict invariance (invariance of the item residuals) since this is not necessary in most situations (Byrne & Stewart, 2006).

For the validation of the revised instrument, we used the likelihood ratio test to determine if the constraints imposed worsened the fit of the model. Since this test may be biased with larger samples or more complex models (Cheung & Rensvold, 2002), we evaluated the change in the CFI estimate (less than or equal to $-.01$ indicating a non-substantial change in fit) between nested models (Cheung & Rensvold; Wu, Li & Zumbo, 2007) in addition to the likelihood ratio test for the multi-group assessment of race/ethnicity and language. We used *Mplus* Version 5.1 (Muthén & Muthén, 2007) for all confirmatory models, and Stata Version 9 (StataCorps, 2005) for the exploratory factor analyses.

Results

The observed data eigenvalues for the exploratory factor analysis were 4.79, 1.49, 1.37, and 1.11 for the first four factors. From the parallel analysis, the 95th percentile eigenvalues were 1.45, 1.35, 1.27, and 1.21, which indicated the retention of the first three factors. Table 3 shows the pattern and structure coefficients for each indicator on the three extracted factors. The identified factors were labeled as “personal comfort with a gay identity,” “social comfort with gay men,” and “public identification as gay.”

Estimation of the reduced model in a confirmatory factor analysis resulted in acceptable fit of the model, but the low value on the TLI indicated possible model misspecification. Evaluation of the modification indices indicated two changes that would result in a substantial change to the χ^2 value. Table 4 details the changes made and the accompanying fit indices for each model. First, item 20 was removed for having a cross-loading with the “personal comfort with a gay identity” factor, which suggested low discriminatory ability of the item. Second, we identified a residual covariance between items 3 and 7. Comparison of the content of the items suggested that the items were redundant. We retained item 3 because of its higher loading on the factor. These modifications improved model fit, and yielded the final model.

The final model had reasonably good fit to the data in the validation split sample ($\chi^2_{SB}=23.21$, $df=11$, $p=.02$; CFI=.979; TLI=.959; RMSEA=.057). Assessment of metric invariance (Table 4) suggested invariance of the factor loadings between the groups (Model B2); however, at least one latent variance differed between the training and validation samples (Model B3). We identified a difference in the variance of the “public identification as gay” factor ($s^2_{training}=1.74$, $s^2_{confirmation}=2.61$). Since this difference indicated different distributions of the construct, but not necessarily a problem with the instrumentation, we continued invariance assessment by allowing for partial invariance of the latent variances (Byrne, Shavelson, & Muthen, 1989). The remaining latent variances and the latent variable covariances were invariant (Model B5). Furthermore, we did not identify invariance of item intercepts in the assessment of scalar invariance (Model B6).

Table 5 presents the items included in the final model along with the factor loadings, internal consistency reliabilities, and factor correlations. Overall, the indicators loaded strongly on their assigned factors, and the factor correlations were moderate, which corroborated the oblique structure identified in the exploratory factor analysis. Reliability of the “personal comfort as gay” and “public identification as gay” factors were adequate, whereas the reliability of the “social comfort with gay men” factor was noticeably lower, and may be a product of having only two indicators for the latent variable. The internal consistency reliability of the entire scale was 0.73.

Assessment of criterion validity showed that the reduced, seven-item measure captured a substantial amount of variability of the original, 26-item scale (Table 6). In particular, both “personal comfort with a gay identity” and “public identification as gay” in the reduced scale correlated strongly with both “public identification as gay” and “moral and religious acceptability” from the original scale. “Social comfort with gay men” correlated highly with the original six-item factor. None of the factors from the reduced scale had strong correlations with the “perception of stigma associated with being gay” factor from the original scale. This is in large part a product of the exclusion of these items for their theoretical incongruence with internalized homonegativity. As hypothesized, the three factors had small-to-moderate, positive correlations with compulsive sexual behavior, with the “personal comfort with a gay identity” factor having the strongest correlation. Furthermore, the negative correlations between each factor and the measure of sexual orientation indicate that men who do not endorse an exclusive same-sex orientation have higher scores on the three factors.

Mean comparisons using independent samples t-tests (Table 7) for the three dichotomous criterion variables were consistent with our hypotheses. Overall, men who were not involved with gay organizations, who did not discuss their sexual orientation with their physician, and who were not in a relationship with another man had higher scores on each of the three factors, indicating higher internalized homonegativity. The only mean difference that was not statistically significant was the “public identification as gay” factor between men in and not in a relationship.

Application of the reduced model to the various race/ethnicity and linguistic groups resulted in adequate-to-good fit (CFI range: 0.95 – 1.00, TLI range: 0.92 – 1.00, RMSEA range: 0.00 – 0.07). The configural model across race/ethnicity groups (Table 8, Model A1) had acceptable fit to the data, suggesting that the same measurement structure was holding for each group. Both the likelihood ratio test and the difference in the CFI indicated invariance of the factor loadings (Model A2). Similar to the validation assessment, the likelihood ratio test suggested a worsening of fit upon constraining the latent variable variances across the groups (Model A3). However, the difference in the CFI was negligible, so we continued invariance assessment with a fully-constrained model. The factor covariances were invariant across the race/ethnicity groups (Model A4), and the item intercept constraints, while significantly worsening fit

according to the likelihood ratio test, yielded only a modest difference in the CFI estimate. Thus, we concluded that the scale evidenced both metric and scalar invariance. Model constraints across linguistic groups (Table 8, B models) did not result in any statistically-significant worsening of fit according to the likelihood ratio test or according to the change in the CFI estimate, indicating both measurement and scalar invariance.

Discussion

In this investigation we revised the Ross and Rosser (1996) scale to improve its conceptual alignment with theory and to produce a shortened measure for screening in future studies. The revised measure contains three factors, which address personal beliefs about homosexuality, comfort around other similarly-identified individuals, and comfort making this identity known in a public forum. This measurement structure of internalized homonegativity closely parallels the original conceptualization of internalized homonegativity from the work of Nungesser (1983). As hypothesized, the factors included in the reduced scale correlate positively with compulsive sexual behavior, and negatively with measures relevant to sexual orientation, affiliation with the gay community, openness about one's sexual orientation, and being in a relationship with another man. This evidence lends support to the conclusion that the identified factors are measuring internalized homonegativity.

While we anticipated differences in the measurement structure or in the specific item endorsement as a function of race/ethnicity or survey language, we did not identify such differences in this analysis. This suggests that the current revision to the Reactions to Homosexuality scale can be used in pluralistic populations without introducing bias. It is worthy to mention that our assessment of invariance of this particular instrument cannot address the question of whether or not internalized homonegativity is experienced and manifested in different ways. At present, we were able to capture the same latent variables in the same way, which means that to the extent that personal comfort, social comfort with gay men, and public identification as gay compose the construct of internalized homonegativity, it can be assessed uniformly. However, this does not negate the possibility of additional nuances that are culture-specific and not incorporated into the current measurement model. To address these components, there is a need for formative work which will elaborate future theoretical and empirical work.

While this investigation had the advantage of a large sample size, there are several limitations to the study reported here. First, recruitment for both study samples relied solely on volunteers responding to an advertisement on a website, so their representativeness of all men who have sex with men is negligible. Second, in the absence of valid measures of constructs such as depression or self-esteem, we had to rely on a small set of measures to assess criterion validity. While the results were in agreement with our hypotheses, we cannot draw any conclusions about the construct validity of the measure. Third, the group representing Spanish language respondents was relatively small. This reduced the power to detect significant differences in terms of measurement and factorial noninvariance, or significant deviations of model fit. Further investigation with a larger sample of Spanish language participants will provide stronger evidence about the level of invariance in the measure. Fourth, in our assessment of model fit, we were unable to provide a 90% confidence interval for the RMSEA estimate since there is not an appropriate method for estimating the interval when using the Satorra-Bentler χ^2 (Muthén, 2007). This limits our ability to draw strong conclusions about model fit based on the RMSEA alone; however, the reasonable values reported for the other indices did not imply a lack of fit. A final limitation relates to the structure of the final measurement model itself, which includes two first-order factors with only two indicators. Factors with fewer than three indicators are considered less than ideal psychometrically, evidenced in part by the lower reliability observed for the "social comfort with gay men" factor. The development of one or

more additional items that are related to social comfort and public identification as gay will improve the psychometric properties, but at the cost of model parsimony.

In spite of the limitations of this analysis, the seven-item revision to the Ross and Rosser (1996) Reactions to Homosexuality scale offers two primary advantages for both clinicians and researchers interested in screening for internalized homonegativity. First, the seven-item scale has substantially less respondent burden than the original, 26-item scale. Second, the invariance of the measure by race/ethnicity and English/Spanish versions suggests that the measure is appropriate for use with pluralistic treatment or study groups.

Acknowledgments

The *Men's Internet Sex (MINTS-II)* study was funded by the National Institutes of Mental Health Center for Mental Health Research on AIDS, grant number 5 R01 MH063688-05. All research was carried out with the approval of the University of Minnesota Institutional Review Board, study number 0405S59661.

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Table 1

Demographic characteristics of study participants with full information on the Reactions to Homosexuality scale

Variable	MINTS-I (n=733)		MINTS-II (n=2,392)	
	n	%	n	%
Age, years				
18 to 24	293	40.0	858	35.9
25 to 34	293	40.0	975	40.8
35 to 44	111	15.1	419	17.5
45 to 54	24	3.3	114	4.8
55 and above	3	0.4	24	1.0
Missing	9	1.2	2	0.1
Education, years				
0 to 8	35	4.8	30	1.3
9 to 12	115	15.7	280	11.7
13 to 16	405	55.3	1,463	60.7
17 and above	166	22.7	627	26.2
Missing	12	1.6	2	0.1
Race/Ethnicity				
Asian			486	20.3
Black			404	16.9
Latino	734	100.0	520	21.7
White			686	28.7
Other			297	12.4
Language				
English	648	88.4	2,392	100.0
Spanish	85	11.6		

Table 2

Items from the Reactions to Homosexuality Scale (Ross & Rosser, 1996) and means and standard deviations the scale training and calibration sample (n=686).

Factor and Item	<i>M</i>	<i>SD</i>
Public identification as gay		
1. I am comfortable about anyone finding out that I am gay (R).	2.87	2.01
2. I feel comfortable discussing homosexuality in a public situation (R).	3.03	2.03
3. Even if I could change my sexual orientation, I wouldn't (R).	2.67	2.09
4. It is important to me to control who knows about my homosexuality.	3.98	2.29
5. I feel comfortable being a homosexual man (R).	2.63	1.81
6. I feel comfortable being seen in public with an obviously gay person (R).	3.12	2.08
7. I would prefer to be more heterosexual.	3.01	2.15
8. I avoid thinking about my homosexuality.	2.20	1.73
9. Obviously effeminate homosexual men make me feel uncomfortable.	4.17	2.01
10. It would be harder in life to be a homosexual man.	4.78	2.09
Perception of stigma associated with being gay		
11. <i>I worry about becoming an old, gay man.</i>	4.60	2.26
12. <i>I worry about becoming unattractive.</i>	5.20	1.89
13. <i>Society still punishes people for being gay.</i>	5.88	1.41
14. <i>Most people have negative reactions to homosexuality.</i>	4.32	1.75
15. <i>Discrimination against gay people is still common.</i>	6.11	1.17
16. <i>Only a few people discriminate against homosexual men (R).</i>	5.36	1.63
Social comfort with gay men		
17. I feel comfortable in gay bars (R).	3.45	2.07
18. Most of my friends are gay/bisexual men (R).	4.40	1.98
19. Making an advance to another man is difficult for me.	4.57	1.98
20. When I think about other homosexual men, I think of negative situations.	2.37	1.71
21. Social situations with gay men make me feel uncomfortable.	2.76	1.80
22. I prefer to have anonymous sexual partners.	2.77	1.88
Moral and religious acceptability of being gay		
23. <i>Homosexuality is not against the will of God (R).</i>	1.80	1.62
24. Homosexuality is morally acceptable (R).	2.32	1.80
25. Homosexuality is as natural as heterosexuality (R).	1.81	1.48
26. I object if an anti-gay joke is told in my presence (R).	3.83	2.03

Note: Items in *italics* were excluded *a priori*. R=reverse-coded item.

Table 3
Pattern and structure coefficients and factor correlations from the exploratory factor analysis of the Reactions to Homosexuality scale (n=343)

Item	Factor					
	1. Personal comfort with a gay identity		2. Social comfort with gay men		3. Public identification as gay	
	P	S	P	S	P	S
3 number	.85	.81	-.06	.41	-.01	.30
7	.75	.79	.07	.49	-.00	.32
25	.50	.52	.02	.31	.04	.24
5	.44	.61	.16	.50	.21	.45
21	-.03	.38	.70	.70	.03	.32
17	-.05	.26	.51	.50	.05	.25
20	.22	.45	.48	.57	-.10	.20
2	.00	.27	-.02	.29	.72	.71
6	.01	.30	.02	.33	.70	.71

Correlations

Factor	
1	-
2	0.49
3	0.32

Note: Parameter estimates in boldface type indicate the factor to which an indicator was assigned. P=pattern coefficient; S=structure coefficient

Table 4
Model modifications to the EFA model and multi-group validation in the confirmation split sample

Model	χ^2_{SB}	df	p	SCF	Ref.	$\Delta\chi^2$	Adf	$P_{\Delta\chi^2}$	CFI	TLI	RMSEA	AIC	SABIC
Modifications in the training split-sample ($n=343$)													
A1. EFA Model	68.66	24	<.001	1.13					.937	.906	.074	11855	11875
A2. Remove item 20	40.80	17	.001	1.14	A1				.961	.936	.064	10606	10623
A3. Remove item 7	24.03	11	.01	1.09	A2				.967	.937	.059	9370	9386
Multi-group validation constraints ($n=686$)													
B1. Configural invariance	47.27	22	.001	1.04					.974	.950	.058	18783	18848
B2. Factor loadings	49.67	26	.003	1.06	B1	2.06	4	.72	.975	.960	.052	18779	18838
B3. Factor variances	57.86	29	.001	1.06	B2	8.17	3	.04	.970	.956	.058	18781	18837
B4. Free Public identification variance	51.38	28	.005	1.05	B2	1.83	2	.40	.976	.963	.049	18776	18833
B5. Factor covariances	56.45	31	.004	1.08	B4	3.87	3	.28	.974	.964	.049	18777	18830
B6. Item intercepts	60.13	35	.005	1.07	B5	3.65	4	.45	.974	.969	.046	18772	18820

Note: χ^2_{SB} =Satorra-Bentler corrected chi-square; df=degrees of freedom; p=p-value; SCF=scaling correction factor; Ref.=referent model for nested model testing; $\Delta\chi^2$ =change in the chi-square; Δdf =change in degrees of freedom; $P_{\Delta\chi^2}$ =p-value for the likelihood ratio test between nested models; CFI=comparative fit index; TLI=Tucker-Lewis index; RMSEA=root mean squared error of approximation; AIC=Akaike information criterion; SABIC=sample-size-adjusted Bayes information criterion.

Standardized coefficients (β), internal consistency reliability, and factor correlations for the revised Reactions to Homosexuality scale in the combined training/validation sample (n=686)

Table 5

Factor and items	β	Residual	Reliability
Personal comfort with a gay identity			0.70
Even if I could change my sexual orientation, I wouldn't.	0.71	0.49	
I feel comfortable being a homosexual man.	0.73	0.47	
Homosexuality is as natural as heterosexuality.	0.54	0.71	
Social comfort with gay men			0.60
I feel comfortable in gay bars.	0.57	0.68	
Social situations with gay men make me feel uncomfortable (R).	0.75	0.43	
Public identification as gay			0.76
I feel comfortable discussing homosexuality in a public situation.	0.76	0.43	
I feel comfortable being seen in public with an obviously gay person.	0.81	0.34	

Factor correlations				
Factor	M	SD	1	2 3
1. Personal comfort with a gay identity	2.37	1.43	-	
2. Social comfort with gay men	3.11	1.64	0.55	-
3. Public identification as gay	3.43	1.53	0.47	0.40 -

Note: R=reverse-coded item

Table 6

Pearson product-moment correlations between the factors of the revised scale with the factors of the original Ross & Rosser (1996) scale and continuous criterion validity variables (n=686)

Criterion	M	SD	Final model factors		
			Personal comfort with a gay identity	Social comfort with gay men	Public identification as gay
1996 Reactions to Homosexuality factors					
Public identification as gay	3.25	1.30	0.80***	0.45***	0.55***
Perception of stigma associated with being gay	5.25	0.96	0.15***	0.15***	-0.05
Social comfort with gay men	3.39	1.05	0.44***	0.82***	0.28***
Moral and religious acceptability	2.44	1.19	0.66***	0.24***	0.59***
Compulsive sexual behavior	2.48	0.78	0.36***	0.20***	0.16***
Sexual orientation	5.92	0.75	-0.42***	-0.15***	-0.14***

Note:

**
p≤.01,

p≤.001, two-tailed

Table 7
Independent sample t-tests of scale means by endorsement of three criterion variables

Factor	No		Yes		t	df
	M	SD	M	SD		
Gay organization member (n=685; Yes=48.18%)						
Personal comfort with a gay identity	2.83	1.54	1.87	1.10	9.44***	640.83
Social comfort with gay men	3.47	1.62	2.71	1.57	6.29***	683
Public identification as gay	3.94	1.43	2.89	1.44	9.60***	683
Out to physician (n=686; Yes=64.87%)						
Personal comfort with a gay identity	2.67	1.61	2.21	1.29	3.86***	409.00
Social comfort with gay men	3.44	1.65	2.92	1.60	3.99***	684
Public identification as gay	3.81	1.50	3.23	1.51	4.87***	684
In a relationship with another man (n=685; Yes=33.43%)						
Personal comfort with a gay identity	2.57	1.51	1.96	1.15	5.98***	576.65
Social comfort with gay men	3.25	1.65	3.82	1.59	3.30***	683
Public identification as gay	3.50	1.56	3.31	1.47	1.47	683

Note:

 $p \leq .001$, two-tailed.
Degrees of freedom for the “personal comfort with a gay identity” factor are Satterthwaite’s degrees of freedom for unequal variances.

Table 8

Multi-group invariance testing by race/ethnicity and by survey language

Model	χ^2_{SB}	df	p	SCF	Ref.	$\Delta\chi^2$	Δdf	p _{Δχ}	CFI	TLI	RMSEA	ACFI
Race/ethnicity (n=2,392)												
A1. Configural invariance	133.53	55	<.001	1.11					.976	.954	.055	
A2. Factor loadings	157.51	71	<.001	1.13	A1	20.35	16	.21	.973	.961	.050	-.003
A3. Factor variances	177.96	83	<.001	1.10	A2	21.43	12	.04	.971	.963	.049	-.002
A4. Factor covariances	188.14	95	<.001	1.12	A3	8.39	12	.75	.971	.968	.045	.000
A5. Item intercepts	217.73	111	<.001	1.10	A4	29.44	16	.02	.967	.969	.045	-.004
Survey language (n=733)												
B1. Configural invariance	38.59	22	.02	1.16					.983	.968	.045	
B2. Factor loadings	40.71	26	.03	1.15	B1	1.95	4	.74	.985	.976	.039	.002
B3. Factor variances	45.49	29	.02	1.13	B2	4.92	3	.18	.983	.976	.039	-.002
B4. Factor covariances	46.19	32	.05	1.14	B3	0.54	3	.91	.985	.981	.035	.002
B5. Scalar invariance	50.88	36	.05	1.13	B4	4.69	4	.32	.985	.982	.034	.000

Note: χ^2_{SB} =Satorra-Bentler corrected chi-square; df=degrees of freedom; p=p-value; SCF=scaling correction factor; Ref.=referent model for nested model testing; $\Delta\chi^2$ =change in the chi-square; Δdf =change in degrees of freedom; p_{Δχ}=p-value for the likelihood ratio test between nested models; CFI=comparative fit index; TLI=Tucker-Lewis index; RMSEA=root mean squared error of approximation; AIC=Akaike information criterion; SABIC=sample-size-adjusted Bayes information criterion.