HHS Public Access

Author manuscript

Int J Transgend. Author manuscript; available in PMC 2016 July 16.

Published in final edited form as:

Int J Transgend. 2015 ; 16(1): 36–48. doi:10.1080/15532739.2015.1039176.

Quality-of-Life Measurement: Assessing the WHOQOL-BREF Scale in a Sample of High-HIV-Risk Transgender Women in San Francisco, California

Hale M. Thompson,
School of Public Health, University of Minnesota, Minneapolis, Minnesota

Sari L. Reisner,
Department of Epidemiology, Harvard School of Public Health, Boston, Massachusetts

Nicole VanKim, PhD, and
School of Public Health, University of Minnesota, Minneapolis, Minnesota

H. Fisher Raymond
Center for Public Health Research, Population Health Division, San Francisco Department of Public Health, San Francisco, California

Background

Transgender is an umbrella term in the United States used to refer to people whose gender expression and identity differ from the sex assigned to them at birth and the gender norms associated with the assigned sex (Fenway Health, 2010). In a landmark report (2011) issued by the Institute of Medicine and commissioned by the National Institutes of Health on sexual and gender minority health disparities, investigators called for more research in transgender health, including methodological innovations. Whereas the transgender health literature has largely relied upon methodologically weak and untested measures of quality of life (Murad et al., 2010), this analysis investigates and assesses a validated quality of life measurement, an understudied area of transgender health research.

In this paper we conduct a psychometric evaluation of the World Health Organization Quality of Life Brief Version (WHOQOL-BREF), based on a sample drawn in San Francisco, California in 2010. The WHOQOL-BREF has been validated with numerous populations around the world, but it has not been validated for transgender populations. The Transfemales Empowering and Advancing Community Health (TEACH) study was a cross-sectional, interviewer-administered survey of transgender women (N = 313) recruited in San Francisco in 2010. Funded by the Centers for Disease Control and Prevention (CDC) and conducted by the San Francisco Department of Public Health HIV Prevention and HIV Epidemiology Sections, TEACH used components of community-based participatory research (CBPR) and respondent-driven sampling (RDS) to assess HIV risk behaviors and

Address correspondence to Hale M. Thompson, University of Illinois at Chicago, School of Public Health, 1603 West Taylor Street, Rm. 627, Chicago, IL 60612 lthomp10@uic.edu.
Hal M. Thompson is currently affiliated with University of Illinois at Chicago, School of Public Health, Chicago, Illinois

seroprevalence. Like much transgender health research in the United States, TEACH was funded and the sample was drawn to assess HIV risk across a range of social and behavioral contexts (e.g. demographics, trans identity and stage of transition, access to care, psychosocial behaviors and characteristics, quality of life, etc.).

Quality of life measurement extends beyond measures of disease and pathology and, in the WHOQOL-BREF scale's case, captures important aspects of survey participants' daily social contexts. This instrument is based on the World Health Organization's definition of quality of life: "Individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHO - The World Health Organization, 1998, p. 3). There is, however, no consensus on the definition of quality of life and what exactly constitutes quality of life measures, and the development of numerous types of QOL instruments reflects these differences (Skevington & Lotfy, 2004, p.299). As a generic measure of well-being rather than health status per se or simply the absence of disease, WHOQOL-BREF attempts to capture key behavioral, environmental, social and even spiritual perceptions. The World Health Organization developed this tool for a broad range of purposes including for cross-cultural use, for surveys where QOL is one of many variables of interest and for routine audits and assessments of health and social programs and services (WHO - The World Health Organization, 1998, p. 51).

Conducted at 24 sites in 23 countries in all WHO regions of the world, WHO's samples were culturally and socio-economically diverse; mean domain scores of cisgender (defined as a gender identity or expression congruent with the sex assigned at birth) women in the WHOQOL-BREF international field trials, for example, were quite low (Skevington & Lotfy, 2004, p.300). The World Health Organization describes these women as part of "a richly heterogeneous sample of sick people covering 28 groups of physical or mental health problems (linked to ICD-10 categories)" (Skevington & Lotfy, 2004, p.301). The World Health Organization defines the social determinants of health as "the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices…" (WHO - The World Health Organization, 2013). Many studies of transgender women's risks for HIV have broadened the analytical scope to connect individual stressors and HIV risk factors to social determinants of health. The transgender HIV literature has been extensive in its exploration of relevant cofactors for HIV risk (Bockting, Robinson, & Rosser, 1998; De Santis, 2009; Herbst et al., 2008; Nuttbrock et al., 2013b; Operario & Nemoto, 2010; Rapues, Wilson, Packer, Colfax, & Raymond, 2013). In the U.S. transgender people have been shown to experience a multitude of stressors across the life course (Fabbre, 2014; Nuttbrock et al., 2013a; Wilson et al., 2009). Cross-sectional, community-based studies with transgender persons have found that stigmatization, histories of gender-based violence, discrimination in healthcare, housing, and employment, lack of social support, low self-esteem, heavy drug and alcohol use and depression are highly prevalent (Bradford, Reisner, Honnold, & Xavier, 2013; K Clements-Nolle, Marx, Guzman, & Katz, 2001; Kristen Clements-Nolle, Marx, & Katz, 2006; Kenagy & Bostwick, 2005; Lombardi, 2009; Reisner, Gamarel, Nemoto, & Operario, 2014; Xavier, J., Honnold, JA, Bradford, 2007). These complex behavioral and

social determinants of transgender health have been linked to HIV risk behaviors among transgender people, in particular transgender women of color (Melendez & Pinto, 2009; Nemoto, Operario, Keatley, Han, & Soma, 2004; Nemoto, Operario, Keatley, & Villegas, 2004; Nuttbrock et al., 2009, 2013b). These determinants may also be correlated with quality of life.

The TEACH study represents a departure from much of the literature on transgender quality of life in its use of a validated, cross-cultural scale and its drawing a racially diverse sample with less access to resources. A meta-analysis (Murad et al., 2010) of 28 transgender studies conducted between 1971 and 2007 observed that most of the analyses were methodologically poor in that quality of life was measured using only one to three items, sample sizes were small, and often consisted of combined analyses of both transgender men and women. The authors recommended that future studies use validated and consistent scales in order to make inferences as well as comparisons between subgroups and samples (Murad et al., 2010).

Prior to TEACH, the transgender QOL literature focused almost exclusively on medical outcomes such as gender-affirming hormonal or surgical outcomes. Many studies (De Cuypere et al., 2006; Dhejne et al., 2011; Kuhn et al., 2009) come from European countries where national healthcare programs cover such procedures. In Switzerland, for example, Kuhn and colleagues (Kuhn et al., 2009) used the King's Health Questionnaire in a case-control study to assess quality of life in transsexual patients 15 years after initiation of medical, gender transition. Although quality of life was significantly lower for transsexual cases versus controls across four of eight quality of life domains (i.e., lower scores for general health, role limitation, physical limitation, and personal limitation, but no difference for emotions, sleep, incontinence, and symptom severity), the sample size was small (N = 55), consisted of both transgender men (n = 3) and women (n = 52), and there was no validated baseline data to represent quality of life before sexual reassignment occurred (Kuhn et al., 2009). Despite methodological limitations, the European QOL results do not translate to U.S. settings as healthcare programs and insurance historically and presently, with some exceptions, have not covered medical gender transition (Newfield, Hart, Dibble, & Kohler, 2006). Quality of life studies in the U.S. have been biased toward samples of transgender women with greater access to resources such as employment, income and medical care (Ainsworth & Spiegel, 2010; Hancock, Krissinger, & Owen, 2011; Newfield et al., 2006).

Since Murad's meta-analysis, at least two studies have used a validated scale to assess transgender quality of life in the United States (Ainsworth & Spiegel, 2010; Newfield et al., 2006). For example, Ainsworth and Spiegel (Ainsworth & Spiegel, 2010) conducted a study of 247 transgender women and used the Short Form Health Survey, version 2 (SF-36v2), a standardized, 36-question, generic measure that has been validated in multiple U.S. populations. The authors found that mental health-related quality of life among transgender women without facial feminization surgery was significantly lower compared to women in the general U.S. population as well as to those transgender women in the sample who had had the facial surgery (Ainsworth & Spiegel, 2010). Similarly, Newfield and colleagues used the SF-36v2 scale, but the focus was on transgender men. This Internet-based survey relied

upon self-selection of participants, trust in their transgender identities, and was limited by the over-representation of white transgender men (Newfield et al., 2006).

The present study takes the transgender quality of life literature and Murad's critique (Murad et al., 2010) of it as a point of departure to assess two aims. The first aim is to assess the psychometric properties of the WHOQOL-BREF instrument with this diverse, urban-based sample of transgender women using confirmatory factor analysis. The second aim is to assess briefly QOL mean score differences between this sample and cisgender women and between HIV-negative and HIV-positive respondents. The WHOQOL-BREF has been validated with numerous patient populations around the world, (WHO - The World Health Organization, 1998) and, in particular, with a range of samples cisgender women with a diversity of illnesses (Skevington & Lotfy, 2004). It has not, however, been validated for transgender respondent populations. While the TEACH sample is not a sample of transgender patients, it is a sample with high prevalence of HIV and HIV-related risk factors. Our primary hypothesis is that the four-factor WHOQOL-BREF scale demonstrates goodness of fit, reliability and validity with this sample of transgender women; our second hypothesis is that transgender women would report lower mean domain QOL scores than cisgender women in WHO's international field trial and that HIV-positive respondents would report lower mean domain scores than HIV-negative respondents.

Methods

Participants and Recruitment

The TEACH study investigators employed respondent-driven sampling (RDS) to recruit this hard-to-reach population. RDS is a method of chain-referral sampling that utilizes initial study participants known as "seeds" to recruit their social or sexual network peers (Heckathorn, 2007). This recruitment method has been used extensively with difficult-to-reach populations at risk for or living with HIV, including injection drug users, sex workers, and men who have sex with men, both domestically and internationally (Johnston, Sabin, Mai, & Pham, 2006; Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008; Reisner et al., 2010; Rudolph et al., 2011). This secondary data analysis did not use RDS analysis, but the RDS method was very effective in terms of recruiting a diverse (e.g., race, education, geography, sexual risk behaviors) sample relatively quickly. Study recruitment and the RDS process has been described in detail elsewhere (Rapues et al., 2013). Typical of CDC's national behavioral health surveys, particularly in San Francisco, participants received $50 for completion of the survey and additional $10 incentives for successful recruitment of up to three peers. For the purposes of this analysis, the data were treated as a long-chain, peer-referral sample in order to increase diversity.

Between August and December 2010, the TEACH survey was conducted face-to-face by the San Francisco Department of Public Health. Staff conducted the interviews with handheld computers at sites frequented by members of the population: two community drop-in centers, a public health clinic, and offices at San Francisco Department of Public Health. The improved reliability of handheld computers compared to paper and pencil mode of data collection has been demonstrated in several randomized controlled trials (Lane, Heddle, Arnold, & Walker, 2006). All participants were screened for eligibility according to the

following criteria: 1) presentation of a study recruitment coupon (except for initial seeds), 2) self-identification as male-to-female, transgender, 2) age 18 years or older, and 3) reported living in San Francisco, CA. Eligible participants were then asked to provide verbal, informed consent to take the survey and were offered a rapid HIV test regardless of self-reported positive status. Positive HIV tests were confirmed using standard laboratory methods (Rapues et al., 2013). Forty-seven participants opted to take the survey in Spanish. The Spanish version of the WHO instrument, however, was not appropriate for this sample's Spanish speakers due to Central American and Mexican influences. As a result, a professional translation service provided the translated version of the survey to Spanish-speaking staff, who then administered the survey to Spanish-speaking participants. The University of California San Francisco Institutional Review Board approved and monitored the research.

Instrument

The WHOQOL-BREF instrument consists of 24 items—the most general item (i.e., the item with the greatest correlation with the total score or, in six cases, the item that "constituted a cohesive and interpretable domain") from each of the 24 facets of the WHOQOL-100 (WHO - The World Health Organization, 1998, p. 36). For the purposes of assessing scale construct validity, WHO included two additional items to represent overall health and overall quality of life facets. Based on exploratory and confirmatory factor analyses done by the World Health Organization with multiple samples around the world, the 24 items encompass four domains: physical health, psychological health, social relationships, and environmental conditions.

Items probe respondents about their level of satisfaction with various aspects of daily living. The two global items, overall quality of life and overall satisfaction with health, are not included in the domain scores but are included in the total scores. Timeframe for the questions was the past two weeks. The following questions are four examples of items: 1) How much do you enjoy life? (Psychological domain), 2) How healthy is your physical environment? (Environmental domain), 3) How satisfied are you with your sex life? (Social domain), and 4) How much do you need medical treatment to function in your daily life? (Physical domain) (WHO - The World Health Organization, 1998, p. 101–102). The 26 items are captured with a five-point Likert interval scale (Skevington & Lotfy, 2004, p.301). Total quality of life is calculated by summing scores of all 26 items; possible scores range from 26 to 130. with high scores reflecting a higher quality of life. Following the WHOQOL BREF's instrument guidelines, domain scores were transformed and scaled from 0 to 100 so to afford comparisons of scores between domains with unequal numbers of items. Individual item and total QOL univariate distributions all approximated a normal distribution.

Statistical Analysis and Model Fit

According to the WHOQOL-BREF manual, cases missing more than 20% of QOL items should be deleted. This guideline reduced the sample size from 313 to 312 participants. We assume this case to be missing at random as it represents less than 0.5% of the sample. Similarly, of more than 8,000 observations generated by the WHOQOL-BREF, 17 were

missing. While we do not consider this missingness to impact the results, we acknowledge that the HIV-prevention funding and focus of the study may have introduced sampling bias.

This secondary data analysis did not use the RDS analysis tool (RDSAT), as it does not have the statistical capacity to run factor analyses. The effects of RDS weights on complex measures like quality of life -- in order to address possible correlations and sampling bias -- are unknown. SAS version 9.1 (SAS Institute, Cary, NC) was used to assess normality of and to test the means of the QOL item and total scores. Mplus, version 7.0 (Muthen & Muthen, Los Angeles, CA) was used to conduct confirmatory factor analysis (CFA). Analyses of the frequency distribution at the item level were performed to assess normality and the floor and ceiling effects. Model-based reliability was used over Cronbach's alpha to analyze internal consistency of the domains as Cronbach's alpha is sensitive to number of items and makes comparisons across domains difficult. Values greater than 0.70 indicated acceptable internal consistency. Convergent validity was determined through analysis of the correlations between the each of the domains and two global QOL items as well as the correlation between the two global items. Differences in domain mean scores were assessed with t-tests, assuming unequal variances, across all four QOL domains of HIV-positive and HIV-negative participants.

Following Long (1983), full information maximum likelihood was used as it is a robust estimator and takes into account non-normality when evaluating model fit. Models were a priori specified as orthogonal, and the factor variances were constrained to 1.0. Errors were assumed to be independent and were not free to correlate. Goodness-of-fit was assessed by several indices: 1) the chi-square statistic is reported but is not robust to violations of model assumptions and is sensitive to sample size (Long, 1983; Marsh, Hau, & Wen, 2004), 2) a root mean square error of approximation (RMSEA) of 0.08 to 0.05 or less indicates reasonably good fit, 3) the standardized root mean square residual (SRMR) of 0.08 or less indicates good fit, 4) according to the WHOQOL User Manual, a CFI of 0.90 or more is considered good, and the CFI that is greater between two CFI measures is considered better, and 5) similarly, the Akaike Information Criteria (AIC) that is the lower of two AIC measures is considered the better model fit.

A preliminary exploratory factor analysis (EFA) was performed whereby one- to four-factor solutions were estimated. In Table 1 the RMSEA statistic (0.045) and the RMR statistic (0.037) both indicate the four-factor solution as the best model. The chi-square statistic was significant for each solution but is known for rejecting even good-fitting models (Marsh et al., 2004). The four-factor solution, however, had the lowest chi-square value. The scree plot also showed the final substantial drop at the four-factor solution although the most severe drop occurred at the two-factor solution. Based on the four-factor solution outperforming the others, a four-factor solution was specified, and confirmatory factor analysis was estimated.

Results

Data Quality and Sample Characteristics

The sum scores of the 24 items composing each of the four factors plus the two general items were approximately normally distributed, and there were no outliers, or floor or

ceiling effects. Briefly, the sample mean age was 42 years with a range of age 20 to 77 years. The majority of the sample was non-white (83%), and 32% were Latina in a city (San Francisco) where Latinos represent 15.4% of the population (U.S. Census Bureau, 2011). "Latina" was treated as a mutually exclusive, racial category from white and African American, for example. Forty-seven Latina participants opted to take the survey in Spanish. Nearly one-third (29%) of the sample was born outside the U.S., including 15% who had ever been undocumented to live in the U.S. Most earned very low incomes (76% earned less than $15,000/year), and 41% were unstably housed (e.g., living in shelters, single resident occupancy hotels, on the streets); 47% had some college or more. Regarding transgender-related characteristics, 91% lived full-time as women, 93% had ever taken hormones, and 23% had ever had a gender-related affirmation surgery. Overall, 39% were laboratory-confirmed HIV-positive.

Mean QOL Scores, Model-Based Reliability, and Construct Validity

Table 2 summarizes the standardized domain scores for environmental conditions, psychological health, physical health and social relationships and the reliability and validity of the measures. The distributions were all negatively skewed, and all mean and median scores were above 50%, meaning a relatively good quality of life. The mean environmental domain score (M = 59.54, SD = 17.74) reflected the lowest score and the lowest standard deviation. The mean psychological domain score (M = 67.39, SD = 17.84) was highest while physical health and social relationships fell between the high and low scores and had higher standard deviations. In addition, with the exception of the psychological domain, results from independent samples t-tests indicated no significant differences between mean domain scores for HIV-positive (n = 123) and HIV-negative (n = 189) participants. HIV-positive participants reported significantly higher scores (M = 70.51, SD = 18.90) on the psychological domain compared to HIV-negative participants' scores (M = 65.37, SD = 16.87); $t(310) = -2.51$, $p = .013$. Overall, HIV-positive mean scores on all four domains were higher than HIV-negative mean scores, but they were not significant ($p < .001$).

Model-based reliability estimates for Domains 1 (physical health), 2 (psychological health), and 4 (environmental conditions) were 0.78, 0.78, and 0.77, respectively. Domain 3 (social relationships) had marginal internal consistency at 0.65 and should be interpreted with caution as its value is based on only three items (personal relationship satisfaction, social support, and sexual satisfaction) rather than the minimum four that is generally recommended (WHO - The World Health Organization, 1998). This low internal consistency may not indicate poor measurement of social relationships as the three items are relatively heterogeneous and yet key aspects of social life: sexual relationships, social relationships, and social support.

Table 2 also presents construct validity in terms of the correlations of the two global items (i.e., overall QOL and health) with each domain and with each other. The values of these correlations were low to moderate and all were significant, ranging from 0.33 (overall health to overall QOL) to 0.55 (for the environmental domain to overall QOL) ($p < .001$). Domains tended to correlate stronger with the global item more conceptually affiliated with that domain; for example, the strongest correlation with overall health was the physical health

domain (0.50), and the strongest correlation with overall QOL was the environmental domain (0.55) followed by the psychological domain (0.49). The aforementioned results generally lend support to the four-factor solution.

Confirmatory Factor Analysis

Confirmatory factor analysis results demonstrate marginally acceptable fit of the data to the specified CFA four-factor solution. For comparison, Table 3 shows the item loadings onto each of the four factors in the EFA against the item loadings of the CFA. With the exception of three items (daily energy, work capacity, and access to health services), all items loaded most strongly onto the same factors as specified in the CFA (i.e. WHOQOL-BREF model). Figure 1 presents the CFA overall model fit and is indicated by the following indices. The chi-square statistic ($x^2 = 2066.92$, $df = 276$, $p < 0.001$) was significant, rejecting model fit. The RMSEA was reasonably good (0.051), and the SRMR was also good (0.056). CFI was not greater than 0.95 but was acceptable at 0.890.

The standardized factor loadings held together well, demonstrating good model fit. Figure 1 shows the factor loadings for the four-factor solution. Loadings ranged from 0.29 for medical treatment to 0.76 for daily activities in Domain 1, from 0.52 for concentration to 0.76 for self-satisfaction in Domain 2, from 0.56 for sexual satisfaction to 0.69 for relationship satisfaction in Domain 3, and from 0.46 for enough money to 0.66 for transportation in Domain 4. Though slightly lower due in part to sample size, these loadings are comparable to the WHOQOL-BREF international field trial results (Skevington & Lotfy, 2004; WHO - The World Health Organization, 1998). The only poor item-total correlation (<0.30) was found for medical treatment which also has the lowest $R^2 = 0.085$, $p < 0.01$; it was also problematic in seven out of 24 sites of the WHO international field trial (Skevington & Lotfy, 2004, p. 305). The low correlation may stem from being overly broad since, for this sample, the item covers transgender-specific health care, HIV-related care, as well as general health care. Specifically, this sample's overall high reliance upon hormonal and HIV medication, indicating well being rather than sickness, is paired with a high mean physical QOL score (M = 66.08, SD = 18.98). The low correlation may also be due to medical treatment functioning differently for HIV-negative and HIV-positive participants. Two additional items, leisure opportunities and enough money, had fair item-total correlations of 0.47 and 0.46, respectively.

Finally, correlations between domains were strong, positive and highly significant ($p < 0.001$), ranging from 0.62 (physical health vs. social relationships) to 0.80 (physical health vs. psychological health). Correlations greater than 0.85 suggest difficulty in meaningfully discerning between factors and that the factors may be measuring the same construct. In this case, the items may not be collinear but they may not be independent either.

Discussion

To our knowledge, this is the first study to demonstrate the WHOQOL-BREF scale as an acceptable, reliable and valid measure of quality of life for research with transgender women. Use of this instrument with future samples of transgender individuals may afford useful comparisons and possible inferences about a specified transgender respondent

population. Measuring 26 items, the scale lends reliability and validity to the drivers of quality of life in the sample. The breadth of the domains extend beyond individual-level factors to more environmental and social ones, providing depth to a social determinants of health framework rather than one that focuses narrowly on a biomedical domain in an attempt to measure the impact of gender-confirming medical interventions.

In the case of populations disproportionately impacted by HIV, such as transgender women, the use of this WHOQOL-BREF tool may reduce some of the burden on survey respondents to recall and report stigmatized behaviors in order to elicit prevention program funding. While QOL scales focus on individuals' subjective experiences, WHOQOL BREF items are focused less on individual behaviors and more on how individuals experience their everyday social contexts. This focus on the self within social contexts rather than simply behavior may more effectively address the social determinants of health for transgender persons, particularly those at high-risk for HIV. Although the scale is not a diagnostic tool of mental or physical health, low scores on specific domains such as environmental quality of life may enable health planners and providers to better assess what type of interventions (e.g., free transportation to the HIV clinic or a public transit pass) may be needed at the community program level.

A social determinants of health perspective and an instrument such as WHOQOL-BREF that is more sensitive to social aspects of quality of life may more effectively address the impact that social stressors such as discrimination and violence have on quality of life. Literature suggests that trans and gender non-conforming people perceive San Francisco as a refuge from those forces (Howe, Zaraysky, & Lorentzen, 2008). The sample's relatively high mean scores overall may reflect San Francisco's role as a refuge for LGBT persons; though not free of discrimination and violence, the city may offer added protections from discrimination and violence vis-à-vis points of origin with trans-specific public policy, social services, and community visibility (see, for example, City and County of San Francisco Department of Public Health, 2013).

Nonetheless, the finding that HIV-positive transgender participants had higher mean QOL scores across domains -- though only significantly so in the psychological domain -- may indicate that an HIV-positive status improves a transgender female's access to resources and levels of social support among the sample. The high scores may also speak to the high quality of HIV-related services to which the sample has access. On the other hand, the higher scores of HIV-positive participants compared to HIV-negative participants may also reflect response shift (Schwartz & Sprangers, 1999). This kind of bias reflects HIV-positive respondents' perception of their condition as much better than they expected vis-à-vis other HIV-positive persons whose quality of life they perceive as relatively poor. Thus, HIV-positive respondents may be comparing their quality of life to other HIV-positive persons, rather than other sets of peers or the general population.

Though beyond the scope of this particular study, a comparison sample of cisgender women with otherwise similar characteristics, such as HIV prevalence, might benefit the interpretation of the findings. As noted, WHO's samples of cisgender women were culturally and socio-economically diverse and had a range of illnesses (Skevington & Lotfy,

2004, p.300). Mean domain scores of cisgender women in the WHOQOL-BREF international field trials are well below those of this sample and range from 13.9 (environmental) to 14.4 (social). In light of the San Francisco sample's relatively high levels of poverty, unstable housing, and high rates of HIV, the sample's mean scores for the four quality of life domains are paradoxical. Although one might expect much lower mean scores, the relatively high scores, ranging from 59.4 (environmental) to 67.4 (psychological), may suggest a high level of resiliency among the sample. It is also possible that life in San Francisco, relative to participants' points of origin, provides a comparatively good quality of life, or a refuge; that is, the scores may again reflect a kind of response shift whereby respondents compare their current quality of life to peers' quality of life in their points of origin rather than San Francisco's general population. Unlike most places in the U.S. and abroad, culturally competent health care and related social services are relatively accessible in San Francisco. This infrastructure makes community members and related organizations more visible, including those organizations that are highly competent in serving the healthcare and social support needs of transgender people.

Although we have established some psychometric properties and the acceptability of the WHOQOL-BREF scale with this sample, the analysis has limitations. Data are cross-sectional, and the findings represent a snapshot of measures that cannot necessarily address bias such as response shift. The interviewer-administered nature of the survey may have introduced some recall and social desirability bias. Similarly, the generalizability of the findings to transgender women in the Bay Area and to the transgender population more broadly is not known. Although monetary incentives are typical for high-risk HIV population research, these incentives may induce sampling bias such that we cannot generalize to the population of transgender women as a whole.

The WHOQOL-BREF instrument may be underestimating differences in quality of life due to the relatively healthy and otherwise quite heterogeneous sample. The sample was racially and geographically diverse with nearly 30% of the sample born outside the U.S. At least one study has found that aspects of wealth, environmental conditions, and psychosocial life relate to overall quality of life differently across cultural populations (Theuns, Hofmans, Mazaheri, Van Acker, & Bernheim, 2010). Furthermore, the wide age range in addition to the varying times since gender transition may also impact the internal consistency of domains such as physical health or social relations. According to WHO, the use of an un-standardized Spanish translation of the survey for 47 participants may also have attenuated the reliability and validity of the instrument (WHO - The World Health Organization, 1998). The low item-total correlation for medical treatment may also indicate further investigation and scale development that is more specific to transgender persons' needs.

As a conceptually and methodologically reliable and valid generic quality of life instrument, a number of research and programmatic directions are possible. Future applications of the instrument in San Francisco include a range of intervention studies around HIV prevention, HIV care, as well as addressing stigma and access to health care, housing, and employment; the instrument may offer a cost-effective means to identify links between psychosocial and broader social determinants of health leading to a range of possible programmatic improvements. Beyond San Francisco and high-risk HIV transgender samples, more

psychometric research with a range of transgender samples is recommended to assess WHOQOL-BREF's test-retest reliability, sensitivity to health and quality of life over time, and the convergent and divergent validity relative to other measures. Finally, this instrument may be integral to a mixed methods research that includes a qualitative exploration of transgender quality of life leading to additional insights into the WHOQOL-BREF scores and the apparent tensions between resilience and stress.

Acknowledgments

Derek Smolenski, Nicholas Eaton, and anonymous reviewers offered valuable input on the analysis as well as feedback on the interpretation of the data.

Funding

The project described was supported by the Fenway Summer Institute in LGBT Population Health, under Award Number R25HD064426 from the Eunice Kennedy Shriver National Institute of Child Health & Human Development (NICHD). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NICHD or the National Institutes of Health. This work was partially supported by the National Science Foundation IGERT grant CNS-1069311. The third author acknowledges award number T32DK083250 from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The content is solely the responsibility of the authors and does not necessarily represent the official view of NIDDK.

References

Ainsworth TA, Spiegel JH. Quality of life of individuals with and without facial feminization surgery or gender reassignment surgery. Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2010; 19(7):1019–1024.

Bockting WO, Robinson BE, Rosser BR. Transgender HIV prevention: a qualitative needs assessment. AIDS Care. 1998; 10(4):505–525. [PubMed: 9828969]

Bradford J, Reisner SL, Honnold JA, Xavier J. Experiences of Transgender-Related Discrimination and Implications for Health: Results From the Virginia Transgender Health Initiative Study - ProQuest. 2013 from http://search.proquest.com.proxy.cc.uic.edu/docview/1441294106.

City and County of San Francisco Department of Public Health. Principles for Collecting, Coding, and Reporting Identity Data: Sex and Gender Guidelines (interim draft 8.15.13). San Francisco: 2013. p. 1-11.

Clements-Nolle K, Marx R, Guzman R, Katz M. HIV prevalence, risk behaviors, health care use, and mental health status of transgender persons: implications for public health intervention. American Journal of Public Health. 2001; 91(6):915–921. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1446468&tool=pmcentrez&rendertype=abstract. [PubMed: 11392934]

Clements-Nolle K, Marx R, Katz M. Attempted suicide among transgender persons: The influence of gender-based discrimination and victimization. Journal of Homosexuality. 2006; 51(3):53–69. [PubMed: 17135115]

De Cuypere G, Elaut E, Heylens G, Van Maele G, Selvaggi G, T'Sjoen G, Monstrey S. Long-term follow-up: psychosocial outcome of Belgian transsexuals after sex reassignment surgery. Sexologies. 2006; 15(2):126–133.

De Santis JP. HIV infection risk factors among male-to-female transgender persons: a review of the literature. The Journal of the Association of Nurses in AIDS Care : JANAC. 2009; 20(5):362–372. [PubMed: 19732695]

Dhejne C, Lichtenstein P, Boman M, Johansson ALV, Långström N, Landén M. Long-term follow-up of transsexual persons undergoing sex reassignment surgery: cohort study in Sweden. PloS One. 2011; 6(2):e16885. [PubMed: 21364939]

Fabbre VD. Gender Transitions in Later Life: A Queer Perspective on Successful Aging. The Gerontologist. 2014 gnu079–.

Fenway Health. Glossary of Gender and Transgender Terms. 2010 from http://www.fenwayhealth.org/site/DocServer/Handout_7-C_Glossary_of_Gender_and_Transgender_Terms__fi.pdf?docID=7081.

Hancock AB, Krissinger J, Owen K. Voice perceptions and quality of life of transgender people. Journal of Voice : Official Journal of the Voice Foundation. 2011; 25(5):553–558. [PubMed: 21051199]

Heckathorn D. Extensions of Respondent-Driven Sampling: Analyzing Continuous Variables and Controlling for Differential Recruitment. 2007 from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9531.2007.00188.x/pdf.

Herbst JH, Jacobs ED, Finlayson TJ, McKleroy VS, Neumann MS, Crepaz N. Estimating HIV prevalence and risk behaviors of transgender persons in the United States: a systematic review. AIDS and Behavior. 2008; 12(1):1–17. [PubMed: 17694429]

Howe C, Zaraysky S, Lorentzen L. Transgender Sex Workers and Sexual Transmigration between Guadalajara and San Francisco. Latin American Perspectives. 2008; 35(1):31–50.

Institute of Medicine Committee on Lesbian, Gay, Bisexual, and T.H.. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. Washington D. C: The National Academies Press; 2011.

Johnston LG, Sabin K, Mai TH, Pham TH. Assessment of respondent driven sampling for recruiting female sex workers in two Vietnamese cities: reaching the unseen sex worker. Journal of Urban Health : Bulletin of the New York Academy of Medicine. 2006; 83(6 Suppl):i16–i28. [PubMed: 17031567]

Kenagy GP, Bostwick WB. Health and Social Service Needs of Transgender People in Chicago. International Journal of Transgenderism. 2005; 8(2–3):57–66.

Kuhn A, Bodmer C, Stadlmayr W, Kuhn P, Mueller MD, Birkhäuser M. Quality of life 15 years after sex reassignment surgery for transsexualism. Fertility and Sterility. 2009; 92(5):1685–1689. e3. [PubMed: 18990387]

Lane SJ, Heddle NM, Arnold E, Walker I. A review of randomized controlled trials comparing the effectiveness of hand held computers with paper methods for data collection. BMC Medical Informatics and Decision Making. 2006; 6(1):23. [PubMed: 16737535]

Lombardi E. Varieties of transgender/transsexual lives and their relationship with transphobia. Journal of Homosexuality. 2009; 56(8):977–992. [PubMed: 19882422]

Long JS. Confirmatory Factor Analysis. Sage University Paper Series on Quantitative Applications in the Social Sciences. 1983; 33(001):1–87.

Marsh HW, Hau K-T, Wen Z. In Search of Golden Rules: Comment on Hypothesis-Testing Approaches to Setting Cutoff Values for Fit Indexes and Dangers in Overgeneralizing Hu and Bentler's (1999) Findings. Structural Equation Modeling: A Multidisciplinary Journal. 2004; 11(3):320–341.

Melendez RM, Pinto R. "It"s really a hard life': love, gender and HIV risk among male-to-female transgender persons. Culture, Health & Sexuality. 2009; 9(3):233–245.

Murad MH, Elamin MB, Garcia MZ, Mullan RJ, Murad A, Erwin PJ, Montori VM. Hormonal therapy and sex reassignment: a systematic review and meta-analysis of quality of life and psychosocial outcomes. Clinical Endocrinology. 2010; 72(2):214–231. [PubMed: 19473181]

Nemoto T, Operario D, Keatley J, Han L, Soma T. HIV risk behaviors among male-to-female transgender persons of color in San Francisco. American Journal of Public Health. 2004; 94(7):1193–1199. [PubMed: 15226142]

Nemoto T, Operario D, Keatley J, Villegas D. Social context of HIV risk behaviours among male-to-female transgenders of colour. AIDS Care. 2004; 16(6):724–735. [PubMed: 15370060]

Newfield E, Hart S, Dibble S, Kohler L. Female-to-male transgender quality of life. Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2006; 15(9):1447–1457.

Nuttbrock L, Bockting W, Rosenblum A, Hwahng S, Mason M, Macri M, Becker J. Gender Abuse and Major Depression Among Transgender Women: A Prospective Study of Vulnerability and Resilience. American Journal of Public Health. 2013a

Nuttbrock L, Bockting W, Rosenblum A, Hwahng S, Mason M, Macri M, Becker J. Gender abuse, depressive symptoms, and HIV and other sexually transmitted infections among male-to-female transgender persons: a three-year prospective study. American Journal of Public Health. 2013b; 103(2):300–307. [PubMed: 22698023]

Nuttbrock L, Hwahng S, Bockting W, Rosenblum A, Mason M, Macri M, Becker J. Lifetime risk factors for HIV/sexually transmitted infections among male-to-female transgender persons. Journal of Acquired Immune Deficiency Syndromes (1999). 2009; 52(3):417–421. [PubMed: 19550351]

Operario D, Nemoto T. HIV in transgender communities: syndemic dynamics and a need for multicomponent interventions. Journal of Acquired Immune Deficiency Syndromes (1999). 2010; 55(Suppl 2):S91–S93. [PubMed: 21406995]

Ramirez-Valles J, Garcia D, Campbell RT, Diaz RM, Heckathorn DD. HIV infection, sexual risk behavior, and substance use among Latino gay and bisexual men and transgender persons. American Journal of Public Health. 2008; 98(6):1036–1042. [PubMed: 18445807]

Rapues J, Wilson EC, Packer T, Colfax GN, Raymond HF. Correlates of HIV Infection Among Transfemales, San Francisco, 2010: Results From a Respondent-Driven Sampling Study. American Journal of Public Health. 2013; 103(8):1485–1492. [PubMed: 23763398]

Reisner SL, Gamarel KE, Nemoto T, Operario D. Dyadic effects of gender minority stressors in substance use behaviors among transgender women and their non-transgender male partners. Psychology of Sexual Orientation and Gender Diversity. 2014; 1(1):63–71. [PubMed: 25642440]

Reisner SL, Mimiaga MJ, Johnson CV, Bland S, Case P, Safren SA, Mayer KH. What makes a respondent-driven sampling “seed” productive? Example of finding at-risk Massachusetts men who have sex with men. Journal of Urban Health : Bulletin of the New York Academy of Medicine. 2010; 87(3):467–479. [PubMed: 20354911]

Rudolph AE, Crawford ND, Latkin C, Heimer R, Benjamin EO, Jones KC, Fuller CM. Subpopulations of illicit drug users reached by targeted street outreach and respondent-driven sampling strategies: implications for research and public health practice. Annals of Epidemiology. 2011; 21(4):280–289. [PubMed: 21376275]

Schwartz CE, Sprangers MA. Methodological approaches for assessing response shift in longitudinal health-related quality-of-life research. Social Science & Medicine. 1999; 48(11):1531–1548. [PubMed: 10400255]

Skevington, S.; Lotfy, M. World Health Organization’s WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL; Quality of Life Research. 2004. p. 299-310.Retrieved from http://www.springerlink.com/index/h2142w037vv63004.pdf

Theuns P, Hofmans J, Mazaheri M, Van Acker F, Bernheim JL. Cross-national comparability of the WHOQOL-BREF: a measurement invariance approach. Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2010; 19(2):219–224.

U.S. Census Bureau. [Retrieved March 18, 2012] San Francisco County Quickfacts From the United States Census Bureau (derived from Population Estimates, American Community Survey, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates…Consol. 2011. from http://quickfacts.census.gov/qfd/states/06/06075.html

WHO - The World Health Organization. Geneva, Switzerland: 1998. WHOQOL User Manual. World Health.

WHO - The World Health Organization. [Retrieved March 26, 2014] What are social determinants of health?. 2013. from http://www.who.int/social_determinants/sdh_definition/en/

Wilson EC, Garofalo R, Harris RD, Herrick A, Martinez M, Martinez J, Belzer M. Transgender female youth and sex work: HIV risk and a comparison of life factors related to engagement in sex work. AIDS and Behavior. 2009; 13(5):902–913. [PubMed: 19199022]

Xavier, J.; Honnold, JA.; Bradford, J. [Retrieved March 18, 2012] The Health, Health-Related Needs, and Lifecourse Experiences of Transgender Virginians. 2007. from http://www.vdh.virginia.gov/epidemiology/diseaseprevention/documents/pdf/THISFINALREPORTVol1.pdf

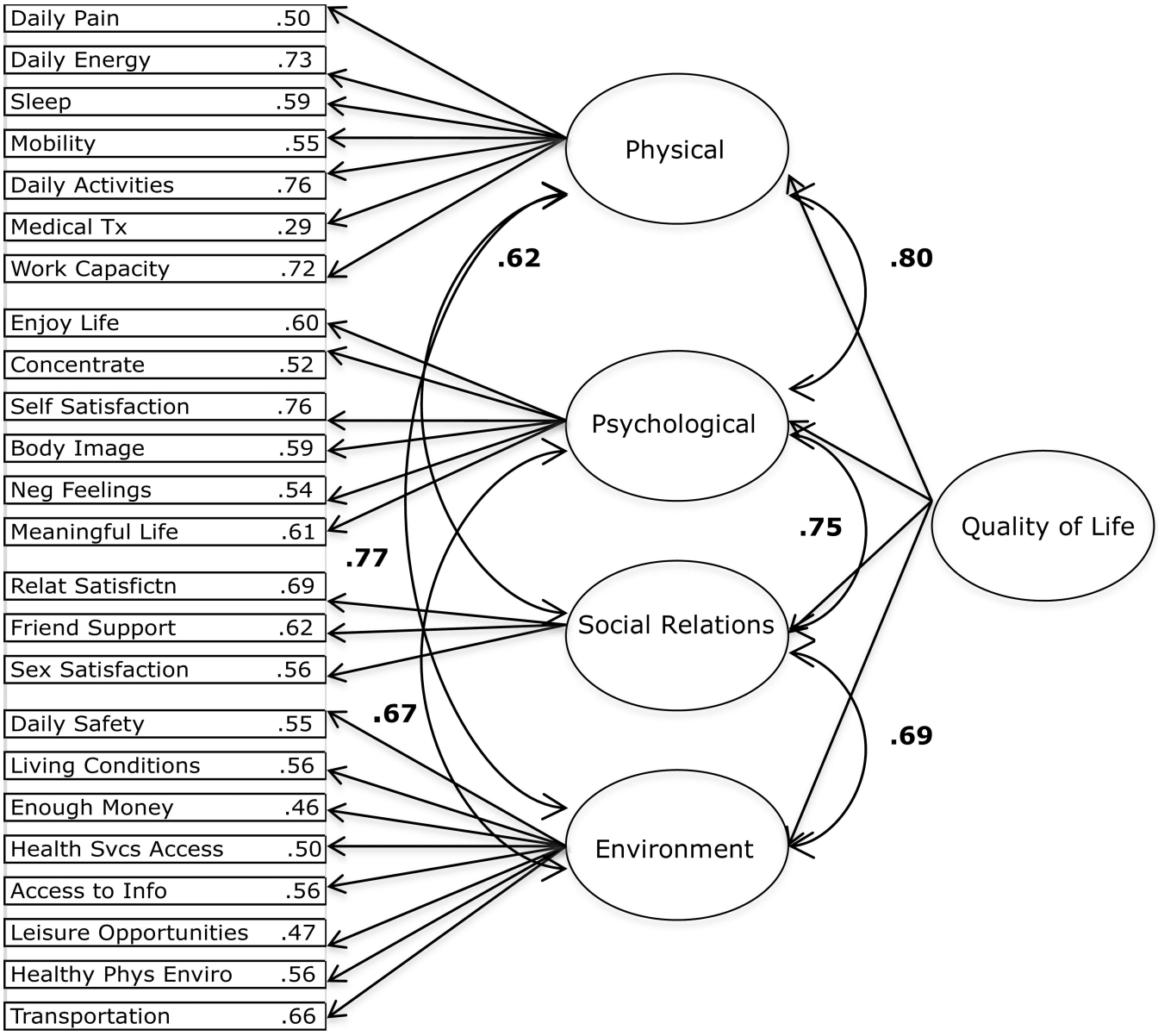

Figure 1.

WHOQOL-BREF Confirmatory Factor Analysis Four-Factor Solution: CFI=.890, RMSEA=.051, 90%CI [.043–.058]

Table 1

EFA Goodness-of-Fit Indices, $N = 312$

DOMAIN	1-Factor	2-Factor	3-Factor	4-Factor
x^2 (*df*)	703.28 (252) *	537.994 (229) *	386.535 (207) *	305.733 (186) *
RMSEA	0.076	0.066	0.053	0.045
RMR	0.070	0.057	0.044	0.037

Note. df = degrees of freedom; RMSEA = root mean square error of approximation; RMR = root mean square residual.

* $P < 0.001$

Table 2

Quality of Life Domain Scores, Reliability, and Construct Validity, $N = 312$

ITEM/DOMAIN	MEDIAN	MEAN (SD)	MODEL-BASED RELIABILITY*	OVERALL QOL*	OVERALL HEALTH*
Overall QOL (Item #1)	--	3.69 (1.03)	--	1.00	0.33
Overall Health (Item #2)	--	3.72 (1.09)	--	0.33	1.00
Domain 1 - Physical	67.86	66.08 (18.98)	0.78	0.38	0.50
Domain 2 - Psychological	70.83	67.39 (17.84)	0.78	0.49	0.43
Domain 3 - Social	65.00	65.00 (22.85)	0.65	0.35	0.31
Domain 4 - Environmental	59.37	59.54 (17.74)	0.77	0.55	0.47

*$P < 0.001$

Table 3

Four-Factor EFA & CFA Loadings (Varimax), *N* = 312

Item	Factor 1 Physical	Factor 2 Psychological	Factor 3 Social	Factor 4 Environmental	CFA Loadings
Daily Pain	***0.73***	0.04	0.03	0.21	0.50
Daily Energy	0.43	***0.52***	0.16	0.26	0.73
Sleep	***0.30***	0.29	0.28	0.28	0.59
Mobility	***0.33***	0.20	0.17	0.39	0.55
Daily Activities	***0.43***	0.42	0.32	0.25	0.76
Medical Treatment	***0.49***	0.06	0.03	0.01	0.29
Work Capacity	0.41	***0.45***	0.24	0.23	0.72
Enjoy Life	0.05	***0.61***	0.14	0.19	0.60
Concentrate	0.19	***0.48***	0.11	0.17	0.52
Self Satisfaction	0.10	***0.56***	0.49	0.15	0.76
Body Image	0.08	***0.47***	0.26	0.15	0.59
Negative Feelings	0.26	***0.31***	0.27	0.24	0.54
Meaningful Life	−0.01	***0.67***	0.18	0.05	0.61
Relationship Satisfaction	0.06	0.21	***0.62***	0.18	0.69
Friend Support	−0.06	0.18	***0.46***	0.38	0.62
Sexual Satisfaction	0.15	0.23	***0.49***	0.08	0.56
Daily Safety	0.18	0.39	0.04	***0.42***	0.55
Living Conditions	0.02	0.14	0.09	***0.64***	0.56
Enough Money	0.10	0.04	0.18	***0.44***	0.46
Health Services Access	0.07	0.15	***0.37***	0.34	0.50
Access to Information	0.16	0.26	0.18	***0.40***	0.56
Leisure Opportunities	0.10	0.11	0.24	***0.37***	0.47
Healthy Physical Environment	0.13	0.29	−0.03	***0.55***	0.56
Transportation Access	0.21	0.06	0.31	***0.58***	0.66

Note. EFA bold-italicized loadings indicate the item's strongest factor loading.