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Attitudes toward Sexual Partner Concurrency: Development and Evaluation of a Brief, Self-Report Measure for Field Research

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Abstract

The purpose of this study was to develop a brief, reliable, and valid self-report measure of attitudes toward sexual partner concurrency. Focus groups, conducted with 59 participants, yielded 26 common attitudes. STD clinic patients ($n = 370$) reported their sexual risk history, and rated the 26 attitude statements. This sample was randomly divided into two subsamples, with some participants completing the items on two occasions (separated by 3 months) to evaluate test-retest reliability. Both exploratory and confirmatory factor analyses confirmed a one-factor model. The final scale consisted of 10 items, with higher scores reflecting more positive attitudes toward sexual partner concurrency. This scale is internally consistent ($\alpha = .92$) and stable over time (3-month retest ICC = 0.82), with a factor structure that is equivalent for men and women. Evidence of validity was also obtained by confirming hypothesized correlations with sexual risk history. Continued research is needed to confirm the usefulness of this measure as an antecedent of sexual risk behavior.

Keywords

concurrency; sexual behavior; attitudes; measurement

INTRODUCTION

HIV and other sexually transmitted diseases (STDs) remain a major public health concern. In the U. S., the Centers for Disease Control and Prevention (CDC) estimate the prevalence of HIV at 1.2 million people and the annual incidence at 50,000 (1). Other STDs are even more common; for example, prevalence estimates range from 20 million infected with human papillomavirus (HPV) to 45 million infected with genital herpes, and incidence estimates of HPV exceed 5.5 million annually (2). According to the Institute of Medicine, HIV and other STDs continue to be a “hidden epidemic” (3).

Untreated STDs can have serious complications, such as pelvic inflammatory disease, cervical cancer, chronic pelvic pain, ectopic pregnancy, birth complications, and infertility among women, and epididymitis and urethritis among men (4). Moreover, untreated STDs

substantially increase the risk of HIV acquisition and transmission (5, 6). In addition to these health consequences, STDs pose a huge economic burden to the U.S. health care system with an estimated direct cost of \$15.3 billion annually (6). To reduce the health and economic burden of STDs, the Surgeon General (7), and the CDC (8) have called for the expansion of sexual risk reduction and HIV/STD prevention efforts.

Prevention of HIV and other STDs requires identification of the biological, psychosocial, and behavioral determinants of disease transmission. With respect to the behavioral determinants, sexual partner concurrency (i.e., having multiple sexual partnerships that overlap in time) has been identified as an important factor in the spread of HIV and other STDs (9). Having multiple partners increases an individual's risk of acquiring an STD, and concurrency increases the risk of infection among an individual's *partners* and in the larger sexual network (10). The epidemiological importance of concurrency has been supported with mathematical modeling studies that demonstrate that (a) partner concurrency can lead to faster spread of infection and larger epidemics (11, 12), and (b) concurrency could help to explain the racial disparities in STD rates that persist despite few racial differences in individual-level sexual behaviors (13). Such modeling findings are supported by field studies demonstrating that concurrency is associated with STD transmission (14, 15).

Theoretical models of health behavior, such as the Theory of Reasoned Action (16), the Theory of Planned Behavior (17), and the Information-Motivation-Behavior Skills model (18), identify attitudes toward a risk behavior as a robust predictor of that behavior. Because attitudes influence behavior, measurement of attitudes toward partner concurrency would be useful as a predictor of sexual risk behavior and as an early indicator of intervention efficacy. However, there is no empirically validated measure of attitudes toward sexual partner concurrency.

Therefore, the purpose of this study was to develop a self-report measure of attitudes toward sexual partner concurrency that could be used in behavioral epidemiologic and prevention research. We conducted this research in a publicly-funded STD clinic for three reasons. First, research shows that sexual partner concurrency occurs at elevated rates among patients attending STD clinics. For example, Drumright, Gorbach, and Holmes (19) found that 32% of patients attending an STD clinic reported having other partners since they began a sexual relationship with their current partner. Senn, Carey, Vanable, Coury-Doniger, and Urban (20) found that among STD clinic patients who were involved in a steady sexual partnership, 64% reported at least one additional sexual partner during the past 3 months. These elevated rates contrast with estimates from the general populations which find that between 6% and 18% of women and between 11% and 23% of men report concurrent partnerships in the past year (21-23). Second, our qualitative and intervention work has shown that patients express a wide range of views about concurrency, which is helpful from a sampling perspective (24, 25). Finally, from a public health perspective, STD clinics provide an important context for HIV and STD testing, prevention, and treatment.

Stage 1: Item Generation

METHOD

Attitudinal items were generated based on data collected from focus groups with 59 patients recruited from an urban, publicly-funded STD clinic (24). Approximately half of the participants in the focus groups were female (47%) and most (77%) were African American. Focus group participants were, on average, 29 years of age. Approximately half (47%) of the focus group participants reported more than one sexual partner (i.e., partner concurrency) in the past 3 months.

Eight same-sex focus groups were conducted (4 male and 4 female). Facilitators followed a semi-structured interview guide that included questions about why men and women have multiple partners, motivations for partner reduction, and benefits of a monogamous relationship. Facilitators probed responses and asked follow-up questions to encourage participants to expand on their initial responses.

The focus groups were audio recorded and subsequently transcribed. Transcripts were analyzed by the research team using the principles of grounded theory (26). During the analysis of the focus group transcripts, the research team identified themes related to beliefs about the benefits and consequences of having multiple, concurrent partners. The themes identified by the research team served as the basis for the development of the partner concurrency attitude items. Items were further informed by other qualitative research on partner concurrency (27).

RESULTS

Based on formative research, 26 items (see Table I) were developed for the initial *Attitudes toward Partner Concurrency Scale*.

Stage 2: Measure Refinement

METHOD

Participants—To examine the factor structure and reliability of the concurrency attitudes items, patients attending a publicly-funded STD clinic were recruited as part of a larger randomized controlled trial (RCT) evaluating the effects of a sexual risk reduction intervention. Patients were eligible to participate in the RCT if they were (a) 16 years of age or older and (b) reported sexual risk behavior in the past 3 months (i.e., inconsistent condom use, vaginal or anal sex with more than one partner or with a partner who had other partners).

Of 1,887 patients approached for the RCT, 1,814 (96%) agreed to answer the screening questions, 926 (51%) met screening criteria, and 721 (78%) agreed to participate. Approximately one-half of the participants were randomly assigned to complete these partner concurrency attitude items (as part of the design of the larger RCT, the other one-half of participants completed a different survey). Thus, 370 participants were available for testing the attitude concurrency measure.

The sample ($n = 370$) was 41% female ($n = 151$), 67% African American ($n = 248$), and ranged in age from 16 to 60 (M age = 29, $SD = 10$). Approximately one-half of participants were unemployed (53%; $n = 196$), had an income $< \$15,000/\text{year}$ (53%; $n = 191$), and had children (54%; $n = 199$). Most participants had a high school education or less (64%; $n = 236$) and were single/never married (80%; $n = 295$).

Participant recruitment—Patients were called from the waiting room of the STD clinic and escorted to a private exam room by a trained Research Assistant (RA). Patients were informed about the study and the RA asked the patient several questions to determine eligibility for the study. Eligible patients received a detailed explanation of the study and those who were interested in participating provided written, informed consent. Contact information was obtained so that participants could be reminded to return for follow-up surveys.

To assist participants' recollection of their behavior, they completed a calendar of important events over the past 3 months. Then participants completed an Audio Computer Assisted Self Interview (ACASI) alone in a private room. Participants were provided with a wireless

buzzer to indicate when they had questions and when they completed the survey. The survey took approximately 45 minutes. Participants were reimbursed \$30 for their time. All procedures were approved by the IRBs of the participating institutions.

Measures—The ACASI assessed demographic information (age, sex, race, marital status, education, employment status, income, and number of children) as well as the following domains. First, for each of the 26 items on the attitudes toward partner concurrency scale (APCS, see Table I), participants rated the statement on a 6 point scale (*strongly disagree* to *strongly agree*). Participants responded to a number of other knowledge and attitudinal measures (not used in the current analyses). Participants also responded to questions about their health behaviors, including sexual behavior. Age at sexual debut was assessed by asking participants to report their age when they first had sex with the following response options: 13 years, 14-15 years, 16-17 years, and age 18 years or older. Participants who indicated having sex on or before the age of 13 were categorized as having an early sexual debut (1 = 13 years, 0 = <14 years of age). To assess partner concurrency behavior, participants were asked to report the number of women and the number of men with whom they had sex in the past 3 months. Responses to these two items were summed to derive the total number of sex partners in the past 3 months. If participants reported more than one sex partner, they were asked, “Over the past 3 months, did any of your sexual relationships overlap? That is, were you involved in more than one sexual relationship at a time?” (Response options: 0 = No, these relationships did NOT overlap in time. I ended each relationship before having sex in a new relationship. 1 = Yes, these relationships did overlap in time.) Participants who indicated that their sexual relationships did overlap in time were considered to have concurrent partners. Finally, we asked participants about their history of STDs: “In your entire life, how many times have you been treated for an STD?” (open-ended response).

RESULTS

Participants were randomly divided into two subsamples using randomization software (28). The first subsample ($n = 181$; 45% female, 68% African American, M age = 28, SD age = 10, age range = 16 to 59 years) was selected for the measure development phase. (Based on recommendations that 5 to 10 participants per item is appropriate for exploratory and confirmatory factor analyses (29), the sample size was adequate.) Of the 181 participants randomly assigned to the first subsample, seven participants had missing data on the APCS (single item: $n = 4$; multiple items: $n = 2$; all items: $n = 1$). Analyses were conducted using the 174 participants with complete data.

Preliminary analyses were conducted to examine the distribution of items and to test for univariate and multivariate normality. Results of these tests (not shown) indicated that none of the items exhibited extreme skew or kurtosis (univariate normality). A lack of multivariate normality was found; therefore, we used the principal axis factors method of extraction because this method does not have any distributional assumptions (30). An initial exploratory factor analysis using principal axis factors was conducted to understand the association between variables. To determine if there was a sufficient number of significant correlations to justify the exploratory factor analysis, we conducted Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin (KMO) test. Both tests indicated that an exploratory factor analysis was justified: Bartlett’s test of sphericity indicated that there was no association between the items, $X^2(325) = 2221.40$, $p < .001$, and the KMO test of sampling adequacy was 0.91 indicating that the sample was sufficient to explain the correlations between variables. (Tabachnick and Fidell (31) recommend KMO values of 0.60 or greater.) Finally, we examined the communalities of the items (i.e., the proportion of variance accounted for by the common factors). Because the inclusion of items with low

communalities may distort the factor solution (32) two items with communalities that fell below 0.20 (0.09 and 0.16 for items 11 and 13, respectively) were deleted. The exploratory factor analysis, using principal axis factors, was conducted with the reduced set of items (i.e., after deleting items 11 and 13).

Three rules were used to determine the number of factors for retention (29). First, we used Kaiser-Guttman's criterion (i.e., factors with eigenvalues >1.00). Five factors emerged with eigenvalues greater than 1.00 (9.54, 1.69, 1.51, 1.19, 1.10); these five factors accounted for 63% of the variance (40%, 7%, 6%, 5%, and 5% respectively). Second, we visually inspected the scree plot, which suggested that a single factor should be retained. Finally, we conducted a parallel analysis, which compares the actual eigenvalues from a common factor analysis to those obtained by chance (33, 34). (Both the average and the 95th percentile of eigenvalues are generated from a random dataset. Because the 95th percentile of eigenvalues sets the Type 1 error rate to .05, it is more conservative and thus preferable to the mean (35)). The first factor was well above the chance level (actual eigenvalue = 9.54; estimated average eigenvalue = 1.74; 95th percentile eigenvalue = 1.86); for the second factor, the actual eigenvalue was greater than the estimated eigenvalue (actual = 1.69; estimated = 1.62) but the 95th percentile eigenvalue indicated that it did not quite reach above chance levels (1.70). Hayton, Allen, and Scarpello (36) suggest using the 95th percentile criterion when the two criteria (estimated mean and 95th percentile eigenvalues) are discrepant. Actual eigenvalues for factors three, four, and five failed to meet the criterion. Visual inspection of the scree plot of the actual, estimated, and 95th percentile eigenvalues suggested the retention of a single factor (Figure 1).

An exploratory factor analysis using the principal axis factor method was conducted restricting the analysis to a single factor. Examination of the factor loadings indicated support for a one factor solution that describes the value of having multiple sexual partners. Most of the item loadings (16 of the 24 items) were high ($>.55$). Four items had low loadings ($<.45$) and were deleted from further analyses (items 16, 17, 20, and 26). We re-analyzed the reduced measure using principal axis factor analysis; item loadings for the 20 retained items are presented in Table II. The single factor solution accounted for 45% of the variance. Coefficient alpha (37) was .93 for the 20 retained items (items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 18, 19, 21, 22, 23, 24 and 25).

Stage 3: Measure Confirmation

METHOD

Participants and Procedures—The second subsample ($n = 189$; 37% women, 63% African American, M age = 30, SD age = 11, age range = 16 to 60 years) was selected for the measurement confirmation stage. Preliminary analyses were conducted to (a) determine the number of participants with missing data, (b) evaluate the items for multicollinearity by inspecting intercorrelations and determining the potential severity of multicollinearity in the sample using the variance inflation factor (VIF), (c) examine the data for univariate outliers, and (d) test the data for univariate and/or multivariate normality (38). Of the 189 participants randomly assigned to the second subsample, twelve participants had missing data on the APCS (single item: $n = 7$; multiple items: $n = 4$; and all items: $n = 1$). Analyses were conducted with the 177 participants with complete data.

Multicollinearity was initially assessed by constructing a correlation matrix of the items. The inter-item correlations did not exceed 0.85, indicating that multicollinearity was not a problem (38). Examination of the VIFs confirmed our initial findings; none of the VIFs exceeded 10 (range = 1.2 to 3.5; cf. Kline (38)). Next, we inspected our data for univariate outliers; none of the items indicated any individual outliers (i.e., all scores were ≤ 3 standard

deviations from the mean). Finally, we evaluated the data for univariate and multivariate normality. There was no evidence of univariate non-normality as none of the items exhibited extreme skew or kurtosis. To test for multivariate non-normality, we used the Mahalanobis distance (D^2) statistic. Multivariate non-normality was detected; 10 participants with the most problematic data were removed from analyses. We conducted confirmatory factor analyses with and without these participants; because the results were generally consistent with or without these individuals, we report results based on the restricted sample ($N = 167$).

RESULTS

A confirmatory factor analysis (CFA) using Amos 20.0 (39) was performed on the reduced 20-items retained from the previous phase. Model fit was assessed using the comparative fit index (CFI) (40), the Tucker-Lewis index (TLI) (41), the root mean square error of approximation (RMSEA) (42), and the model chi-square (38). Both the CFI and TLI are incremental fit indices (i.e., the hypothesized model is compared with the independence model) but, unlike the CFI, the TLI corrects for model complexity. The RMSEA is an absolute measure of fit and is based on a non-central chi-square distribution (38). An overall good fit to the model is assumed when the CFI and TLI are .95, the RMSEA is less than .06 (31) and when chi-square is non-significant (38). Respecifications to the model were guided by theory and designed to produce a brief measure of attitudes toward partner concurrency suitable for use in field research.

The initial fit of the model was poor ($n = 167$; CFI = 0.80; TLI = 0.77; RMSEA = 0.10; $X^2 [170] = 471.60, p < .001$). To improve model fit, we examined the standardized residual covariance matrix. Standardized residual covariances greater than 2 are considered problematic (43). Four items asking participants about their attitudes toward having one sex partner (items 4, 5, 15, and 24) exhibited high standardized residual covariances (range 2.48 to 5.14). Modification indices indicated that the model fit could be substantially improved if these items were correlated. Based on the pattern of standardized residual covariances and modification indices, a two-factor solution was tested (fit indices for the two-factor model: CFI = 0.86; TLI = 0.84; RMSEA = 0.09; $X^2 [169] = 379.59, p < .001, r_{\text{factors}} = .67$). Although the fit was improved in the two-factor model ($X^2_{\text{diff}} [1] = 92.01, p < .001$), neither the one-factor nor two-factor models provided an acceptable fit to the data. This second factor consisted of only four items that were focused on attitudes towards having one sexual partner (vs. attitudes toward multiple partners). Because our ultimate goal was to establish a brief measure of partner concurrency to be used in field research, we deleted this factor (and corresponding indicators) (44).

The one-factor model (consisting of the 16 remaining items) improved the model fit (CFI = 0.87; TLI = 0.85; RMSEA = 0.09; $X^2 [104] = 251.54, p < .001$). Three additional items (1, 8, and 25) were removed due to low factor loadings ($< .50$) and two items (21 and 22) were removed from the model due to high standardized residual covariances. We reexamined the reduced APCS model (fit indices for the respecified model: CFI = 0.91; TLI = 0.89; RMSEA = 0.10; $X^2 [44] = 122.83, p < .001$). Modification indices were also reviewed for suggestions to improve model fit. These indices indicated that the model fit could be substantially improved by allowing several error covariances (e2-e3, e3-e23, e6-e18, e7-e19, e9-e12, e9-e14, e12-e23 and e19-e23) to be freely estimated. The respecified model improved the model fit (CFI = 0.98; TLI = 0.97; RMSEA = 0.05; $X^2 [36] = 50.72, p = .053$). The APCS consisted of 11 items (2, 3, 6, 7, 9, 10, 12, 14, 18, 19, and 23; item loadings ranged from .51 to .87) representing attitudes towards having multiple partners.

To confirm our model, confirmatory factor analysis was performed on the complete sample (Samples 1 and 2 combined; $N = 351$). Consistent with our previous findings, multivariate non-normality was detected; 16 participants (Sample 1: $n = 11$; Sample 2: $n = 5$) with the

most problematic data were removed from analyses. This CFA was conducted with the twenty APCS items that were retained after the EFA. Consistent with procedures used for the CFA with Sample 2, several models were tested. (This allowed for direct comparison between the model testing from the initial and subsequent CFA.) Initial model fit was poor: CFI = 0.81; TLI = 0.79; RMSEA = 0.11; X^2 [170] = 851.11, $p < .001$. Removing the same four items that were removed in the previous CFA due to high standardized residual covariances (items 4, 5, 15, and 24) improved the fit of the model: CFI = 0.89; TLI = 0.88; RMSEA = 0.09; X^2 [104] = 377.27, $p < .001$. The reduced model, removing the same five items removed in the previous CFA (items 1, 8, and 25 due to low factor loadings and 21 and 22 due to high standardized residual covariances) plus one additional item (item 14) due to low factor loadings (factor loading estimates for item 14 was .51 in the initial CFA and .49 for the current CFA suggesting that the item may be an unreliable indicator of partner concurrency), improved the model fit: CFI = 0.94; TLI = 0.92; RMSEA = 0.10; X^2 [35] = 151.99, $p < .001$. The modification indices indicated that the fit could be improved by retaining two of the previously identified correlated measurement errors (e9-e12 and e19-e23) and allowing five additional errors to be correlated (e2-e12, e7-e18, e10-e18, e10-e19, and e18-19). Our final model, shown in Figure 2, fit the data well (CFI = 0.99; TLI = 0.99; RMSEA = 0.04; X^2 [28] = 40.88, $p = .06$). Consistent with our earlier findings, item loadings for the 10-item APCS ranged from .58 to .86. Coefficient alpha (37) was .92 for the remaining items (items 2, 3, 6, 7, 9, 10, 12, 18, 19, and 23).

To investigate the generalizability of the 10-item APCS by sex of respondent, we examined whether the one-factor model was equivalent across men and women using multiple-group CFA. First, we used CFA to evaluate the final 10-item model separately for men ($n = 197$) and women ($n = 138$). For both men and women, the one-factor model fit the data well (men: CFI = 1.00; TLI = 0.99; RMSEA = 0.03; X^2 [28] = 32.59, $p = .25$; women: CFI = 0.97; TLI = 0.96; RMSEA = 0.07; X^2 [28] = 44.07, $p = .03$). The factor loadings for each model were statistically significant and stable; the loadings ranged from 0.50 to 0.85 for men and 0.49 to 0.76 for women. Second, because the separate CFA models for men and women adequately fit the data, we proceeded with the multiple-group CFA (45). We first tested a model with no equality constraints imposed (i.e., the unconstrained multiple group model or configural model). Results indicated that the baseline model provided an acceptable fit to the data; CFI = 0.99; TLI = 0.98; RMSEA = 0.03; X^2 (56) = 76.66, $p = .04$. To evaluate multiple group invariance, we tested a model with equality constraints imposed (i.e., the measurement model). Consistent with the configural model, this model provided an acceptable fit to the data (CFI = 0.98; TLI = 0.97; RMSEA = 0.04; X^2 [72] = 104.71, $p = .01$). Tests for model differences between the configural and measurement models indicate possible noninvariance of the factor loadings and error covariances, X^2_{diff} [16] = 28.05, $p = .03$. Because the model chi-square is sensitive to sample sizes and is differentially influenced by differences in group sample sizes (i.e., $n_{\text{men}} > n_{\text{women}}$) (44), we examined other fit indices to evaluate changes between models (46). The change in CFI, TLI, and RMSEA between the configural and measurement models is .008, .005, and .004 respectively. Due to the relatively small changes in CFI, TLI, and RMSEA between models, as well as the overall good fit of the model, the hypothesis of invariance was not rejected, and we conclude that the factor structure for the 10-item APCS is equivalent for men and women.

Stage 4: Test-Retest Reliability

Participants were asked to return 3 months later to complete a similar survey. Control participants (i.e., those who did not receive a sexual risk reduction intervention, $n = 189$) who returned for this 3 month follow-up ($n = 156$) formed the sample for the test-retest reliability analyses (42% female, 72% African American, M age = 30, SD age = 10, age range = 16 to 57 years). Two participants did not provide responses for the 10 APCS items

at baseline; therefore, analyses were conducted with the 154 participants who provided complete responses to the APCS items.

Test reliability was assessed using indicators of internal consistency (coefficient alpha) and temporal stability (intraclass correlation coefficient) (47). Consistent with guidelines suggested by Cicchetti and Sparrow (48), the coefficient alphas for this sample ($N = 154$) at baseline ($\alpha = .89$) and follow-up ($\alpha = .88$) indicated strong internal consistency. An intraclass correlation coefficient (ICC) using a two-way mixed effects model was conducted to determine test-retest reliability. The test-retest reliability was excellent ($ICC = 0.82$, 95% $CI = 0.75, 0.87$) and indicated high reliability for the APCS.

Stage 5: Validity

To test for concurrent and convergent validity of the final measure, we examined the association between the APCS (total summed score) and measures of sexual health history (participant sex, age at sexual debut, number of sexual partners, and concurrency; see Measure Refinement section for a description of measures). Average APCS was associated with the number of sexual partners in the past 3 months ($r = 0.40$, $p < .001$) and concurrent partners ($r = 0.25$, $p < .001$). Participants who reported having concurrent partners had more positive attitudes toward having multiple sexual partners ($n = 171$, $M = 28.85$, $SD = 10.40$) than those who did not have concurrent partners ($n = 93$, $M = 23.05$, $SD = 11.42$), $t(262) = 4.18$, $p < .001$.

Because men typically report more concurrent partners than women (49, 50), and because having multiple partners is more socially acceptable for men (25), we expected men to have more positive attitudes towards having concurrent partners than women. Men reported significantly more positive attitudes toward concurrent partners ($n = 218$, $M = 27.99$, $SD = 10.88$) than women ($n = 150$, $M = 18.80$, $SD = 9.05$), $t(366) = 8.51$, $p < .001$. Concurrent partners are also associated with earlier age during first sex (49, 50); therefore, we expected that APCS scores would be higher for participants who had an earlier sexual debut. Participants who reported an early sexual debut (≤ 13 years of age) had more positive attitudes toward partner concurrency ($n = 130$, $M = 27.37$, $SD = 11.98$) than those reporting sexual debut at older ages ($n = 238$, $M = 22.53$, $SD = 10.25$), $t(366) = 4.07$, $p < .001$. Finally, we expected APCS scores to be associated with a history of STDs given that STDs are associated with partner concurrency. To test our hypothesis, we used a negative binomial regression analysis (with robust standard errors) to model STD history (overdispersed count variable) while controlling for sex of participant (1 = women, 0 = men), age at sexual debut (1 = ≤ 13 years, 0 = >13 years), and concurrent partners in past 3 months (1 = yes, 0 = no). The APCS was a significant predictor of STD history; participants with more positive attitudes toward partner concurrency were more likely to have had been treated for multiple STDs, $IRR = 1.02$ (95% $CI = 1.00, 1.03$), $z = 2.04$, $p = .04$.

DISCUSSION

The purpose of this research was to develop and evaluate the psychometric properties of a brief, self-report measure of attitudes toward sexual partner concurrency. Such a measure could be useful in behavioral epidemiologic research as a theoretical antecedent of intentions or actual concurrency, and in prevention research as an earlier indicator of change resulting from sexual risk reduction interventions.

Items were developed based on extensive formative research with patients from an urban, STD clinic as well as a thorough review of the extant literature. Using both exploratory and confirmatory factor analysis, the *Attitudes toward Partner Concurrency Scale (APCS)* was developed to assess attitudes toward partner concurrency to be used in field research. The

final APCS consisted of 10 items and was found to be reliable, with respect to factor structure, internal consistency, and temporal stability.

Evidence for the construct validity of the APCS was obtained by investigating the associations between the APCS and sexual risk behavior and history. Concurrent evidence was obtained through predicted associations with current behavior; as expected, participants with multiple partners had higher APCS scores than did participants without multiple partners. Convergent evidence was obtained by associations between sex and APCS scores (i.e., men had higher APCS scores relative to women) and between sexual debut and APCS scores (i.e., participants who reported an earlier sexual debut had higher scores than those with a later debut). Also, consistent with our expectations, higher APCS scores were associated with a history of being treated for STDs.

Strengths of the study include use of formative work to guide measure development, testing of the measure on a large sample of urban adults known to be at risk for HIV and other STDs, and the multiple step exploration of factorial validity employing initial EFA and subsequent CFA on a separate subsample. Nonetheless, study limitations should also be acknowledged. For example, our sample was recruited from a single STD clinic in the northeastern U. S. Although the sample was diverse with respect to age and gender, three-quarters of the participants were African-American. The extent to which these results will generalize to different parts of the country, to persons from other racial/ethnic backgrounds, or to individuals who are not seeking care at a publicly-funded STD clinic requires further research. The early stage of our intervention work did not allow us to obtain predictive evidence of the validity of the APCS but this will help to establish the usefulness of the measure.

CONCLUSIONS

The role that partner concurrency plays in driving STD and HIV epidemics continues to be debated with some arguing that the importance of concurrency has been overstated (51-53). Although continued research on the role of concurrency is needed, there appears to be consensus that having a greater number of partners facilitates STD acquisition and transmission (9, 51-54). Moreover, in urban communities where STD and HIV rates are high, partner concurrency (rather than rapid turnover of serially monogamous relationships) may be normative; thus, in these communities, partner concurrency and large numbers of partners are clearly linked (20, 24, 55, 56). Given the prevalence of concurrency and its likely role in HIV and STD transmission, measuring attitudes toward concurrency may serve as a practical marker of sexual risk behavior, and as an early stage outcome in the evaluation of sexual risk reduction programs.

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Appendix

Attitudes toward Partner Concurrency Measure

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1. It is in my nature to have more than one sexual partner.						
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	
2. I respect men who have multiple partners.

Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
3. I need to have sex with multiple partners for variety.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
4. It is OK to have sex with my child's mother [or father] even if I am in a relationship with someone else.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
5. I would be respected if I had multiple partners.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
6. Being in a relationship with just one person is boring.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
7. Having multiple partners makes me feel like a man [woman].					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
8. It is smart to have outside partners as a "back up" (in case things do not work out with my primary partner).					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
9. One sex partner cannot meet all my needs.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
10. I cannot control my sexual impulses.					
Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree

Scoring. Response options ranged from 1 (strongly disagree) to 6 (strongly agree). To create a single summary score, sum the response scores for the individual items (possible range = 6 to 60); higher scores indicate more positive attitudes toward sexual partner concurrency.

Use: The measure is available for use without charge. No further permission is needed but proper citation of this article is required.

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Figure 1.
Scree Plot of the Actual, Mean, and 95th Percentile Eigenvalues from the Parallel Analysis

Figure 2.
The Final Model from the Confirmatory Factor Analysis (Stage 3)

Table 1

Initial Items for the Attitudes toward Partner Concurrency Scale

Items	Subsample 1 <i>n</i> = 174		Subsample 2 <i>n</i> = 177	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1 It is wrong to have multiple sex partners. (R)	2.82	1.67	2.68	1.44
2 It is in my nature to have more than one sexual partner.	3.17	1.72	3.01	1.59
3 I respect men who have multiple partners.	2.52	1.56	2.55	1.50
4 I am willing to have only one sex partner for the good of my family. (R)	1.80	1.23	1.88	1.27
5 I am willing to have only one sex partner for the good of my primary relationship. (R)	1.76	1.15	1.65	1.07
6 I need to have sex with multiple partners for variety.	2.46	1.63	2.24	1.49
7 It is OK to have sex with my child's mother or father even if I am in a relationship with someone else.	2.30	1.49	2.14	1.38
8 Having multiple sex partners has financial benefits.	2.52	1.66	2.51	1.58
9 I would be respected if I had multiple partners.	2.13	1.30	2.15	1.45
10 Being in a relationship with just one person is boring.	2.45	1.53	2.45	1.49
11 A committed relationship provides me with someone I can trust completely. (R)	2.01	1.37	1.78	1.04
12 Having multiple partners makes me feel like a man [woman].	1.99	1.24	2.03	1.29
13 Most people can be trusted to not have sex outside of their primary relationship. (R)	4.03	1.57	3.83	1.54
14 I respect women who have multiple partners.	1.81	1.19	1.76	1.06
15 I can be satisfied with one sexual partner. (R)	1.98	1.32	1.86	1.16
16 Having multiple partners would threaten my primary relationship. (R)	1.78	1.21	1.60	1.06
17 I expect my partner [If I had a primary partner, I would expect him or her] to be faithful. (R)	1.45	0.75	1.42	0.78
18 It is smart to have outside partners as a "back up" (in case things do not work out with my primary partner).	2.79	1.68	2.54	1.58
19 One sex partner cannot meet all my needs.	2.49	1.68	2.37	1.43
20 It is stressful to have multiple sex partners. (R)	2.29	1.42	2.25	1.50
21 If your partner has other sex partners, it is okay for you to have other partners.	2.81	1.79	2.54	1.61
22 It is okay to have other sex partners while your partner is in jail.	2.50	1.64	2.37	1.54
23 I cannot control my sexual impulses.	2.55	1.67	2.42	1.47
24 I prefer having one sex partner. (R)	2.10	1.39	2.14	1.40
25 The advantages of having multiple partners outweigh the disadvantages.	2.55	1.65	2.55	1.51
26 My partner expects [If I had a primary partner, he or she would expect] me to be faithful. (R)	1.44	0.71	1.44	0.78

Note. Response options ranged from 1 (strongly disagree) to 6 (strongly agree). (R) indicates reverse-scored items.

Table II

Factor Loadings from the Exploratory Factor Analysis (N = 174)

Item No.	Items	Factor I
1	It is wrong to have multiple sex partners. (R)	.51
2	It is in my nature to have more than one sexual partner.	.64
3	I respect men who have multiple partners.	.73
4	I am willing to have only one sex partner for the good of my family. (R)	.56
5	I am willing to have only one sex partner for the good of my primary relationship. (R)	.57
6	I need to have sex with multiple partners for variety.	.81
7	It is OK to have sex with my child's mother or father even if I am in a relationship with someone else.	.73
8	Having multiple sex partners has financial benefits.	.47
9	I would be respected if I had multiple partners.	.62
10	Being in a relationship with just one person is boring.	.78
12	Having multiple partners makes me feel like a man [woman].	.68
14	I respect women who have multiple partners.	.46
15	I can be satisfied with one sexual partner. (R)	.71
18	It is smart to have outside partners as a "back up" (in case things do not work out with my primary partner).	.76
19	One sex partner cannot meet all my needs.	.76
21	If your partner has other sex partners, it is okay for you to have other partners.	.67
22	It is okay to have other sex partners while your partner is in jail.	.54
23	I cannot control my sexual impulses.	.57
24	I prefer having one sex partner. (R)	.69
25	The advantages of having multiple partners outweigh the disadvantages.	.62