The IPV-GBM Scale: A New Scale to Measure Intimate Partner Violence among Gay and Bisexual Men

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Abstract

Objectives: The paper describes the creation of a new scale to measure intimate partner violence (IPV) among gay and bisexual men.

Methods: Seven focus group discussions were held with gay and bisexual men, focusing on defining intimate partner violence: 30 forms of IPV were identified. A venue-recruited sample of 912 gay and bisexual men was surveyed, examining definitional understanding and recent experiences of each of the 30 forms of IPV. Participants were also asked questions from the CDC definition of intimate partner violence and the short-form of the Conflicts Tactics Scale (CTS2S). Factor analysis of responses to the definitional questions was used to create the IPV-GBM scale, and the prevalence of intimate partner violence was compared with that identified by the CDC and CTS2S measures of intimate partner violence.

Results: A 23-item scale, with 5 unique domains, was created, with strong internal reliability (Cronbach Alpha > .90). The IPV-GBM scale mirrored both the CDC and CTS2S definitions of intimate partner violence, but contained additional domains such as controlling violence, monitoring behaviors, emotional violence, and HIV-related violence. The new scale identified a significantly higher prevalence of IPV than either of the more commonly used measures.

Conclusions: The results presented here provide encouraging evidence for a new, more accurate measure of intimate partner violence among gay and bisexual men in the U.S.

Background

The emergence of research on intimate partner violence (IPV) among gay, bisexual, and other men who have sex with men (MSM) has demonstrated that IPV occurs in male-male partnerships at rates similar to or higher than opposite-sex partnerships [1–3]. Recently, researchers have documented vastly varied, though universally high, rates of IPV among MSM: between 32–78% for any form of IPV [4,5], 12–45% for physical IPV [6,7], and 5–33% for sexual IPV [7,8]. Studies of IPV among gay and bisexual men have suffered from a number of methodological limitations [9,10], including a challenge not unique to the field of same-sex IPV research: a lack of an uniform definition of IPV and use of IPV definitions non-specific to MSM [11–15]. Existing studies of IPV among MSM have relied upon measures of IPV that were created for use in assumedly heterosexual populations [13]. While IPV is universal across sexual orientations, it is not clear as to the extent to which the typologies of IPV – especially psychological IPV and controlling behaviors – experienced by gay and bisexual men are different to those experienced by heterosexual women, perhaps contributing to the wide range of prevalence estimates found in the literature. This paper describes the development of a new scale to measure IPV among gay and bisexual men, the IPV-GBM scale, contrasting the prevalence of IPV identified among gay and bisexual men using this new scale with that identified with two other commonly used measures of IPV. The new IPV-GBM scale has the potential to significantly improve the accuracy of the measurement of IPV among gay and bisexual men in the US, allowing a more accurate understanding of the relationships between IPV and health outcomes experienced by gay and bisexual men.

In studies of IPV in women, one of the most commonly used measures of IPV is the Revised Conflict Tactics Scale (R-CTS) [16], developed from the original Conflict Tactics Scale (CTS) [17], which aimed to measure the extent to which specific tactics, including acts of physical violence, were used in intimate partnerships [16]. The R-CTS updated the original CTS by including measurement of sexual coercion and consequences of physical violence (injury), and is comprised of 39 items contained in five sub-scales: physical assault, psychological aggression, negotiation, sexual coercion, and injury [16]. In 2004, Straus and Douglas updated the R-CTS and created the short-form CTS (CTS2S), a reduced, 10-item scale, including the same five sub-scales included in the R-CTS [18]. Recently, a number of studies have used the CTS2S to identify the prevalence of IPV among gay and bisexual men [5,7,13,19,20].
A number of studies have also relied on single-item questions to capture the experience of IPV among gay and bisexual men [21–28], often based up Center for Disease Control and Prevention (CDC)-developed specific definitions of physical and sexual IPV. Variations of this definition are commonly used to capture recent experiences of physical (In the last “time period”, have any of your partners ever tried to hurt you? This includes pushing you, holding you down, hitting you with a fist, kicking you, attempting to strangle you, and/or attacking you with a knife, gun or other weapon?) and sexual violence (In the last “time period”, have any of your partners ever used physical force or verbal threats to force you to have sex when you did not want to?) [11].

In a systematic review of the literature around IPV among MSM, Finneran and Stephenson (in press) note that across 28 studies identified, 16 different definitions of IPV were used by researchers in various combinations [13]. The most commonly used scale measures of IPV were the Conflict Tactics Scale [17] or its derivatives, the Revised Conflicts Tactics Scale [16] or the CTS2S [18]. Ten studies used definitions of IPV that were unique to the study or did not provide a reference to a validated scale, while several studies used binary measures of the presence of IPV based on the CDC definition of violence. However, none of these measures were developed specifically for gay and bisexual men; hence, it remains unknown whether or not these measures accurately represent IPV in gay and bisexual men. Several authors of studies captured in this systematic review reported having to modify the validated scales post hoc, such as by using gender-neutral language, in order to make the measurement tools appropriate for MSM [13]. In this paper we describe the development of a new scale – the intimate partner violence among gay and bisexual men (IPV-GBM) scale – and compare the prevalence of IPV identified with that identified with the CTS2S and the CDC measures of IPV.

**Methods**

**Ethics**

This study was approved by Emory University’s Institutional Review Board.

**Data**

Data collection involved two stages: the first included seven focus group discussions (FGDs) with gay and bisexual men stratified by race (Black/African-American and white) in Atlanta, Ga., and the second stage included a survey of over 1000 gay and bisexual men, also in Atlanta, Ga. For both stages, respondents were recruited through venue-based sampling (VBS). VBS is a derivative of time-space sampling, in which sampling occurs within prescribed blocks of time at previously-identified venues at which hard-to-reach populations congregate with greater frequency than elsewhere [29]. In order to reach a diverse population of gay and bisexual men in the Atlanta area, the venue sampling frame used for this study consisted of a wide variety of over 160 gay-themed or gay-friendly venues, including Gay Pride events, gay sports teams events, gay fundraising events, downtown areas, gay bars, bathhouses, an AIDS service organization, an MSM-targeted drop-in center, gay bookstores, restaurants, and urban parks.

Study recruiters stood adjacent to the venue, drew an imaginary line on the ground, and approached every nth man who crossed it; n varied between one and three depending on the volume of traffic at the venue. If he agreed to be screened, he was then asked a series of eight questions in order to examine the perceptions of and experience of IPV among the sample of over 1000 gay and bisexual men in Atlanta.

Table 1. Sample characteristics (n = 912).

| Mean       | Standard deviation |
|------------|--------------------|
| Age        | 34.5               |
| Race       | %                  |
| White non-Hispanic | 48.0 | 438 |
| Black / African-American non-Hispanic | 39.3 | 358 |
| Latino/Hispanic & Other | 12.7 | 116 |
| Education Level |                |
| High School or Less | 16.2 | 147 |
| Some College / 2 yr. Degree | 32.8 | 298 |
| College or More | 51.1 | 465 |
| Employment Status |              |
| Employed | 78.9               |
| Unemployed | 21.1               |
| HIV Status |                    |
| Negative | 69.3               |
| Positive | 23.9               |
| Never tested / Unknown | 6.8 | 62 |
| Sexual Orientation |                  |
| Homosexual | 89.8               |
| Bisexual | 10.2               |
| TOTAL | 100                |

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Study recruiters stood adjacent to the venue, drew an imaginary line on the ground, and approached every nth man who crossed it; n varied between one and three depending on the volume of traffic at the venue. If he agreed to be screened, he was then asked a series of eight questions in order to examine the perceptions of and experience of IPV among the sample of over 1000 gay and bisexual men in Atlanta.

Recruitment for the survey was conducted using the same venue-based approach as was used for FGD recruitment. For survey recruitment, eligible participants were read a script that...
outlined their potential participation in a web-based survey, approximately 25 minutes in length, that could be completed at home, or, in the case of five venues (the AIDS service organization, the drop-in center, Atlanta Pride, In the Life Pride, and a National Coming Out Day event), at the venue itself on an iPad. Men interested in study participation were then given a card with a web address and a unique identifier, ensuring that the survey could only be completed once per venue-recruited participant.

Of 4,309 men approached, 2,936 (59.9%) agreed to be screened for the survey. Of these, 2,093 (71.3%) were eligible for study participation. Men were eligible for study participation if they reported being 18 years of age or older, being male, identifying as gay/homosexual or bisexual, living in the Atlanta Metro Area, and having had sex with a man in the previous six months. Of eligible participants, 1,965 (93.9%) were interested in study participation. A total of 1,074 men completed the survey; thus 21.9% of men approached and 51.4% of eligible men completed the survey. Approximately one-third (33.7%) completed the survey at a venue, while the remaining two-thirds (66.3%) of respondents completed the survey at home. A total of 912 men had complete data for all covariates of interest and were included in the final analysis.

Creating a new scale to measure IPV among gay and bisexual men. Rotational factor analysis was conducted to identify which of the 30 items were to be included in the IPV-GBM scale based upon respondent’s answers to whether or not they would consider an individual item presented to be violent if it happened to them from a male partner. The factor structure of the

| Type of Violence                                                                 | White | Black | Other | Total | p-value (<) |
|---------------------------------------------------------------------------------|-------|-------|-------|-------|-------------|
| Hit you                                                                         | 98.6  | 93.3  | 94.8  | 96.1  | 0.029       |
| Punch you                                                                       | 97.7  | 93.9  | 96.6  | 95.7  | 0.015       |
| Kick you                                                                        | 97.7  | 93.0  | 96.6  | 95.7  | 0.004       |
| Rape you                                                                        | 96.8  | 92.7  | 95.7  | 95.1  | 0.000       |
| Slap you                                                                        | 94.7  | 89.7  | 94.8  | 92.8  | 0.017       |
| Damage your property (for example, break a TV or cell phone)                    | 94.1  | 90.2  | 93.1  | 92.4  | 0.355       |
| Push/shove you                                                                  | 90.2  | 86.3  | 89.7  | 88.6  | 0.120       |
| Intentionally transmit HIV to you                                               | 87.9  | 84.4  | 88.8  | 86.6  | 0.000       |
| Force you to do something sexually that you didn’t want to do                   | 84.5  | 83.2  | 88.8  | 84.5  | 0.216       |
| Lie to you about his HIV status                                                 | 74.7  | 80.4  | 76.7  | 77.2  | 0.416       |
| Not tell you he had HIV before you had sex                                      | 74.0  | 77.1  | 77.6  | 75.7  | 0.478       |
| Do something sexual to you for which you hadn’t given your prior consent        | 68.5  | 75.4  | 78.4  | 72.5  | 0.025       |
| Prevent you from seeing your family                                             | 60.0  | 64.8  | 73.3  | 63.6  | 0.018       |
| Refuse to wear a condom during sex                                              | 56.8  | 68.4  | 62.1  | 62.1  | 0.008       |
| Prevent you from seeing your friends                                           | 58.7  | 60.6  | 72.4  | 61.2  | 0.011       |
| Call you names / put you down                                                   | 54.6  | 63.4  | 66.4  | 59.5  | 0.029       |
| Cheat on you                                                                    | 42.0  | 62.0  | 60.3  | 52.2  | 0.046       |
| Threaten to tell someone who didn’t know you were gay/bisexual about your sexual orientation (“out you”) | 44.5  | 53.4  | 57.8  | 49.7  | 0.519       |
| Demand access to your cell phone                                               | 46.8  | 49.4  | 53.4  | 48.7  | 0.005       |
| Demand access to your email                                                     | 46.3  | 46.9  | 52.6  | 47.4  | 0.000       |
| Read your text messages without your knowledge                                  | 44.1  | 47.8  | 56.9  | 47.1  | 0.000       |
| Read your email without your knowledge                                          | 43.8  | 47.8  | 56.0  | 46.9  | 0.000       |
| Unintentionally transmit HIV to you                                              | 33.6  | 46.6  | 48.3  | 40.6  | 0.263       |
| Repeatedly post on your social networking pages (Facebook, Twitter, etc.)       | 33.8  | 46.9  | 45.7  | 40.5  | 0.102       |
| Prevent you from seeing his friends                                             | 35.2  | 40.5  | 49.1  | 39.0  | 0.000       |
| Put his sexual needs before yours                                               | 25.8  | 48.0  | 48.3  | 37.4  | 0.059       |
| Prevent you from seeing his family                                              | 30.8  | 39.4  | 44.8  | 36.0  | 0.025       |
| Ask or tell you to “act straight” around certain people                         | 19.9  | 31.3  | 34.5  | 26.2  | 0.004       |
| Criticize your clothes                                                          | 13.5  | 26.3  | 29.3  | 20.5  | 0.026       |
| Call you fat                                                                    | 17.6  | 21.5  | 25.9  | 20.2  | 0.000       |

Significant differences by race are denoted in bold italics.
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**Table 3.** Factor analysis of definitions of intimate partner violence among gay and bisexual men.

| Items | Factor Loading | All men | White men | Black men |
|-------|---------------|---------|-----------|-----------|
| **Domain 1: Physical & Sexual** | | | | |
| Eigenvalue (Proportion of Variance Explained) | | 9.6985 (0.3233) | 9.21088 (0.3070) | 10.20997 (0.3403) |
| Combined Cronbach Alpha | | 0.8458 | 0.8167 | 0.8967 |
| Slap you | | 0.8312 | 0.8044 | 0.8836 |
| Punch you | | 0.8272 | 0.7655 | 0.8756 |
| Hit you | | 0.8289 | 0.7715 | 0.8769 |
| Kick you | | 0.8272 | 0.7655 | 0.8775 |
| Push you | | 0.8567 | – | 0.9021 |
| Force you to do something sexually that you didn’t want to do | | 0.8717 | – | 0.9035 |
| Rape you | | 0.8322 | 0.7883 | 0.8793 |
| Damage your property (for example, break a TV or cell phone) | | 0.8458 | 0.8368 | 0.8894 |
| **Domain 2: Monitoring** | | | | |
| Eigenvalue (Proportion of Variance Explained) | | 4.16566 (0.1389) | 3.80936 (0.1270) | 4.04978 (0.1350) |
| Combined Cronbach Alpha | | 0.9226 | 0.9279 | 0.9148 |
| Demand access to your cell phone | | 0.9022 | 0.9031 | 0.8997 |
| Demand access to your email | | 0.8983 | 0.9015 | 0.8918 |
| Read your text messages without your knowledge | | 0.8944 | 0.9013 | 0.8837 |
| Read your email without your knowledge | | 0.8928 | 0.9002 | 0.8829 |
| Repeatedly post on your social networking pages | | 0.9345 | 0.9460 | 0.9186 |
| **Domain 3: Controlling** | | | | |
| Eigenvalue (Proportion of Variance Explained) | | 1.76858 (0.0509) | 1.73009 (0.0577) | 1.95378 (0.0651) |
| Combined Cronbach Alpha | | 0.8860 | 0.8864 | 0.8869 |
| Prevent you from seeing your family | | 0.8531 | 0.8522 | 0.8573 |
| Prevent you from seeing his family | | 0.8606 | 0.8683 | 0.8541 |
| Prevent you from seeing your friends | | 0.8435 | 0.8384 | 0.8452 |
| Prevent you from seeing his friends | | 0.8569 | 0.8559 | 0.8618 |
| **Domain 4: HIV-related** | | | | |
| Eigenvalue (Proportion of Variance Explained) | | 1.47115 (0.0490) | 1.56658 (0.0522) | 1.44745 (0.0482) |
| Combined Cronbach Alpha | | 0.8512 | 0.8476 | 0.8326 |
| Lie to you about his HIV status | | 0.7160 | 0.6995 | 0.7931 |
| Not tell you he had HIV before you had sex | | 0.7156 | 0.6830 | 0.7886 |
| Intentionally transmit HIV to you | | 0.8999 | 0.9122 | 0.8000 |
| Cheat on you | | – | – | 0.8031 |
| Put his sexual needs before yours | | – | – | 0.8349 |
| **Domain 5: Emotional** | | | | |
| Eigenvalue (Proportion of Variance Explained) | | 1.25644 (0.0419) | 1.138720 (0.0462) | 1.25642 (0.0419) |
| Combined Cronbach Alpha | | 0.7152 | 0.7607 | 0.6994 |
| Call you fat | | 0.6707 | 0.7207 | 0.6422 |
| Ask or tell you to “act straight” around certain people | | 0.5996 | 0.6990 | 0.5844 |
| Criticize your clothes | | 0.6031 | 0.6898 | 0.5924 |
| Put his sexual needs before yours | | – | 0.7092 | – |
| Total Cronbach Alpha for All Domains Combined | | 0.9060 | 0.8960 | 0.9147 |

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## Table 4. Percentage of gay and bisexual men reporting the experience and perpetration of each form of intimate partner violence and results of chi-square testing.

| Type of Violence | Receipt of IPV | Perpetration of IPV |
|------------------|----------------|---------------------|
|                  | White | Black | Other | Total | p-value (<c> | White | Black | Other | Total | p-value (<c> |
| **Domain 1: Physical & Sexual** | | | | | | | | | | | |
| Punch/Hit/Slap you | 5.9 | 14.5 | 12.1 | 10.0 | 0.000 | 2.8 | 9.8 | 6.3 | 6.1 | 0.000 |
| Kick you | 3.0 | 9.3 | 6.0 | 5.8 | 0.001 | 1.3 | 6.7 | 5.1 | 4.0 | 0.000 |
| Push/shove you | 8.8 | 20.9 | 18.1 | 14.7 | 0.000 | 6.9 | 13.3 | 13.9 | 10.3 | 0.005 |
| Force you to do something sexually that you didn’t want to do | 5.3 | 8.7 | 7.8 | 6.9 | 0.161 | 1.9 | 6.1 | 6.3 | 4.1 | 0.004 |
| Rape you | 2.1 | 3.9 | 1.8 | 2.8 | 0.012 | 1.3 | 4.4 | 3.8 | 2.8 | 0.018 |
| Damage your property (for example, break a TV or cell phone) | 4.8 | 12.4 | 10.4 | 8.5 | 0.001 | 1.9 | 8.6 | 5.1 | 5.0 | 0.000 |
| **Any Physical/Sexual IPV** | 15.1 | 30.6 | 25.3 | 22.6 | 0.000 | 12.9 | 26.7 | 24.1 | 19.7 | 0.000 |

| **Domain 2: Monitoring** | | | | | | | | | | | |
| Demand access to your cell phone | 4.4 | 16.0 | 15.6 | 10.4 | 0.000 | 3.6 | 13.0 | 8.9 | 8.1 | 0.000 |
| Demand access to your email | 2.3 | 10.6 | 8.7 | 6.4 | 0.000 | 1.9 | 8.3 | 3.8 | 4.8 | 0.000 |
| Read your text messages without your knowledge | 13.1 | 18.8 | 20.2 | 16.2 | 0.045 | 13.1 | 15.4 | 7.6 | 13.2 | 0.109 |
| Read your email without your knowledge | 7.8 | 14.3 | 15.7 | 11.4 | 0.000 | 8.1 | 12.3 | 2.5 | 9.4 | 0.010 |
| Repeatedly post on your social networking pages | 6.8 | 12.0 | 6.3 | 8.8 | 0.024 | 3.0 | 8.1 | 5.1 | 5.4 | 0.004 |
| **Any Monitoring IPV** | 18.5 | 26.2 | 31.7 | 22.9 | 0.004 | 16.2 | 19.6 | 13.9 | 17.4 | 0.289 |

| **Domain 3: Controlling** | | | | | | | | | | | |
| Prevent you from seeing your family | 1.6 | 5.6 | 2.6 | 3.3 | 0.007 | 2.6 | 4.9 | 3.8 | 3.7 | 0.187 |
| Prevent you from seeing his family | 5.3 | 6.4 | 6.1 | 5.8 | 0.774 | 0.4 | 5.4 | 2.5 | 2.7 | 0.000 |
| Prevent you from seeing your friends | 4.4 | 8.2 | 7.8 | 6.2 | 0.068 | 1.9 | 5.6 | 5.1 | 3.8 | 0.012 |
| Prevent you from seeing his friends | 5.3 | 6.7 | 7.8 | 6.2 | 0.503 | 0.6 | 5.6 | 3.8 | 3.0 | 0.000 |
| **Any Controlling Behaviors** | 9.4 | 13.7 | 19.0 | 12.0 | 0.020 | 3.4 | 8.1 | 8.9 | 5.9 | 0.007 |

| **Domain 4: HIV-related** | | | | | | | | | | | |
| Lie to you about his HIV status | 3.7 | 12.4 | 2.6 | 6.9 | 0.000 | 1.1 | 7.1 | 3.6 | 3.9 | 0.000 |
| Not tell you he had HIV before you had sex | 2.8 | 12.6 | 7.8 | 7.3 | 0.000 | 1.9 | 9.3 | 3.9 | 5.2 | 0.000 |
| Intentionally transmit HIV to you | 0.7 | 6.5 | 2.6 | 3.2 | 0.000 | 0.4 | 4.4 | 2.5 | 2.3 | 0.000 |
| **Any HIV-Related IPV** | 4.0 | 18.3 | 8.9 | 10.5 | 0.000 | 2.1 | 10.8 | 6.3 | 6.2 | 0.000 |

| **Domain 5: Emotional** | | | | | | | | | | | |
| Call you fat or ugly | 13.0 | 12.0 | 16.4 | 13.0 | 0.484 | 4.9 | 8.1 | 11.4 | 6.8 | 0.041 |
| Ask or tell you to “act straight” around certain people | 6.9 | 10.9 | 11.3 | 9.0 | 0.093 | 3.2 | 6.2 | 5.1 | 4.6 | 0.114 |
| Criticize your clothes | 21.2 | 15.1 | 18.3 | 18.5 | 0.087 | 14.1 | 13.7 | 11.4 | 13.7 | 0.814 |
| **Any Emotional IPV** | 30.0 | 28.4 | 30.4 | 29.3 | 0.848 | 16.8 | 19.8 | 17.7 | 18.2 | 0.514 |
| **Any IPV-GBM IPV** | 44.7 | 51.1 | 49.4 | 47.8 | 0.158 | 32.6 | 40.8 | 40.5 | 36.7 | 0.031 |

Significant differences are denoted in **bold italics.**

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IPV-GBM scale was determined using principal components analysis with oblique rotation using a promax solution. The Kaiser-Meyer-Olkin test and Bartlett’s test of sphericity were calculated prior to the exploratory factor analysis (EFA) in order to assure the appropriateness of EFA. The factor analysis was conducted for the total sample, and then separately for white and Black/African-American respondents to identify racial variations in scale content. There were insufficient numbers of Latino/Other respondents to allow factor analysis to be performed for this group. Reliability of each definitional scale (overall, white respondents, Black/African-American respondents only) was assessed by calculating Cronbach’s alpha to assess the internal consistency of the items. Adequate reliability was indicated if Cronbach’s alpha was >0.70.

The analysis sample. Table 1 shows the characteristics of participants in the final analysis sample. The mean age was approximately 34 years, with the majority reporting post-secondary education (83.9%), current employment (79%), negative HIV status (69%), and homosexual sexual orientation (90%). Approximately 48% of the sample was white non-Hispanic, 40% Black/African-American non-Hispanic, and 12% Latino/Hispanic or other, including Asian/Pacific Islander and Native American/Alaska Native.

Results
Definitions of IPV. There was significant variation reported among survey participants as to what constituted IPV (Table 2). While more than 90% of respondents agreed that hitting, punching, kicking, rape, slapping and intentional damage to property were forms of IPV, fewer than 40% of participants reported that preventing the victim from seeing his friends or family, putting the perpetrator’s sexual needs before the victim’s, asking/telling the victim to act straight around others, criticizing the victim’s clothes, or calling the victim fat were considered IPV. Thus, definitions of IPV tended to focus more on physical and extreme forms of sexual IPV (e.g., rape), whereas controlling behaviors were less likely to be viewed as IPV. Latino/Other men endorsed an average of 20 of 30 items as IPV and Black/African-American an average of 19 of 30, both significantly higher than the mean 17 endorsed by white men. There were racial variations in the definitions of IPV: Black/African-American participants were less likely to report that hitting, punching, kicking, rape, slapping, intentionally transmitting HIV and intentional damage to property were forms of IPV, although the vast majority of all respondents affirmed that these were forms of IPV. Conversely, Black/African-American and Latino/Other participants were more likely to report that doing something sexual for which you hadn’t given consent, preventing someone from seeing their family or friends, refusing to wear a condom during sex, calling someone names, and cheating were forms of IPV. Non-white participants were also more likely to report that controlling behaviors, such as demanding access to a cell phone or email, reading text messages or email, and preventing someone from seeing his friends were forms of IPV. Whereas white men were more likely to report physical violence or extreme sexual violence as IPV, non-white men were more likely to report psychological violence or controlling behaviors as forms of IPV.

Both the Kaiser-Meyer-Olkin test (0.903) and Bartlett’s test of sphericity ($\chi^2 = 17817.0$, p<0.000) indicated that the variation present in the data was well-suited to EFA, both for the overall sample and for factor analysis by race (White men, KMO: 0.866, Bartlett’s test p<0.000 and Black men, KMO: 0.901, Bartlett’s test p<0.000). The factor analysis yielded five unique factors with eigenvalues >1.0: physical and sexual IPV, monitoring behaviors,
controlling behaviors, HIV-related IPV, and emotional IPV (Table 3). The same five factors were identified for each racial group, although the content of the factor varied by race. Five items did not load into any factor (i.e., alpha < 0.50 in any one factor): name-calling, refusing to wear a condom during sex, revealing the victim’s sexual orientation to others (“outing” him), doing something sexually for which the victim had not given his prior consent, and unintentionally transmitting HIV to the victim.

**Factor One: Physical and Sexual IPV.** For the total sample, and for white respondents, this factor was comprised of slapping, punching, hitting, kicking, pushing, coerced sex, rape, and damage to property; however, for white respondents, pushing and coerced sex did not load into this factor. The factor explained 32% of total variance for the total sample: 31% for white men and 34% for Black/African-American men.

**Factor Two: Monitoring Behaviors.** The same items loaded for all groups: demanding access to a cell phone, demanding access to email, reading text messages or email(s) without knowledge, and repeatedly posting on victim’s social networking pages (e.g., Facebook, Twitter), explaining approximately 14% of total variance.

**Factor Three: Controlling Behaviors.** Again, the same items loaded for all groups: preventing a victim from seeing his family or friends, and preventing victim from seeing his partner’s family or friends, explaining approximately 5% of the variance in each group.

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### Table 5. Results of sensitivity analysis: comparisons are made between participants reporting experience of IPV based on the IPV-GBM items and domains versus both the CDC and CTS2S definitions of IPV.

| Domain 1: Physical & Sexual | n   | % Answering yes to CDC (physical or sexual) | % Answering yes to any CTS2S question |
|----------------------------|-----|---------------------------------------------|--------------------------------------|
| Punch/Hit/Slap you         | 92  | 57.4                                        | 100.0                                |
| Kick you                   | 53  | 48.3                                        | 100.0                                |
| Push/shove you             | 133 | 56.3                                        | 100.0                                |
| Force you to do something sexually that you didn’t want to do | 63  | 39.1                                        | 37.7                                 |
| Rape you                   | 60  | 30.3                                        | 30.3                                 |
| Damage your property (for example, break a TV or cell phone) | 132 | 51.1                                        | 85.6                                 |
| Any Physical/Sexual        | 224 | 47.2                                        | 86.1                                 |

| Domain 2: Monitoring       | n   | % Answering yes to CDC (physical or sexual) | % Answering yes to any CTS2S question |
|----------------------------|-----|---------------------------------------------|--------------------------------------|
| Demand access to your cell phone | 94  | 45.7                                        | 73.3                                 |
| Demand access to your email | 58  | 54.3                                        | 80.0                                 |
| Read your text messages without your knowledge | 147 | 39.7                                        | 65.5                                 |
| Read your email without your knowledge | 103 | 36.6                                        | 64.0                                 |
| Repeatedly post on your social networking pages | 78  | 46.5                                        | 66.3                                 |
| Any Monitoring             | 200 | 35.6                                        | 60.3                                 |

| Domain 3: Controlling      | n   | % Answering yes to CDC (physical or sexual) | % Answering yes to any CTS2S question |
|----------------------------|-----|---------------------------------------------|--------------------------------------|
| Prevent you from seeing your family | 30  | 40.0                                        | 75.0                                 |
| Prevent you from seeing his family | 53  | 43.6                                        | 62.9                                 |
| Prevent you from seeing your friends | 57  | 40.0                                        | 75.4                                 |
| Prevent you from seeing his friends | 57  | 40.6                                        | 70.3                                 |
| Any Controlling            | 106 | 39.1                                        | 66.1                                 |

| Domain 4: HIV-related      | n   | % Answering yes to CDC (physical or sexual) | % Answering yes to any CTS2S question |
|----------------------------|-----|---------------------------------------------|--------------------------------------|
| Lie to you about his HIV status | 63  | 32.4                                        | 64.9                                 |
| Not tell you he had HIV before you had sex | 66  | 35.1                                        | 58.1                                 |
| Intentionally transmit HIV to you | 29  | 31.4                                        | 65.7                                 |
| Any HIV-Related            | 92  | 39.6                                        | 63.4                                 |

| Domain 5: Emotional        | n   | % Answering yes to CDC (physical or sexual) | % Answering yes to any CTS2S question |
|----------------------------|-----|---------------------------------------------|--------------------------------------|
| Call you fat or ugly       | 119 | 33.6                                        | 100.0                                |
| Ask or tell you to “act straight” around certain people | 82  | 34.8                                        | 67.4                                 |
| Criticize your clothes      | 168 | 27.1                                        | 60.8                                 |
| Any Emotional              | 263 | 27.4                                        | 66.2                                 |
| Any IPV-GBM IPV            | 418 | 35.1                                        | 58.3                                 |

NB: n varies by row.
doi:10.1371/journal.pone.0062592.t005
**Factor Four: HIV-related IPV.** For the total sample and for white men, the items loading in this factor were lying about HIV status to a partner, not revealing HIV positive status to a partner before sex, and intentionally transmitting HIV, which collectively explained 5% of the total variance. For Black/African-American men, cheating and the perpetrator putting his sexual needs first also loaded on this factor, although the percentage of variation explained remained approximately 5%.

**Factor Five: Emotional IPV.** For the total sample and for Black/African-American men, the following items loaded: calling the victim fat, asking/telling the victim to “act straight,” and criticizing the victim’s clothes, explaining approximately 4% of the variation. For white men, the perpetrator putting his sexual needs before the victim’s also loaded on this factor. This factor explained only 4% of the total variance.

**The experience of IPV.** Among the total sample, the most commonly experienced forms of IPV in the past 12 months were criticizing of clothing (10.5%, emotional IPV), reading text messages without permission (16.2%, monitoring behavior), and pushing/shoving (14.7%, physical and sexual IPV). The least commonly experienced forms of IPV were rape (2.8%, physical and sexual IPV), preventing victim from seeing his family (3.3%, monitoring behaviors), and intentionally transmitting HIV (3.2%, HIV-related IPV) (Table 4).

There were clear racial variations in reporting experience of IPV. Black/African-American respondents were more likely to report experiencing any form of physical and sexual IPV and all forms of HIV-related IPV. Black/African-American respondents were also more likely to report being prevented from seeing their family by a male partner, but were not more likely than white men to report any other controlling behaviors. There were no significant racial differences in the reporting of emotional violence between Black/African-American and white men. Similar variations were present in the presentation of reporting recent perpetration of IPV, with Black/African-American men significantly more likely to report any recent perpetration of IPV.

The CDC definition-based measure of IPV consistently generated the lowest prevalence of IPV (experience 13.5%, perpetration 7.9%). The CTS2S measure generated higher prevalences (experience 28.2%, perpetration 18.6%), while the newly developed IPV-GBM scale generated significantly higher prevalences than the other two measures (experience 45.8%, perpetration 32.1%). The least commonly experienced forms of IPV were rape (2.8%, physical and sexual IPV), preventing victim from seeing his family (3.3%, monitoring behaviors), and intentionally transmitting HIV (3.2%, HIV-related IPV) (Table 4).

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The results of sensitivity analysis are summarized in Table 5. For all but two forms of IPV (rape and forced sex), the CTS2S measurement was more sensitive at identifying victims of IPV compared to the CTS measurement. For example, only 27% of participants who had recently experienced emotional violence from a male partner were classified as experiencing violence by the CTS measurement, whereas the CTS2S correctly classified 66% of these participants. Overall, the 64.9% and 41.7% of participants with recent experience of IPV per the IPV-GBM scale were not classified as such by the CTS measurement and the CTS2S measurement, respectively.

**Discussion**

The results demonstrate the increased sensitivity of scale to specifically measure the experience of IPV among MSM in the US. The IPV-GBM scale, consisting of 23 items in five unique domains of IPV, showed strong internal reliability, and more than 60% of variance in definitions of IPV was explained by the scale items. Although there were some variations in the content of the scale by race, these were minimal, and the scale seems appropriate for use in both white and Black/African-American gay and bisexual male populations. A small sample size limited the ability to create the scale for Latino or other racial/ethnic groups, and further work must examine the extent to which the IPV-GBM scale is applicable to other racial and ethnic groups of gay and bisexual men in the U.S. Further work is required to test associations between IPV as measured in the IPV-GBM and other health outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes, especially health outcomes thought to have strong correlations with IPV such as substance abuse, depression, HIV risk, and HIV-related outcomes.
other parts of the U.S. Additionally, the stem question used to determine whether or not something was IPV ("Would you consider it violent if a male partner of yours were to...") was intentionally oblique. Participants may have considered that certain acts would not always necessarily constitute violence (particularly in cases of consensual violence, such as occurs in bondage, domination, and sadomasochism [BDSM] relationships); this may partly explain why no single IPV item received 100% endorsement.

Conclusion

The results presented here provide evidence for encouraging a new, more accurate, measure of IPV among gay and bisexual men in the U.S. The large number of items in the scale enhances content sensitivity and reliability, and provides the ability to differentiate between five domains of IPV. The IPV-GBM utilizes interspersed item order to limit response set bias [40], and the referent time period can be adjusted from 12 months to meet the needs of the research question (e.g., last 3 months). The IPV-GBM requires a 6th grade reading level, and takes approximately 10–15 minutes to complete. These characteristics are similar to those of the variations of the CTS [16,18], which have gained in popularity and frequency of use in the IPV research community. Given the increased attention to IPV among gay and bisexual men, a more accurate measure of IPV that is grounded in the lived realities of gay and bisexual men is vital. Further work is now required to test this scale on larger samples of gay and bisexual men, and to explore the extent to which the IPV-GBM scale is applicable to other racial/ethnic groups and is associated with other health outcomes.

Author Contributions

Conceived and designed the experiments: RS CF. Performed the experiments: RS CF. Analyzed the data: CF. Wrote the paper: RS CF.

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