Supplemental File 2. Study characteristics of included articles

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| **Source** | **Research objective** | **Study design** | **Location and year** | **Sampling strategy** | **Sample size** | **Population** | **Mean age (range)** | **Race/**  **ethnicity** | **Sexual orientation** | **Gender composition** |
| Arnold & Bailey, (2009)22 | Explore role of gender and sexual identity in HIV prevention and treatment in ballroom community | Cross-sectional, ethnographic study | San Francisco Bay Area, California: 2006  Detroit, Michigan: 2001-2005 | Convenience sample of members of the ballroom community | Members of ballroom community: n = 40  HIV/AIDS-prevention workers: n = 6 | African American gay and bisexual men and transgender women who were members of the ballroom community | NR (NR)\*  \*study specified youth were interviewed | African American: 100% | Gay and bisexual men and transgender women: 100% | Gay and bisexual men and transgender women: 100% |
| Bauermeister et al., (2015)37 | Test the feasibility, acceptability and preliminary efficacy of a test locator intended to promote HIV/STI testing among YMSM | RCT | Southeast Michigan | Convenience sample recruited at Pride celebrations, online, and at public locations | Baseline n = 130  Follow-up n = 104 (at 1 month) | YMSM | 21 (eligibility range: 15-24) | White: 65.6%  Black: 19.5%  Latino: 9.4%  Middle Eastern: 7.8%  Asian/Pacific Islander: 6.3% | Gay: 83.8%  Bisexual: 14.6%  Some respondents identified as heterosexual, queer or same-gender loving | Cis-male: 100% |
| Blake et al., (2001)47 | Evaluate associations between gay-sensitive HIV instruction and risk behaviors of GLB youths | Cross-sectional survey | Massachusetts: 1994-1995 | Youth Risk Behavior Survey multistage cluster sampling design plus census of HIV education teachers in same schools | GLB students = 151 | GLB students | NR (≤14 to ≥18) | Among GLB students:  White, non-Hispanic: 69.0%  Black, non-Hispanic: 7.8%  Hispanic or Latino: 5.1%  Asian or Pacific Islander: 4.7%  American Indian or Alaskan Native: 5.3%  Other: 8.2% | Of total sample:  Heterosexual: 94.5%  GLB: 4.2%  Not sure: 1.3% | Among GLB students:  Male: 57.5%  Female: 42.6% |
| Bowen et al., (2008)40 | Examine the feasibility, acceptability, and module specific effects of an online HIV risk reduction program | Pre-post study, no comparison group | Online/nationwide | Convenience sample recruited through Internet banner ads | Baseline n = 425  Follow-up n = 294 (at post-test 3) | Rural MSM | NR (eligibility range: 18 years or older) | At post-test 3:  Non-Hispanic White: 77.2%  Hispanic: 8.8%  Asian/Asian Pacific Islander, African American, Native American, other: 13.9% | At post-test 3:  Gay: 84.4%  Bisexual: 15.3%  Heterosexual: 0.3% | Male: 100% |
| Brockenbrough (2016)26 | Describes a center’s work in HIV/AIDS prevention with Black and Latino urban queer youth | Ethnography | Midsize city in the northeastern US | Convenience sample of youth at Midtown AIDS Center (MAC) | Total n for youth = 10 | Black and Latino urban queer youth | NR (16-22) | Black: 80%  Black and Latino: 20% | Queer males: 80% | Male: 80%  Transgender females: 20% |
| Cotten & Garofalo (2016)33 | Describe feasibility trial for an HIV prevention intervention for young transgender women | Pre-post study, no comparison group | A large metropolitan area | Convenience sample | Baseline n = 51  Follow-up n = 43 (at 3 months) | Young transgender women | NR (eligibility range: 16-24) | NR | NR | Transgender women: 100% |
| Estes (2017)31 | Examine LGB young adults views on school-based sex education | Cross-sectional, semi-structured interviews | Primarily at a large southeastern university, 2015 | Convenience sample recruited at a public university, referrals | n = 10 | LGB young adults | 22.1 (19-25) | White: 80%  African-American: 10%  Multiracial: 10% | Gay: 40%  Lesbian: 30%  Pansexual lesbian: 20%  Bisexual: 10% | Male: 40%  Female: 60% |
| Fisher (2009)21 | Explore experiences of gay and bisexual male youth who had an abstinence-only-until-marriage sexuality education in high school | Cross-sectional, semi-structured interviews | Large West Coast university and city, 2005-2006 | Convenience sample recruited by flyers at a university and locations frequented by gay and bisexual men | n = 8 | Gay and bisexual male youth | 20.75 (18-24) | White: 75%  Chinese: 12.5%  Half Native American/Half White: 12.5% | Gay: 75%  Bisexual: 25% | Male: 100% |
| Flores et al., (2011)19 | Examine YMSM’s perspectives regarding the design and efficacy of current HIV prevention interventions | Cross-sectional, semi-structured interviews | Major southeastern metropolitan area, 2009-2010 | Convenience sample recruited at HIV service organizations by case managers, flyers | n = 10 | YMSM living with HIV | 21 (18-24) | African-American: 90%  Latino: 10% | Gay: 100% | Male: 100% |
| Garofalo et al., (2012)34 | Pilot test group-based HIV prevention intervention for young transgender women | Pre-post study, no comparison group | Chicago, IL, 2008  ` | Convenience sample recruited at public locations frequented by transgender women, flyers, community organizations | Baseline n = 51  Follow-up n = 43 (at 3 months) | Adolescents and young adult transgender women | 21 (eligibility range: 16 to 24) | At baseline:  African American: 67%  White: 14%  Asian/Pacific Islander: 8%  American Indian/Native Alaskan: 8%  Other or multi-racial: 4%  Hispanic: 29% | At baseline:  Homosexual/gay: 61%  Bisexual: 16%  Heterosexual/straight: 14%  Lesbian: 6% | At baseline:  Transgender: 67%  Male: 29%  Female: 4% |
| Glick & Golden (2014)48 | Assess the relationship between receipt of sex education and HIV/STI risk among YMSM | Cohort study, serial online retrospective surveys | Seattle, Washington, 2009-2010 | Convenience sample recruited through Facebook, referrals, community- or college-organizations, STD clinic | n = 94 | YMSM | 21 (eligibility range: 16 to 30) | Latino and/or Non-white race: 40.4% | Gay: 84% | Male: 100% |
| Gowen & Winges-Yanez, (2014)23 | Explore school-based sexuality education experiences of LGBTQ youth and suggestions for improvement | Cross-sectional, semi-structured focus groups | Oregon | Convenience sample obtained by contacting organizers at LGBTQ youth Oregon youth centers | n = 30 | LGBTQ youth | NR (16-20) | White: 56.7%  Asian: 16.7%  Latino(a): 13.3%  Pacific Islander: 3.3% | Bisexual: 13.3%  Lesbian: 16.7%  Gay: 16.7%  Questioning: 23.3%  Undisclosed: 16.7% | Transgender: 13.3%  Undisclosed: 16.7% |
| Greene et al., (2015)17 | Assess preferences for intervention content and format for young same-sex couples | Cross-sectional, dyadic couple interviews | NR | Convenience sample recruited from two ongoing, longitudinal cohort studies of LGBT youth | Total n = 36 couples | Young same-sex couples | 22.21 (18-46) | African American: 56.9%  Hispanic/Latino: 15.3%  Caucasian: 16.7%  Other/multi-racial: 11.1% | Gay/Lesbian: 79.2%  Bisexual: 13.9%  Heterosexual/Other: 2.8% | Male: 54.2%  Female: 40.3%  Transgender: 5.6% |
| Greene et al., (2016)35 | Report on the evaluation of Keep It Up!, an online HIV prevention intervention | Pre-post study, no comparison group | Chicago, Illinois, 2012-2013 | Convenience sample recruited by HIV testing counselors, online and print ads, referrals, LGBT community center | Baseline n = 343  Follow-up n = 200 (at 12-weeks) | YMSM | 21.52 (eligibility range: 18-24) | At baseline:  African American: 31.6%  Latino: 21.6%  White: 33.9%  Other: 12.9% | At baseline:  Gay/homosexual: 73.4%  Bisexual/other: 26.3% | At baseline:  Male: 92.8%  Female: 1.8%  Transgender: 5% |
| Hidalgo et al., (2015)38 | Determine efficacy, feasibility, and acceptability of a group-based, HIV primary prevention intervention | RCT | Large Midwestern city | Convenience sample recruited at public events frequented by LGBT youth, LGBT community organizations, high school GSAs, college groups | Baseline n = 101  Any follow-up n = 75 | YMSM | 18.8 (16-20.9) | At baseline:  White: 22.8%  Black/African American: 38.6%  Hispanic/Latino: 26.7%  Other including multi-racial: 11.9% | MSM: 100% | Male: 100% |
| Holloway et al., (2012)32 | Describe the types of HIV prevention activities at House and Ball communities and solicit recommendations | Cross-sectional, semi-structured interviews | Los Angeles, CA, 2008-2009 | Convenience sample of local leaders of House and Ball communities | n = 26 | Leaders of the House and Ball communities | Based on quantitative sample from which qualitative participants were recruited from: 23.74 (17 -53) | NR | NR | NR |
| Hosek et al., (2013)45 | Describe the integration of a behavioral intervention into a PrEP pilot trial | Process evaluation, including evaluation forms, fidelity logs, acceptability questionnaire, and qualitative interviews | Chicago, IL | Convenience sample | n = 58 | YMSM | 19.97 (eligibility range: 18-22) | Black/African American: 53.45%  Native American/Alaskan Native: 1.72%  White: 6.90%  Other/Mixed Race: 37.93%  Hispanic or Latino: 39.66%  Non-Hispanic or Latino: 60.34% | At least one episode of unprotected anal intercourse with a male in the past 12 months: 100% | Male: 100% |
| Hosek et al., (2015)42 | Test feasibility, acceptability, and preliminary efficacy of an HIV prevention intervention | Serial cross-sectional surveys | NR | Convenience sample recruited at a community-based organization | n = 406 | Black YMSM | 20.93 (eligibility range: 15-24) | Black: 100% | Gay: 63.5%  Bisexual: 17.0%  Straight: 7.6%  Other: 11.8% | Cis-male: 90.1%  Male-to-female trans: 7.6%  Female-to-male-trans: 1.5% |
| Jones et al., (2008)43 | Assess efficacy of an HIV intervention for Black men who have sex with men (MSM) | Serial cross-sectional surveys | North Carolina, 2004-2005 | Convenience sample recruited at nightclubs | n = 1190 | Black MSM | 22.8 (18-30) | Black or African American: 100% | Report oral or anal intercourse with a man in the past year: 100%  Nongay identified: 43.0% | Male: 100% |
| Kubicek et al., (2010)18 | Explore how  YMSM receive relevant information on sexual health/behavior | Cross-sectional, semi-structured interviews | Los Angeles, California, 2006-2007 | Participants were recruited from the Healthy Young Men’s Study | n = 58 | YMSM | NR (eligibility range: 18 to 24) | Caucasian: 35%  African-American: 32%  Mexican descent: 33% | Gay: 72%  Bisexual: 14%  Straight: 2%  Other same-sex identity: 11%  Don't know/ refused: 2% | Male: 100% |
| Linville (2011)25 | Analyze school norms and sex education policies using participatory action research | Participatory action research (PAR) project  Cross-sectional Q sort task | New York City, New York | Convenience sample | PAR youth n = 8  Q Sort n = 21 | Non-heterosexual/gender non-conforming youth | NR (PAR eligibility range: 15-18) | NR | PAR youth: non-heterosexual: 100% | NR |
| Mustanski et al., (2013)36 | Examine the feasibility, acceptability, and preliminary efficacy of the HIV prevention program Keep It Up! | RCT | Chicago, IL, 2009-2010 | Convenience sample recruited by HIV/AIDS test counselors | Baseline n = 102  Follow-up n = 90 (at 12 weeks) | YMSM | 21.3 (18-24) | At baseline:  White, Latino: 46.1%  White, Non-Latino: 25.5%  African American: 12.7%  Other: 15.7% | At baseline:  Gay/homosexual: 82.3%  Bisexual/other: 17.7% | Male: 100% |
| Mustanski et al., (2015)41 | Determine the feasibility, acceptability, and efficacy of an online sexual health intervention | Pre-post study, no comparison group | United States, 2012-2013 | Convenience sample recruited online and via organizations | Baseline n = 276  Follow-up n = 202 (completed post-test) | LGBT Youth | 17.9 (16-20) | Among those who completed post-test:  White: 79.2%  Latino: 10.4%  Black: 3.0%  Other: 7.4% | Among those who completed post-test:  Gay: 44.6%  Lesbian: 25.7%  Bisexual: 15.3%  Queer: 13.4%  Unsure/ Questioning: 1.0% | Among those who completed post-test:  Cisgender male: 51.0%  Cisgender female: 41.6%  Transgender male to female: 2.0%  Transgender female to male: 5.0% |
| Mutchler (2000)20 | Explore how young gay men produce a change in safer sex norms | Multimethod ethnography, including on-site observations and semi-structured interviews | Santa Barbara, California, 1993-94 | Convenience sample of Pride Mission members | n = 20 | Gay and bisexual men | Pride mission core: 24 (19-30)  Phoenix rising core: NR (18-29) | Pride mission core:  White: 55.0%  Latino: 35.0%  Black: 5.0%  Asian: 5.0%  Phoenix rising:  White: 60.0%  Latino: 40.0% | Pride mission core:  Gay or bisexual: 100% | Male: 100% |
| Pingel et al., (2013)29 | Explore what young gay, bisexual and questioning men learned in school-based sex education | Cross-sectional, semi-structured interviews | Michigan | Convenience sample recruited through online advertisements, referrals, and flyers | n = 30 | Young gay, bisexual and questioning men | 21.96 (eligibility range: 18-24) | White: 60.0%  African American: 40.0%  White/Latino: 6.7%  African American/Latino: 3.3% | Gay: 70.0%  Gay/bisexual: 6.7%  Bisexual: 13.3%  Questioning/gay: 3.3%  Gay/trans: 3.3%  Trans: 3.3% | Gay/trans: 3.3%  Trans: 3.3% |
| Rose & Friedman, (2017)28 | Examine African American SGM males’ perception of school-based sexual health education | Cross-sectional, including focus groups and in-depth interviews | Metropolitan area in the Southeastern United States | Convenience sample recruited through flyers and announcements made at local SGM youth organizations | n = 42 | African American SGM males | 19.4 (18-21) | African American: 100% | Sexual or gender minority: 100% | Male: 100% |
| Seal et al., (2000)30 | Explore YMSM perspectives on HIV prevention programs | Cross-sectional, in-depth qualitative interviews | Milwaukee, WI and Detroit, MI, 1997 | Convenience sample | n = 72 | YMSM | 20.9 (16-25) | White: 44%  Black/African-American: 32%  Latino: 10%  Biracial: 8%  Asian-American: 4%  Middle Eastern: 1% | Gay: 69%  Bisexual: 14%  Heterosexual: 1%  Gay/bisexual: 6%  Ambivalent or exploring: 6% | Transgender: 3% |
| Snapp et al., (2015)27 | Explore students’ experiences of LGBTQ-inclusive curriculum | Cross-sectional, focus groups | California, 2011 | Convenience sample recruited from the Gay Straight Alliance (GSA) network | n = 26 | Students who indicated they experienced LGBTQ-inclusive curriculum in their school | NR (NR)\*  All participants were high school aged, except for 1 college freshman | White: 34.6%  Biracial or multiracial: 34.6%  Latino/a: 23.1%  African American: 3.8%  Asian American: 3.8% | Queer and/or pansexual: 30.8%  Lesbian/gay: 23.1%  Bisexual: 15.4%  Questioning: 11.5%  Straight/heterosexual: 7.7%  Straight and questioning: 3.8%  Panromantic asexual: 3.8%  “attracted to girls”: 3.8% | Female-assigned: 53.8%  Male-assigned: 15.4%  Trans\* (including genderqueer, gender questioning): 30.8% |
| Steinke et al., (2017)24 | Obtain perspectives of SGMY to guide and inform the development of new digital health interventions | Cross-sectional, semi-structured interviews, in-person and online focus groups | Dallas, Texas  Seattle, Washington  Online | Convenience sample recruited from SGM service organizations, online ads, and existing research panel | n = 92 | SGM Youth | 17.0 (15-20) | White: 52.2%  Hispanic/Latino: 16.3%  African-American/Black: 13.0%  Mixed race: 11.9%  Asian: 5.4%  American-Indian/Alaskan Native: 1.1% | Gay (male): 33.7%  Lesbian: 20.6%  Bisexual (female): 16.3%  Queer: 10.9%  Questioning: 10.9%  Pansexual: 9.8%  Bisexual (male): 6.5%  Unreported: 5.4%  Asexual: 2.2%  Panromantic: 2.2%  Homoromantic: 1.1%  Demisexual: 1.1% | Female: 41.3%  Male: 40.2%  Transgender man: 14.1%  Gender fluid: 9.8%  Gender queer: 6.5%  Agender: 2.2%  Demigirl: 1.1%  Nonbinary: 1.1%  Transgender woman: 1.1%  Unreported: 1.1% |
| Widman et al., (2017)46 | Assess feasibility and acceptability of HIV/STD prevention program for adolescent girls | Post-test survey, no comparison group | Southeastern United States, 2015 | Convenience sample recruited from high schools | n = 107 (intervention condition only) | Adolescents girls | 15.26 (14-17) | White: 36%  Black: 27%  Hispanic: 29%  Other: 7% | Lesbian: 4%  Bisexual: 12%  Heterosexual: 79%  Other: 6% | Female: 100% |
| Ybarra et al., (2014)44 | Examine behavioral and attitudinal changes after online focus groups about GBQ sexual health topics | Online focus groups conducted over the course of 3 consecutive days | United States, 2012-2013 | Convenience sample recruited through online ads and outreach by LGB organizations | n = 75 | Gay, bisexual, and queer adolescent males | 16.15 (14-18) | Caucasian: 54.7%  African American: 5.3%  Asian: 5.3%  Mixed racial background: 18.7%  Native American or Alaskan Native: 1.3%  Other: 14.7%  Hispanic: 25.3% | Gay: 86.7%  Bisexual: 18.7%  Queer: 5.3% | Male: 100% |
| Ybarra et al., (2017)39 | Conduct pilot randomized controlled trial for an mHealth HIV prevention program | RCT | United States, 2014-2015 | Convenience sample recruited through online ads on Facebook | Baseline n = 302  Follow-up n = 283 (90-days post-intervention) | Adolescent gay, bisexual, and queer men | 16.14 (14-18) | Among those who completed 3-month follow-up:  White: 67.1%  African American: 14.8%  All other races: 18.0%  Hispanic: 22.6% | Among those who completed 3-month follow-up:  Gay identity: 71.7% | Among those who completed 3-month follow-up:  Cisgender male: 100% |

NR (not reported), HIV (human immunodeficiency virus), acquired immunodeficiency syndrome (AIDS), RCT (randomized controlled trial), YMSM (young men who have sex with men), men who have sex with men (MSM), lesbian, gay, bisexual, transgender, and queer/questioning (LGBTQ), lesbian, gay, bisexual, and transgender (LGBT), lesbian, gay, bisexual (LGB), pre-exposure prophylaxis (PrEP), sexual and gender minority (SGM)