

DATA AND ANALYSES

Comparison 1. Comparison intervention versus control

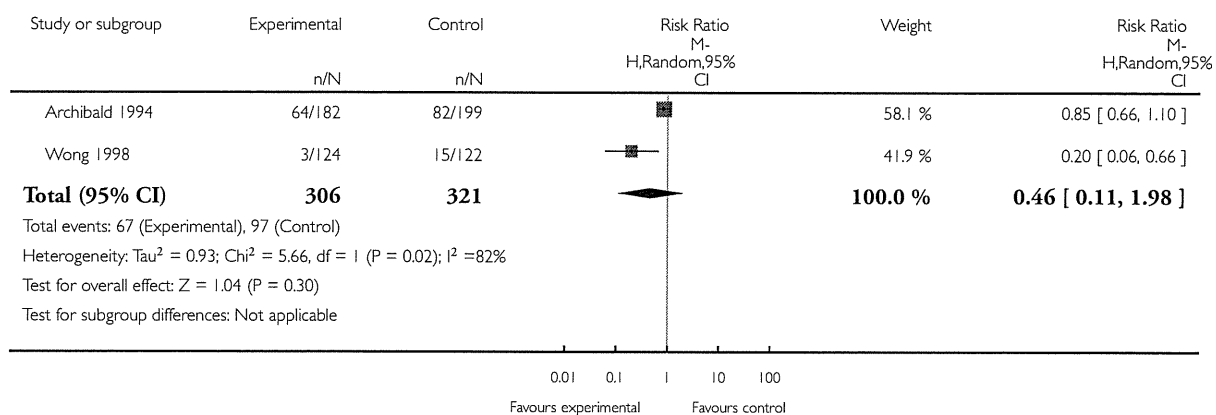
| Outcome or subgroup title | No. of studies | No. of participants | Statistical method | Effect size |
|---|----------------|---------------------|----------------------------------|-------------------|
| 1 STI incidence for sex workers | 2 | 627 | Risk Ratio (M-H, Random, 95% CI) | 0.46 [0.11, 1.98] |
| 2 STI prevalence for clients of sex workers | 1 | 288 | Risk Ratio (M-H, Fixed, 95% CI) | 0.09 [0.01, 0.72] |
| 3 Condom use for sex workers | 3 | 1133 | Risk Ratio (M-H, Fixed, 95% CI) | 1.04 [0.99, 1.09] |
| 3.1 Randomised control trial | 1 | 506 | Risk Ratio (M-H, Fixed, 95% CI) | 1.00 [0.96, 1.03] |
| 3.2 Quasi-experimental pretest-posttest with control group | 2 | 627 | Risk Ratio (M-H, Fixed, 95% CI) | 1.08 [0.99, 1.18] |
| 4 Condom use for clients of sex workers | 1 | 26 | Risk Ratio (M-H, Fixed, 95% CI) | 1.10 [0.69, 1.75] |
| 5 Knowledge of HIV transmission for sex workers | 1 | 381 | Risk Ratio (M-H, Fixed, 95% CI) | 1.82 [1.55, 2.14] |
| 6 Knowledge of HIV transmission for clients of sex workers | 1 | 287 | Risk Ratio (M-H, Fixed, 95% CI) | 1.93 [1.46, 2.55] |
| 7 Visited female sex workers (for clients of sex workers) | 1 | 286 | Risk Ratio (M-H, Fixed, 95% CI) | 0.54 [0.25, 1.18] |
| 8 Perceiving very high efficacy of condom use for HIV prevention (For clients of sex workers) | 1 | 287 | Risk Ratio (M-H, Fixed, 95% CI) | 1.35 [0.89, 2.04] |
| 9 physical victimization for sex workers | 1 | 506 | Risk Ratio (M-H, Fixed, 95% CI) | 0.99 [0.63, 1.56] |
| 10 Sexual victimization for sex workers | 1 | 506 | Risk Ratio (M-H, Fixed, 95% CI) | 0.99 [0.53, 1.86] |

Analysis 1.1. Comparison 1 Comparison intervention versus control, Outcome 1 STI incidence for sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 1 STI incidence for sex workers

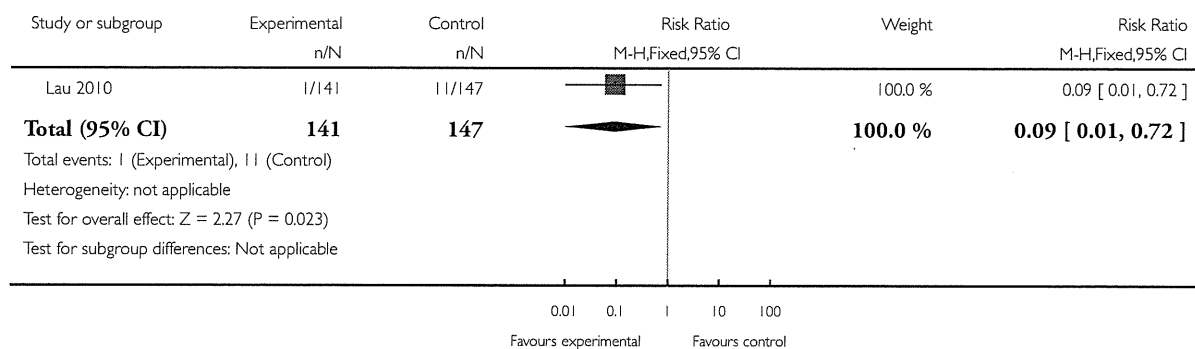


Analysis 1.2. Comparison 1 Comparison intervention versus control, Outcome 2 STI prevalence for clients of sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 2 STI prevalence for clients of sex workers

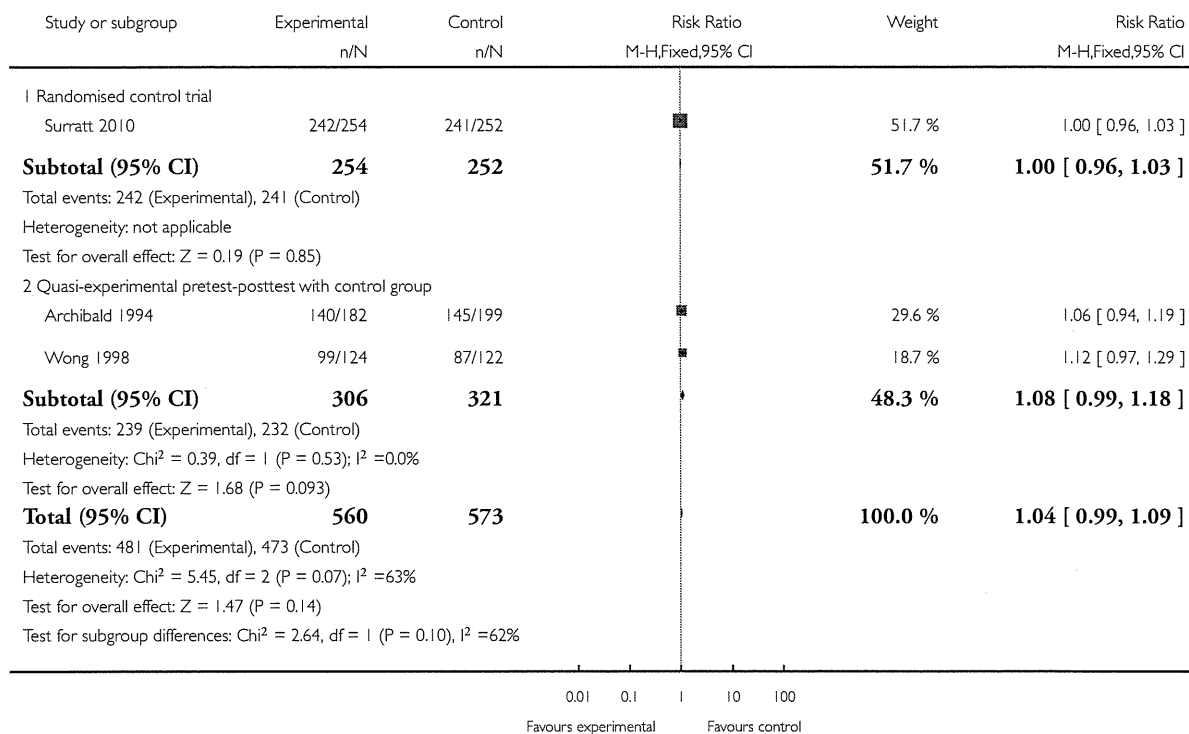


Analysis 1.3. Comparison 1 Comparison intervention versus control, Outcome 3 Condom use for sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 3 Condom use for sex workers

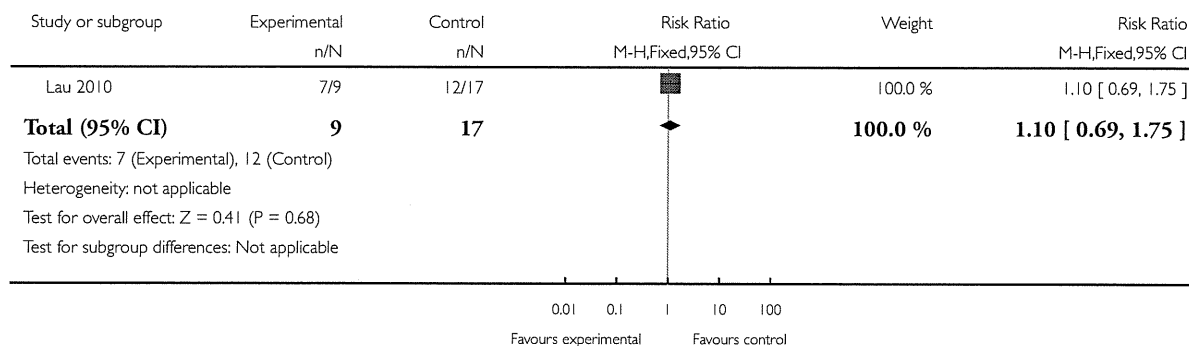


Analysis 1.4. Comparison 1 Comparison intervention versus control, Outcome 4 Condom use for clients of sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 4 Condom use for clients of sex workers

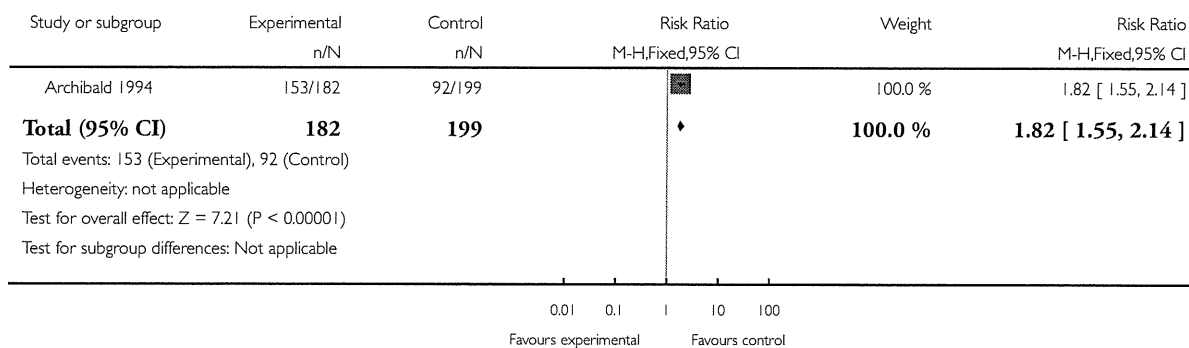


Analysis 1.5. Comparison 1 Comparison intervention versus control, Outcome 5 Knowledge of HIV transmission for sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 5 Knowledge of HIV transmission for sex workers

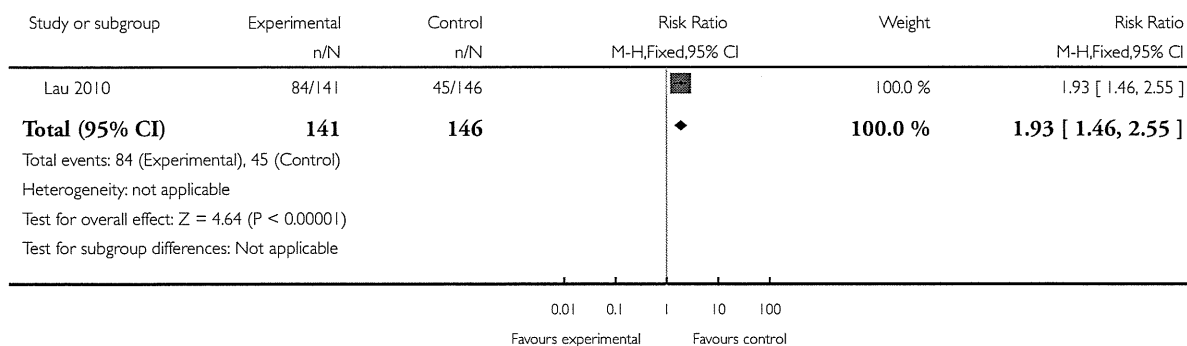


Analysis 1.6. Comparison 1 Comparison intervention versus control, Outcome 6 Knowledge of HIV transmission for clients of sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 6 Knowledge of HIV transmission for clients of sex workers

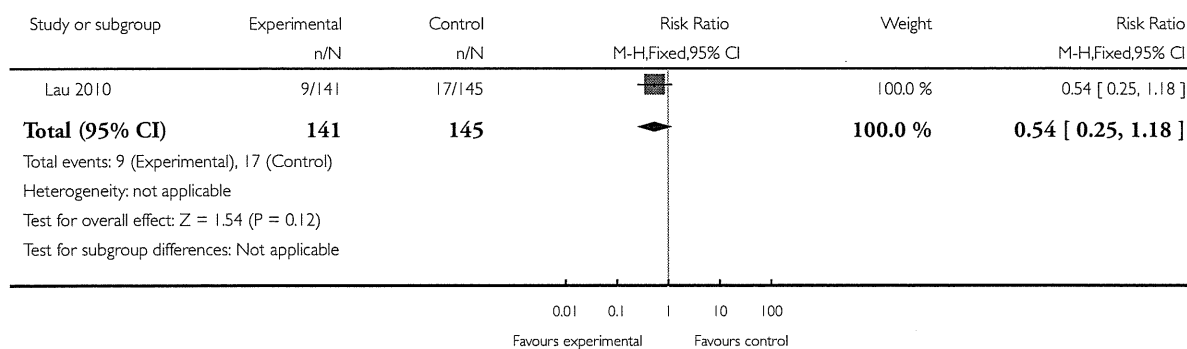


Analysis 1.7. Comparison 1 Comparison intervention versus control, Outcome 7 Visited female sex workers (for clients of sex workers).

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 7 Visited female sex workers (for clients of sex workers)

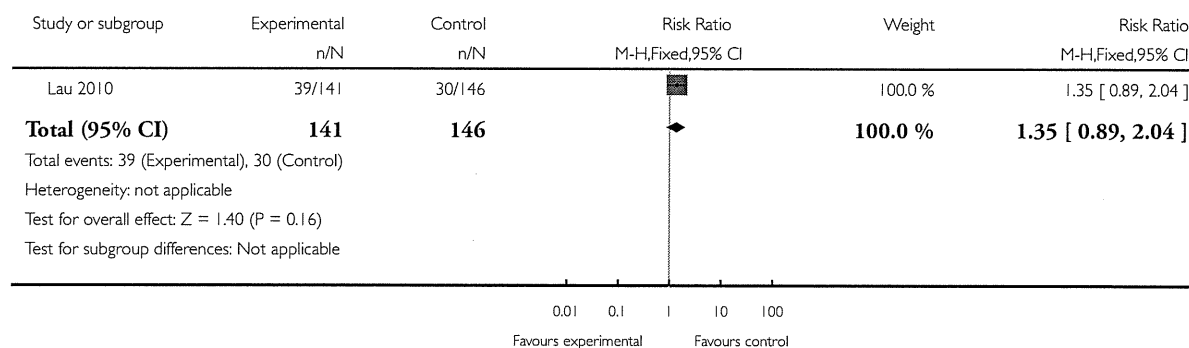


Analysis 1.8. Comparison 1 Comparison intervention versus control, Outcome 8 Perceiving very high efficacy of condom use for HIV prevention (For clients of sex workers).

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 8 Perceiving very high efficacy of condom use for HIV prevention (For clients of sex workers)

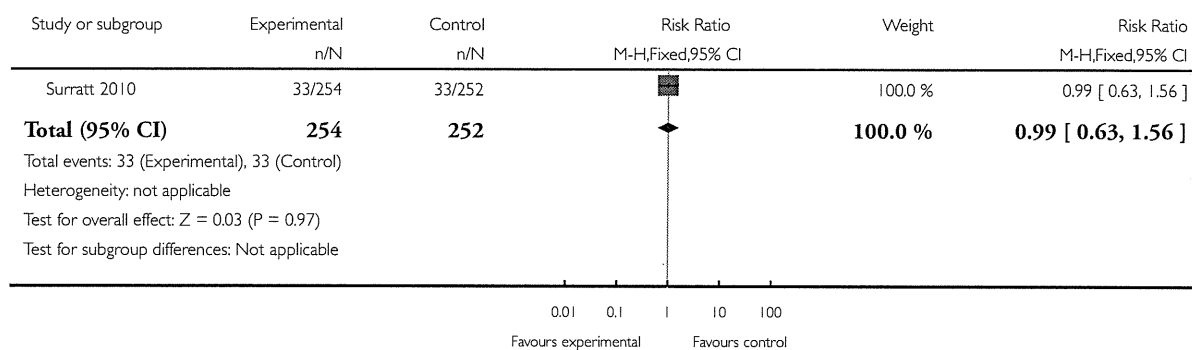


Analysis 1.9. Comparison 1 Comparison intervention versus control, Outcome 9 physical victimization for sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 9 physical victimization for sex workers

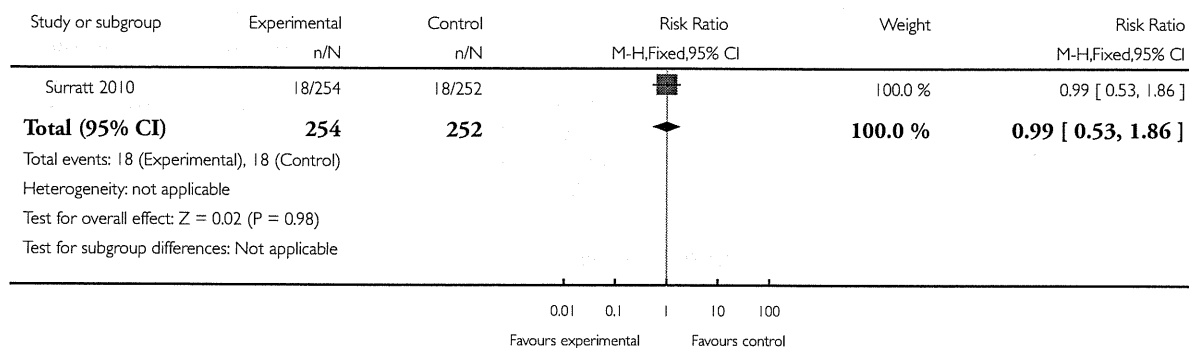


Analysis 1.10. Comparison 1 Comparison intervention versus control, Outcome 10 Sexual victimization for sex workers.

Review: Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

Comparison: 1 Comparison intervention versus control

Outcome: 10 Sexual victimization for sex workers



APPENDICES

Appendix 1. Table 1 Examples of search strategies

Table 1 Examples of search strategies

| PubMed: Date range ?1 January 1980- 23 July 2010 | |
|--|---|
| #44 | Search #39 AND #40 AND #41 AND #42 Limits: Publication Date from 1980/01/01 to 2010/07/23 |
| #43 | Search #39 AND #40 AND #41 AND #42 |
| #42 | Search intervention[tiab] OR interventions[tiab] OR risk reduction behavior[mh] OR risk reduction[tiab] OR risk reducing[tiab] OR Health Knowledge, Attitudes, Practice[mh] OR incidence[mh] OR incidence[tiab] OR prevalence[mh] OR prevalence[tiab] OR sexual behavior[mh] OR sexual behavior[tiab] OR sexual behaviour[tiab] OR intervention studies[mh] |
| #41 | Search prostitute[tiab] OR prostitutes[tiab] OR sex worker[tiab] OR sex workers[tiab] OR prostitution[mh] OR prostitution[tiab] |
| #40 | Search (randomized controlled trial [pt] OR controlled clinical trial [pt] OR randomized [tiab] OR placebo [tiab] OR drug therapy [sh] OR randomly [tiab] OR trial [tiab] OR groups [tiab]) NOT (animals [mh] NOT |

(Continued)

| | |
|---|--|
| | humans [mh]) |
| #39 | Search HIV Infections[MeSH] OR HIV[MeSH] OR HIV[tw] OR hiv-1*[tw] OR hiv-2*[tw] OR hiv1[tw] OR hiv2[tw] OR hiv infect*[tw] OR human immunodeficiency virus[tw] OR human immunodeficiency virus[tw] OR human immuno-deficiency virus[tw] OR human immunodeficiency virus[tw] OR ((human immun*) AND (deficiency virus[tw])) OR acquired immunodeficiency syndrome[tw] OR acquired immunodeficiency syndrome[tw] OR acquired immuno-deficiency syndrome[tw] OR acquired immune-deficiency syndrome[tw] OR ((acquired immun*) AND (deficiency syndrome[tw])) OR “sexually transmitted diseases, viral” [MH] |
| Cochrane CENTRAL Controlled Trials Register: Date range 1 January 1980 to 27 July 2010 | |
| #1 | MeSH descriptor HIV Infections explode all trees |
| #2 | MeSH descriptor HIV explode all trees |
| #3 | hiv OR hiv-1* OR hiv-2* OR hiv1 OR hiv2 OR HIV INFECT* OR HUMAN IMMUNODEFICIENCY VIRUS OR HUMAN IMMUNODEFICIENCY VIRUS OR HUMAN IMMUNODEFICIENCY VIRUS OR HUMAN IMMUNODEFICIENCY VIRUS OR HUMAN IMMUN* DEFICIENCY VIRUS OR ACQUIRED IMMUNODEFICIENCY SYNDROME OR ACQUIRED IMMUNODEFICIENCY SYNDROME OR ACQUIRED IMMUNODEFICIENCY SYNDROME OR ACQUIRED IMMUNODEFICIENCY SYNDROME OR ACQUIRED IMMUNODEFICIENCY SYNDROME |
| #4 | MeSH descriptor Lymphoma, AIDS-Related, this term only |
| #5 | MeSH descriptor Sexually Transmitted Diseases, Viral, this term only |
| #6 | (#1 OR #2 OR #3 OR #4 OR #5) |
| #7 | prostitute* OR sex worker* OR prostitution |
| #8 | MeSH descriptor Prostitution, this term only |
| #9 | (#7 OR #8) |
| #10 | intervention* OR risk reduction OR risk reducing OR incidence OR prevalence OR sexual behavior OR sexual behaviour |
| #11 | MeSH descriptor Health Knowledge, Attitudes, Practice, this term only |
| #12 | MeSH descriptor Risk Reduction Behavior, this term only |

(Continued)

| | |
|---|--|
| #13 | MeSH descriptor Sexual Behavior, this term only |
| #14 | MeSH descriptor Intervention Studies, this term only |
| #15 | (#10 OR #11 OR #12 OR #13 OR #14) |
| #16 | (#6 AND #9 AND #15) |
| #17 | (#6 AND #9 AND #15), from 1980 to 2010 |
| EMBASE: Date range 1 January 1980 ? 23 July 2010 | |
| #6 | #1 AND #2 AND #3 AND #4 AND [humans]/lim AND [embase]/lim AND [1980-2010]/py |
| #5 | #1 AND #2 AND #3 AND #4 |
| #4 | intervention OR interventions OR 'risk reduction'/de OR 'risk reduction' OR 'risk reducing' OR 'attitudes to health' OR 'prevalence'/de OR prevalence OR 'incidence'/de OR incidence |
| #3 | 'prostitute'/de OR prostitute OR prostitutes OR 'prostitution'/de OR prostitution OR 'sex worker' OR 'sex workers' OR 'callgirl'/de OR callgirl OR callgirls |
| #2 | random*:ti OR random*:ab OR factorial*:ti OR factorial*:ab OR cross?over*:ti OR cross?over*:ab OR crossover*:ti OR crossover*:ab OR placebo*:ti OR placebo*:ab OR (doubl*:ti AND blind*:ti) OR (doubl*:ab AND blind*:ab) OR (singl*:ti AND blind*:ti) OR (singl*:ab AND blind*:ab) OR assign*:ti OR assign*:ab OR allocat*:ti OR allocat*:ab OR volunteer*:ti OR volunteer*:ab OR 'crossover procedure'/exp OR 'crossover procedure'/de OR 'crossover procedure' OR 'double-blind procedure'/exp OR 'double-blind procedure'/de OR 'double-blind procedure' OR 'single-blind procedure'/exp OR 'single-blind procedure'/de OR 'single-blind procedure' OR 'randomized controlled trial'/exp OR 'randomized controlled trial'/de OR 'randomized controlled trial' |
| #1 | 'human immunodeficiency virus infection'/exp OR 'human immunodeficiency virus infection'/de OR 'human immunodeficiency virus infection' OR 'human immunodeficiency virus'/exp OR 'human immunodeficiency virus'/de OR 'human immunodeficiency virus' OR hiv:ti OR hiv:ab OR 'hiv-1':ti OR 'hiv-1':ab OR 'hiv-2':ti OR 'hiv-2':ab OR 'human immunodeficiency virus':ti OR 'human immunodeficiency virus':ab OR 'human immuno-deficiency virus':ti OR 'human immuno-deficiency virus':ab OR 'human immunodeficiency virus':ti OR 'human immunodeficiency virus':ab OR 'human immune-deficiency virus':ti OR 'human immune-deficiency virus':ab OR 'acquired immune-deficiency syndrome':ti OR 'acquired immune-deficiency syndrome':ab OR 'acquired immunodeficiency |

(Continued)

syndrome':ti OR 'acquired immunodeficiency syndrome':ab OR 'acquired immunodeficiency syndrome':ti OR 'acquired immunodeficiency syndrome':ab OR 'acquired immuno-deficiency syndrome':ti OR 'acquired immuno-deficiency syndrome':ab

HISTORY

Protocol first published: Issue 2, 2006

Review first published: Issue 12, 2011

| Date | Event | Description |
|------------------|---|--|
| 15 November 2010 | New search has been performed | New full review. |
| 15 February 2010 | New citation required and major changes | Made protocol a "clean slate" for new author team. |
| 11 November 2008 | Amended | Converted to RevMan 5, and re-published without new citation |

CONTRIBUTIONS OF AUTHORS

Erika Ota (EO) and Windy Wariki (WW) designed, set up and drafted the review. Narumi Hori (NH), Rintaro Mori (RM) and Kenji Shibuya (KS) commented upon and revised the article. All the authors approved the final review.

DECLARATIONS OF INTEREST

We declare that we have no conflict of interest.

SOURCES OF SUPPORT

Internal sources

- Department of Global Health Policy, Graduate School of Medicine, The University of Tokyo, Japan.

External sources

- Health Labour Sciences Research Grant, Japan.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Violence against sex workers, whether physical, psychological or sexual victimisation, was not listed in the protocol as a secondary outcome. This was added as a relevance to the high risk of transmission of HIV infection.

INDEX TERMS

Medical Subject Headings (MeSH)

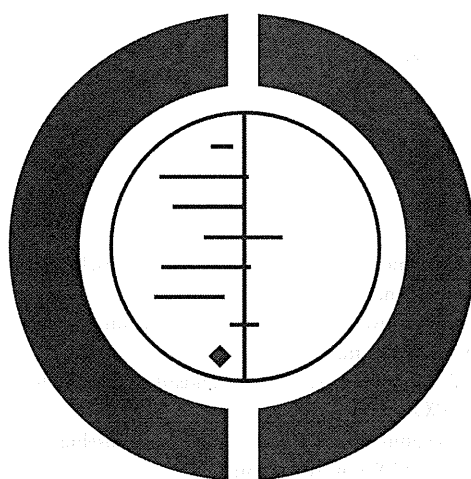
*Sex Workers; Condoms [utilization]; Counseling; Developed Countries; HIV Infections [*prevention & control; transmission]; Health Knowledge, Attitudes, Practice; Negotiating; Randomized Controlled Trials as Topic; Safe Sex

MeSH check words

Female; Humans; Male

Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries (Review)

Wariki WMV, Ota E, Mori R, Koyanagi A, Hori N, Shibuya K



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Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries (Review)

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[Intervention Review]

Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries

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ABSTRACT

Background

Various interventions have been adopted to reduce HIV transmission among sex workers and their clients but the effectiveness of these strategies has yet to be investigated using meta-analytic techniques.

Objectives

To evaluate the effectiveness of behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries.

Search methods

The Cochrane Central Register of Controlled Trials (CENTRAL), the Cochrane HIV/AIDS group specialized register, the Cochrane Database of Systematic Reviews, MEDLINE, PsycINFO, Sociological Abstracts, CINAHL, Dissertation Abstract International (DAI), EMBASE, LILACS, BIOSIS, SciSearch, INDMED, Proquest, and various South Asian abstracting databases were included in the database list. The publication sites of the World Health Organization, the US Centers for Disease Control and Prevention, and other international research and non-governmental organizations also appeared in the database list.

Selection criteria

Randomized controlled trials (RCTs) and quasi-RCTs examining the effects on HIV transmission risk of different behavioral interventions or comparing behavioral interventions with no intervention, where described any one of the outcome measures, such as HIV incidence and prevalence, STI incidence and prevalence, change in self-reported of condom use, and other HIV-related outcome.

Data collection and analysis

Two authors independently assessed trials, extracted data and assessed the risk bias. Heterogeneity amongst trials was also tested.

Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries (Review)

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Main results

A total of 13 trials with 8,698 participants were included. Primary outcomes (HIV and STI prevalence and incidence) were reported in seven trials. Of these, HIV incidence was reported in only three trials. After a 6-month follow-up assessment, there was no evidence that social cognitive behavioral intervention was effective in reducing HIV incidence (RR 0.12, 95% CI 0.01 to 2.22). However, there was a reduction in HIV incidence at 3-month follow-up assessment of promotion of female and male condom (RR 0.07, 95% CI 0.00 to 1.38). Social cognitive interventions and promotion of female and male condom use were significantly reduced STIs incidence (RR 0.57, 95% CI 0.34 to 0.96) and (RR 0.63, 95% CI 0.45 to 0.88), respectively. Secondary outcomes were identified in 13 trials. Meta-analyses showed evidence that interventions to promote the use of female and male condoms do reduce non-condom use (RR 0.83, 95% CI 0.65 to 1.05) compared to promotion of male condoms alone, and that social cognitive interventions reduced drug use among sex workers (RR 0.65, 95% CI 0.36 to 1.16) compared to standard care.

Authors' conclusions

Available evidence nevertheless suggests that compared with standard care or no intervention, behavioral interventions are effective in reducing HIV and the incidence of STIs amongst female sex workers (FSWs). Given the benefits of social cognitive theory and the promotion of condom use in reducing HIV/STI and the public health need to control transmission amongst FSWs, there is a clear finding in favour of behavioral interventions. However, it should be recognized that there is a lack of information about most other outcomes and target populations, and that all of the trials were conducted in low- and middle-income countries.

PLAIN LANGUAGE SUMMARY

Behavioral interventions to reduce HIV incidence and HIV/STI prevalence among female sex workers in low- and middle-income countries

The rates of human immunodeficiency virus (HIV) and sexually transmitted infection (STI) transmission continue to increase, particularly among sex workers and their clients in low- and middle-income countries. Prevention efforts directed towards these infections in this at-risk population may have had an effect in reducing the overall transmission of HIV/STIs in the general population. Several successful behavioral interventions have been reported including interventions to reduce HIV/STI incidence and prevalence, change behavior, promote condom use, improve condom availability, and increase sexual health knowledge. The review found seven individual randomised controlled trials (RCTs), two cluster-RCTs and four quasi-RCTs involving 8,698 participants examining a variety of behavioral interventions to evaluate whether they reduced HIV/STIs rates or resulted in changed behavior among sex workers and their clients. Results showed that the interventions were effective in HIV/STI prevention, including reducing the incidence and prevalence of HIV and STIs. Furthermore, there were some differences in self-reported behavior including increased condom use and a reduction in the risk of drug use. However, these trials were small and generally had few participants. As a result, evidence for the effectiveness of social cognitive theory and promoting condom use in reducing HIV/STI incidence compared to other behavioral interventions was limited, because no RCTs examined the effects of these interventions on HIV prevalence or on sex workers other than FSWs. In future research and program agendas therefore it is important to assess other potentially more potent behavioral change strategies.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

| Social cognitive theory compared to standard counseling for promotion of condom use for sex workers | | | | | | |
|--|---|--------------------------|---------------------------|------------------------------|---------------------------------------|----------|
| Patient or population: sex workers Settings: low- and middle-income countries Intervention: Social cognitive theory Comparison: standard counseling for promotion of condom use | | | | | | |
| Outcomes | Illustrative comparative risks* (95% CI) | | Relative effect (95% CI) | No of Participants (studies) | Quality of the evidence (GRADE) | Comments |
| | Assumed risk | Corresponding risk | | | | |
| | standard counseling for promotion of condom use | Social cognitive theory | | | | |
| HIV incidence among FSWs at 6-month | Study population | | RR 0.12 (0.01 to 2.22) | 709 (1 study) | ⊕⊕⊕○ moderate ^{1,2,3,4,5} | |
| | 11 per 1000 | 1 per 1000 (0 to 24) | | | | |
| | Medium risk population | | | | | |
| | 11 per 1000 | 1 per 1000 (0 to 24) | | | | |
| Syphilis incidence among FSWs at 6-month | Study population | | RR 0.46 (0.18 to 1.19) | 709 (1 study) | ⊕⊕⊕○ moderate ^{1,2,3,4,5} | |
| | 38 per 1000 | 17 per 1000 (7 to 45) | | | | |
| | Medium risk population | | | | | |
| | 38 per 1000 | 17 per 1000 (7 to 45) | | | | |

| | | | | |
|---|--|----------------------------------|--------------------|---|
| Gonorrhoea incidence among FSWs at 6-month | Study population | RR 0.69 (0.3 to 1.58) | 709 (1 study) | ⊕⊕⊕○ moderate ^{1,2,3,4,5} |
| | 38 per 1000 26 per 1000 (11 to 60) | | | |
| | Medium risk population | | | |
| | 38 per 1000 26 per 1000 (11 to 60) | | | |
| Any STIs incidence among FSWs at 6-month | Study population | RR 0.57 (0.34 to 0.96) | 709 (1 study) | ⊕⊕⊕○ moderate ^{1,2,3,4,5} |
| | 103 per 1000 59 per 1000 (35 to 99) | | | |
| | Medium risk population | | | |
| | 103 per 1000 59 per 1000 (35 to 99) | | | |
| Consistent condom use by FSWs at 6-month | Study population | RR 1.14 (1.07 to 1.21) | 804 (2 studies) | ⊕○○○ very low ^{6,7,8,9,10} |
| | 767 per 1000 867 per 1000 (805 to 920) | | | |
| | Medium risk population | | | |
| | 789 per 1000 892 per 1000 (828 to 947) | | | |
| Drug use among FSWs at 6-month | Study population | RR 0.65 (0.36 to 1.16) | 772 (2 studies) | ⊕⊕○○ low ^{3,6,7,10,11} |
| | 141 per 1000 93 per 1000 (65 to 134) | | | |
| | Medium risk population | | | |

| | | | | | |
|--|-------------------------------|-------------------------------------|----------------------------------|--------------------|---|
| | 236 per 1000 | 156 per 1000 (109 to 224) | | | |
| Alcohol use among FSWs at 6-month | Study population | | RR 0.68 (0.46 to 1.00) | 772 (2 studies) | ⊕⊕○○ low ^{3,6,7,10,11} |
| | 144 per 1000 | 98 per 1000 (66 to 144) | | | |
| | Medium risk population | | | | |
| | 128 per 1000 | 87 per 1000 (59 to 128) | | | |

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio;

GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

¹ No serious limitations: Allocation concealment was judged to be at ' ' low risk of bias" in this trial.

² Single study.

³ No serious indirectness: Result is likely to be reliable.

⁴ Serious imprecision: The 95% CI of estimate crosses the line of no effect.

⁵ Bias was judged to be at ' ' low risk" in this trial.

⁶ Serious limitations: Allocation concealment was judged to be at ' ' low risk of bias" in Patterson study and ' ' unclear" in Wechsberg study.

⁷ No serious inconsistency: Heterogeneity was low.

⁸ Serious indirectness: There is considerable variability in the effect of control which makes extrapolation of result to other setting unreliable.

⁹ Very serious imprecision: The 95% CI of pooled estimate includes appreciable benefit to control group over intervention group.

¹⁰ Bias was judged to be at ' ' high risk" at Wechsberg trial.

¹¹ No serious imprecision: The 95% CI of estimate includes appreciable benefit to intervention group over control group.