

Preventing and Controlling Sexually Transmitted Infections in the United States

Seth Kalichman
University of Connecticut

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

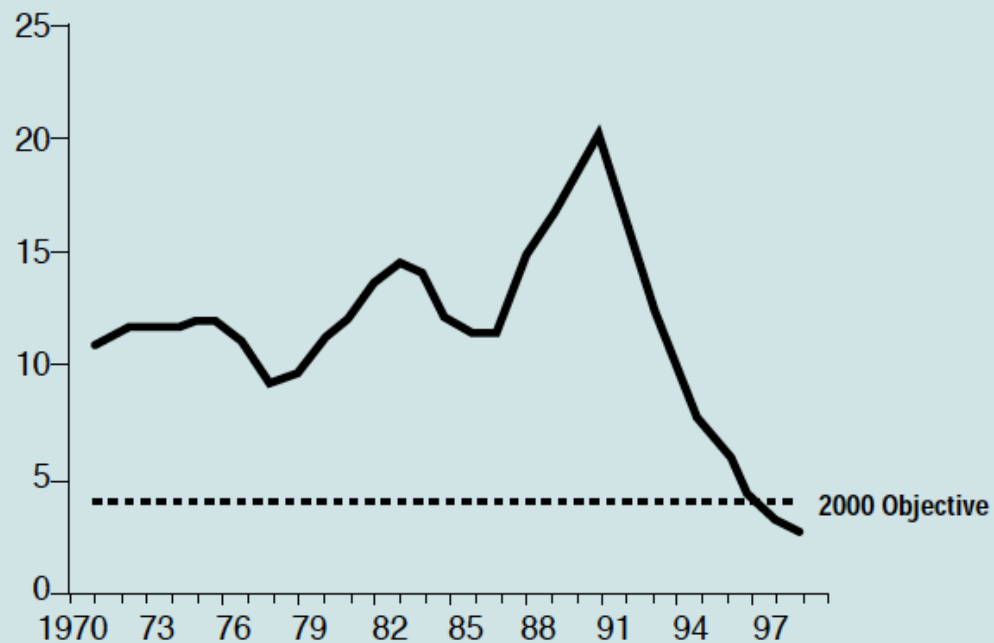
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Research supported by the National Institutes of Health
No other financial conflicts to disclose

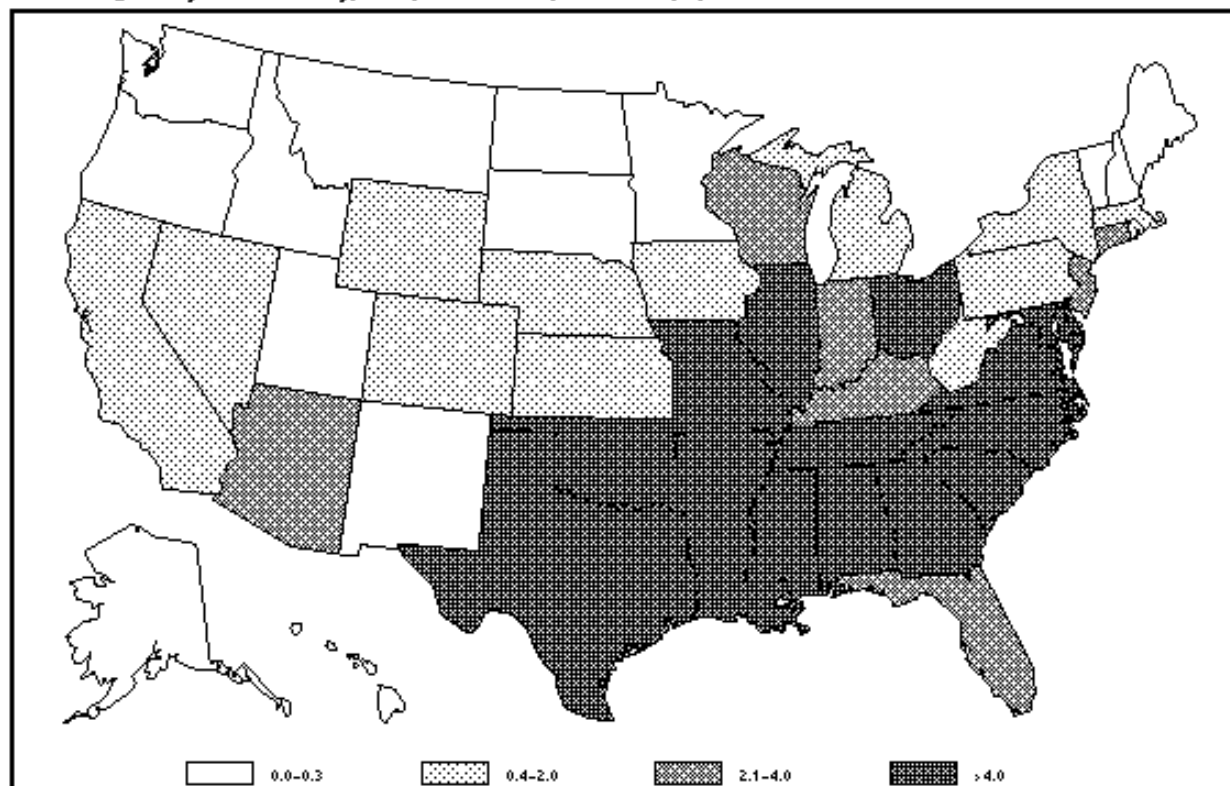
Syphilis in the United States, 1998

Primary and secondary syphilis—Reported rates:
United States, 1970-1998 and the Healthy People year
2000 objective.

Rate (per 100,000 population)



SYPHILIS (primary and secondary)—reported cases, per 100,000 population, United States, 1996



NOTE: The Year 2000 Objective is ≤ 4.0 per 100,000 population.

In 1996, the U.S. rate of primary and secondary syphilis was 4.3 per 100,000 population. However, 34 states reported rates that were below the revised national Healthy People 2000 objective; 13 states reported fewer than five cases.

The National Plan to Eliminate Syphilis from the United States

October 1999

Division of STD Prevention

National Center for HIV, STD, and TB Prevention

Centers for Disease Control and Prevention

Primary prevention activities, such as interventions to reduce risky sexual activity or increase condom use, play a critical role in syphilis elimination. These activities, as they have been carried out by HIV prevention programs, have already contributed to the current decline in syphilis rates in the U.S. Efforts should be made

Answering your questions.

Over the last decade, for whom and under what conditions or in what settings have we seen efficacious interventions to reduce risk or prevent STI or HIV risk in groups with the highest burden of infection?

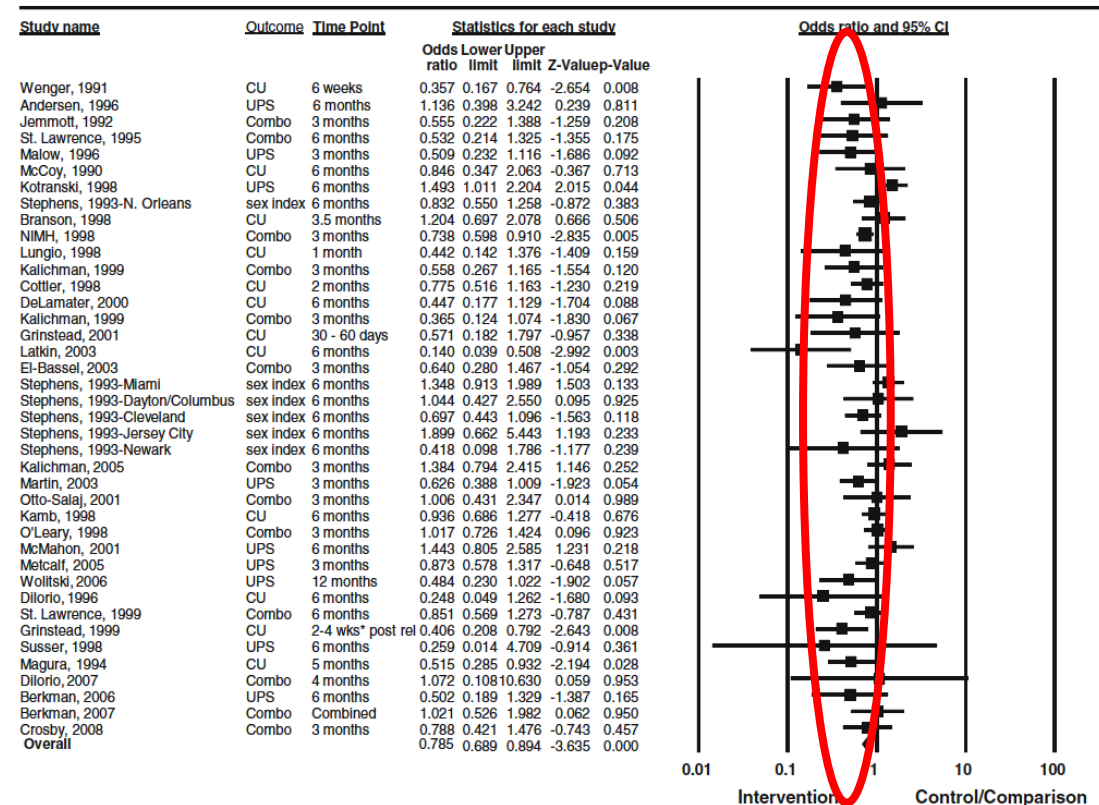
Multiple interventions for STI priority populations have demonstrated efficacy at multiple levels.

Interventions targeting African American heterosexual men in the United States.

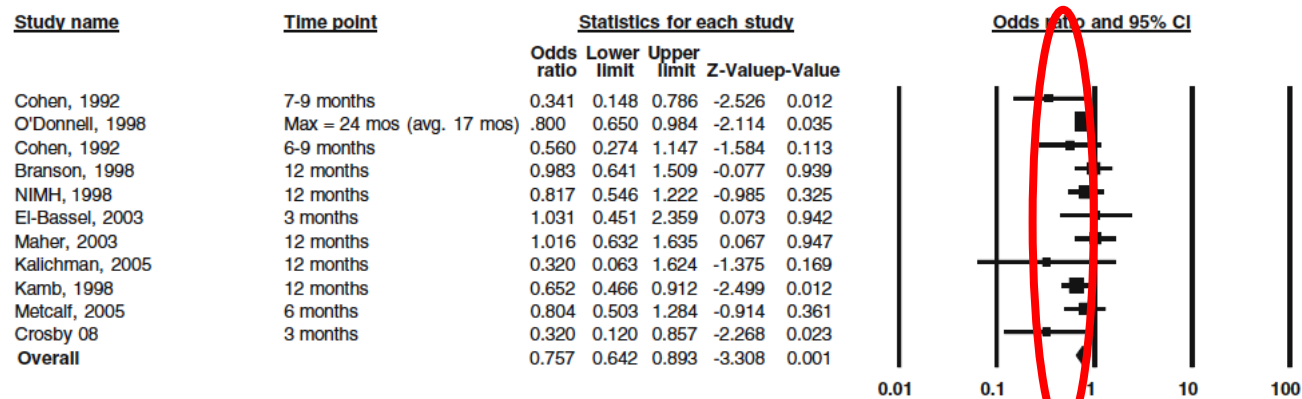
Sexual risks OR = .79

Incident STI OR = .74

Sexual Risk Reduction



Sexually Transmitted Infections

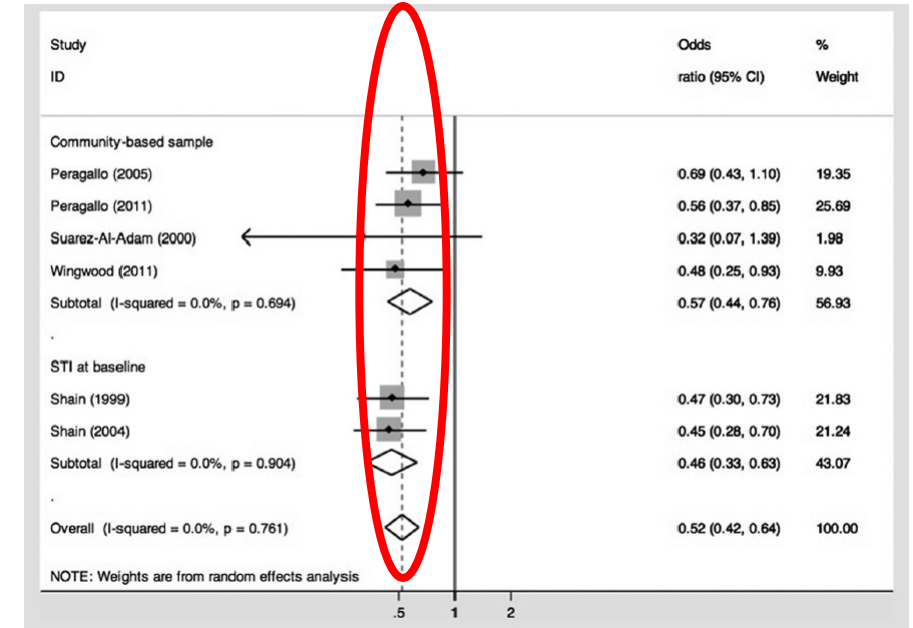


Interventions targeting Latinas in the United States.

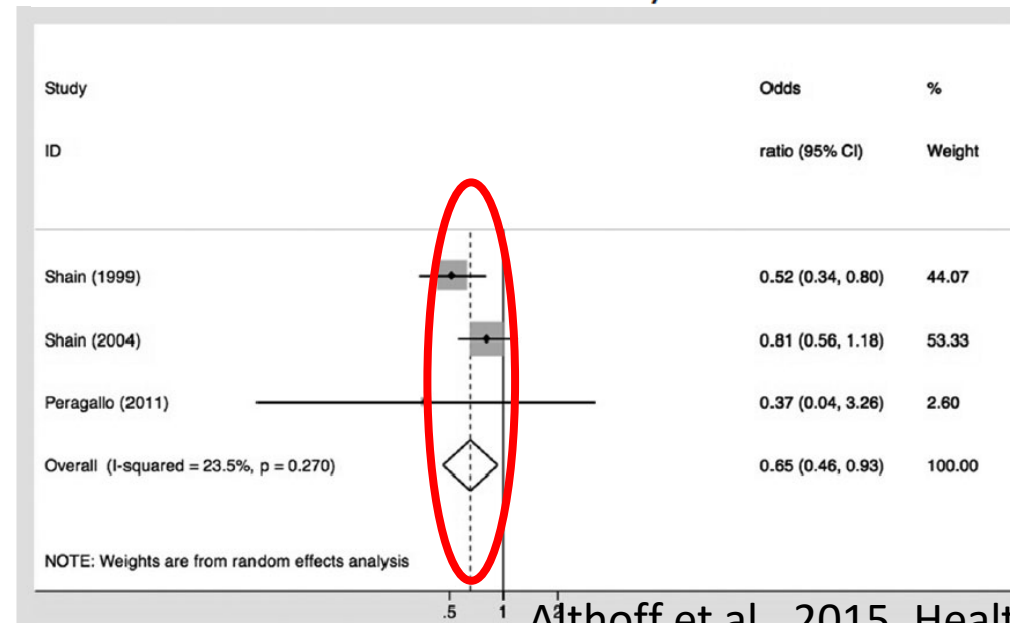
Sexual risks OR = .52

Incident STI OR = .65

The effect of behavioral interventions on risky sex.

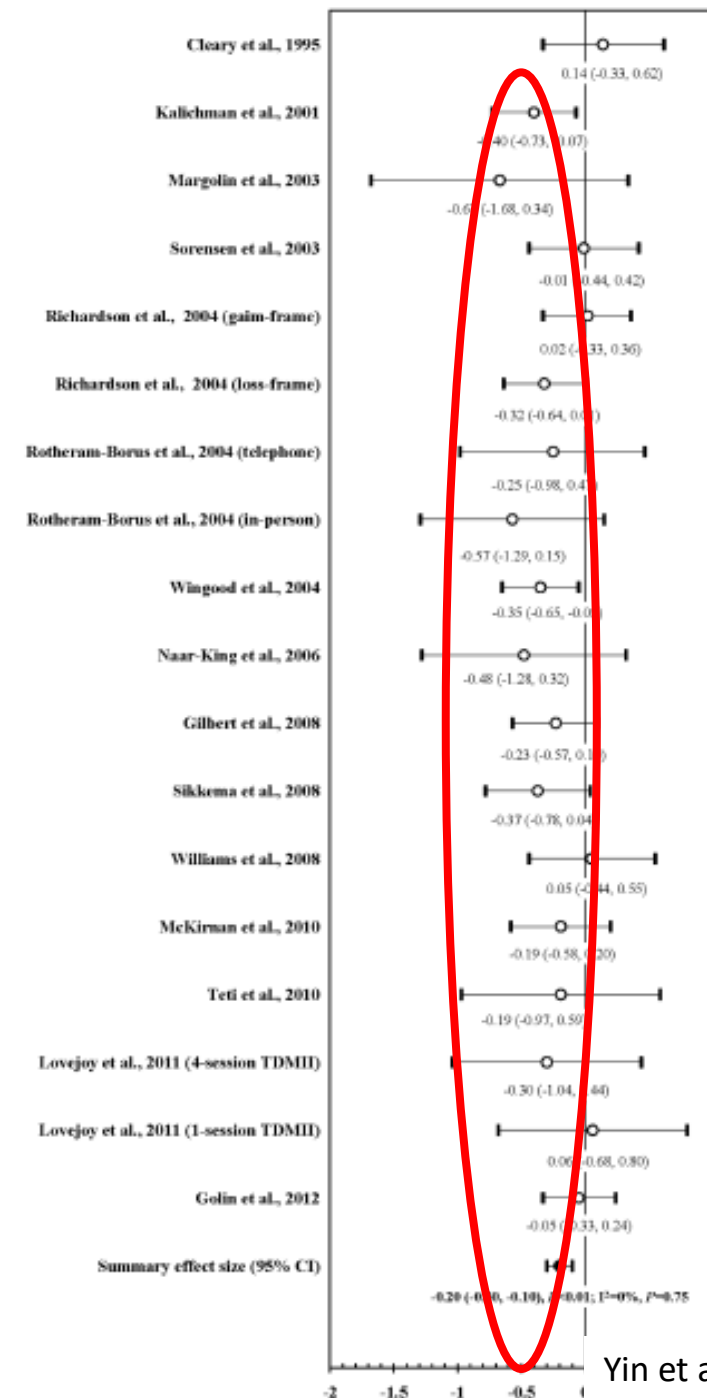


Behavioral interventions on incident sexually transmitted infections.



Interventions targeting people living with HIV.

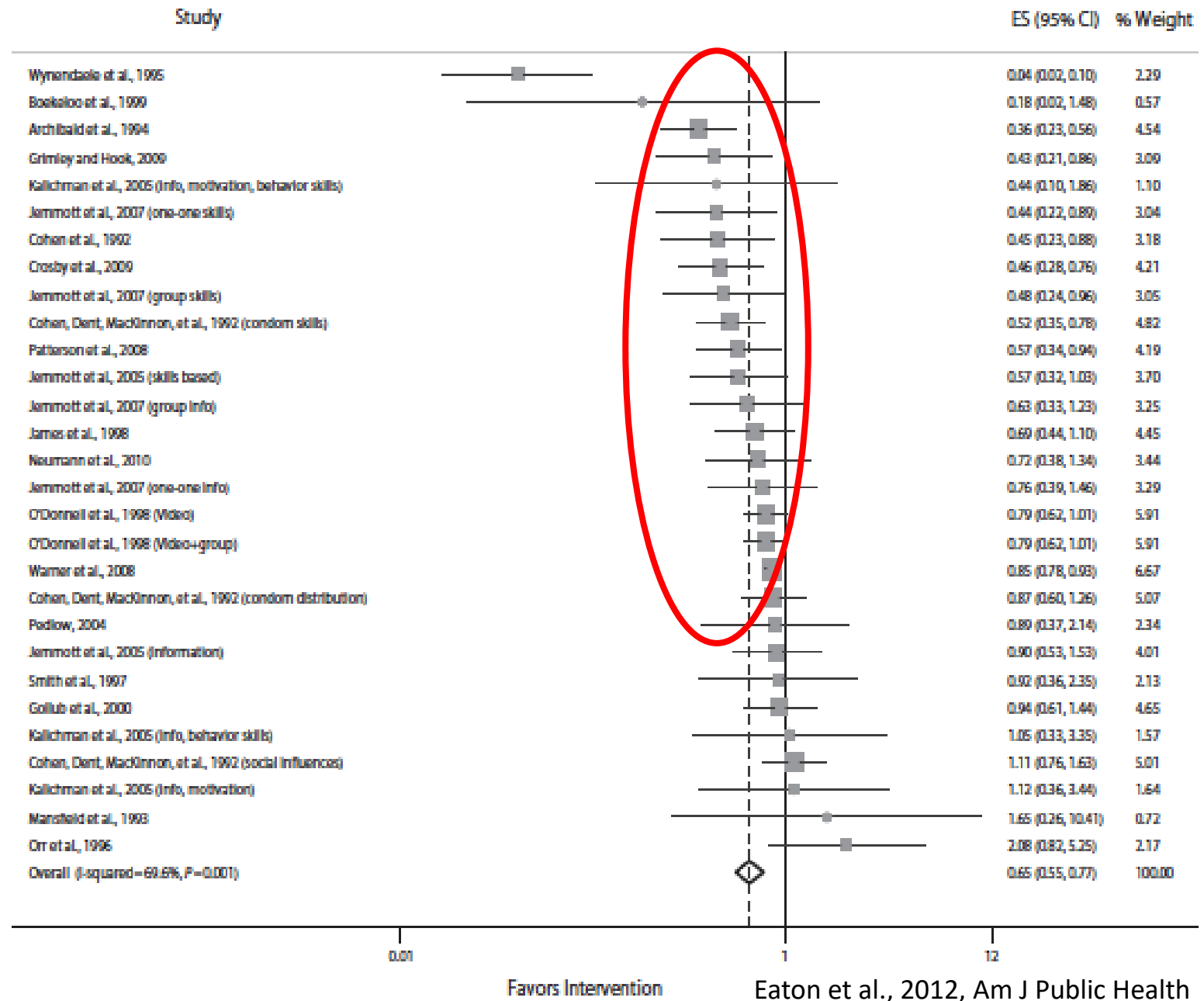
Overall effect-size = -0.20,
95%CI=-0.30 - -0.10



One-Shot Interventions

Meta-analysis of 29 single-session interventions tested in randomized trials reporting STI outcomes.

Overall 35% reduction in STI incidence (OR = 0.65, 95%CI=0.55-0.77)



Odds ratios representing reductions in STI/HIV incident infections reported from selected meta-analyses ordered from most efficacious to least efficacious.

| Source | Study | OR | 95% CI |
|--|---|------|---------------------|
| Behavioral intervention meta-analyses | | | |
| Johnson | Interventions for adolescents | 1.72 | 1.39, 2.17 (k = 19) |
| Eaton | Single-session interventions | 1.59 | 1.37, 1.87 (k = 19) |
| Charania | Structural level condom distribution interventions | 1.45 | 1.10, 1.89 (k = 5) |
| Herbst | Interventions for LatinX in the USA and Puerto Rico | 1.45 | 1.14, 1.85 (k = 3) |
| Neumann | At-risk adults in the USA | 1.35 | 1.12, 1.61 (k = 6) |
| Crepaz | Interventions for African American females | 1.23 | 1.02, 1.49 (k = 17) |
| Mullen | Adolescents in the USA | 1.18 | 0.48, 2.86 (k = 2) |
| Crepaz | Interventions for African Americans and LatinX | 1.17 | 1.00, 1.37 (k = 13) |
| Johnson | Interventions for African Americans | 1.14 | 1.19, 1.22 (k = 14) |
| Biomedical HIV prevention | | | |
| | | | |
| Auvert | Male circumcision | 2.34 | 1.81, 2.87 |
| Bailey | Male circumcision | 2.17 | 1.66, 2.68 |
| Gray | Male circumcision | 2.03 | 1.52, 2.54 |
| Grant | HIV Pre-exposure prophylaxis | 1.82 | 1.41, 2.23 |

Effective Interventions

HIV PREVENTION THAT WORKS



45 Evidence-Based Behavioral Interventions for HIV/STI Prevention

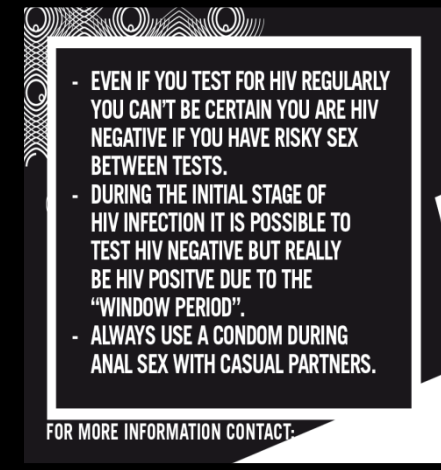
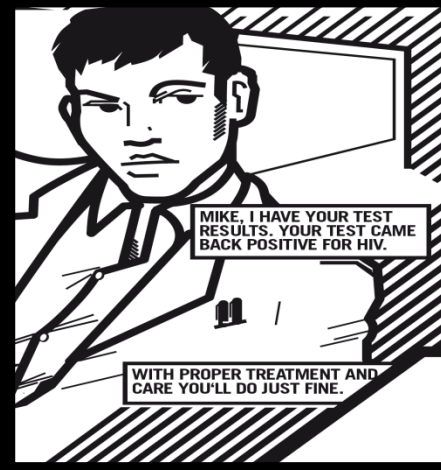
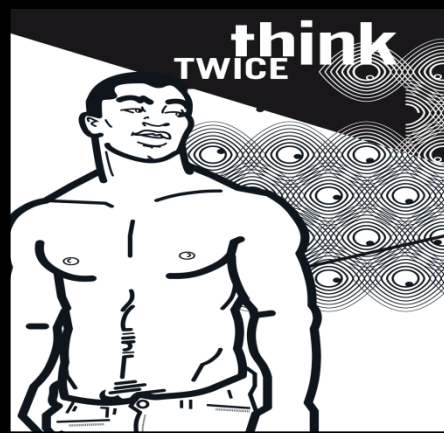


Lisa Eaton

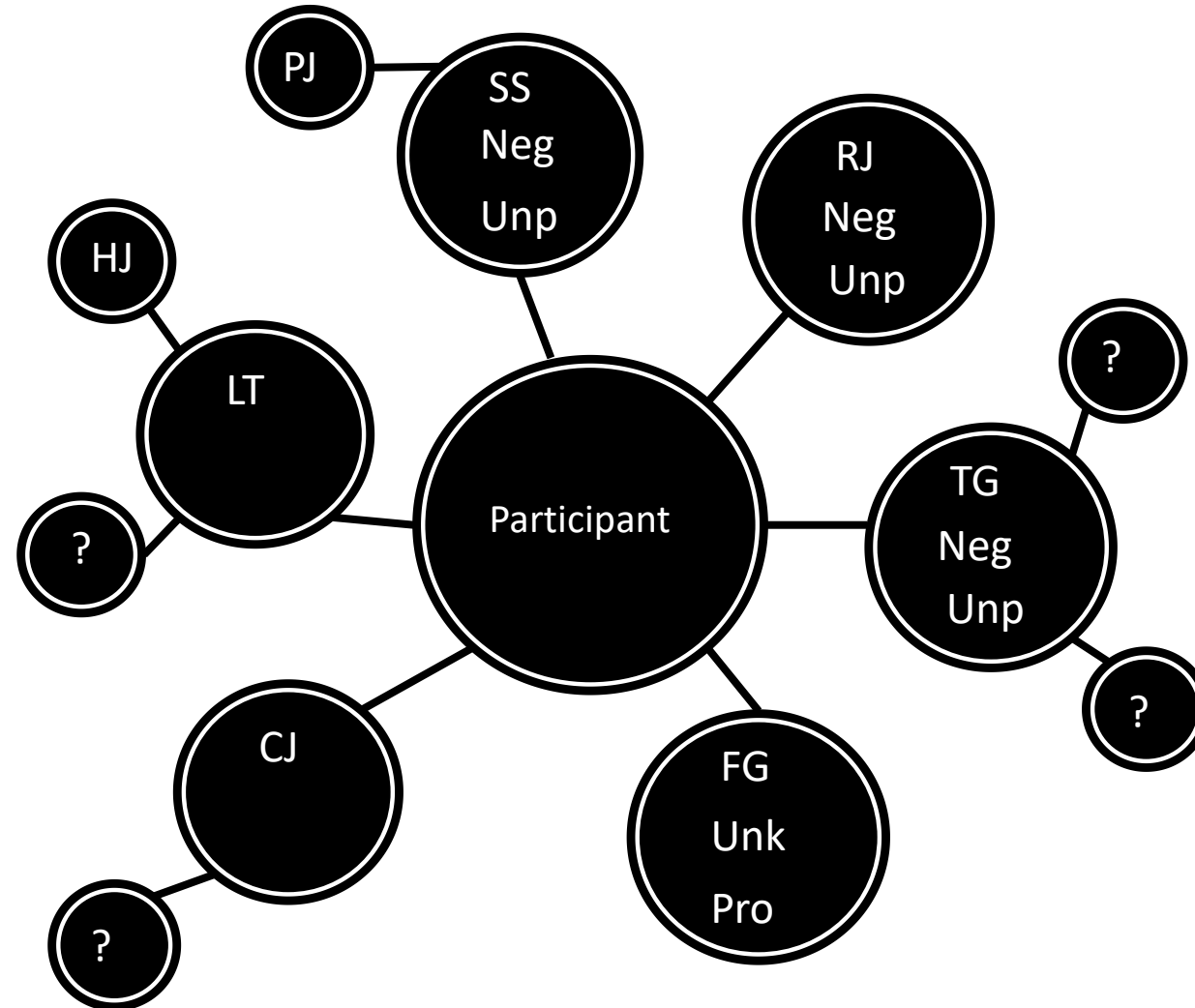


Intervention to Reduce HIV Risks and Sero-adaptive Strategies

- Post-HIV testing intervention
- One-on-one, peer counselor delivered, 40 minutes
- **Think Twice** (Eaton, 2011, AJPH, 2018, Sex Transm Infections)
 - Graphic novel
 - Sexual sociogram
 - Real world, personalized, reasonable plan
 - Can be mobile delivered



Session-Constructed Partner-Socio-Gram



| | Experimental condition (N=300) | | Control condition (N=297) | | Main effect intervention |
|---|-----------------------------------|----------|------------------------------|----------|-----------------------------|
| | N | Per cent | N | Per cent | |
| Symptoms of STI | | | | | 3.59 (1) ^b |
| 3-month | 17 | 6.3 | 26 | 10.2 | |
| 6-month | 19 | 7.5 | 25 | 9.7 | |
| 12-month | 14 | 5.7 | 22 | 8.7 | |
| Lab diagnosed gonorrhoea/chlamydia (urine) | | | | | 2.44 (1) |
| 3-month | 4 | 1.5 | 12 | 4.9* | |
| 6-month | 5 | 2.1 | 6 | 2.5 | |
| 12-month | 6 | 2.6 | 9 | 3.9 | |
| Lab diagnosed gonorrhoea/chlamydia (rectal) | | | | | 1.85 (1) |
| 3-month | 26 | 10 | 15 | 6.1 | |
| 6-month | 16 | 6.7 | 12 | 4.9 | |
| 12-month | 19 | 8.2 | 17 | 7.3 | |

THINK TWICE

Best Evidence – Risk Reduction

INTERVENTION DESCRIPTION

Target Population

- Men who have sex with men (MSM)

Goals of Intervention

- Increase knowledge about serosorting for HIV/STI prevention
- Develop a tailored risk reduction strategy for each participant

Brief Description

Think Twice is an individual-level, single session intervention. It focuses on highlighting misbeliefs about selecting sex partners; shaping accurate beliefs and perceptions of risk about the use of serosorting for HIV/STI prevention; and determining a practical, risk-reduction strategy tailored to each participant. A graphic novel is used to convey messages about serosorting. The counselor uses the story to identify behaviors and situations that may lead to becoming HIV infected. Guided by the conflict theory of decision-making, the counselor and participant work together to identify ways that the story character can

**Clinical trials, implementation studies,
and cost-effectiveness research support
the effectiveness of behavioral
interventions to prevent STI/HIV**

Table 1 Prioritization of risk reduction evidence-based interventions for HIV-negative persons

| EBI | Population | # Sessions (unit of delivery)—implementation description | Cost per client | Effect size (OR) | Incidence per 100,000 [24, 25, 52, 53] | Prevention benefit index (PBI) | Incidence required to achieve cost-saving prevention benefit | Decision to support dissemination |
|---|---|--|-------------------|------------------|--|--------------------------------|--|-----------------------------------|
| Behavioral EBIs for HIV-negative persons that met the PBI criteria | | | | | | | | |
| 3MV: many men, many voices [30] | AA MSM | 6 (GLI) | \$1733 | 0.77 | 1897 | \$397,218 | 1874 | ✓ |
| Community PROM-ISE [29] | AA women ^a | CLI | \$36 ^b | 0.54 | 38 | \$205,993 | 19 | ✓ |
| | High-risk youth | CLI | \$36 ^b | 0.54 | 24 | \$326,155 | 19 | ✓ |
| | PWID and their sex partners | CLI | \$36 ^b | 0.54 | 515 | \$15,188 | 19 | ✓ |
| Focus on the future [32] | MSM | CLI | \$36 ^b | 0.54 | 655 | \$1,951 | 19 | ✓ |
| | Heterosexual AA men with a STI | 1 (ILI)—in STI clinics | \$34 | 0.32 | ≥ 19 ^c | ≤ \$265,111 | 12 | X |
| Mpowerment [33] | MSM | CLI | \$36 ^b | 0.54 | 713 | \$213,911 | 19 | ✓ |
| Personal and Cognitive Counseling [34] | MSM | 1 (ILI)—in STI clinic testing | \$34 | 0.29 | ≥ 65 ^c | ≤ \$265,111 | 5 | ✓ |
| Popular Opinion Leader [21, 22] | MSM | CLI | \$36 ^b | 0.54 | 194 | \$19,195 | 19 | ✓ |
| Safe in the City [35] | STI clinic patients | 1 (GLI)—video in STI clinic waiting | \$0.24 | 0.91 | ≥ 19 ^c | ≤ \$14,109 | 1 | ✓ |
| $\text{Prevention Benefit Index (PBI)} = \frac{\text{Cost per Client} \times 100,000}{\text{HIV incidence per 100,000} \times (1 - \text{Effect Size [OR]})}$ | | | | | | | | |
| Sister to sister [36] | AA women | | | | | \$285,491 | 27 | ✓ |
| Sin buscar Excusas [37] | Latino MSM | | | | | \$137,543 | 224 | ✓ |
| Behavioral EBIs for HIV-negative persons | | | | | | | | |
| Adult identity mentoring [50] | AA youth (pre- and post-risk) | 12 (GLI) | \$1172 | 0.57 | 3 | \$14,367,816 | 104 | X |
| CONNECT [46, 47] | AA and Hispanic/Latino heterosexual couples | 6 (1 ILI and 5 couples) | \$2528 | 0.92 | 15 | \$209,842,297 | 7861 | ✓, for HIV-discordant couples |
| Cuidate [51] | Hispanic/Latino youth | 6 (GLI) | \$150 | 0.52 | 8 | \$3,858,025 | 78 | X |
| FIO (future is ours) [41] | Multicultural women | 9 (GLI)—8 core and 1 booster | \$7029 | 0.66 | 7 | \$283,199,033 | 5143 | X |
| Focus on youth +IMPACT [54] | AA youth (pre-risk) | 9 (GLI)—8 adol. and 1 parent | \$1172 | 0.57 | 3 | \$93,982,358 | 678 | X |

Over the last decade, for whom and under what conditions or in what settings have we seen efficacious interventions to reduce risk or prevent STI or HIV risk in groups with the highest burden of infection?

Interventions delivered in single session counseling, typically of 40-60 min. in STI clinics, community agencies, social services, jails, schools, etc. demonstrate increased condom use, reductions in condomless vaginal and anal sex, reduced STI incidence with diverse US populations.

What are the key elements of effective interventions?

There are a lot of theoretical mediators of effective behavioral STI/HIV prevention interventions.

Which are most critical depends on targeted outcomes.

Figure 1. The AIDS Risk Reduction Model

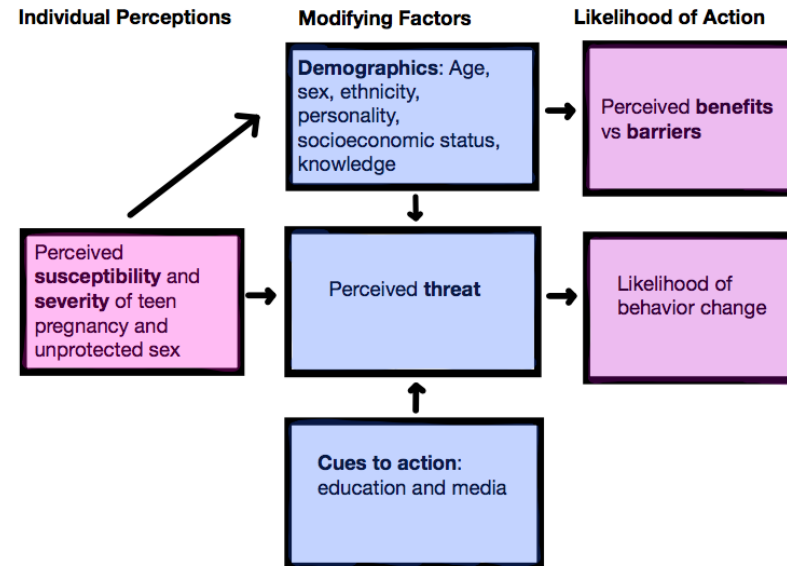
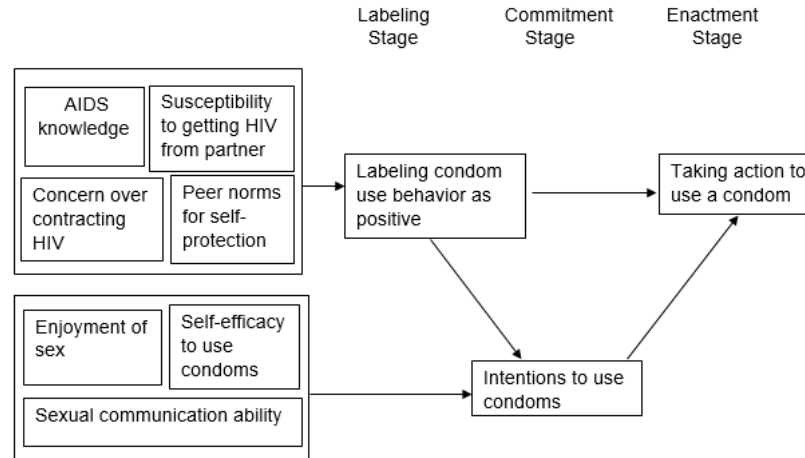
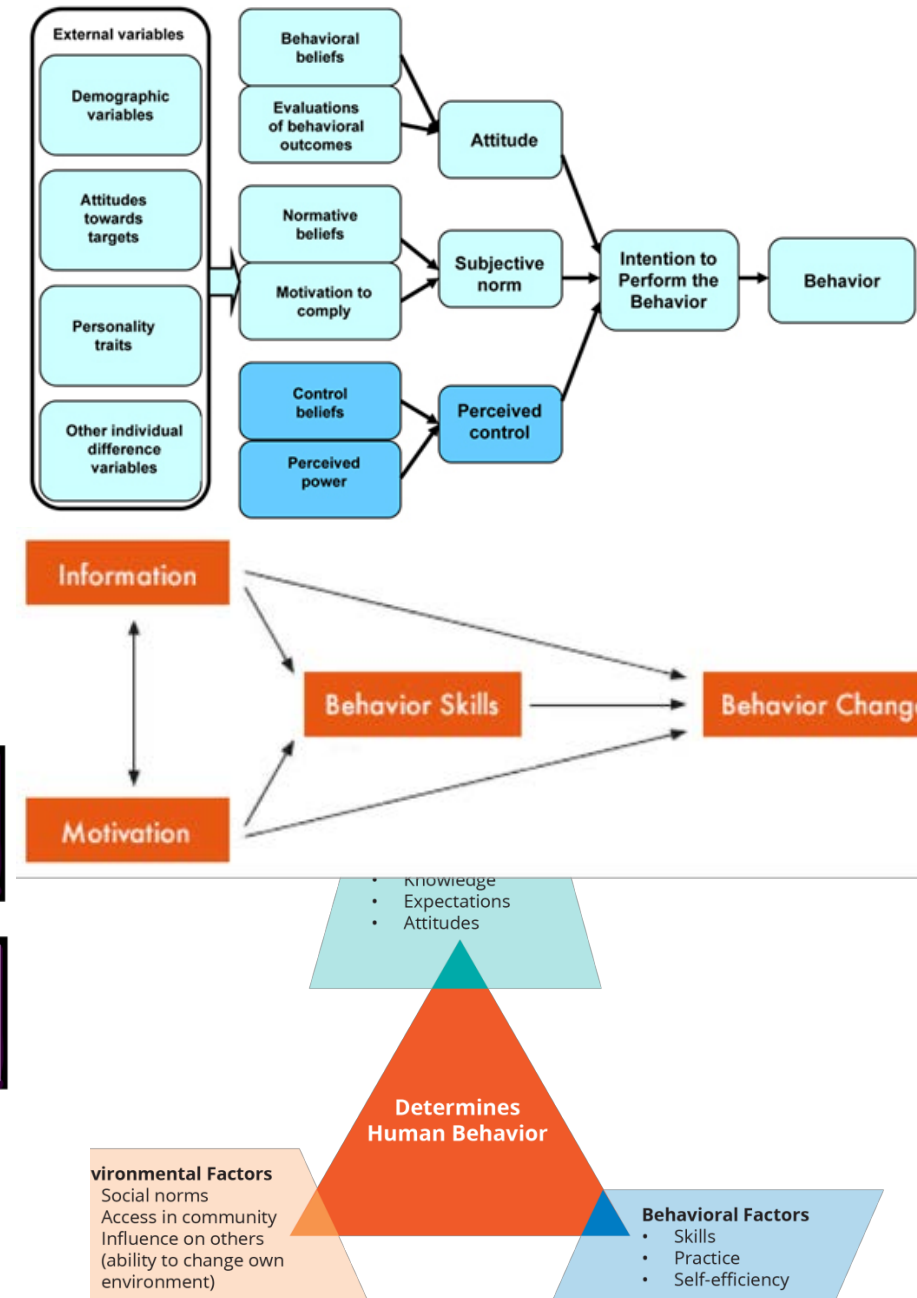
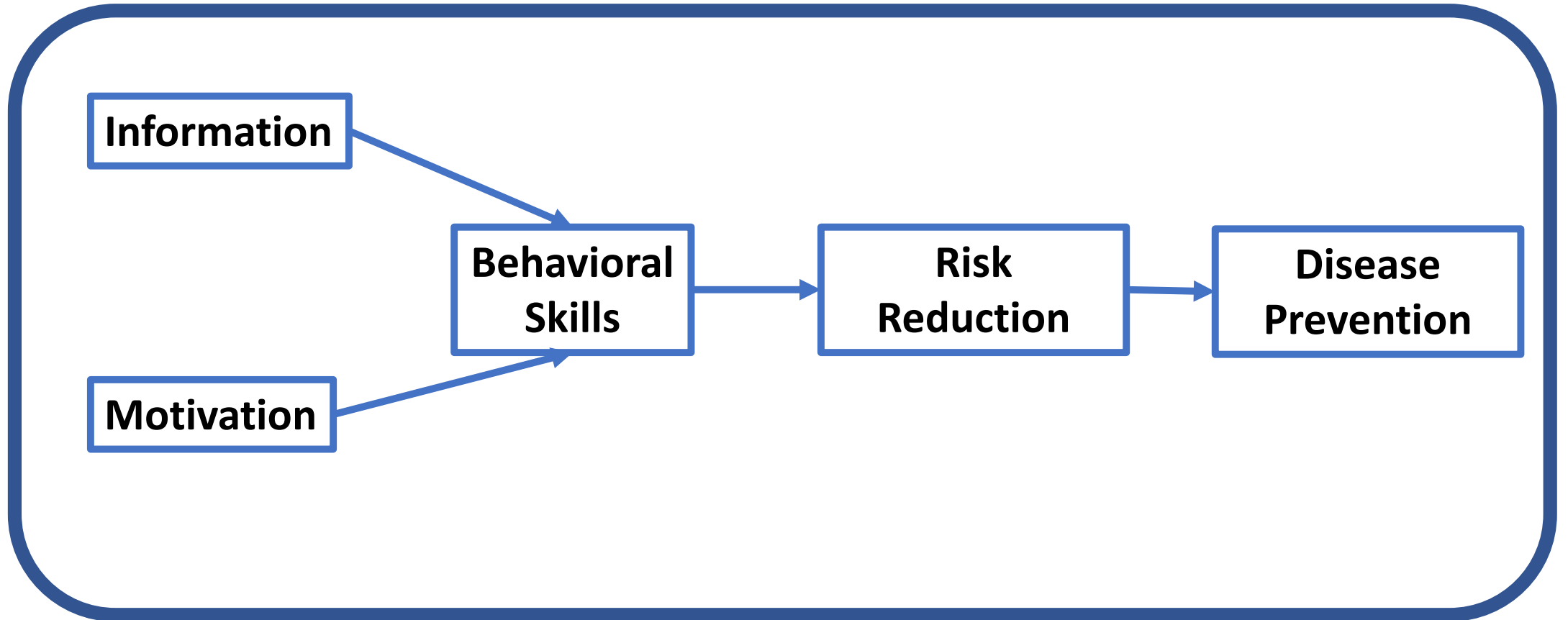


Figure 1. Theory of Reasoned Action and Theory of Planned Behavior



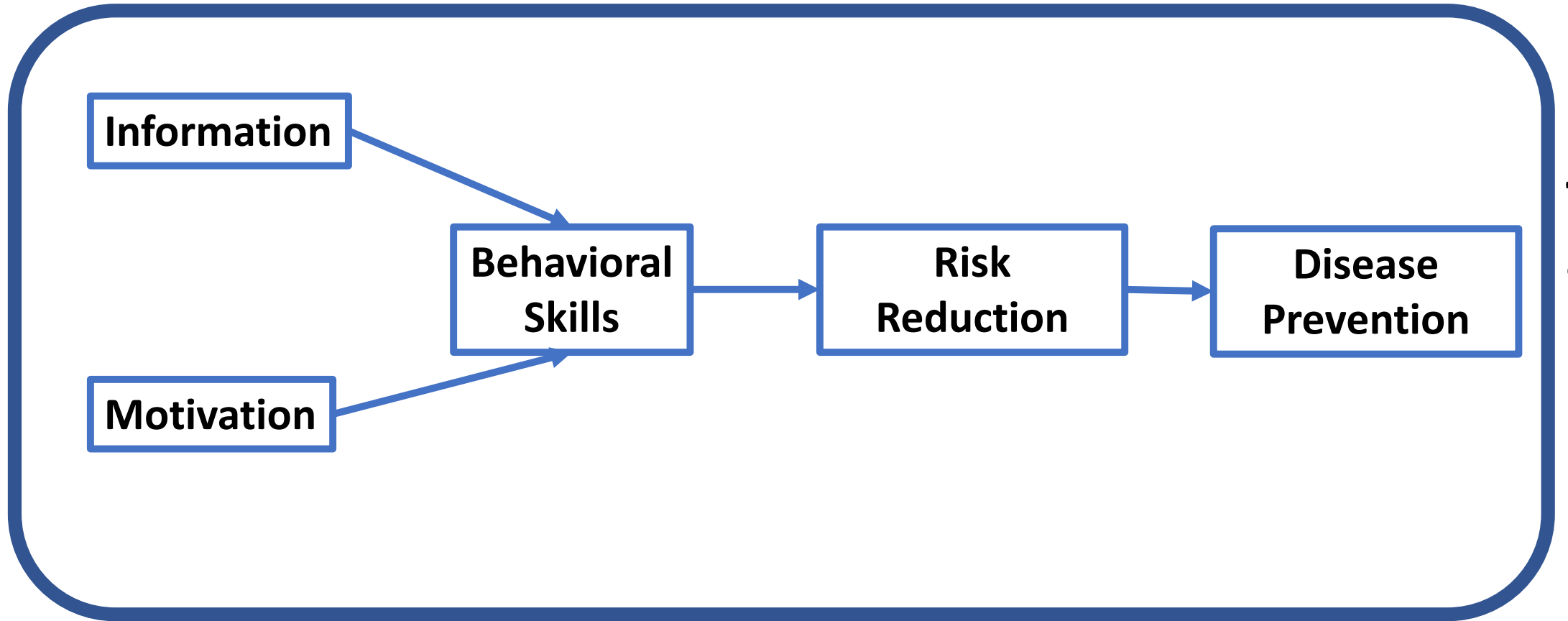
Information Motivation Behavioral Skills Model



Information Motivation Behavioral Skills Model

Social-Cultural Relevance

Mental Health & Substance Use



Relapse / Reversion

Structural, Interpersonal & Intrapersonal Barriers

Behavioral skills and constructs underlying skills (e.g., self-efficacy) are the active ingredients for impacting STI/HIV risk reduction.

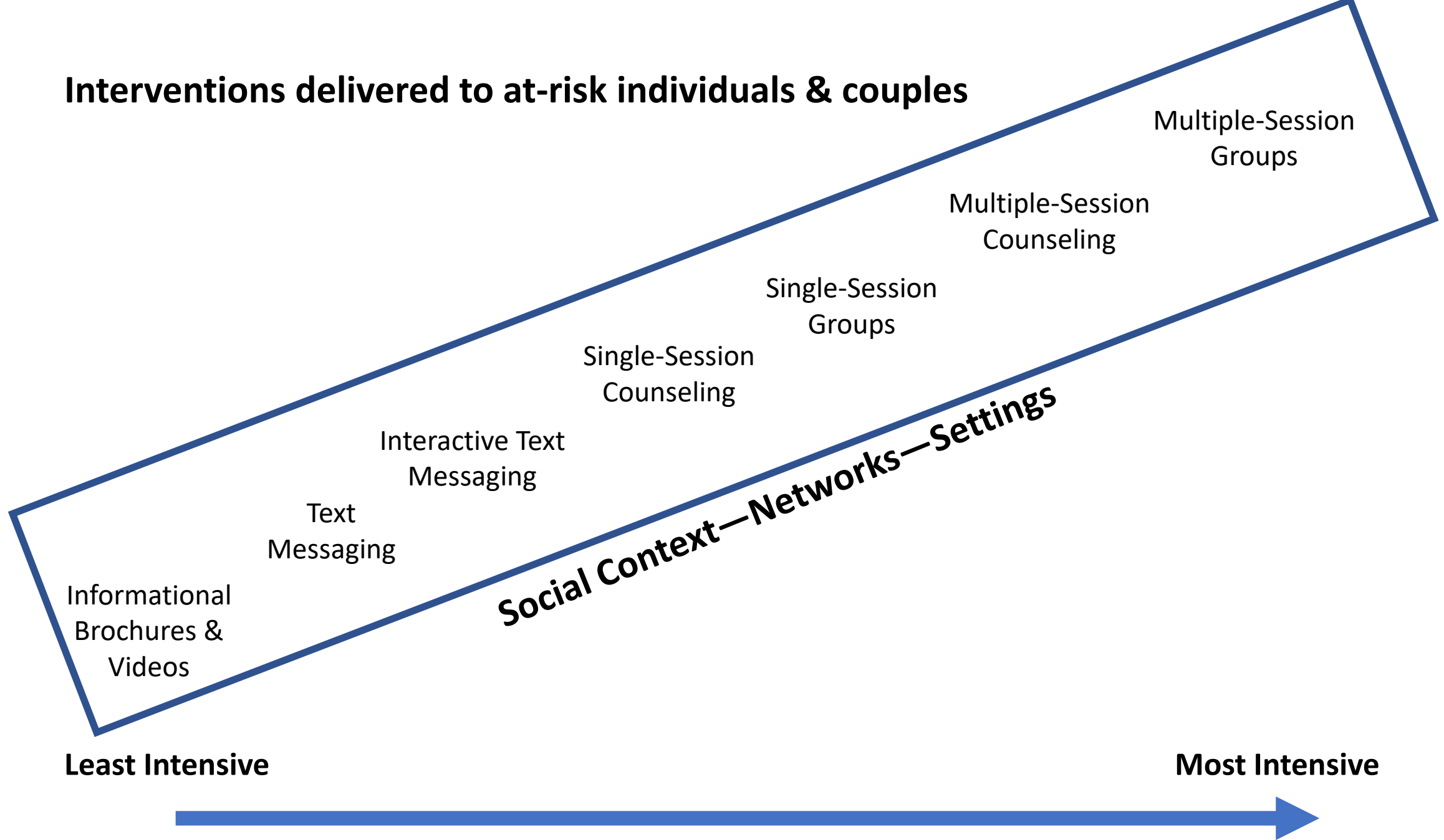
Table 3 IMB moderators for overall sexual risk outcome

IMB moderators for overall sexual risk outcome

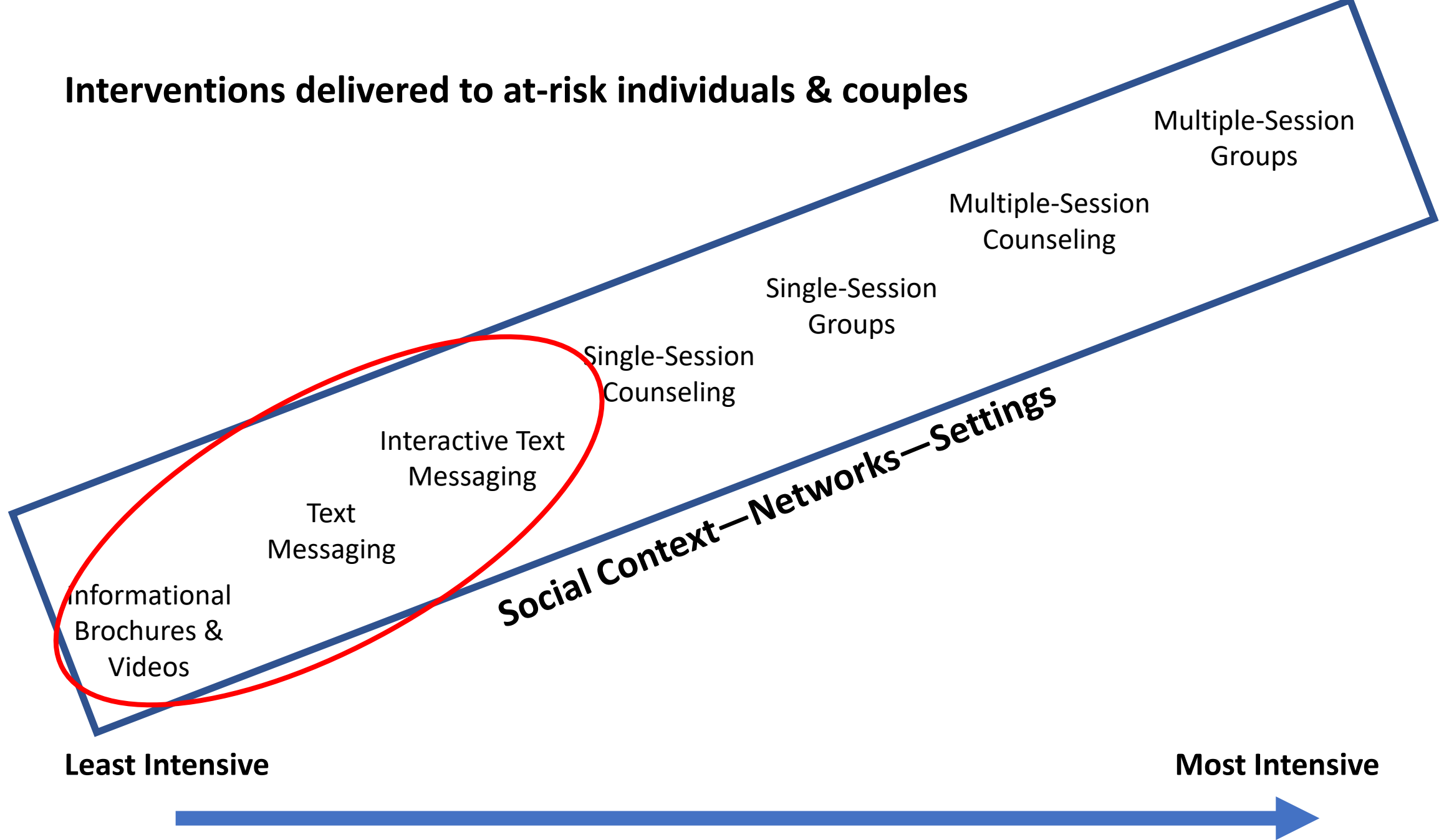
| | <i>k</i> | <i>d</i> _{+i} ^a | 95 % CI for <i>d</i> ₊ |
|-------------------------------------|----------|-------------------------------------|-----------------------------------|
| Information alone | 4 | 0.37 | (0.10, 0.64) |
| Behavior skills alone | 1 | 1.49 | (0.87, 2.12) |
| Info + Motivational | 14 | 0.12 | (−0.03, 0.27) |
| Info + Behavior Skills | 8 | 0.06 | (−0.14, 0.26) |
| Motivational + Behavior Skills | 2 | 0.55 | (0.13, 0.98) |
| Info + Motivation + Behavior Skills | 38 | 0.18 | (0.09, 0.26) |

What outcomes should we expect from briefer and more extensive interventions?

Interventions delivered to at-risk individuals & couples



Interventions delivered to at-risk individuals & couples

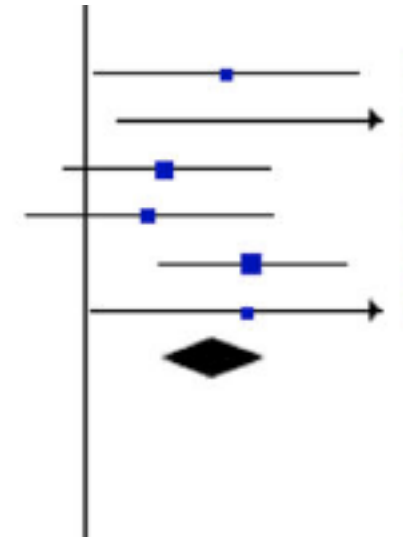


Text Messaging for STI prevention – screening & testing

1.1.7 Uptake of STI/HIV prevention or treatment testing

| | | | | | | |
|---------------------------|-----|------------|-----|-------------|---------------|--------------------------|
| de Tolly 2012 (11) | 38 | 194 | 22 | 187 | 14.8% | 1.83 [1.03, 3.23] |
| Downing 2013 (12) | 9 | 32 | 2 | 32 | 1.8% | 5.87 [1.16, 29.83] |
| Dryden-Peterson 2015 (13) | 100 | 169 | 79 | 156 | 24.9% | 1.41 [0.91, 2.19] |
| Lim 2012 (14) | 34 | 217 | 30 | 242 | 17.1% | 1.31 [0.77, 2.23] |
| Mugo 2016 (15) | 117 | 199 | 85 | 207 | 30.6% | 2.05 [1.38, 3.04] |
| Odeny 2014 (16) | 172 | 187 | 154 | 181 | 10.8% | 2.01 [1.03, 3.92] |
| Subtotal (95% CI) | | 998 | | 1005 | 100.0% | 1.73 [1.39, 2.15] |

Total events 470 372
Heterogeneity: $\tau^2 = 0.00$; $\text{Chi}^2 = 4.96$, $\text{df} = 5$ ($P = 0.42$); $I^2 = 0\%$
Test for overall effect: $Z = 4.91$ ($P < 0.00001$)



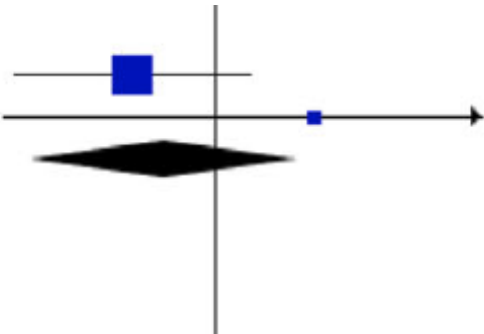
Text Messaging for STI prevention – increased condom use

1.1.2 Condom use

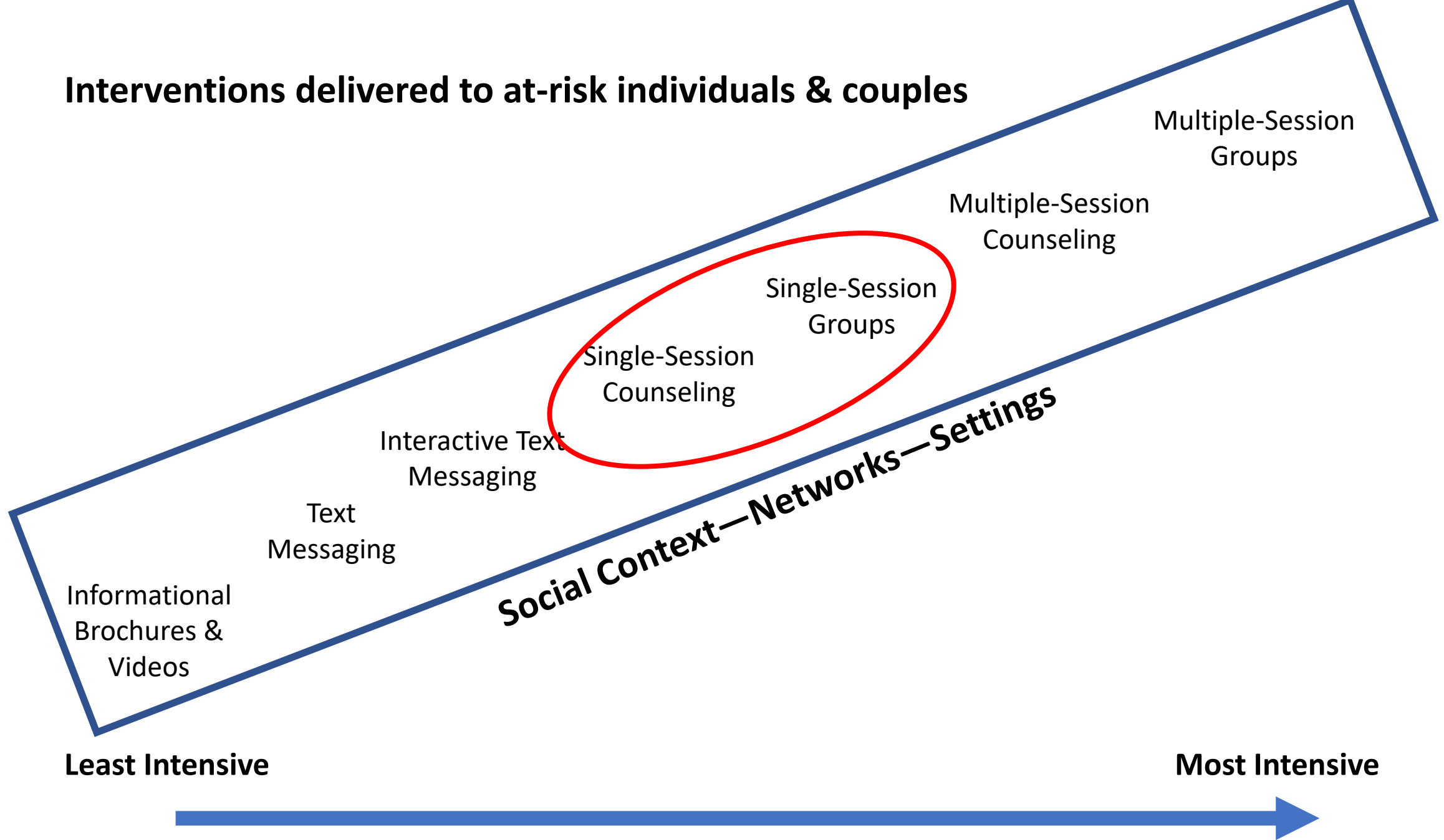
| | | | | | | |
|--------------------------|----|------------|----|------------|---------------|--------------------------|
| Lim 2012 (4) | 23 | 217 | 36 | 242 | 82.7% | 0.68 [0.39, 1.19] |
| Suffoletto 2013 (5) | 5 | 15 | 5 | 21 | 17.3% | 1.60 [0.37, 6.96] |
| Subtotal (95% CI) | | 232 | | 263 | 100.0% | 0.79 [0.42, 1.49] |
| Total events | 28 | | 41 | | | |

Heterogeneity: $\tau^2 = 0.05$; $\chi^2 = 1.14$, $df = 1$ ($P = 0.28$); $I^2 = 13\%$

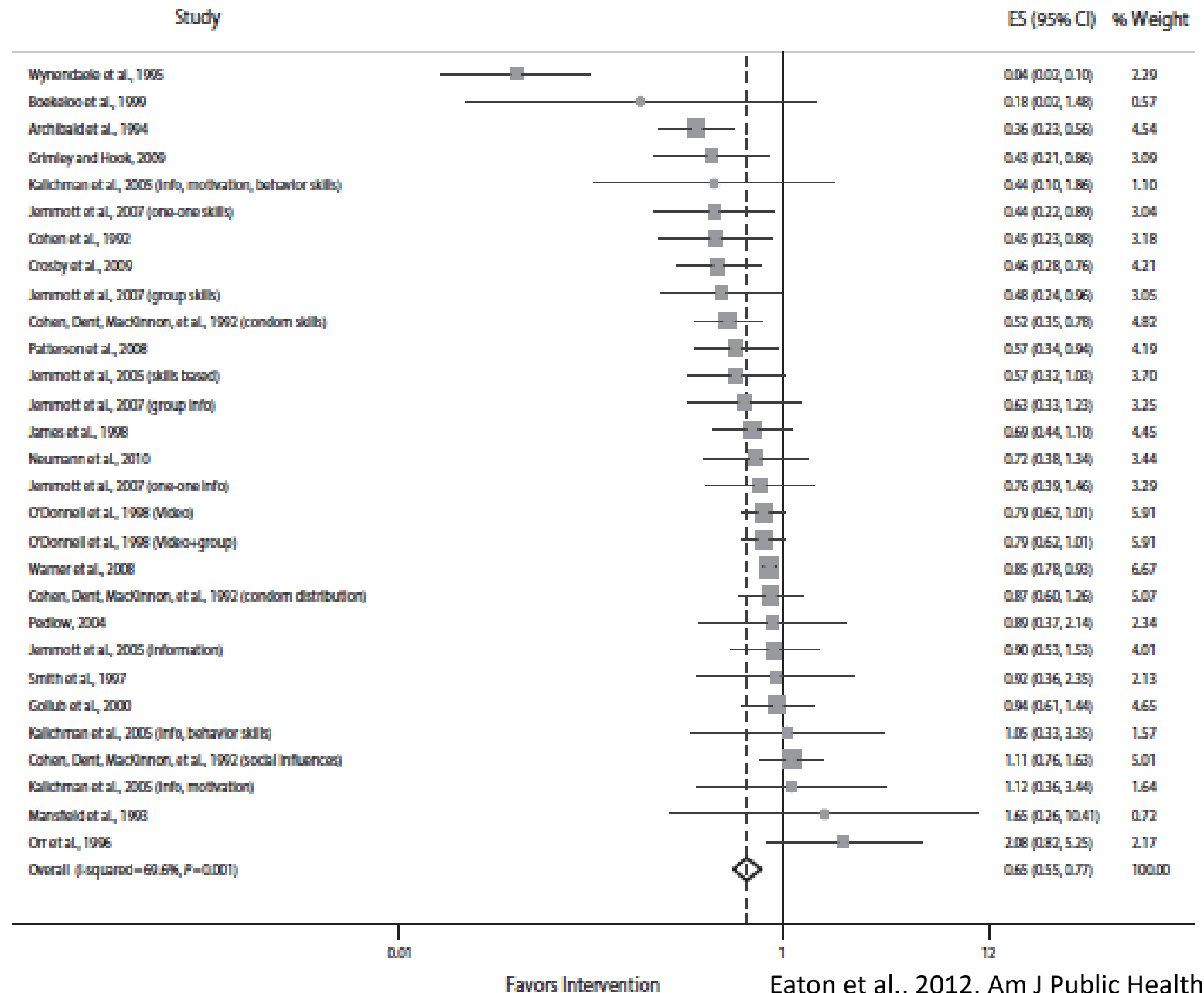
Test for overall effect: $Z = 0.74$ ($P = 0.46$)



Interventions delivered to at-risk individuals & couples



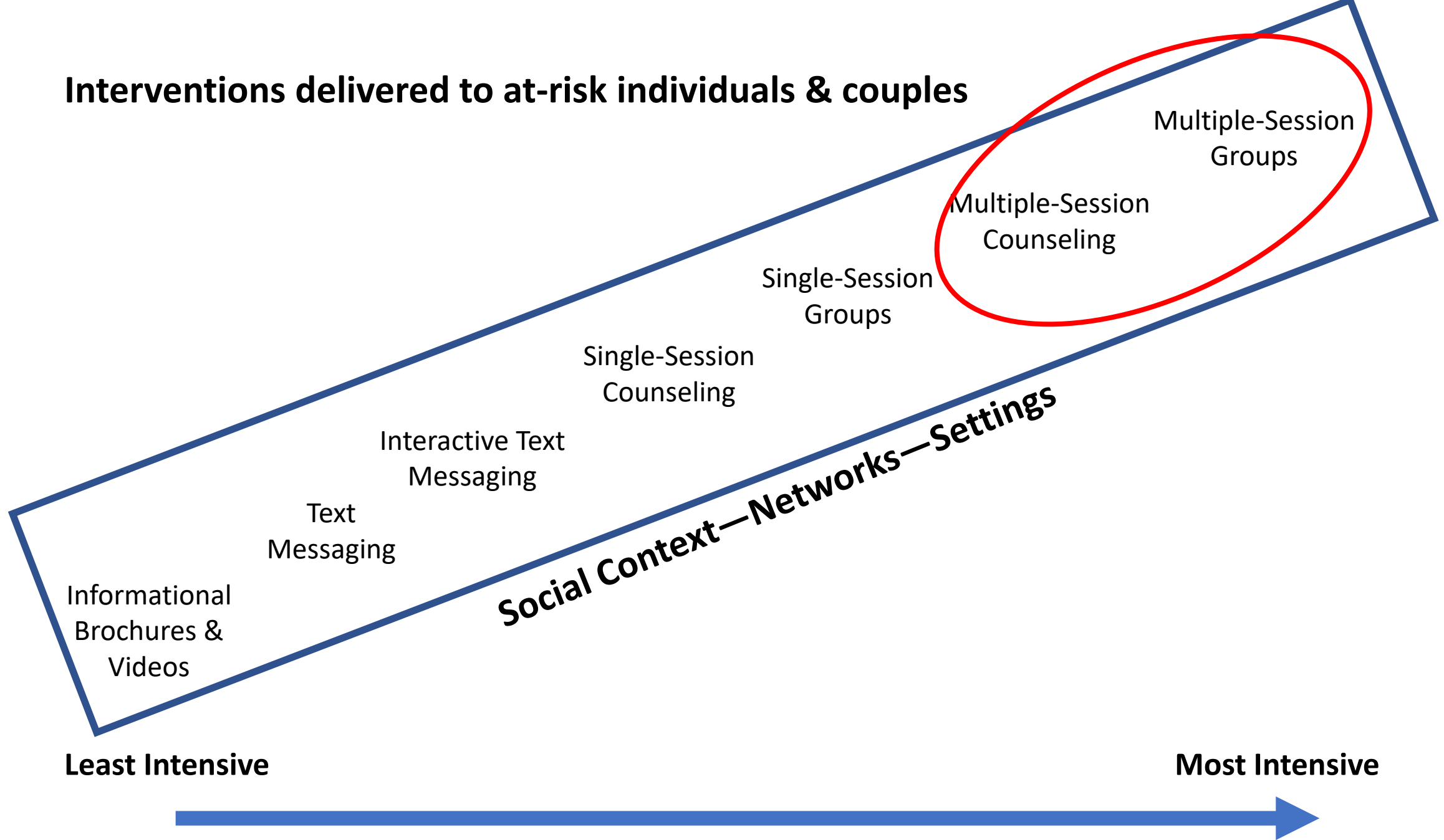
Single-session individual and group counseling interventions demonstrate sexual risk reduction and STI reduction outcomes



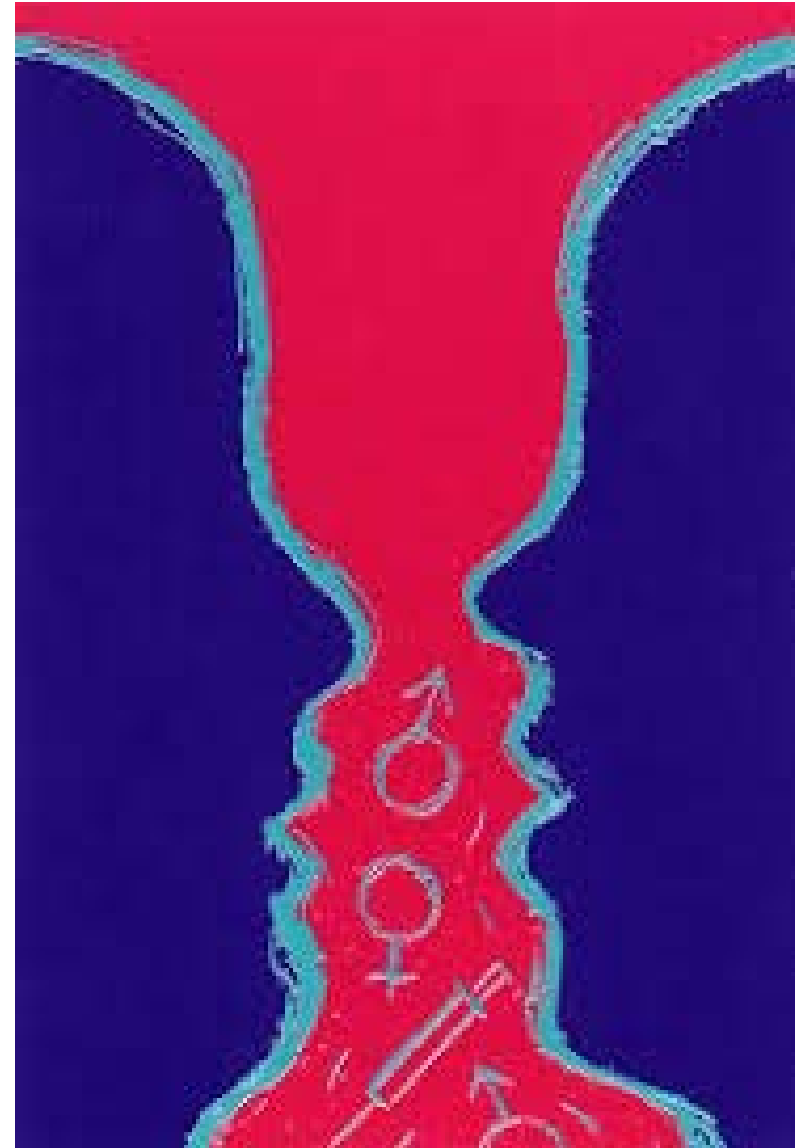
Meta-analyses have generally not found group-delivered interventions to differ from individually-delivered interventions.



Interventions delivered to at-risk individuals & couples



Multiple-session individual and group-delivered interventions were tested extensively with efficacy. But were abandoned due to issues of feasibility and perceived cost, despite evidence for cost-effectiveness.

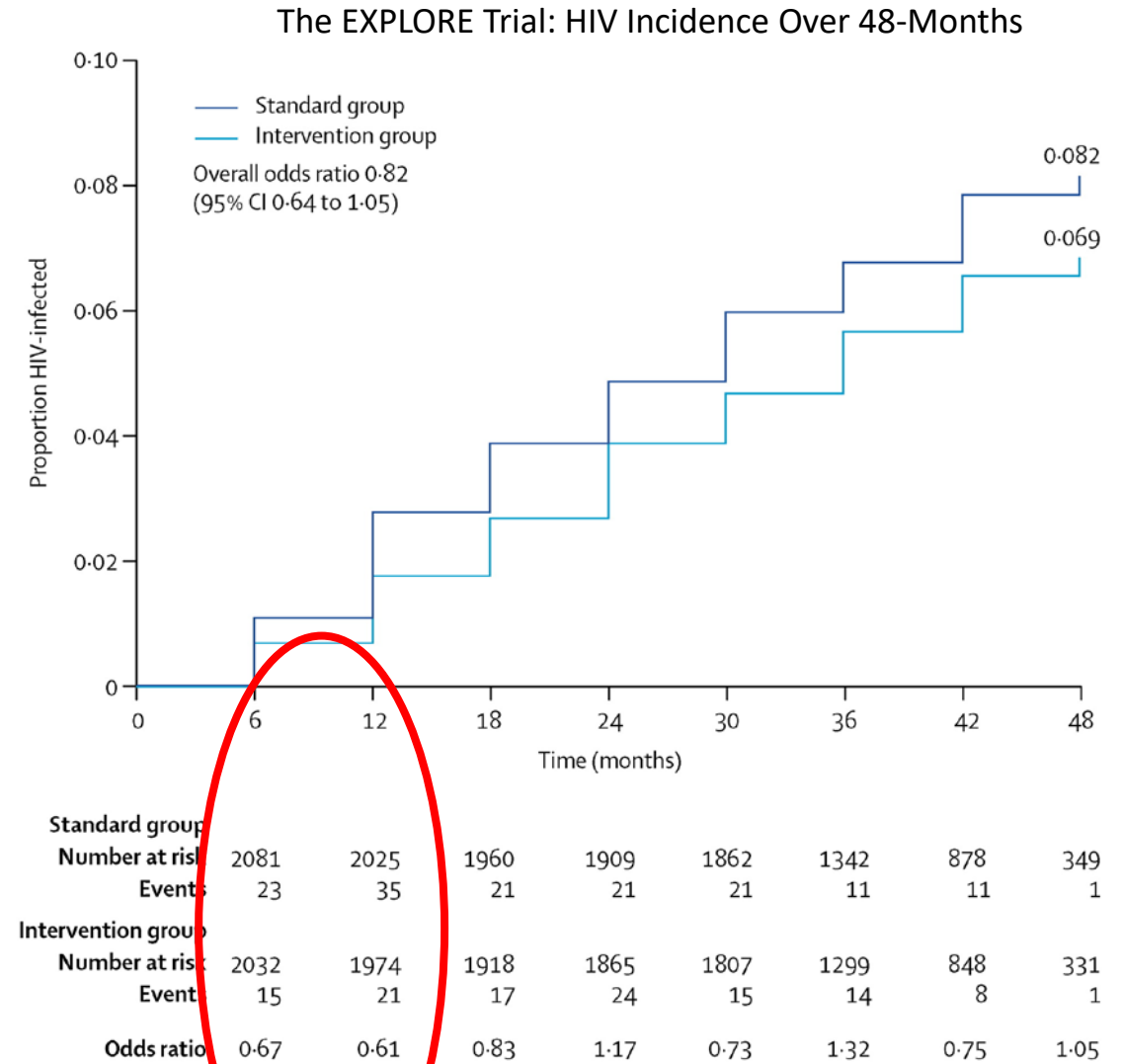


NIMH/NIH Consensus Statement, February, 1997
Interventions to Prevent HIV Risk Behaviors

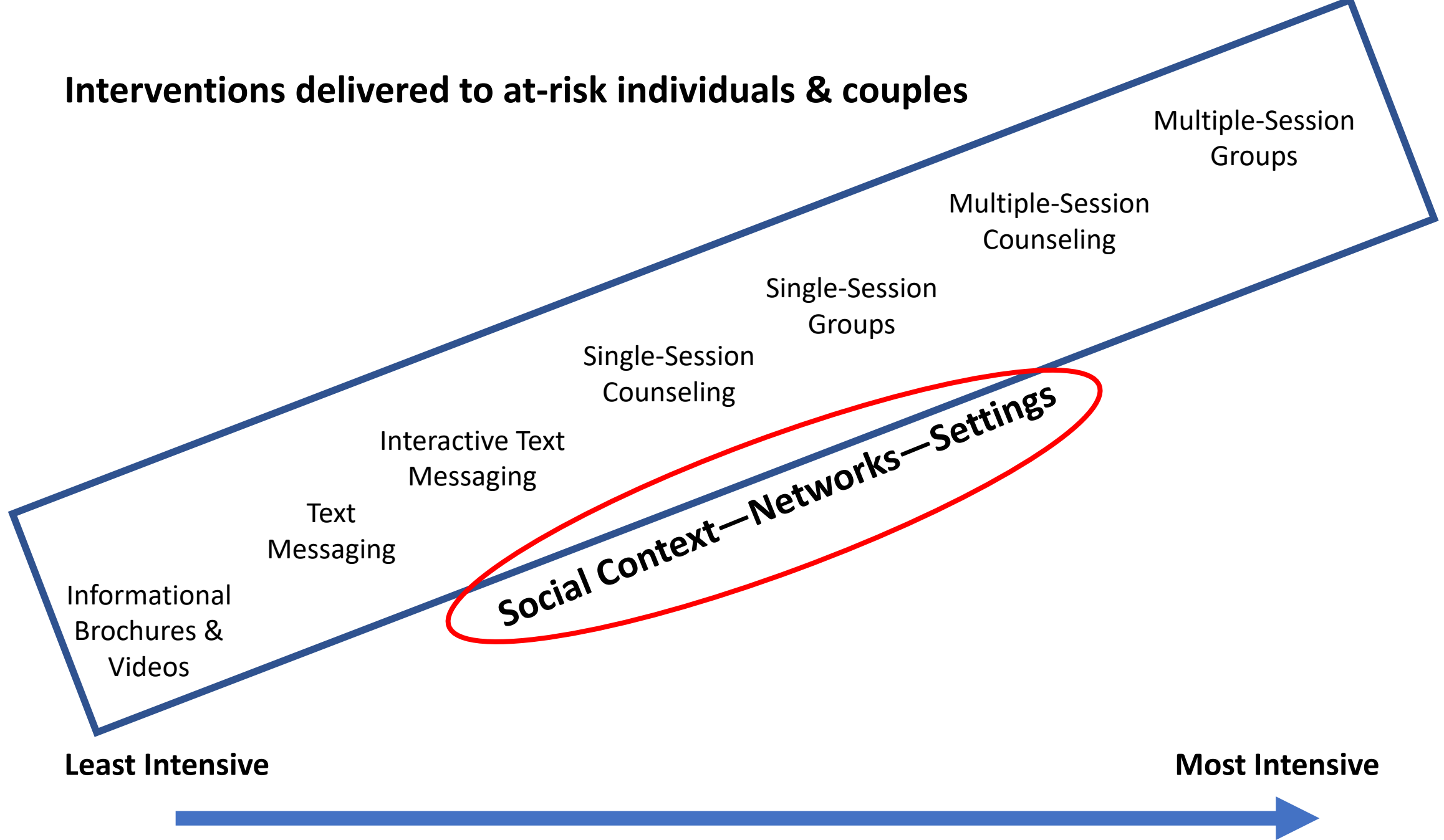
Supporting Sustained Change

Unlike a vaccine or surgical procedure, persistent behavior change requires ongoing support and motivation.

For STI/HIV, 6-12 months of consistent condom use can prevent an outbreak.



Interventions delivered to at-risk individuals & couples



Social Network / Community-Level Interventions

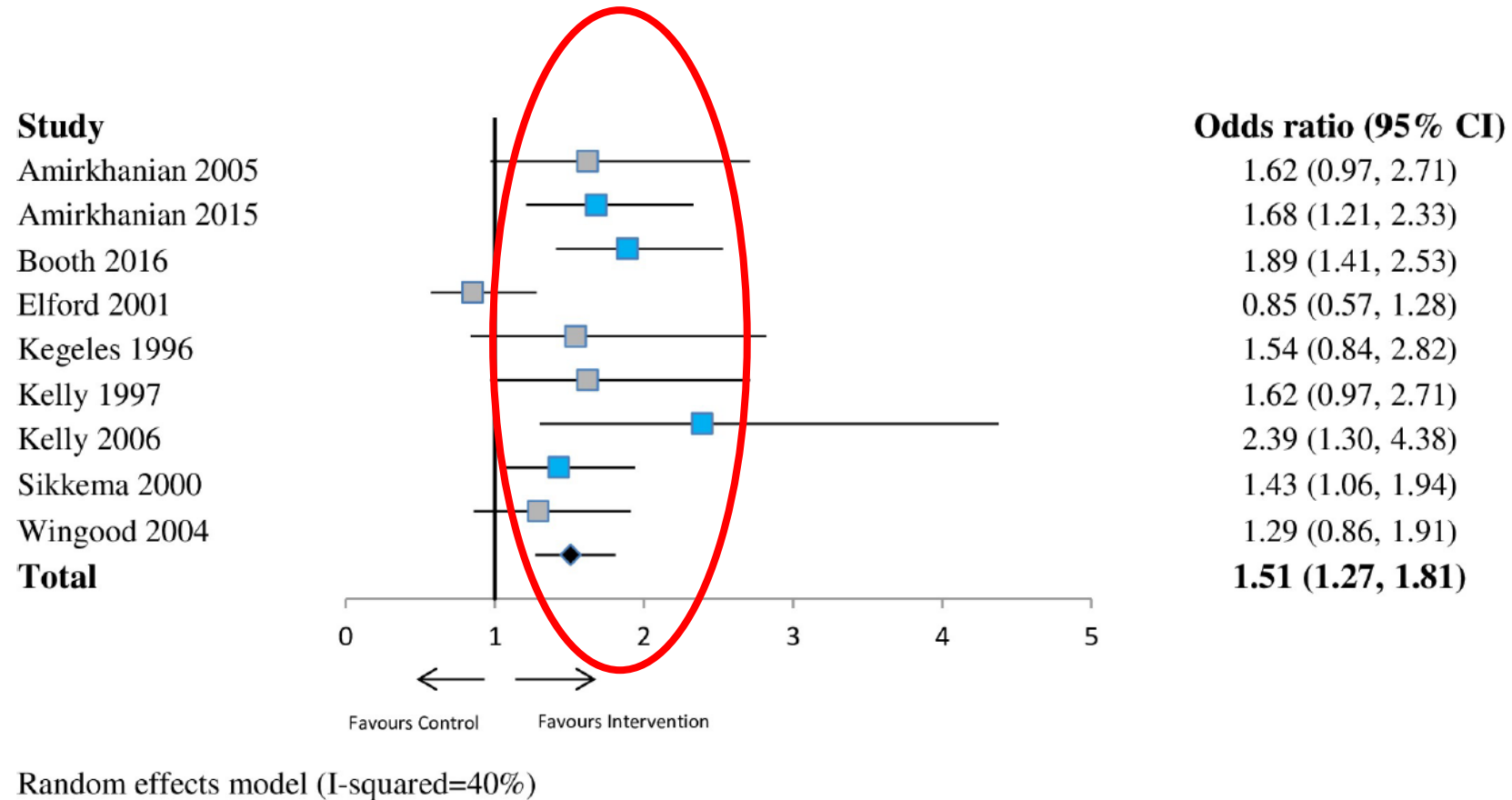


Fig 3. Forest plot showing odds of a more favourable outcome for intervention groups compared with controls for outcomes reported at >6 months to ≤12 months (sexual health outcome measures). The blue denotes significant effect in favour of the Intervention group. The grey denotes non-significant. The red denotes significant effect in the favour of the control group. CI, confidence interval.

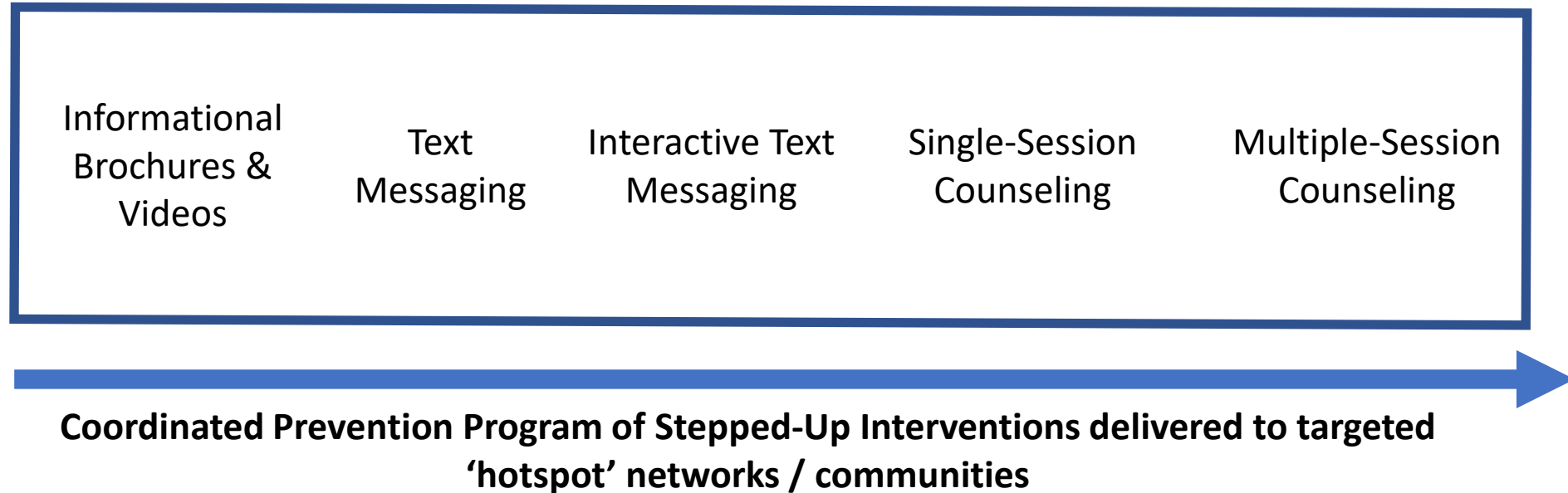
What outcomes should we expect from briefer vs more extensive interventions?

Passive information and messaging increase discrete individual behavior (screening/testing uptake, appointment keeping)

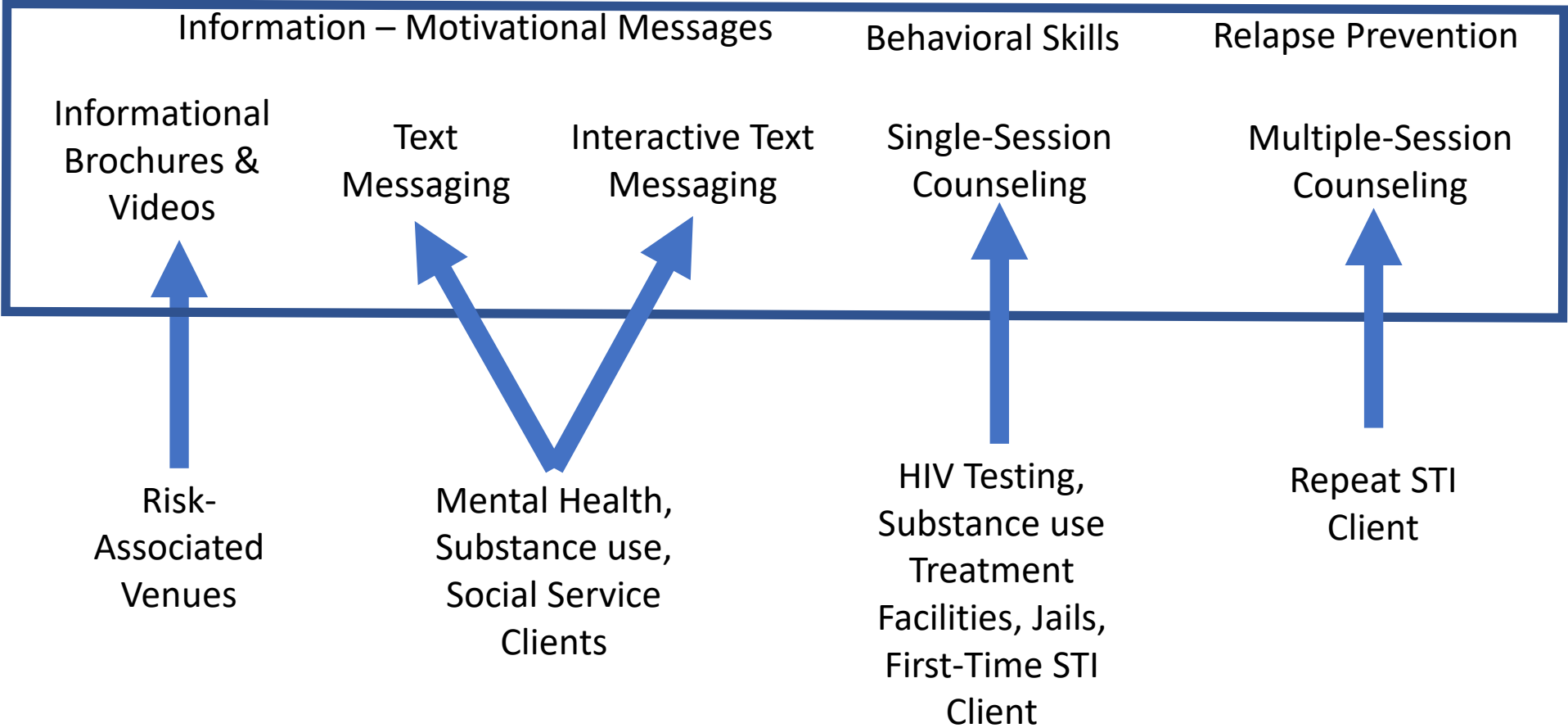
Brief counseling impacts complex and socially interdependent behaviors (condom use, partner selection, safer sex practices, substance use)

Network interventions influence perceived social norms that foster and sustain behavior change.

Not everybody needs the same intensity of intervention: Differentiated STI Prevention



Infusing resources to locations with greatest STI burden



What new/innovative strategies are needed to intervene with African American and Latin/x YMSM and transgender individuals who have a high burden of STIs?

**We cannot wait to end
institutionalized racism,
homophobia, transphobia, &
STI/HIV stigma so we have to work
around them.**

We can home test

Home STI & HIV testing can and should be embedded in evidence-based mobile-delivered behavioral interventions to revolutionize STI detection, treatment & prevention.

STD Testing Home Kit



Self/Home STI Testing

Black men who have sex with men in Atlanta

710/800 89% returned

3% GC/CT urine

12% GC/CT rectal

Eaton, 2019, in process

Men who have sex with men in Chicago, Atlanta, & New York

1001/1076 (93%) returned

3.2% GC/CT urine

5.0% GC/CT rectal

Mustanski et al., 2018, Am J Prev Med

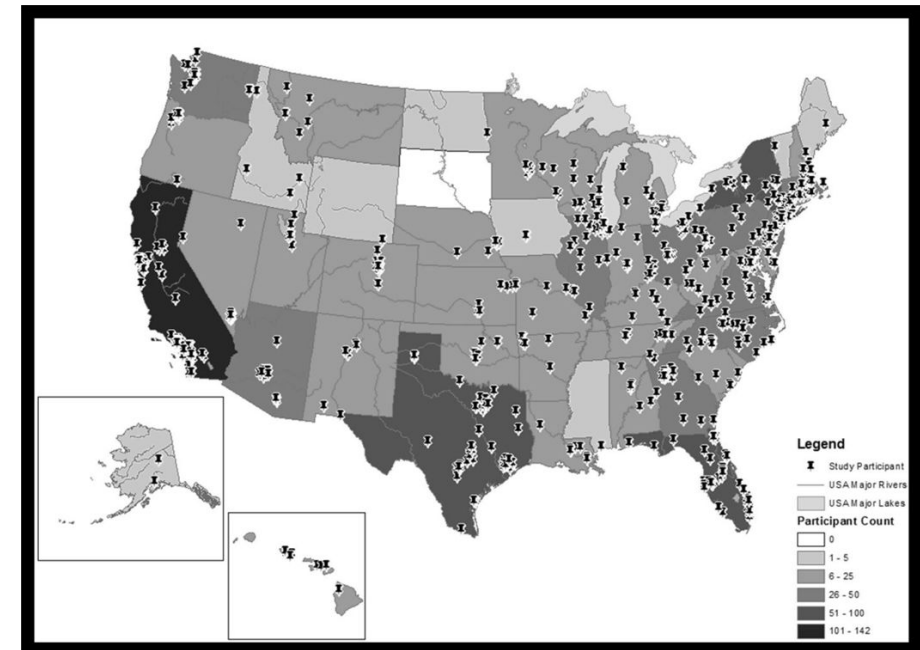
National sample of men who have sex with men

1071/1268 (84%) returned

1.7% GC/CT urine

5.3% GC/CT rectal

Grov et al., 2016, Sex Transm Diseases



Grov et al., 2016, Sex Transm Diseases

**Web-based STI testing
and e-prescription
treatment is feasible,
acceptable, and cost-
effective.**

Blake et al., 2015, Sex Transm Dis



“E-Prescriptions”
Making Patient Care Effective & Efficient



eb

www.engineerbabu.com

**If we can home test and treat,
we can also home counsel**

Digitizing & Customizing

Effective Interventions
HIV PREVENTION THAT WORKS



45 Evidence-Based Behavioral Interventions for HIV/STI Prevention

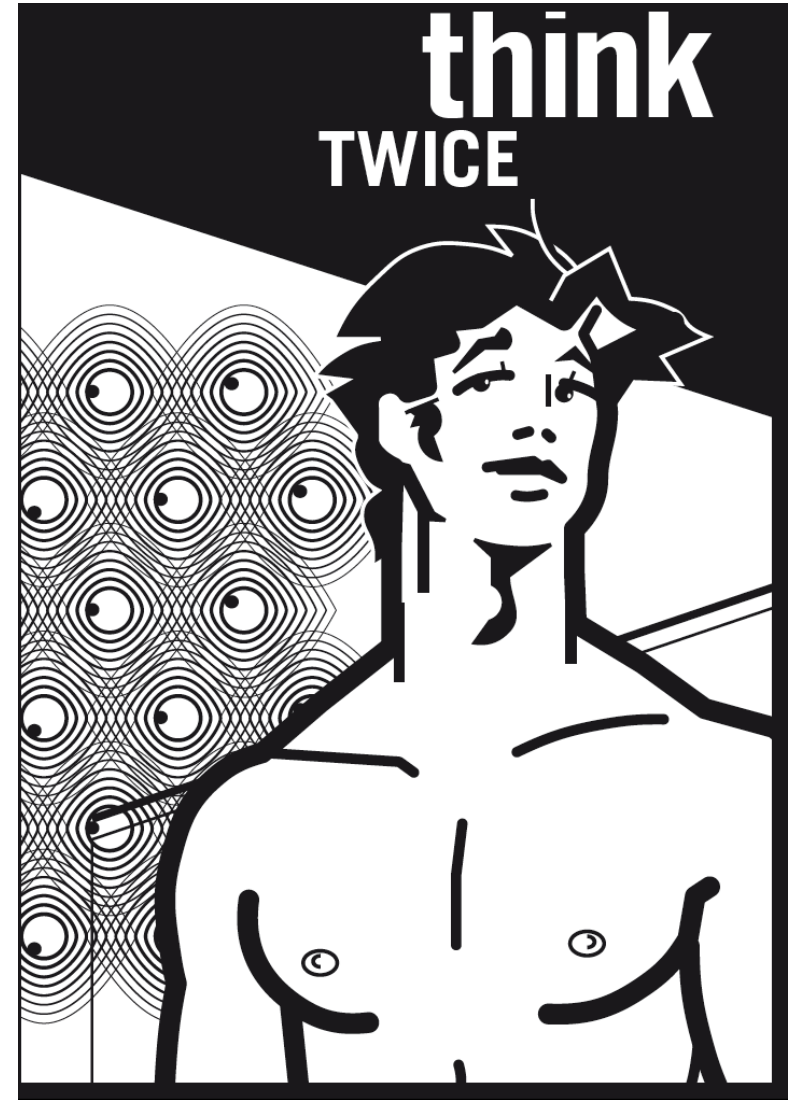
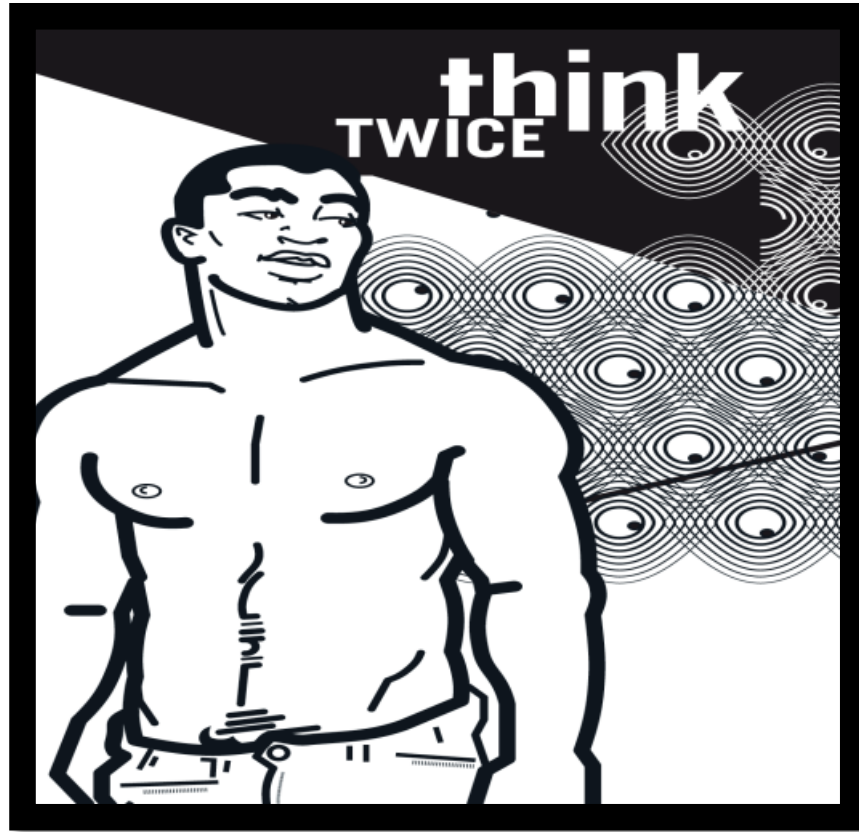
**Interventions that
capitalize on
technology for broad
delivery, targeting
networks, &
removing barriers.**



Jose Bauermeister



Lisa Eaton





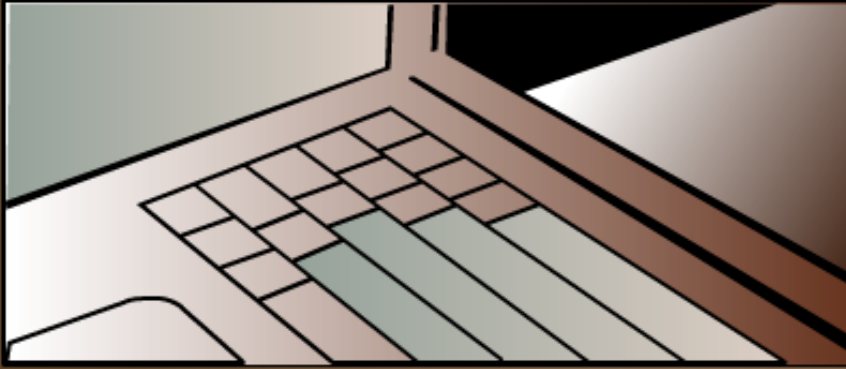
Brian Mustanski

HAVE FUN. **STAY SAFE.**

KEEP IT UP



Hooking Up Online



Guys like us face a number of issues when we meet or hook up with people online.

Let's go "behind the profiles" and see what situations that the following guys might run into...

CARLOS



DAN



RAY



These situations get sexually explicit, so make sure you're viewing this in a private place.

NEXT ►

HAVE FUN. STAY SAFE.

KEEP IT UP 

Hooking Up Online



If the guy I'm hooking up with was HIV positive, I'm sure he'd say something. But he's got condoms in any case, just to be sure.

KEEP IT UP! 2.0

Best Evidence – Risk Reduction

INTERVENTION DESCRIPTION

Target Population

- HIV-negative young men who have sex with men (MSM)

Goals of Intervention

- Reduce incident sexually transmitted infections (STIs)
- Reduce condomless anal sex

Brief Description

Keep It Up! 2.0 is an online and interactive individual-level intervention. It is delivered via computers or tablets, and uses a variety of content (e.g., videos, interactive animation, and games) to increase HIV knowledge, motivate and teach safer behaviors, and instill self-efficacy for HIV prevention strategies. The intervention consists of seven modules based on a particular setting or situation relevant to YMSM. The modules include developmentally appropriate behavior change content. For example, a soap opera-style video following diverse YMSM highlights the risks of assuming a partner's HIV status and monogamy in relationships. The importance of HIV testing, skills for negotiating condom use, and the

Summary

The National Institutes of Health (NIMH, NIDA, NIAAA, NICHD) invested heavily in developing and rigorously testing behavioral STI/HIV prevention interventions.

The CDC established entire infrastructure to evaluate evidence for efficacy, test effectiveness, package, disseminate, and train frontline providers. That scale-up effort stalled in 2015 and appears all but ended in 2017.

No longer linking risk reduction counseling to HIV testing has created enormous missed opportunities for STI prevention.

President Barack Obama, July 13, 2010

“The question is not whether we know what to do, but whether we will do it.”

