

Maximizing # HIV infections averted by targeting alcohol and other risk factors

- An implementation science approach

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Implementation Science

- “The scientific study of methods to promote the integration of research findings and evidence-based interventions into health care policy and practice and hence to improve the quality and effectiveness of health services and care”
 - Schackman, JAIDS, 2010

Implementation Science

- Several quantitative research traditions
 - Industrial engineering
 - Management science.
 - Operations research
 - The discipline of applying advanced analytical methods to optimize decisions, utilizing mathematical and statistical modeling, and decision analysis

Modeling/OR perspective

- Start with outcomes that matter most
 - Life expectancy
 - Quality of life
 - # infections averted
- Represent pathways leading to outcomes
- Represent constraints
 - Budget
 - Feasibility

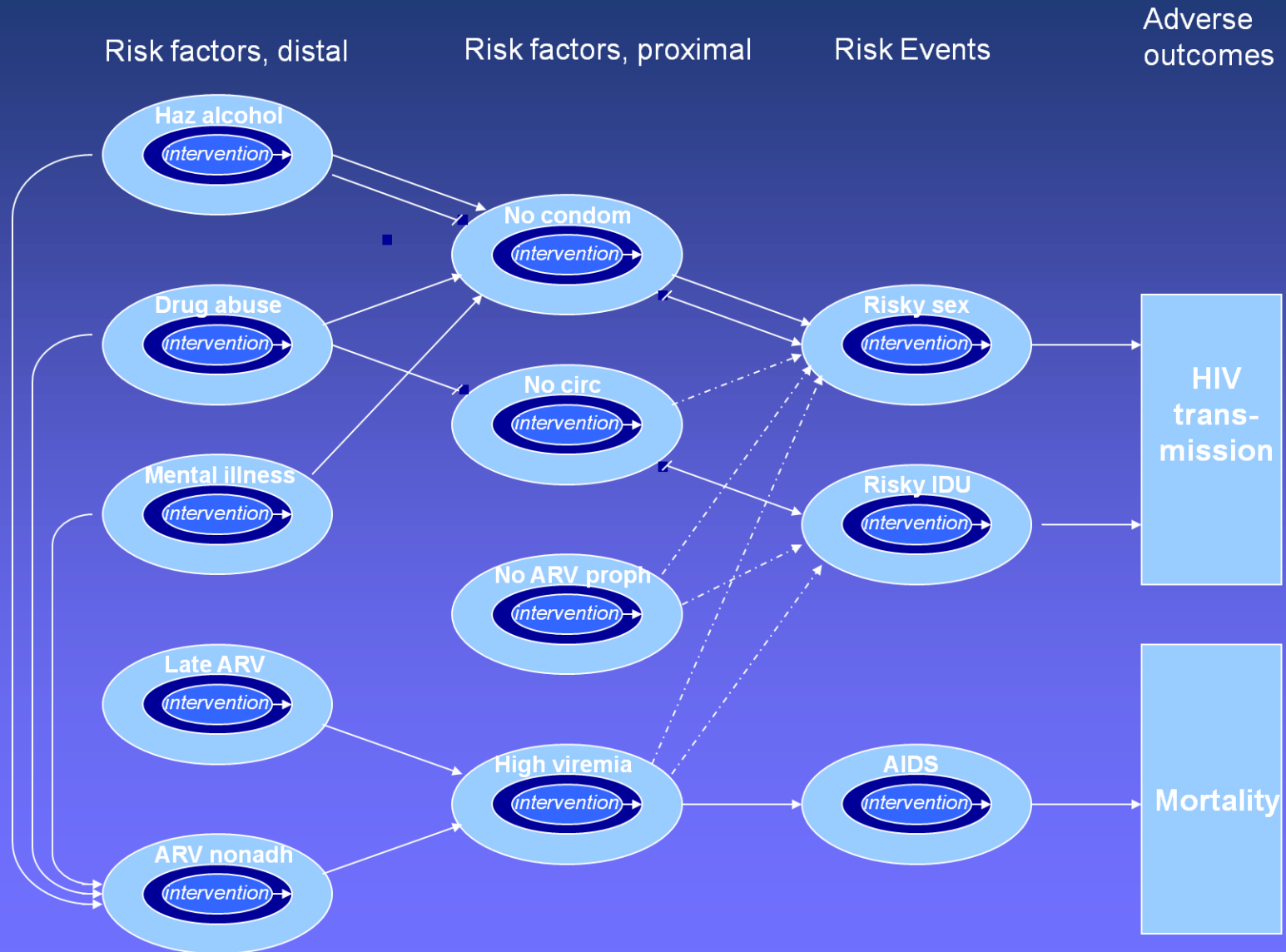
Modeling/OR Challenges

- Evidence does not always exist
 - Use wide plausible ranges and propagate statistical uncertainty through model
- Evidence is not always good
 - Assign each input a level of evidence and let model user pick evidence threshold
 - If input does not meet threshold then don't use it
- Interventions are not always feasible
 - Allow user to designate feasibility

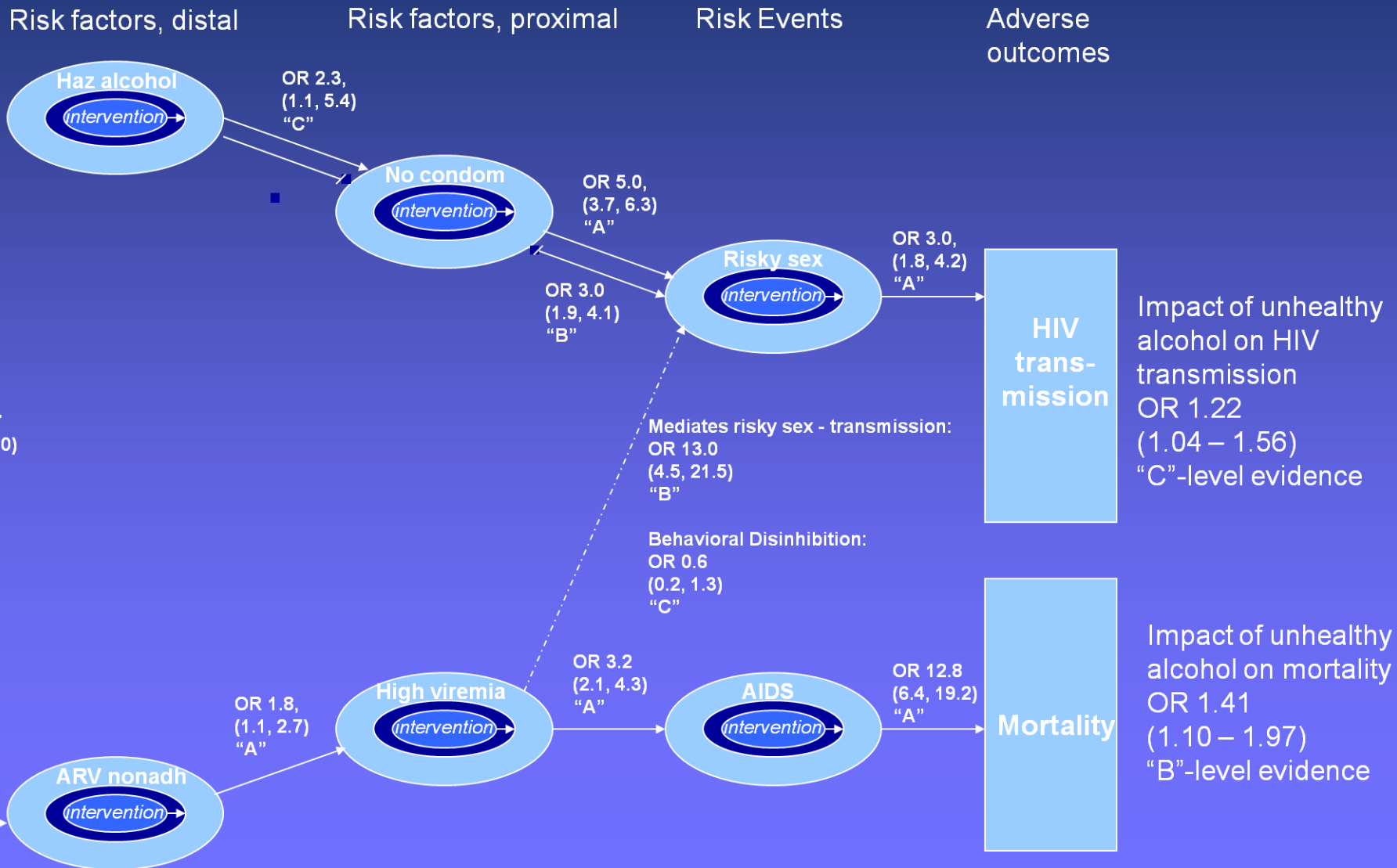
Modeling/OR advantages

- Non-doctrinaire
- Does not favor any type of intervention
 - “Treatment as prevention” versus “prevention as prevention”
 - Circumcision versus PrEP
 - Alcohol intervention vs drug intervention
- If models could talk they would say
 - “If you give me a budget, I’ll give you the comprehensive package of interventions that will avert the most HIV infections”

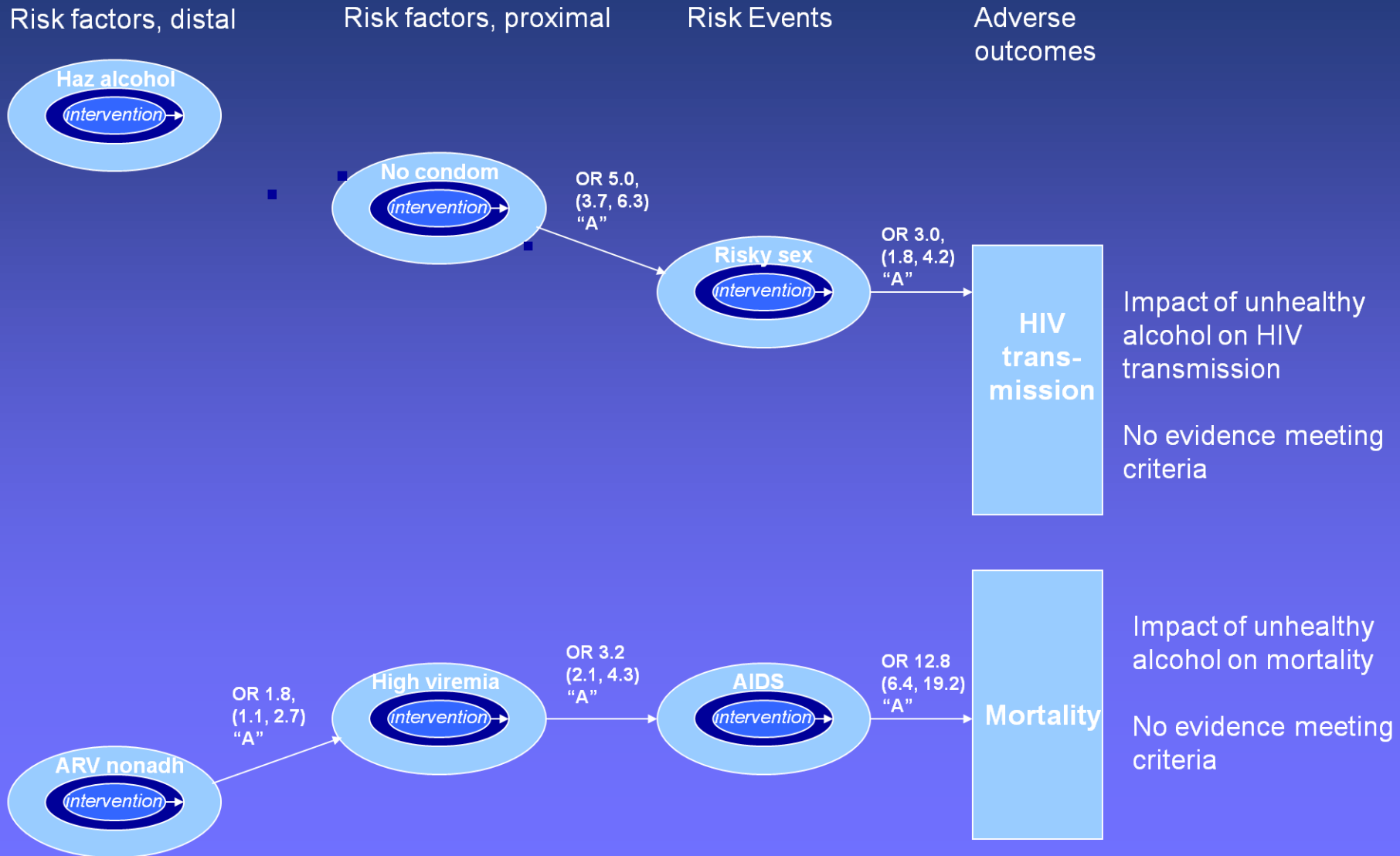
Evidence Synthesis: Pathways



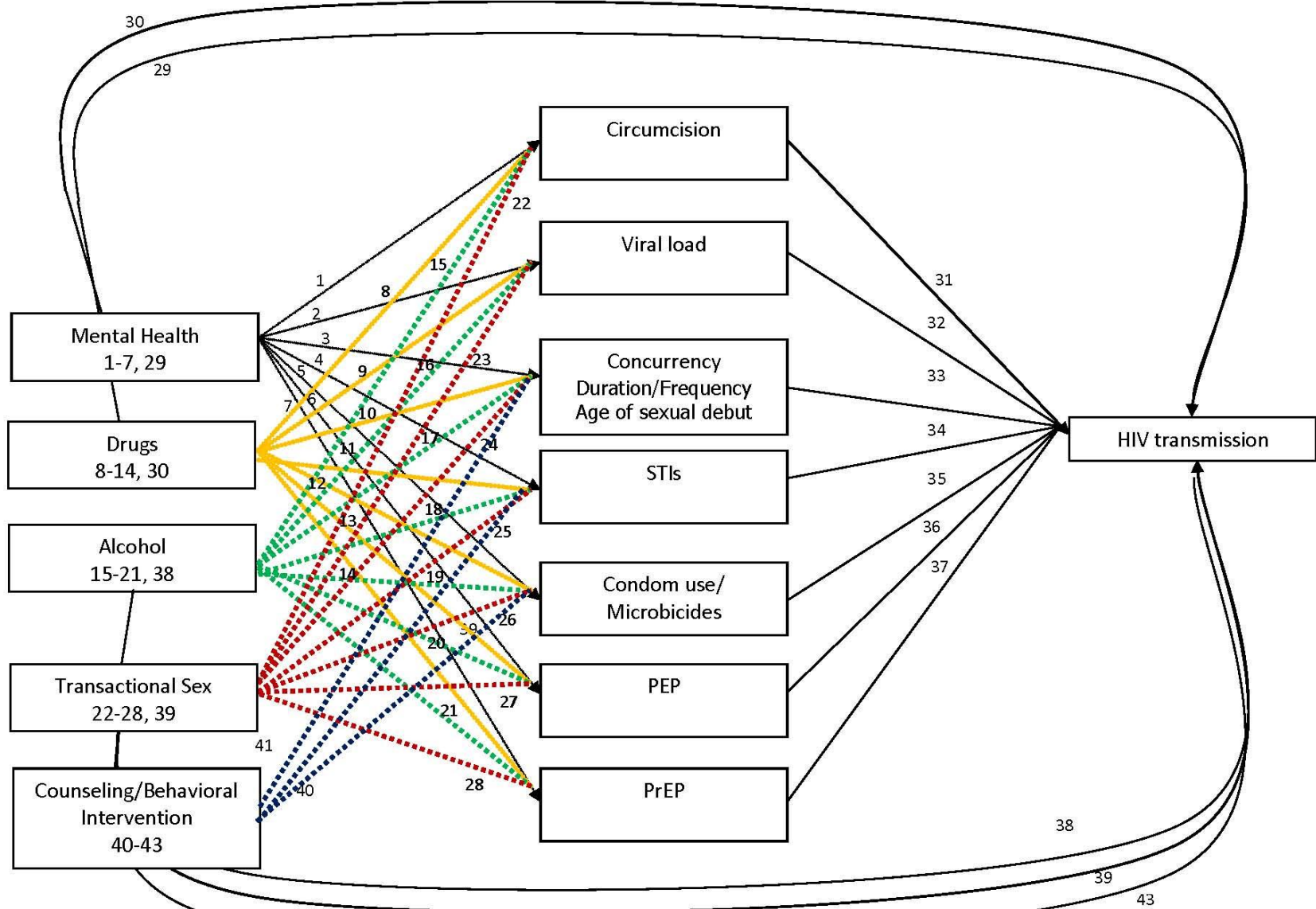
Evidence Synthesis: Including Effect Size and Quality



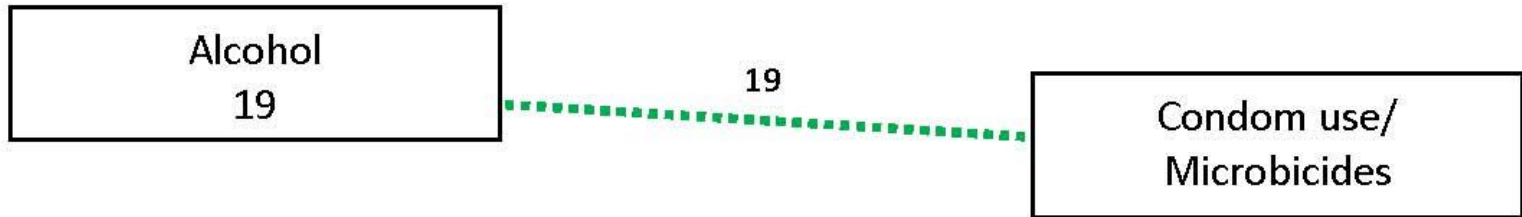
Synthesis of Alcohol Effect: Requiring Level "A" Quality



Pathways: Unabridged



Link19: Alcohol consumption to Condom/microbicides



Link 19 evidence

<u>Link description</u>	<u>Estimate type</u>	<u>Estimate</u>	<u>CI lower limit</u>	<u>CI upper limit</u>
General (unspecified) alcohol consumption to condom use	STATA pooled estimate	0.83	0.57	1.20
General (unspecified) alcohol consumption to condom non use/microbicides	STATA pooled estimate	1.57	1.27	1.93
Low alcohol(0-1 drinks/wk) consumption to condom non-use/microbicides	Plausible estimate	1.01	0.19	5.24
Medium alcohol (1-7 drinks/wk) consumption to condom non-use/microbicides	Plausible estimate	1.21	0.73	2.25
High alcohol (8-14 drinks/wk) consumption to condom non-use/microbicides	Plausible estimate	1.12	0.29	10.99
Very high alcohol (>14 drinks/wk) consumption to condom non-use/microbicides	Plausible estimate	1.23	15.81	23.94
Very high alcohol consumption to condom non-use/microbicides (males:>21 drinks/week))	STATA pooled estimate	2.84	1.92	4.20
Very high alcohol consumption to condom non-use/microbicides (females: >14 drinks/week)	STATA pooled estimate	3.94	2.09	7.42

Hypothetical results: Budget \$100m, No evidence or feasibility thresholds

RANK	Strategy	# HIV cases averted	Evidence	Feasibility
1	Suite of treatment as prevention + Suite of ARV adherence	88,000	B	B
2	Suite of treatment as prevention (enhance HIV test+ treat if viral load >10k + enhance link to care)	53,200	A	B
3	Suite of ARV adherence (alcohol + drug + mental health + food insecurity + retention in care)	43,000	B	B
4	PreP for high-risk (discordant couples and sex workers)	32,000	A	C
5	Circumcision promotion	5,800	A	B
6	Microbicide promotion	3,600	B	C
7	Condom promotion	1,900	B	A

Hypothetical Results: Budget \$100m

Now limit to Evidence=A and Feasibility \geq B.

RANK	Strategy	# HIV cases averted	Evidence	Feasibility
1	Suite of treatment as prevention (enhance HIV test+ treat if viral load >10k + enhance link to care)	53,200	A	B
2	Circumcision promotion	5,800	A	B

Conclusions

- Modeling/OR one of most important disciplines of implementation science
 - Non-doctrinaire systematic quantitative
- Guide to programmatic decision making
 - Which comprehensive package of services will avert most HIV infections given budget?
 - What is balance of alcohol and other ARV adherence/retention interventions versus other approaches?