Teen Pregnancy Prevention Evaluation Technical Assistance: Core Components Analysis

Presentation for Tier II Phase 2 Grantees

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OASH | Office of Population Affairs

Agenda

- Introduction
- Reminder from initial webinar
  - Components of teen pregnancy prevention (TPP) programs
  - Checklist tool
- Preparing for a component analysis
- Research questions and corresponding analysis methods
- Q&A

Today's speakers

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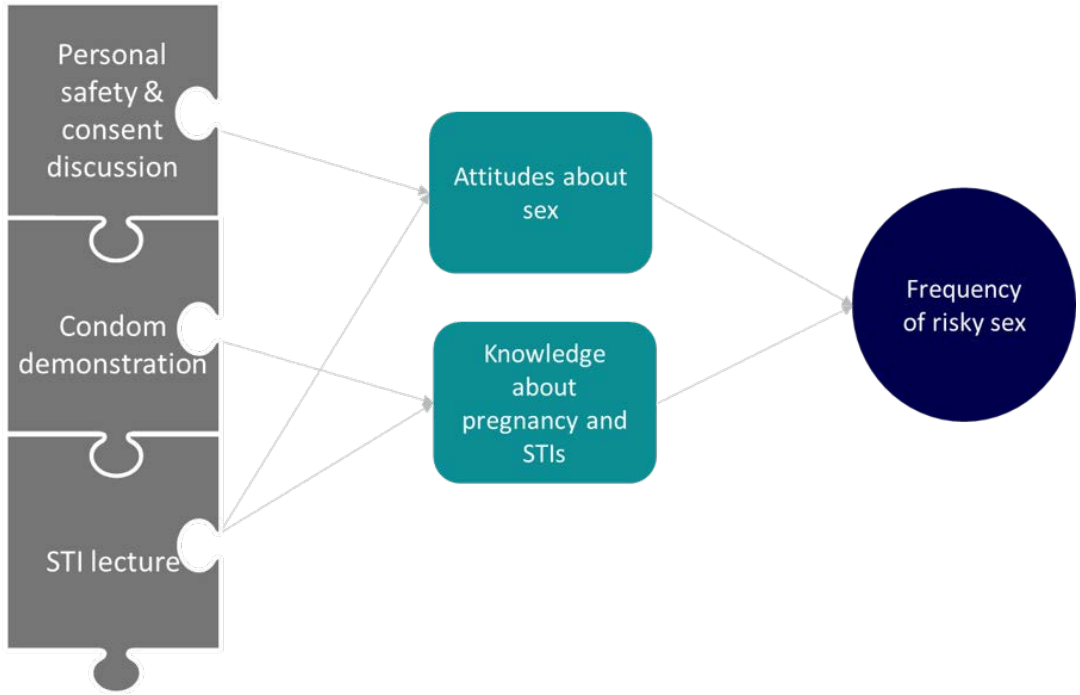
Motivation

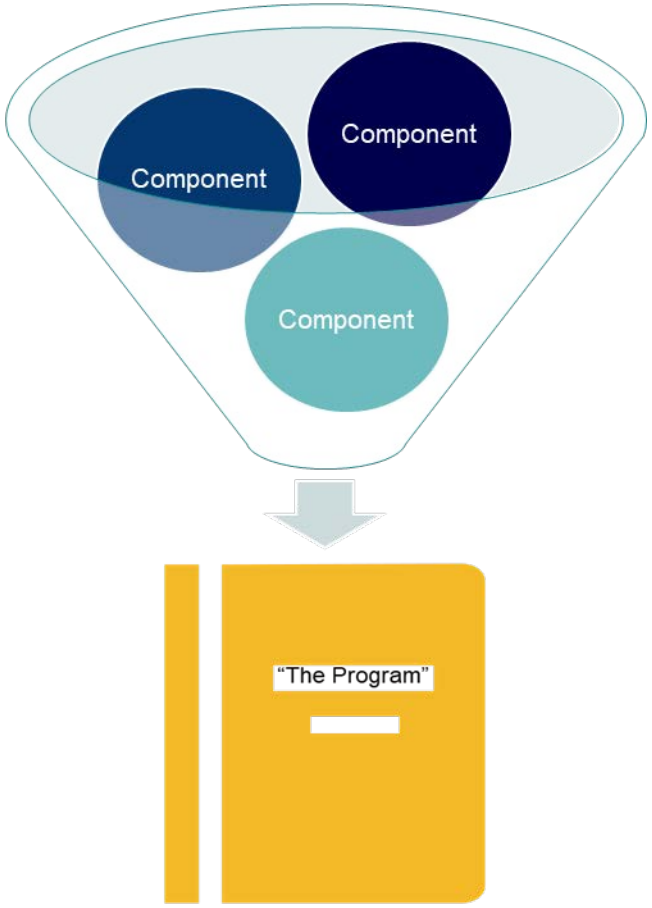
- There is an extensive body of evidence about effective TPP programs
- Much less is known about the what aspects/ingredients of the program drives improvement in outcomes
- National Academy of Sciences Promoting Positive Adolescent Health Behaviors and Outcomes report recommended investigation into components of TPP programs
- The Office of Population Affairs (OPA) is encouraging the field to systematically document components of TPP programs, and has developed a checklist to standardize the process
- Linking components to outcomes will further address this evidence gap

What is a component analysis?

- Traditional impact evaluations assess the effects of the whole program
- Component analysis is a way to learn about the smaller pieces of the program—or *components*.

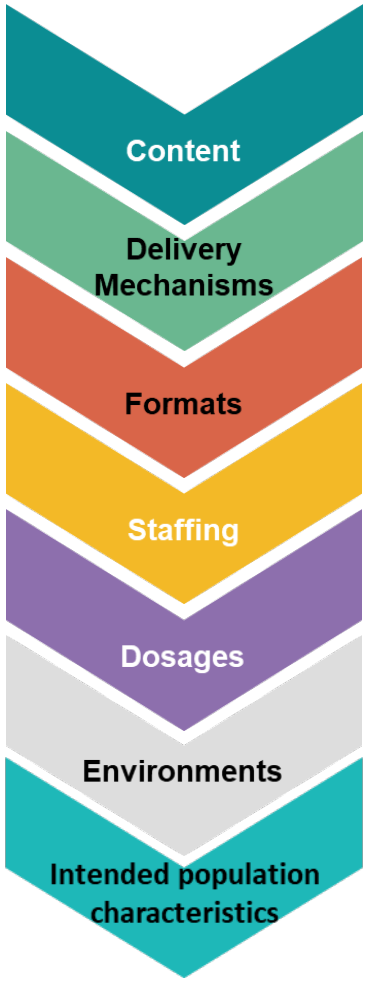


What are program components?



- The "ingredients" of a program
- Often defined in a manual or other program documentation

Types of program components (1)



The intended subject matter of a program

The intended principles and practices by which the content is provided

The intended structure and organization by which the content is delivered

The intended training and characteristics of the individuals delivering content

The intended duration, frequency, and intensity of the program

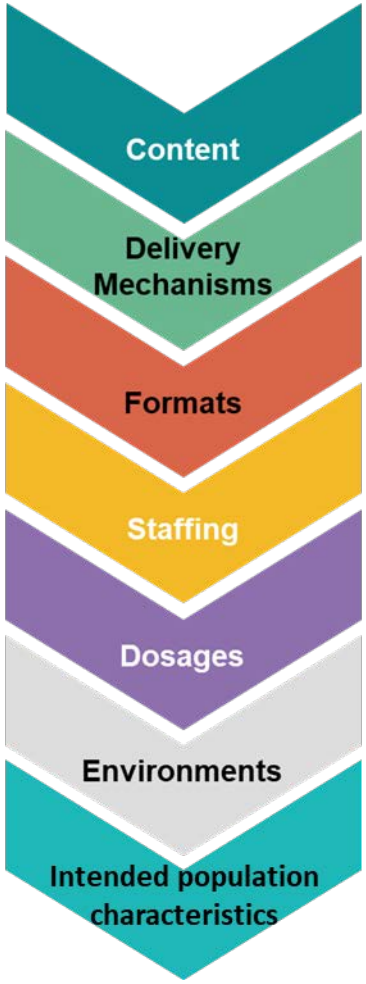
The intended settings or locations where the program occurs

The characteristics of the intended population receiving programming

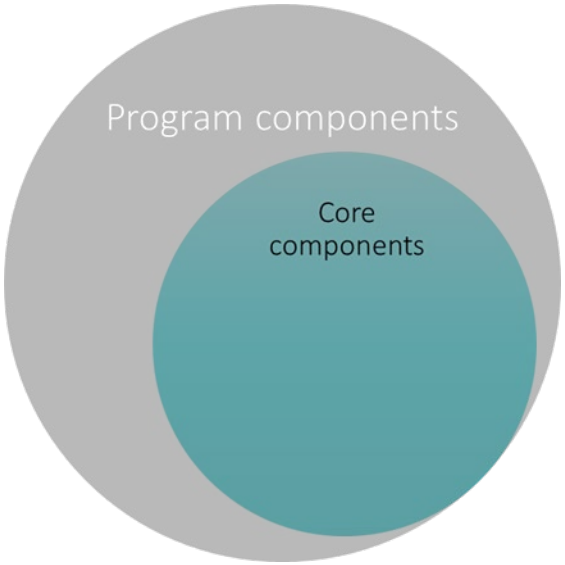
Types of program components (2)

- Combinations of program components describe how a program is meant to be implemented

For example, a 20-minute (dosages), small group activity (formats), with high school students (intended population characteristics), during health class (environments, featuring a discussion about communication in health relationships (content).



What are core components?



- These **core components** are hypothesized to be drivers of program effects
- Rigorous effectiveness evaluation can produce evidence about which core components affect outcomes if the study is designed to test the component impacts
- There are other ways to generate useful preliminary evidence about components without building tests of components into study design

Tool for defining components: Components checklist

	A	B	C	D	E	F	G	H
1	Component	Definition	Component present? (Yes, optional, or No)	Notes (e.g., describe what is in "other")	Lesson number(s)/ activities where present (e.g., Lesson 4, manual page 95) (recommended)	Core component? (Yes or No)	Core component notes (explanation recommended)	Allowable and unallowable adaptions (optional)
2	Content: The intended subject matter being provided							
3	Anatomy/physiology	Content about the structure						
4	Contraception - Condoms	Content about condoms worn						
5	Contraception - Long-acting reversible contraceptives	Content about long-acting,						
6	Contraception - Other	Content about other types of contraception						
7	Contraception - Pills, patches, rings, and shots	Content about methods of						
8	Maternal health	Content about the health of						

Illustrative program description after checklist completion

Content

- Goal setting
- Consent
- Healthy relationships
- Contraception—condoms
- STI prevention
- …

Delivery mechanism

- Lecture
- Demonstration
- Role play/practice
- …

Dosage

- 8 1-hr classroom sessions
- …

Staffing

- Health educator
- Developer training
- …

Format

- Full-group activity
- Small-group activity
- In person
- …

Environment

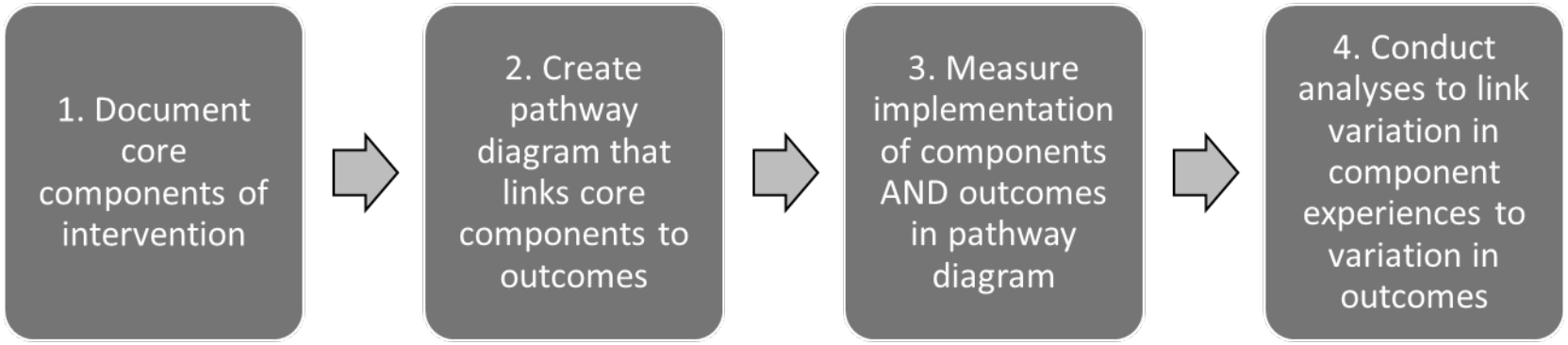
- High school health class
- …

Benefits of describing program components

- Consistent and efficient program descriptions
  - Developers: communicate their program's components and which are core
  - Implementers: document implementation and OPA-approved adaptations
  - Potential users: quickly compare across programs to make program selection decisions
- The ability to compare TPP programs and their components to each other will support research efforts that can lead to stronger evidence and informed program improvement
  - Which components are most common across TPP programs?
  - Which components are associated with specific behavioral outcomes?

Conducting analyses to understand how core components influence outcomes

Steps to link core components to outcomes



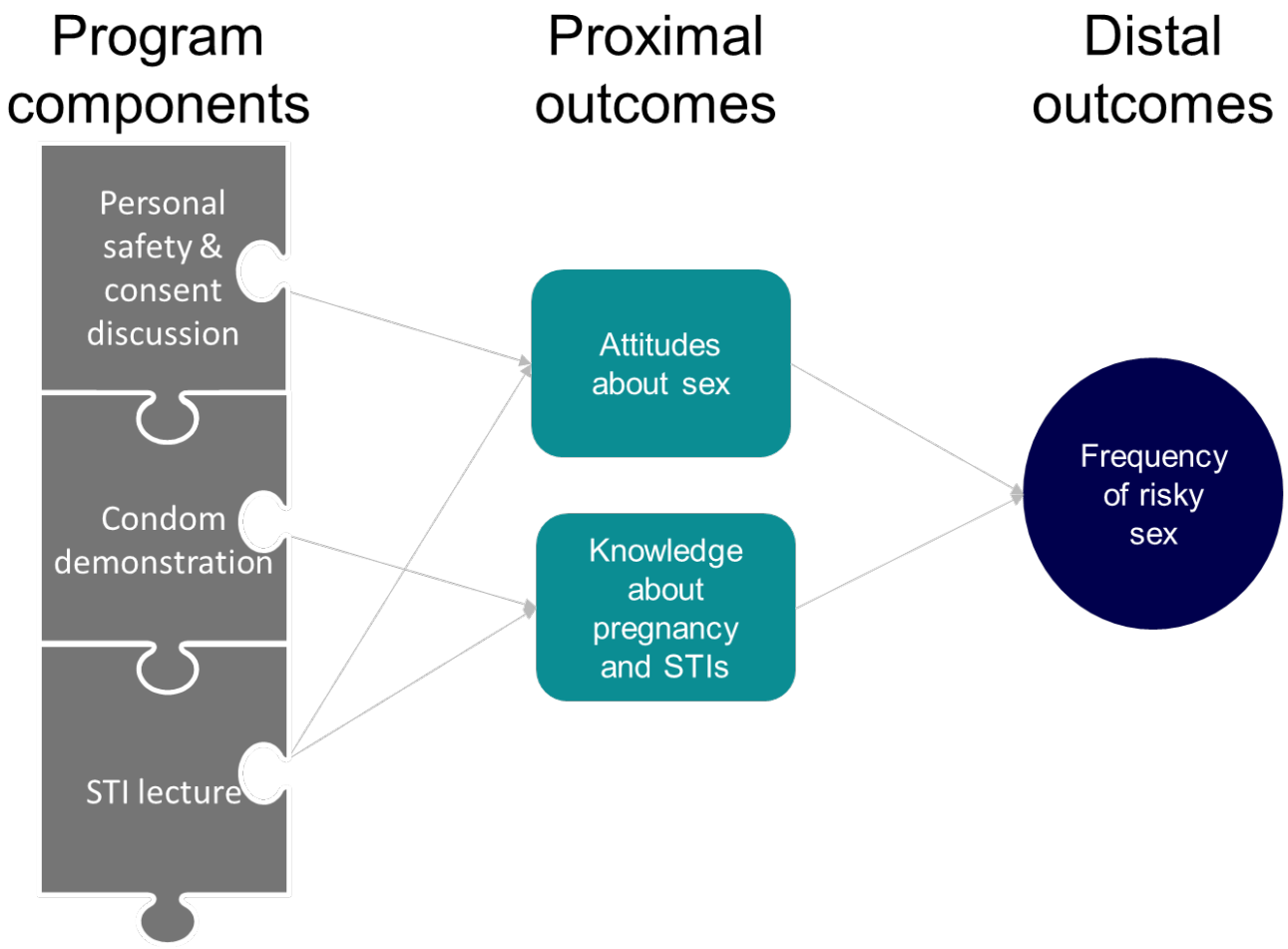
Step 1: List core components of intervention

- Using checklist
- Using pre-defined components hypothesized to be important a-priori (e.g., three structural elements)
  - Personal safety and consent discussion
  - Condom demonstration
  - STI lecture

Step 2: Create pathway diagram

- A pathway diagram is a visual representation of the link between core components and outcomes of interest
  - A more fine-grained version of your program's logic model
- Proximal outcomes influence distal (behavioral) outcomes
- Connect the components to the proximal outcomes, which ultimately connect to the distal outcomes

Illustrative pathway diagram



Step 3a: Collect data on implementation about components

- Define the mechanisms by which program participants receive intended core components - e.g.,
  - Attendance/Dosage
  - Engagement
  - Quality of delivery
- Collect data on attendance/quality/etc., for each component of interest
- These data enable identification of youth who have different experiences of core components

Step 3b: Collect data on outcomes in pathway diagram

- Collect participant-level data for each outcome in the pathway diagram through follow-up surveys or other data sources
  - These data enable us to explore the extent to which variation in component experiences influence variation in outcomes
  - Collecting baseline measures of outcomes allows for additional analyses to improve credibility of findings
- Link the implementation data to the outcome data
  - Ideally, linkages should occur at the individual level (e.g., student X's attendance records should be linked to student X's survey data)

Illustrative data using attendance to represent variation in components

ID	Safety & consent dosage	Condom demo dosage	STI lecture dosage	Attitudes about sex (1-5 scale)	Knowledge about STIs	Frequency of risky sex (times in past 30 days)
1	100%	100%	0%	4.9	70%	15
2	50%	0%	100%	2.3	60%	0
3	100%	0%	100%	1.5	100%	0
4	0%	0%	100%	3.2	80%	5
5	50%	100%	100%	.	20%	1

Step 4: Conduct analyses to link variation in components to outcomes

- Quasi-experimental approach
  - What is the effect of receiving an individual component on an outcome?
- Correlational approach
  - Which component(s) are the best predictors of an outcome?
- Structural equation modeling approach
  - How do core components influence multiple, potentially sequenced, outcomes?

Note: These approaches can be accomplished without using data from the comparison group

Quasi-experimental approach

Quasi-experimental approach

- Compares youth who receive core component (at all, as intended, relative to some known threshold, etc.) relative to youth who did not, on outcomes of interest
- Useful for estimating the effect of individual core components
- EXAMPLE: Effect of attending the condom demonstration on outcomes

Data preparation

- Create indicator for receipt of program component
  - Based on attending any aspect of it
  - Based on attending all of it
  - Based on attending a sufficient dose of it (ideally, prespecified by developer)
- This creates two groups of individuals
  - Those who received the component (*component treatment)*
  - Those who didn't (*component control)*

First, demonstrate internal validity of the contrast

- We can estimate difference in outcomes across those who attended the condom demonstration or not
  - This only reflects the effect of the condom demonstration if the only thing that differs between these two groups is attending this demo
- Strong recommendation: Assess the degree to which these groups are actually equivalent before experiencing the component
  - Use baseline measures of outcome(s) of interest, demographics
  - Ideally, using a measure or proxy for motivation
- Do matching analysis to improve baseline equivalence, if necessary

Estimate differences in outcomes, comparing component receivers vs. component non-receivers

- Estimate differences in outcomes, comparing groups that differ in their component experiences
  - Adjust for baseline differences, as appropriate
  - Adjust for other variables assumed to influence dosage (e.g., motivation)
- Describe your findings
  - Individuals who attended the condom demonstration answered 20% more items correctly on the sexual health knowledge assessment (p = .15)
  - Note: Consider Bayesian interpretation to help guide takeaways of component analyses, given that power is likely a limitation

Correlational approach

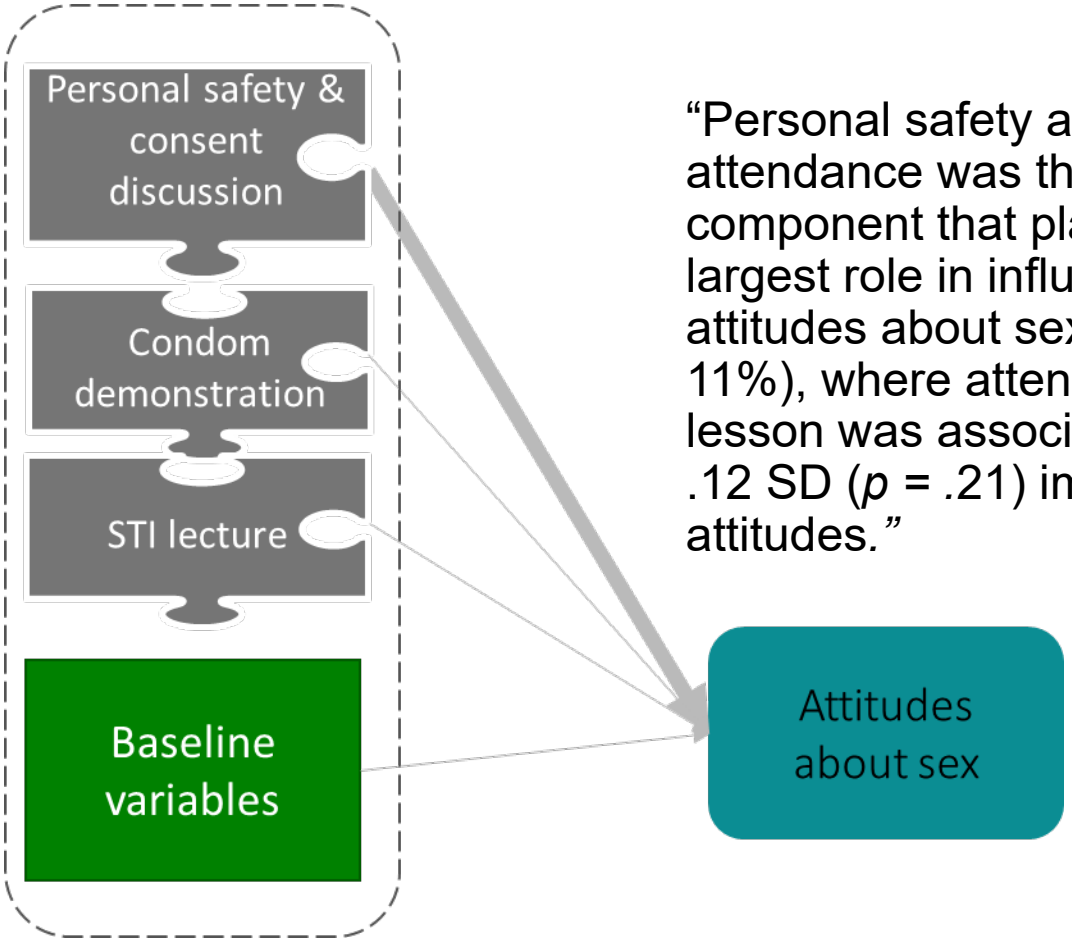
Correlational approach

- Statistical “horse race” that pits core components against each other to understand which ones are most influential on outcomes of interest
- Useful for exploring data, rather than testing hypotheses about particular components
- EXAMPLE: Which core component (personal safety and consent discussion, condom demonstration, STI lecture) plays the biggest role in influencing attitudes about sex?

Analytic approach

- Multiple regression
  - Dependent variable = outcome of interest (e.g., attitudes about sex)
  - Predictor variables = measures of implementation of each core component (e.g., dosage indicators for personal safety and consent discussion, condom demonstration, STI lecture)
  - Ideally, adjusting for other variables that might influence (1) components or (2) outcomes

Illustrative approach and finding



"Personal safety and consent attendance was the core component that played the largest role in influencing attitudes about sex (partial r^2 = 11%), where attending that lesson was associated with a .12 SD (p = .21) improvement in attitudes."

Structural equation modeling approach

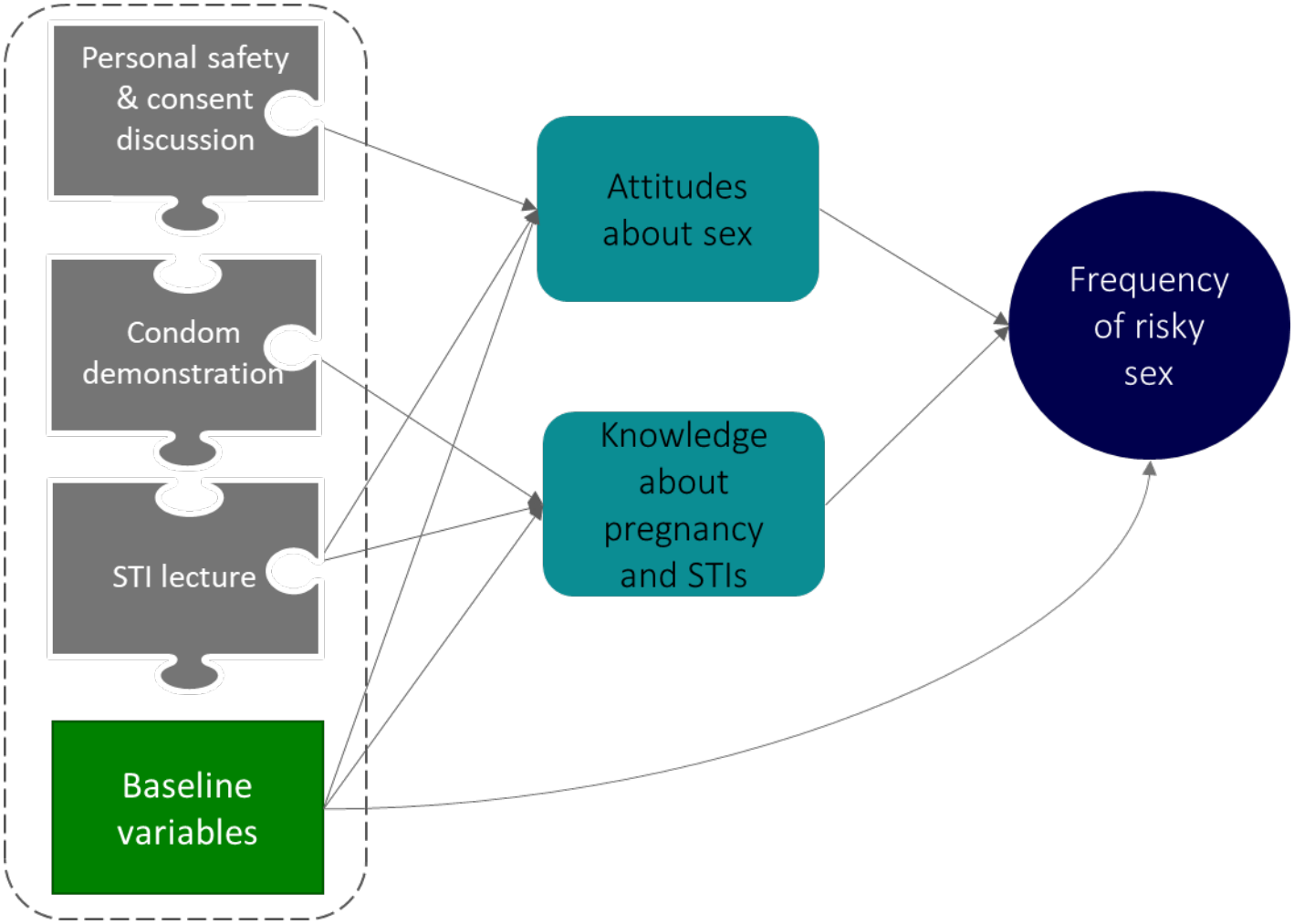
Structural equation modeling approach

- Extends previous correlational approach to include all outcomes in pathway figure in a single model (rather than looking at each outcome separately)
- Shifts from exploratory to more hypothesis driven research approach
  - Test assumptions of how components are related to outcomes
  - Assess overall model fit to data
- EXAMPLE: Which core components (personal safety and consent discussion, condom demonstration, STI lecture) plays the biggest role in influencing proximal (attitudes and knowledge) and distal outcomes (risky sexual behavior)?

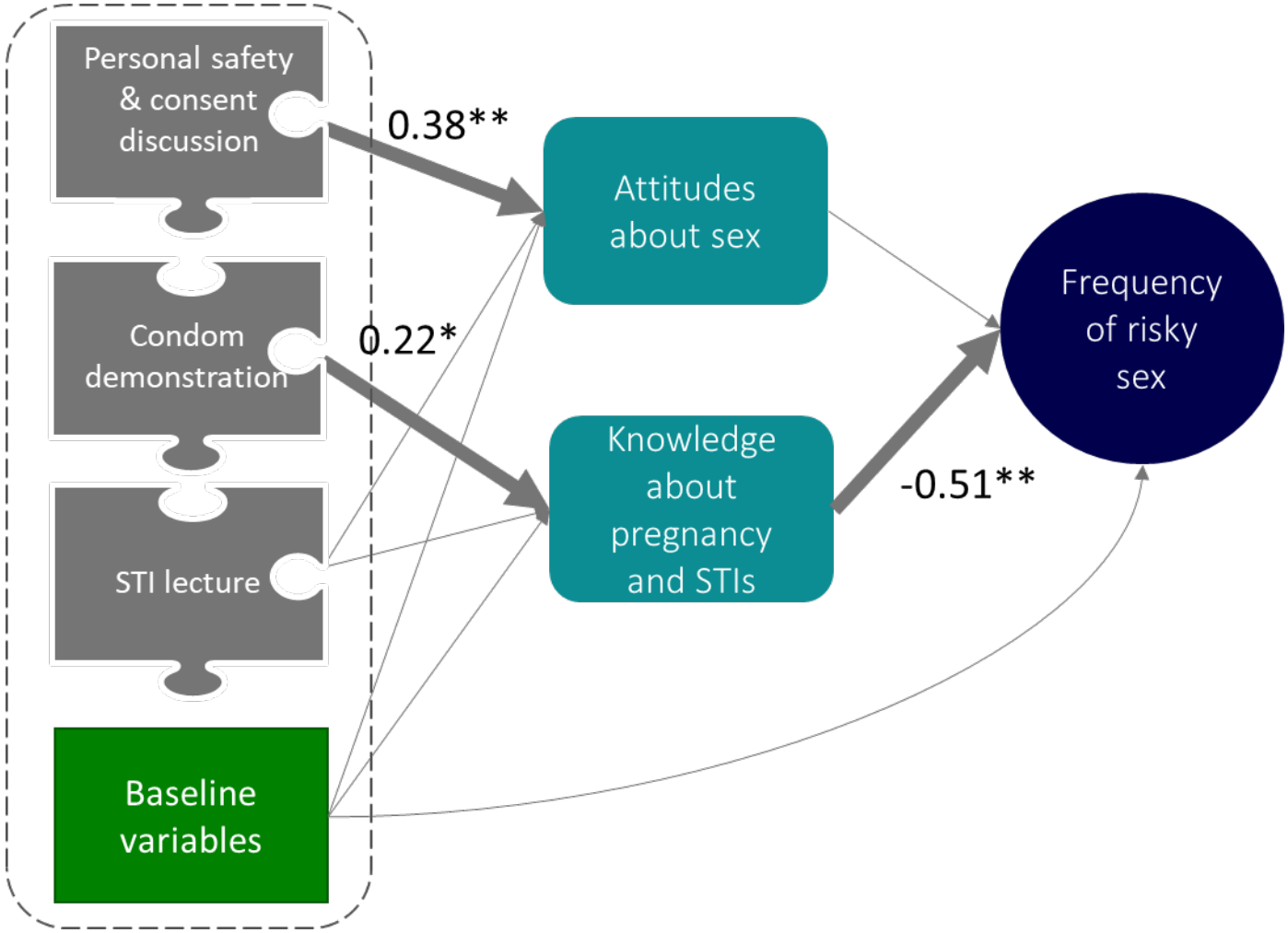
Model estimation & evaluation

- Use structural equation modeling software (e.g., Mplus, LISREL, EQS) or general statistical package (e.g., SAS, STATA, R) to fit model to observed data
- Ideally, adjusting for baseline variables, as in the correlational approach
- Interpret results of model
  - Assess model fit
  - How core components influence each proximal outcome?
  - How proximal outcomes influence distal outcomes?

Model visualization



Model visualization



* $p < 0.05$
** $p < 0.01$

Summary of analytic approaches

- Different analytic approaches answer different research questions
  - Impact of exposure to a component?
  - How do core components influence a single outcome?
  - How do core components influence multiple, potentially sequenced, outcomes?
- These are often useful as supplements to a main impact study that tests effect of full intervention (i.e., all components)
  - Need to acknowledge limitations (quality of implementation and outcome data, sample size, omitted variable bias threat)
  - But can set the stage for more rigorous evaluation of individual components

Conclusions

- Careful documentation of core components of interventions and collection of data on how core components were delivered and received can:
  - Provide insight into how programs work and how they can be adapted
  - Help practitioners/developer recognize which components of a program to emphasize/enhance or reduce/eliminate, given their role in influencing outcomes
  - Complement the primary impact analysis that tests the effect of the program as a whole

Component resources from OPA

- Structural Elements of an Intervention
- Understanding How Components of an Intervention Can Influence Outcomes
- Practical example: *Examining Intervention Component Dosage Effects on Substance Use Initiation in the Strengthening Families Program: for Parents and Youth Ages 10–14*
- Keep an eye out for
  - Checklist
  - Instructions
  - Brief

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Q & A