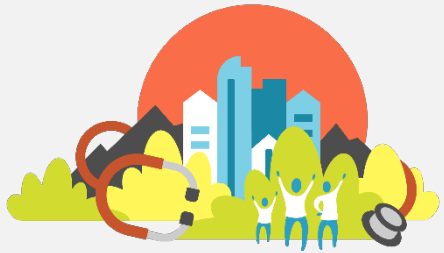


Convincing Health System Leaders to Invest in Integrated Care: How to Conduct Research Using Clinical and Cost Outcomes

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Faculty Disclosure

The presenter of this session has NOT had any relevant financial relationships during the past 12 months.

Conference Resources

Slides and handouts shared by our conference presenters are available on the CFHA website at https://www.cfha.net/page/Resources_2019 and on the conference mobile app.



Learning Objectives

At the conclusion of this session, the participant will be able to:

- Develop ideas for turning integrated care value propositions into convincing effectiveness research with clinical and cost outcomes.
- Identify the steps of the research process and how you might apply them to your own ideas.
- Discover types of clinical and cost data available in major health systems

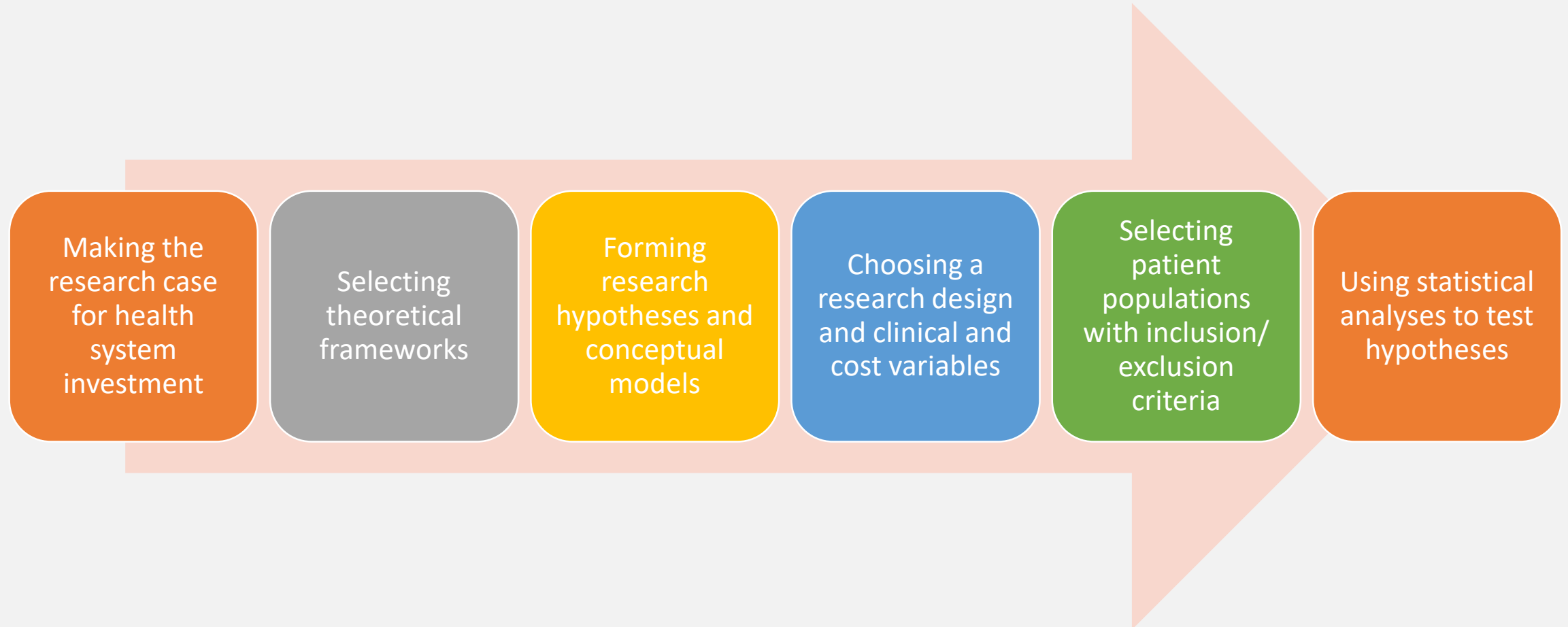
Bibliography / Reference

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2. Crown, W. H. (2014). Propensity-score matching in economic analyses: Comparison with regression models, instrumental variables, residual inclusion, differences-in-differences, and decomposition methods. *Applied Health Economics and Health Policy*, (12), 7-18.
3. Glass, J. E., Bohnert, K. M., & Brown, R. L. (2016). Alcohol screening and intervention among United States adults who attend ambulatory care. *Journal of General Internal Medicine*, 31, 739-745.
4. Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddard, G. L., & Torrance, G. W. (2015). *Methods for the economic evaluation of health care programmes*. New York, NY: Oxford University Press.
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Learning Assessment

- A learning assessment is required for CE credit.
- A question and answer period will be conducted at the end of this presentation.

Session Outline



Program Investment Decision-Making by Health System Leaders

Leaders make investment choices among alternative programs, as **budgets are limited**

Choices influenced by...

- Research evidence
- \$\$\$ available to invest
- Expected benefits
- Strategy
- Culture
- Stakeholder pressure
- Fairness
- Precedents



Making Investment Proposals to Health System Leaders

Support investment proposals – value propositions – with **research evidence**

Effectiveness: evidence from real-world environments

Efficacy: evidence from controlled environments
(*not a focus today*)

Economic value:
assessment of costs
and/or benefits



Why Research Evidence?

- A pilot study: 10 inpatients with disordered substance use who received bedside counseling in an integrated care unit vs. 7 patients with disordered use, also on the unit but not counseled
- Over the next several months, per chart review
 - 4 of the 10 counseled patients returned to the health system as inpatients or emergency patients, only 1 still using substances
 - 5 out of the 7 comparison patients returned, all still using substances
- Wow!! We got a new counselor position with this. But wait...

Why Research Evidence?

What else might explain the outcomes?

The researcher was biased during patient selection and/or data gathering

The two groups of patients differed in important ways that led to different outcomes

The outcomes occurred by chance

The outcomes occurred for reasons other than the counseling interventions

We need to apply the scientific method with research steps to have confidence in our conclusions



What Research is Needed?

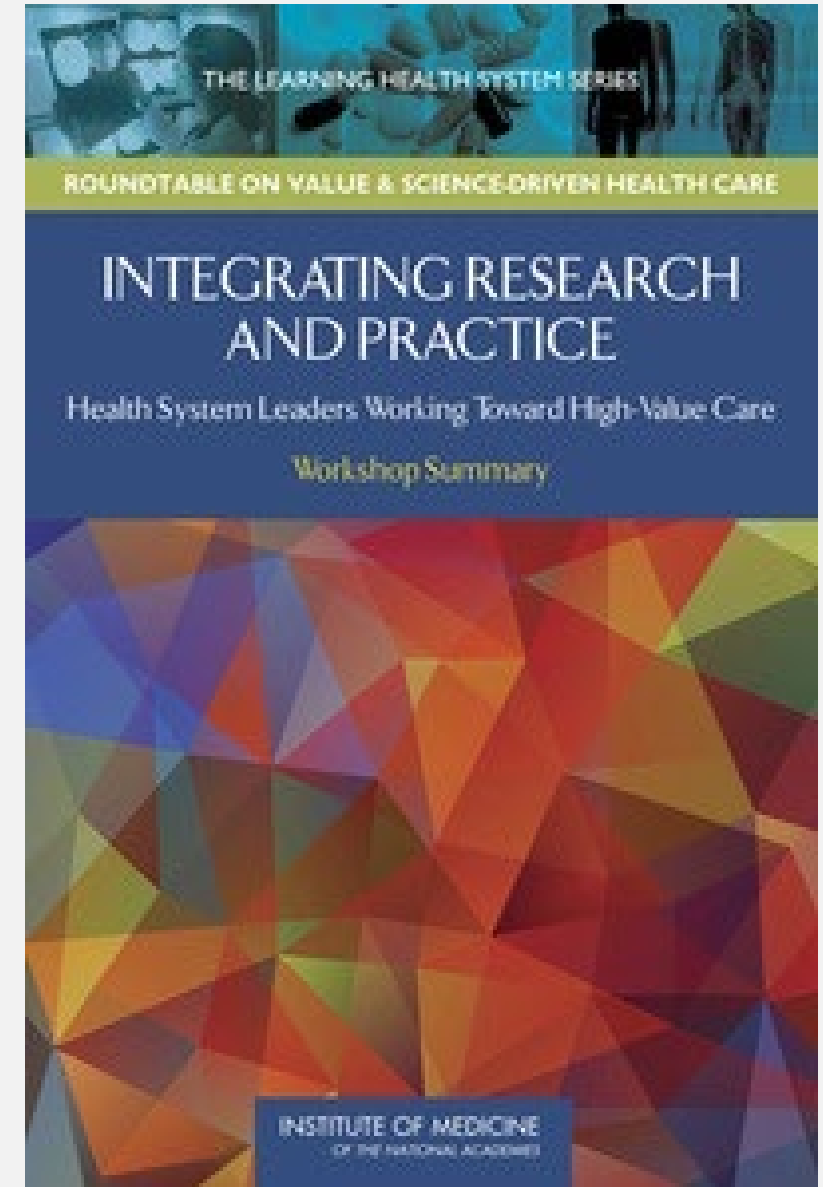
From the National Academy of Medicine

“...traditional approaches to clinical research are straining to keep pace with the demands.

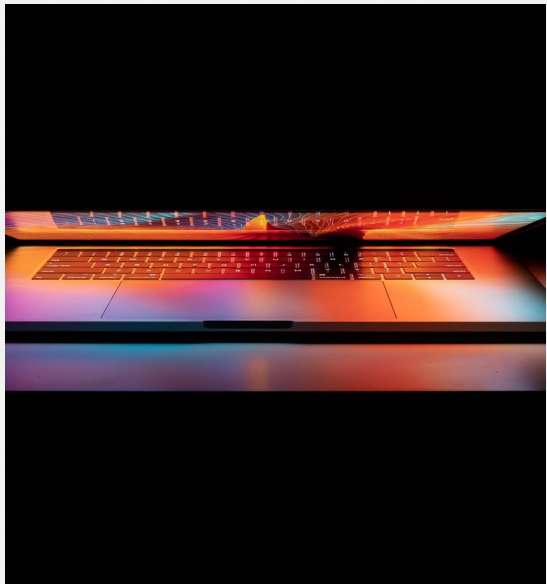
The gap might even be growing between the evidence we have and the evidence we need for best care.

Improvements in electronic records and computing power, as well as novel research designs, offer the prospect of drawing real-world practice and new evidence development much closer together.”

(National Academy of Medicine, 2019)



Suggested Approach to Integrated Care Research



Follow the scientific method

Use retrospective clinical data that is already available

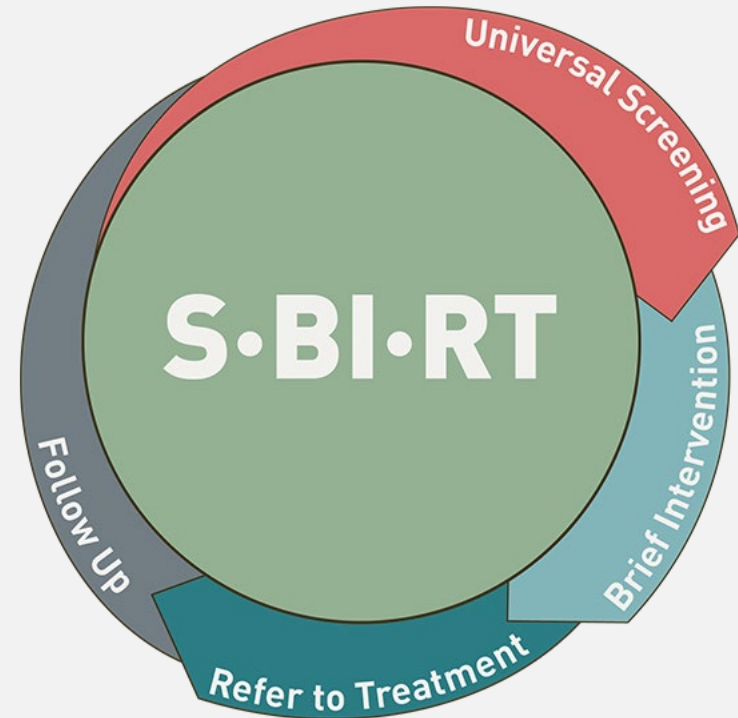
Focus on system-critical clinical and cost outcomes

Research Steps for Effectiveness and Economic Research

*After the **question** is defined, the **literature** is reviewed and the **rationale** is established for the study...*

- Theoretical framework
- Research hypotheses
- Conceptual model
- Research design
- Variables
- Patient populations
- Statistical analyses

Illustrated using an SBIRT research study

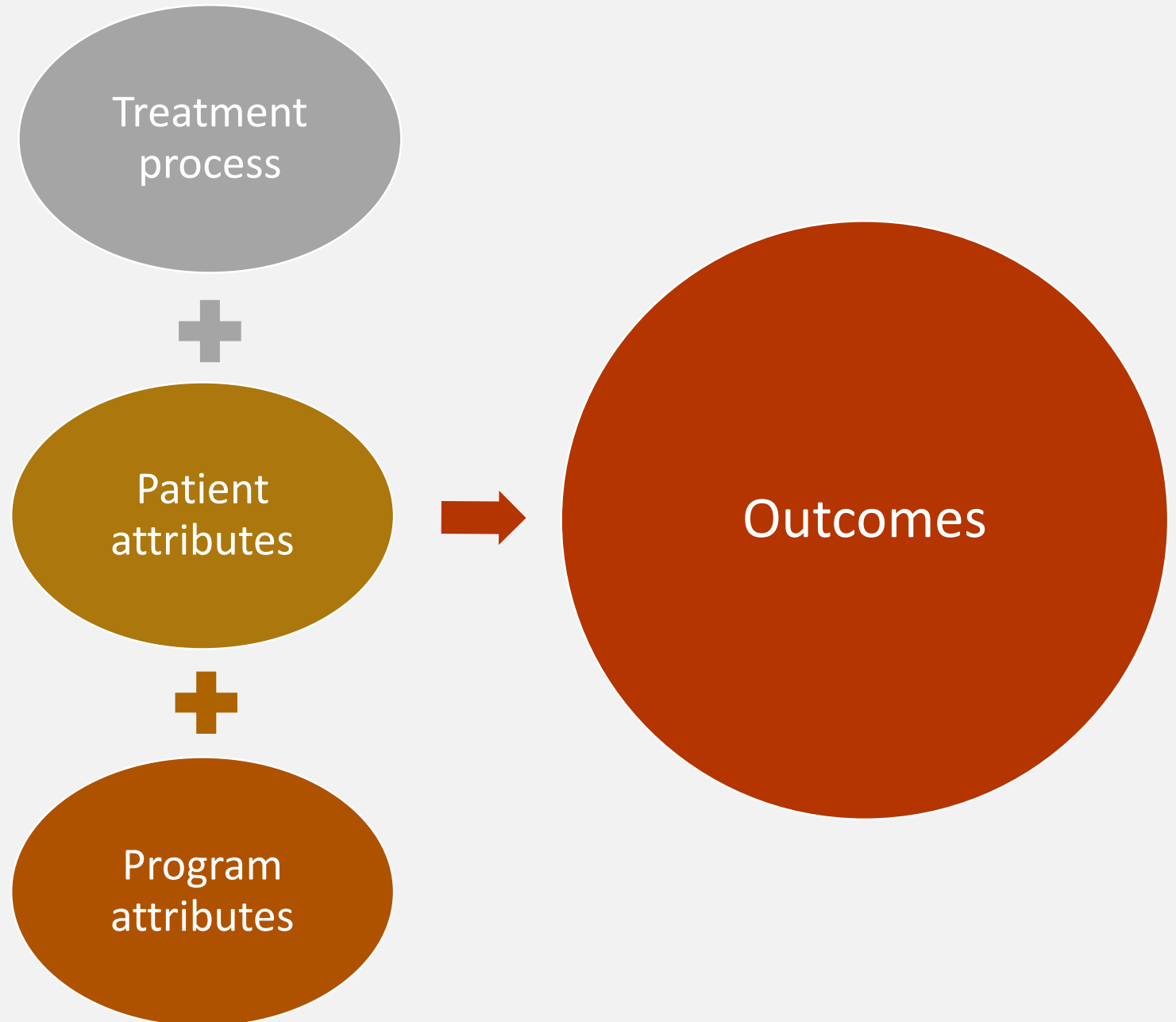


Theoretical Framework

A way to organize and understand theoretical explanations and prior research for the mechanisms underlying phenomena

SBIRT Study
Theoretical
Framework

Texas Christian
University Model
for Substance Use
Treatment
(simplified)



Research Hypotheses

Given the initial question, literature review, rationale, and theoretical framework – what is predicted about the study's outcome(s)?

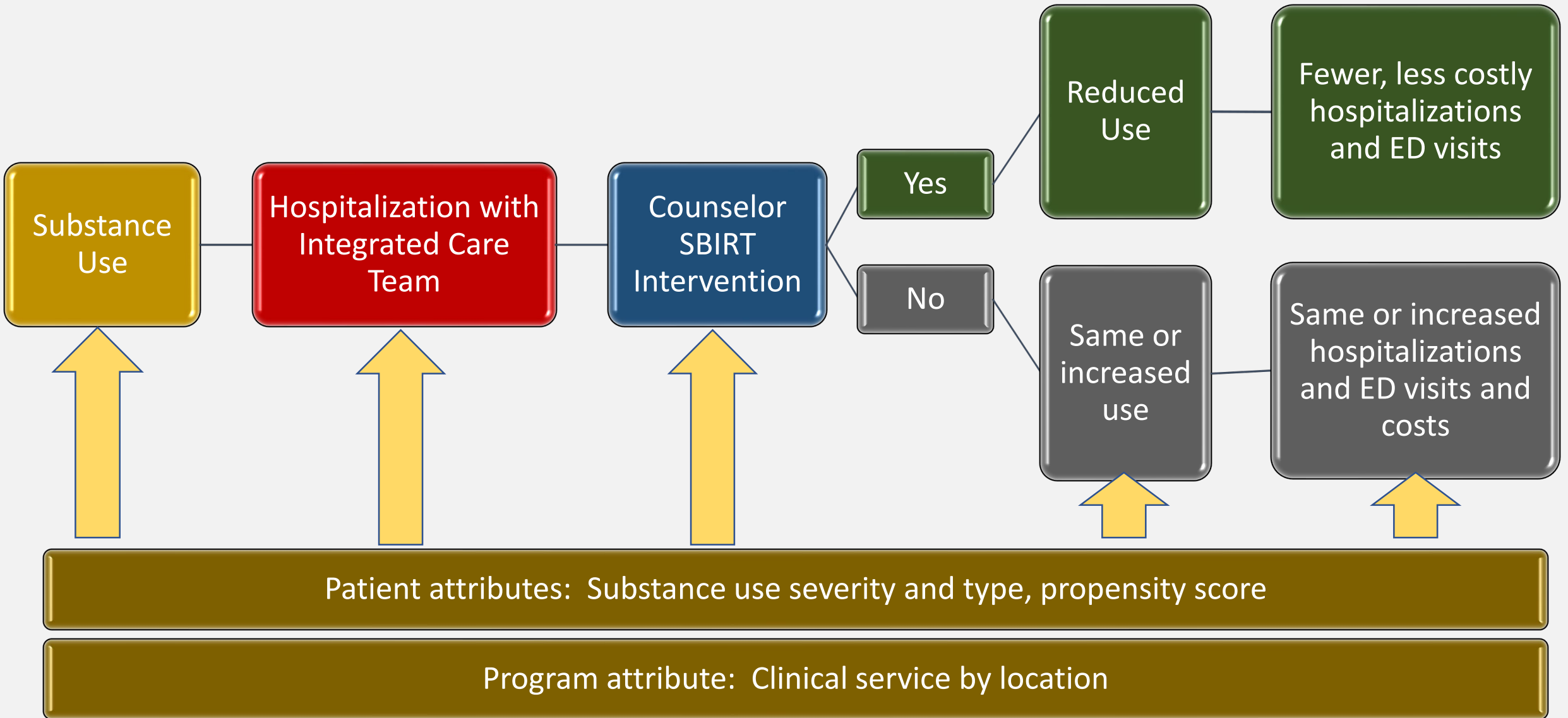
SBIRT Study Research Hypotheses

1. Patients receiving counselor-provided SBIRT in inpatient integrated care settings experience **fewer hospitalizations and emergency department visits** compared to patients not receiving interventions, controlling for substance use type and severity
2. Hospitalization and emergency department visit outcomes for these patients **vary across clinical services**
3. Counselor-provided SBIRT interventions are associated with **reduced economic costs** from the health system perspective

Conceptual Model

Given the theoretical framework and hypotheses, what is the model for the study?

Conceptual Model for SBIRT Study



Research Design

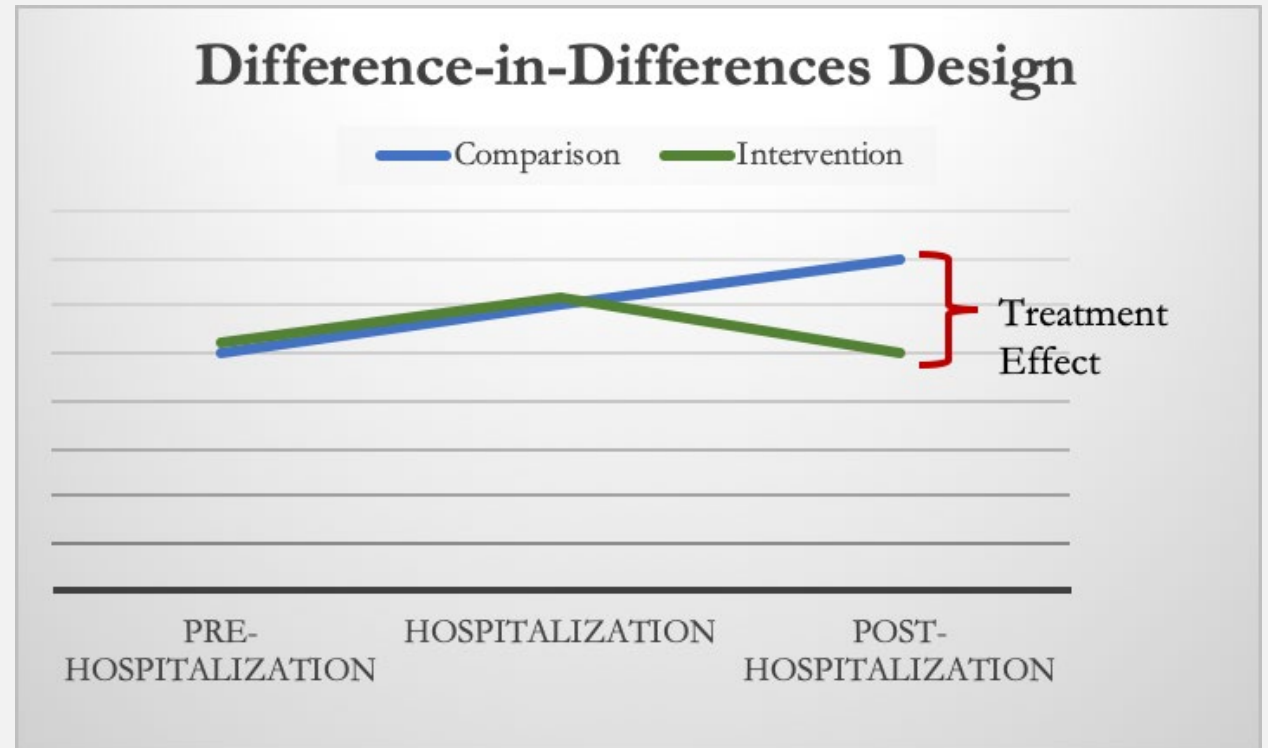
Which research model from the quantitative approaches might be best for testing the research hypothesis(es)?

SBIRT Study Research Design

Difference-in-Differences:

Interactions of time with predictor variables demonstrates treatment effects

Time: Hospitalizations and ED visits one year prior to and one year subsequent to intervention hospitalization



Variable Selection

- What are the clinical and cost outcomes of interest?
 - Consider what matters to health system leaders
- What might be predicting the outcome(s)?
 - Intervention variable (treatment)
 - Other variables that could influence the outcome(s)
- Using retrospective clinical data, what outcome and predictor variables are accessible and measurable?

SBIRT Study Outcome Variables: Hospitalizations and ED Visits Counts and Costs

- People with alcohol and drug problems overuse hospitalizations and emergency department (ED) visits, which are among the most expensive medical services...
- ...but typically are not investigated in SBIRT research, which had relied on self-reported outcomes



Agley et al., 2014; Cornett & Latimer, 2011; Glass et al., 2017; Hankin et al., 2013; Hoffman & Cronin, 2015

SBIRT Study Treatment Variable: SBIRT Interventions by Professional Counselors

SBIRT Brief Intervention Manual	Professional Counseling Identity
Empathy , rapport, trust, non-judgmental approach	Foundation in empathy , unconditional positive regard, and working alliance
Management of resistance and readiness to change	Person-centered, motivational interviewing, Gestalt, psychodynamic and related theories and techniques
Assessment and feedback	Training in assessment /feedback and mental health conditions commonly co-occurring with substance use

Babor & Higgins-Biddle, 2001; Bordin, 1979; CACREP, 2015; Crits-Christoph, Johnson, Gibbons, & Gallop, 2013; Gehart, 2016; Rogers, 1961; Van Horn et al., 2015; Veach et al., 2018; Watts, O'Sullivan, & Chatters, 2018



SBIRT Study Patient Variables: Severity, Type of Use

- SBIRT interventions efficacious only for alcohol misuse
- Inconclusive for drug misuse or disordered drug use
- Inconclusive for disordered alcohol use

SBIRT Study Patient Variable: Propensity Score

Purpose: create a **propensity score** for each patient to balance intervention and comparison groups; the scores are added to the hypothesis-testing models as a covariate

Attributes: age, gender, ethnicity, marital status, risk of mortality, severity of illness, insurer, calendar quarter



SBIRT Study Program Variable: Inpatient Clinical Service

Patient outcomes may differ by clinical service due to physician training and medical approach for treating people with substance misuse and disordered use



Measuring Variables: SBIRT Study Clinical and Cost Data Sources

- **Treatment intervention predictor:**
manually-entered program data in Excel
spreadsheets
- **Outcomes and other predictors:** EPIC
System as fed to data warehouses
 - Research
 - Enterprise
 - Data Analytics

Measuring Variables: SBIRT Study

Clinical and Cost Data Sources

- Only Data Analytics had charge, payment, and cost data
 - Hospital Account Record
 - Nearly 900 variables including CPT, ICD-10, admitting service, treating provider
 - Total charges, payments, and write-offs
 - Total costs, fixed/variable costs, and direct/indirect costs
- Getting access: Independent Contractor and Business Associate Agreements



Variables

Type	Name	Description	Source
Outcome	Counts and Costs	Combined for hospitalizations + ED visits, pre and post intervention	Data analytics system using “trigger event”
Predictor	Intervention	Binary: yes/no	Program data
Predictor	Time	Binary: pre/post	Calculated variable
Predictor	Substance use severity	Categorical: no use (category 0) → disordered use (category 3)	Data analytics system using ICD codes
Predictor	Substance use type	Categorical: no use (0) → disordered use (3)	Data analytics system using ICD codes
Predictor	Propensity score	Balancing on covariates	Calculated variable
Grouping Predictor	Clinical service	Categorical: patients assigned to services and in beds on or off home units for each service	Program data and data analytics system

Patient Populations

Which populations should be included in the study given the theoretical framework, research hypothesis(es), conceptual model and selected variables?

Is there a representative, accessible population available through retrospective selection?



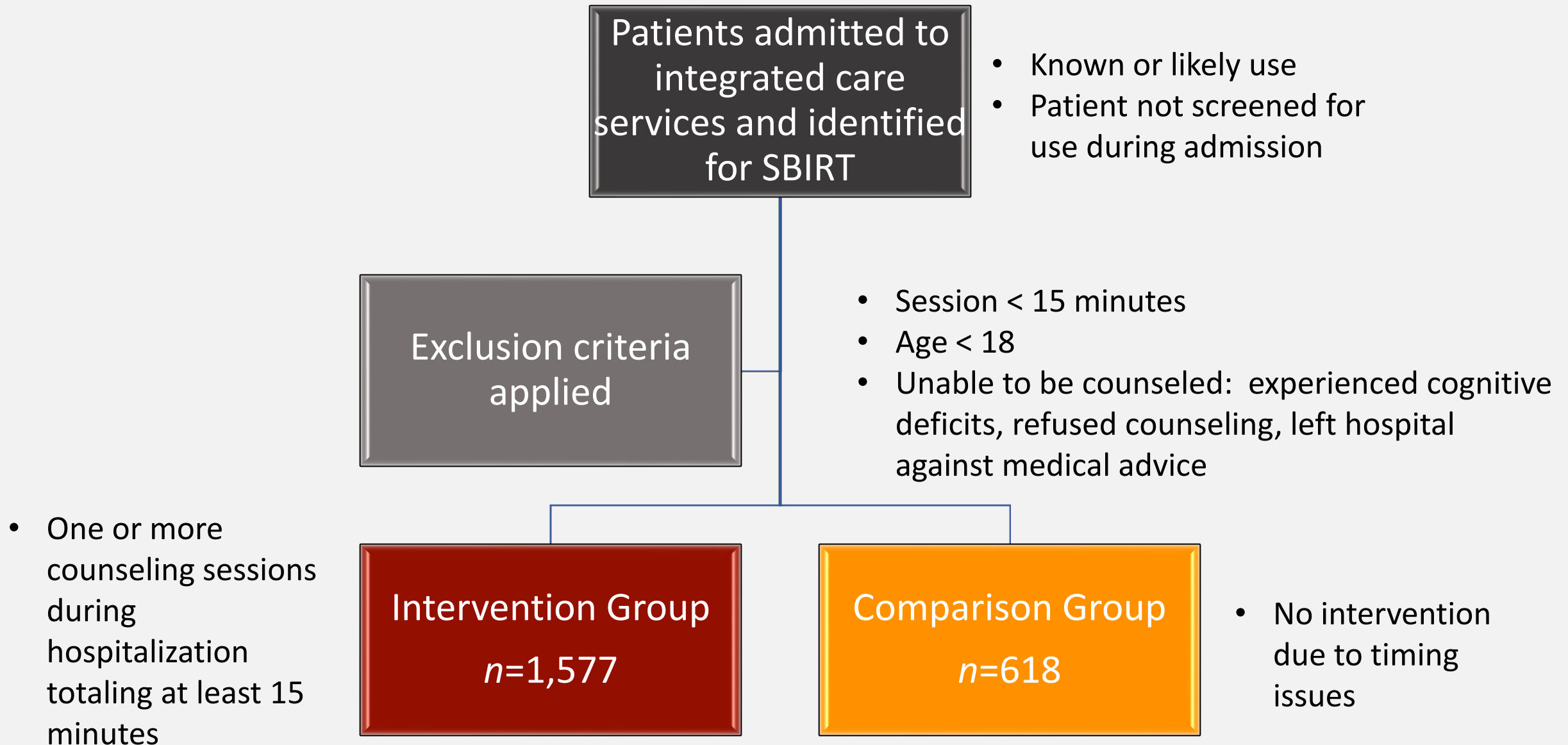
Wake Forest™
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SBIRT Study Setting

Burns, General Medicine, and
Trauma inpatient services

SBIRT Study Sample: Inclusion and Assignment



Statistical Analyses

Given the research design and the characteristics of the data, what are the appropriate statistical analyses to use?



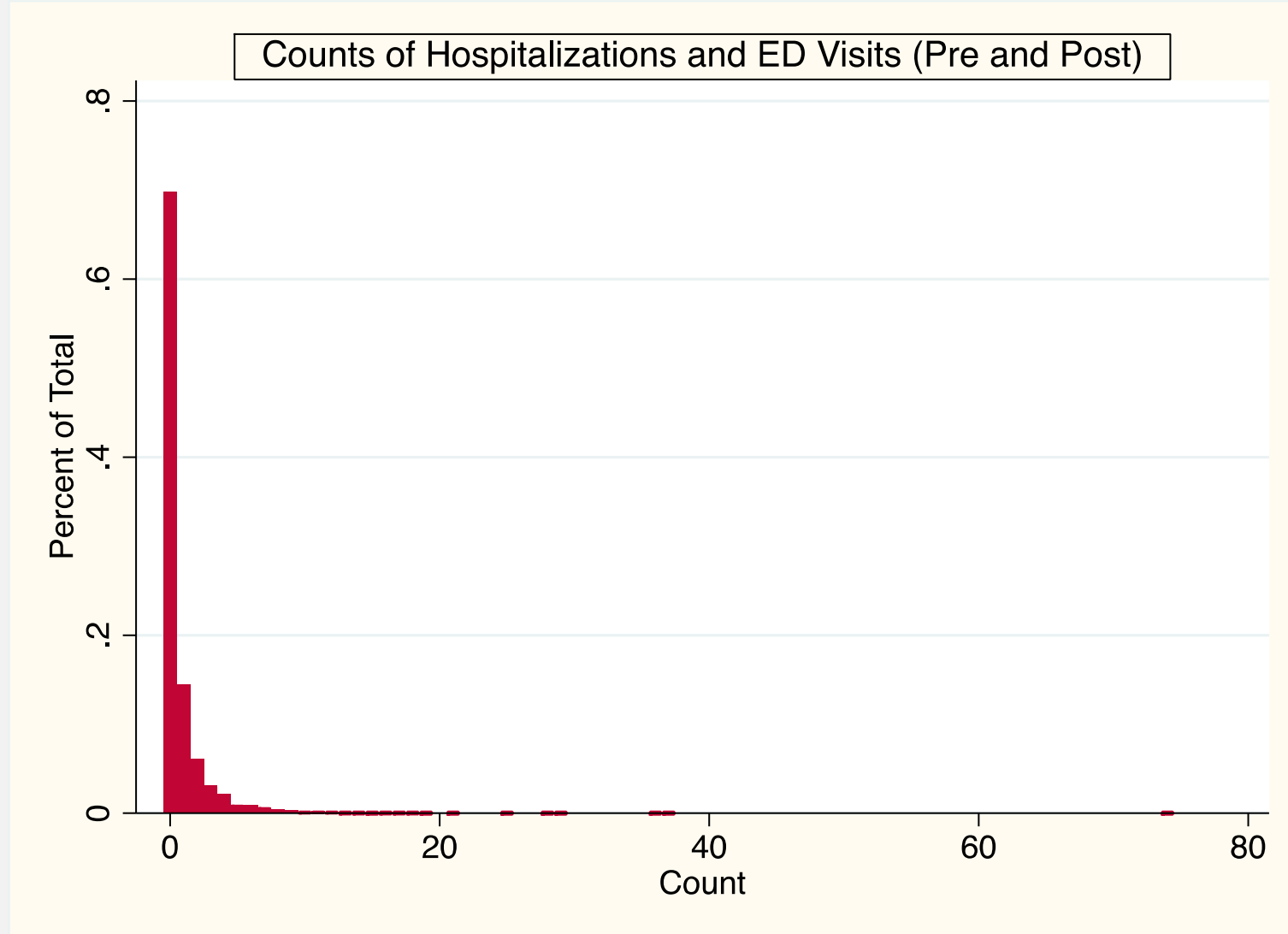
Dataset Development

STATA

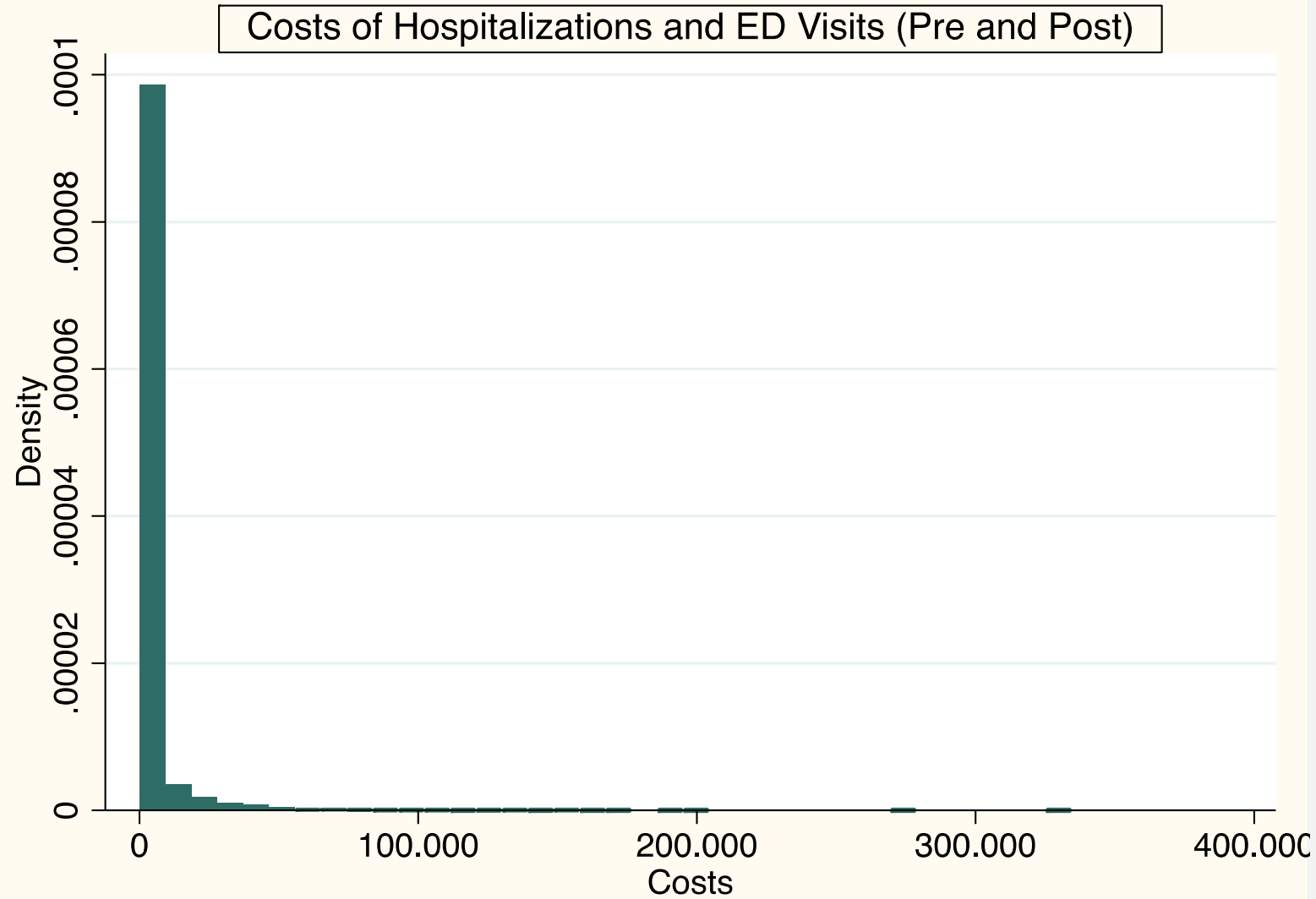


Welcome to
StrataJazz®

Outcome Variable: Counts



Outcome Variable: Costs



Statistical Model for Count Data

- **Mixed effects negative binomial model**
 - Clinical service as grouping variable (random effect)
 - Prevalence of zero values suggests non-normal distributions of error terms and residuals
- **Robust standard errors** option
 - Reduce risk of Type I error (finding differences when there are none; “false positives”)

Statistical Model for Cost Data

- **Under development: two-part model**
 - Predict zero vs. non-zero outcomes using logistic regression
 - Predict cost outcomes using generalized linear modeling with non-zero outcomes



The SBIRT Study Findings: Count Outcomes

Result: On average, patients receiving counselor-provided SBIRT interventions experienced **22% fewer subsequent hospitalizations and emergency department visits** than patients not receiving interventions

Outcome	Intervention	<i>n</i>	Incident Rate Ratio	<i>p</i> -value	95% CI Min	95% CI Max
Count	No	618	Reference category			
Count	Yes	1,577	.777	.003**	.658	.919

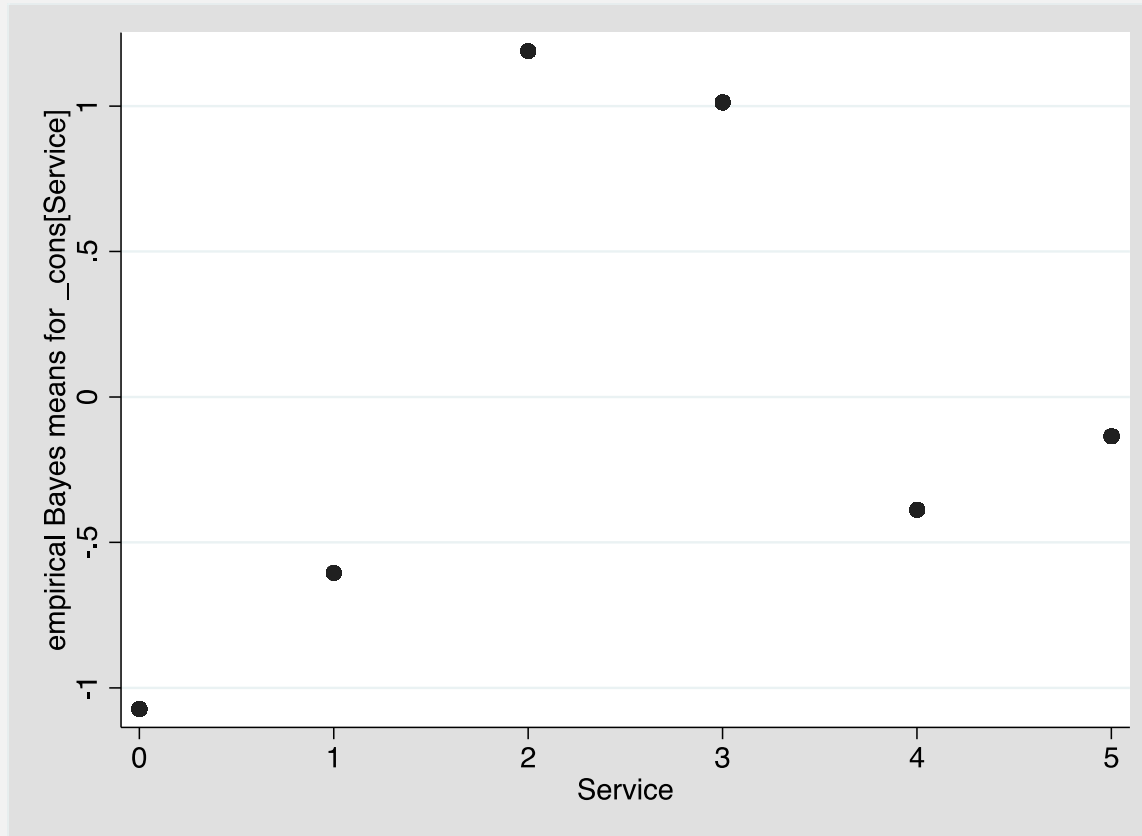
Test of Hypothesis 1

Model	-2 Log Likelihood*	Change in df
Fixed Effects	-4933.464	
Mixed Effects	-4708.709	5
Absolute Difference	224.755	5
<i>*pseudolikelihood for mixed effects</i>		

Result: Hospitalization and emergency department visit outcomes for these patients **vary across clinical services**

Difference in -2 log likelihood of 224.755 exceeds the critical value of $X^2_{(.05, df=5)} = 11.0705$

Test of Hypothesis 2: -2 Log Likelihood



- Means ranging from -1.1 for Burn patients housed on the Burns unit to +1.2 for Medicine patients on the Medicine units
- Supports the finding that **outcomes vary across services**

Test of Hypothesis 2: Empirical Bayes Means of Random Effects

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- Dr. Laura Veach, General Surgery and Psychiatry
- Dr. Kevin High, Executive Vice President



Session Survey

Use the CFHA mobile app to complete the survey/evaluation for this session.



Join us next year in Philadelphia, Pennsylvania! Thank you!

Theoretical Frameworks for Individual Behavior Change



Bandura



Prochaska



Leventhal



Rosenstock

Social Cognitive

- Social Cognitive Theory
- Self-Regulation Model
- Health Belief Model
- Relapse Prevention Model

Other

- Transtheoretical Model
- Theory of Planned Behavior



Ajzen



Marlatt