



# AN INTRODUCTION TO LATENT CLASS ANALYSIS FOR PREVENTION RESEARCH

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# OVERVIEW

- Conceptual introduction to latent class analysis (LCA)
- An example:  
Latent classes of adolescent drinking behavior
- Parameters estimated in LCA
- Technical considerations:  
Model identification, model selection
- Software options



# OVERVIEW

- Including grouping variables
- Predicting latent class membership
- Predicting a distal outcome
- Question & Answer session:  
Open discussion



# ABBREVIATIONS

- LCA = latent class analysis
  - Static, categorical latent variable
- LTA = latent transition analysis
  - Dynamic, categorical latent variable



# CONCEPTUAL INTRODUCTION: LCA



# THE BASIC IDEAS

- Individuals can be divided into subgroups based on unobservable construct
  - The construct of interest is the latent variable
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- True class membership is unknown
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  - Measurement of the construct is typically based on several categorical indicators
- Latent classes are mutually exclusive & exhaustive





# THE BASIC IDEAS

- How many people are familiar with factor analysis?
  - Similar to confirmatory factor analysis but the latent variable is categorical

AND

- Similar to exploratory factor analysis but the latent variable is categorical

# ESTIMATED PARAMETERS

- Latent class prevalences
  - e.g., probability of membership in HIGH DEPRESSION latent class
- Item-response probabilities
  - e.g., probability of reporting Felt Lonely given membership in HIGH DEPRESSION latent class



# AN EXAMPLE OF LCA

## Depression in adolescence

- Eight indicators ( $2^8=256$  possible response patterns)  
(Lanza, Bray, & Collins, 2013)

### Sad

- Couldn't shake blues
- Felt depressed
- Felt lonely
- Felt sad

### Disliked

- People unfriendly
- Disliked by people

### Failure

- Life was failure
- Life not worth living

# AN EXAMPLE OF LCA

## Five latent classes of depression

Latent Class	Prevalence
No depression	41%
Sad	18%
Disliked	17%
Sad & Disliked	15%
Depressed	9%

Conditional probabilities of 'yes' response

# AN EXAMPLE OF LCA

	Class 1	Class 2	Class 3	Class 4	Class 5
Indicator	Non-D	Sad	Disliked	S+D	Depressed
Could not Shake Blues	.03	.54	.17	.66	.90
Felt Depressed	.06	.73	.24	.86	1.00
Felt Lonely	.07	.58	.33	.77	.92
Felt Sad	.14	.80	.38	.87	.94
People Unfriendly	.13	.17	.64	.67	.70
People Dislike You	.04	.00	.68	1.00	.77
Life was Failure	.01	.11	.10	.23	.90
Not worth living	.00	.06	.11	.10	.85

# LATENT CLASSES OF ADOLESCENT DRINKING BEHAVIOR





# DRINKING IN 12<sup>TH</sup> GRADE

- Data from 2004 cohort of Monitoring the Future public release
- $N = 2490$  high school seniors who answered at least one question about alcohol use (48% boys, 52% girls)
- Goals of the study:
  - Alcohol use behavior among U.S. 12<sup>th</sup> graders
  - Gender differences in measurement and behavior
  - Predict behavior from skipping school and grades

# DRINKING IN 12<sup>TH</sup> GRADE

## Seven indicators of drinking behavior

Item	Proportion 'Yes'
Lifetime alcohol use	82%
Past-year alcohol use	73%
Past-month alcohol use	50%
Lifetime drunkenness	57%
Past-year drunkenness	49%
Past-month drunkenness	29%
5+ drinks in past 2 weeks	26%