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# Substance Use Among Older Adolescents:
# A Latent Class Analysis

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# Introduction

- The use of alcohol, tobacco and illicit substances by adolescents is a major public health concern.

- Adolescents often use multiple substances concurrently.

- Prior studies have described heterogeneous profiles of concurrent substance use and abuse in adults.

- However, few studies have empirically identified the cross-sectional profiles of concurrent alcohol, tobacco and marijuana use in older adolescents.

Goals of the present study:

- Use latent class analysis (LCA) to identify latent subgroups of adolescents defined by heterogeneous profiles of concurrent alcohol, tobacco and marijuana use.

- Identify risk factors associated with membership in the latent classes.

# Hypotheses:

1. LCA would identify classes defined by distinct substance use profiles, including:

    - A low-risk class (minimal substance use).
    - One or more concurrent substance use classes.

2. Classes defined by profiles of concurrent substance use would include higher proportions of members who:

    A) Were male
    B) Were White
    C) Reported depression symptoms
    D) Reported oppositional defiant disorder (ODD) symptoms

# Method:

## Participants:

- 1500 Twins ascertained from the Missouri Twin registry.
- Mean Age: 18.3 years (Range: 17.4 -19.6).
- Inclusion criterion: Not yet attending college (n = 1376).

## Assessments:

- Semi-structured Interview for the study of the Genetics of Alcoholism (C-SSAGA), administered via telephone.
- Mailed self-report questionnaires.
- Assessed:
  - Demographic information.
  - Alcohol, tobacco and marijuana use histories.
  - DSM-IV depression and ODD symptoms.
- Data were collected near the end of the participants' senior year in high school.

# Descriptive statistics:

| Substance Use Variables: (dichotomous) | % endorsed item (Total n = 1376) |
|---|---|
| Ever had 1 drink | 64.3 % |
| Had 1 drink on 24 or more days | 29.1 % |
| Ever binge drank (males: 5 drinks in 24hrs. / females: 4 drinks) | 45.9 % |
| Binge drank (within last year) | 37.1 % |
| Binge drank (within last 30 days) | 19.8 % |
| Ever smoked 1 cigarette | 45.3 % |
| Smoked $\geq$ 100 cigarettes | 15.8 % |
| Ever used marijuana | 30.7 % |
| Used marijuana > 20 times | 11.3 % |
| Ever felt sick / vomited due to drinking | 27.5 % |
| Ever blacked out due to drinking | 13.4 % |

# Descriptive statistics:

| Risk Factors: (dichotomous) | Total n = 1376 % of total |
|---|---|
| Gender (Male) | 34.9 % |
| Race (White) | 82.6 % |
| 3 Depression symptoms | 10.2 % |
| > 5 ODD symptoms | 21.5 % |

- ODD and Depression symptom counts were dichotomized because the distributions were skewed. Cut-offs were chosen to identify participants at relatively high risk for psychopathology.

<u>Analyses</u>:

- Latent class analyses were computed using Mplus 5.1.

- The Bayesian Information Criterion (BIC) was used to determine the optimal number of latent classes.

- The LCAs computed the probabilities of class membership for each individual, and individuals were assigned to the class for which the probability of membership was highest.

- Risk factors were included in the LCAs as covariates. (latent classes were regressed onto the risk factors using simultaneous multinomial logistic regression).

- The covariate analyses tested for differences in the proportions of members in each class (relative to a reference class) who were male, white and who reported 3 depression symptoms and 5 or more ODD symptoms.
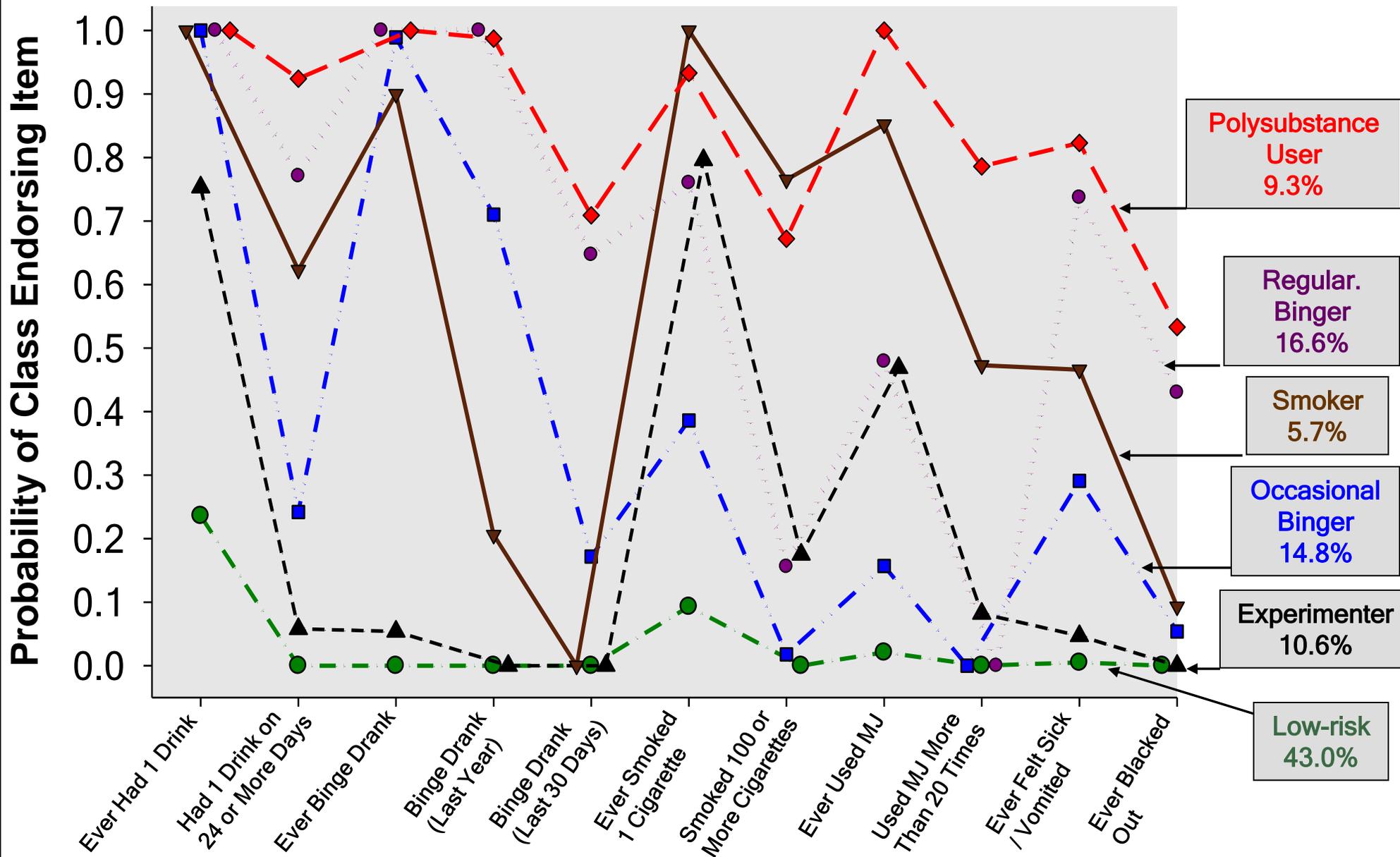
# Results

- BIC indicated a 6-class model best fit the data.

- Classes are described according to the probability that the class endorsed each substance use variable (i.e., item endorsement probability profiles-- substance use patterns).

## Class Descriptions

1. Low-risk (n= 592): Minimal substance use.

2. Experimenter (n= 146): Tried alcohol, tobacco and marijuana.

3. Occasional Binger (n= 203): Tried binge drinking, but tended not to use tobacco or marijuana.

4. Regular Binger (n= 228): Binge drank regularly, tried tobacco and marijuana but had not progressed to regular co-use.

5. Smoker (n= 79): Used tobacco regularly, used marijuana frequently but did not binge drink regularly.

6. Polysubstance User (n= 128): Concurrent use of all substances.

Results: Item Endorsement Probability Profiles

# Results: Risk Factors (covariate analyses)

## Percentage of members in each class who:

A) Were male  C) reported at least 3 depression symptoms
B) Were White  D) reported 5 or more ODD symptoms

| | Low-risk | Experimenter | Occasional Binger | Regular Binger | Smoker | Polysubstance User |
|---|---|---|---|---|---|---|
| **Covariate** | | | | | | |
| A) Male | 32.1% | 32.9% | 33.0% | 37.3% | 25.3% | 54.7% |
| B) White | 79.4% | 55.5% | 91.6% | 94.7% | 88.6% | 88.3% |
| C) 3 Depression Symptoms | 6.8% | 13.7% | 8.4% | 14.0% | 12.7% | 17.2% |
| D) ≥ 5 ODD Symptoms | 12.2% | 28.8% | 7.9% | 26.3% | 60.8% | 45.3% |

- For each covariate, one set of analyses tested for differences in the proportions in each of the classes relative to the Low-risk (reference) class.

# Results: Risk Factors (covariate analyses)

• For each covariate, another set of analyses tested for significant differences among the proportions in the experimenter, occasional binger, regular binger, smoker and polysubstance user classes.

Odds ratios that are underlined differ relative to the low-risk class (p < .05).
Odds ratios (in rows) with different superscripts differ from each other (p < .05).

| | Experimenter | Occasional Binger | Regular Binger | Smoker | Polysubstance User |
|---|---|---|---|---|---|
| **Covariate** | | | | | |
| A) Male | 1.15[a] | 1.15[a] | 1.15[a] | .74[b] | 2.40[c] |
| B) White | .34[a] | 3.27[b] | 3.27[b] | 3.27[b] | 3.27[b] |
| C) 3 Depression Symptoms | 1.69[a] | 1.69[a] | 1.69[a] | 1.69[a] | 1.69[a] |
| D) ≥ 5 ODD Symptoms | 2.48[a] | .71[b] | 2.48[a] | 11.88[c] | 5.94[d] |

Results: Probability of being a member of the classes as a function of risk factor combinations.
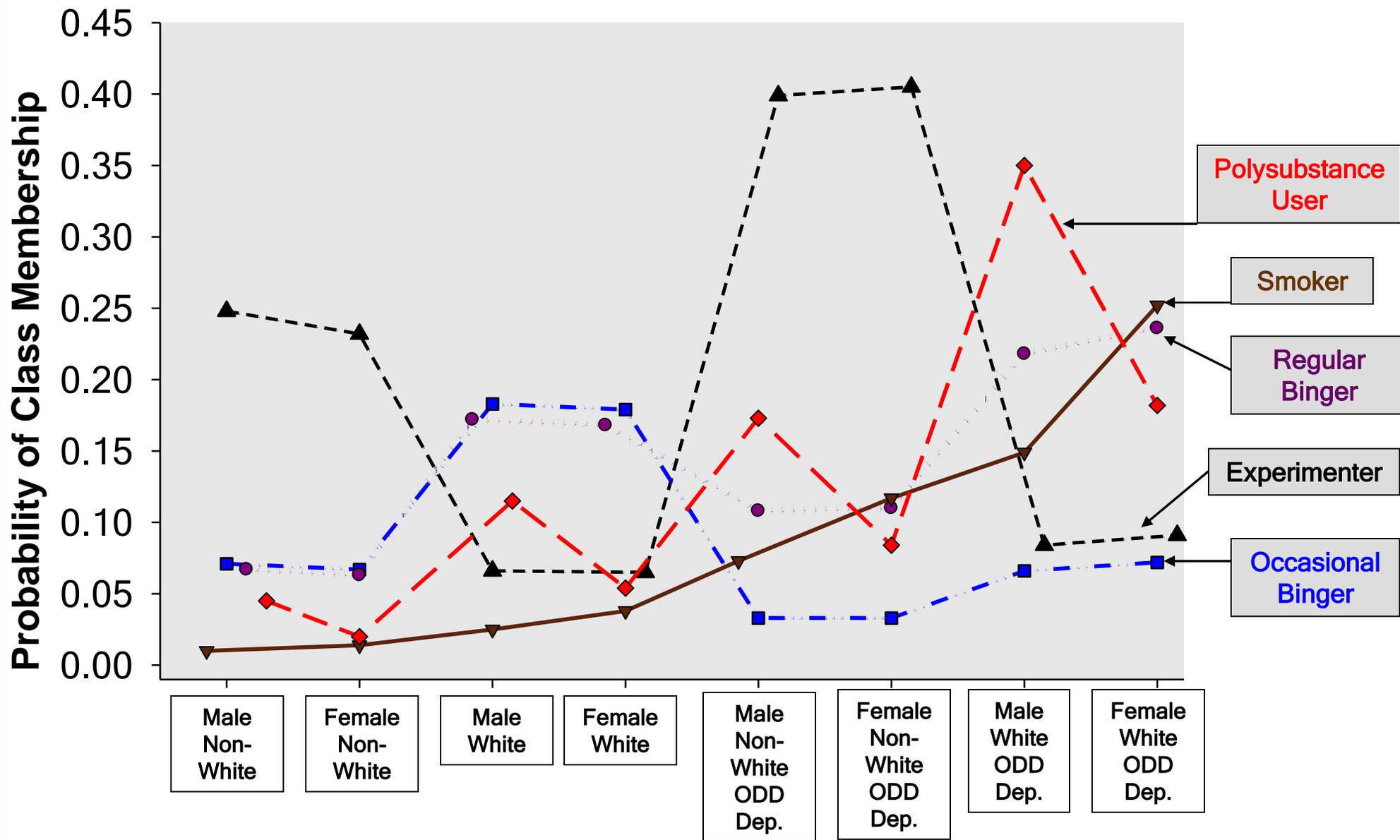
# Discussion

- As expected, the LCA identified latent classes defined by minimal use (low-risk class) and concurrent use of all substances (polysubstance user class).

- Intermediate classes included experimenters, occasional bingers, regular bingers and smokers.

- Relative to the low risk class, depression symptoms were associated with a small risk (OR = 1.69) for membership in the intermediate and polysubstance user classes.

- The risk factors related to the highest probability for being in the polysubstance user class were male gender, White race and ODD symptoms.

# Discussion

- The risk factors related to the highest probability for being in the <u>smoker class</u> were female gender, White race and ODD symptoms.

- The risk factor related to the highest probability for being in the <u>occasional binger class</u> was White race.

- The risk factors related to the highest probabilities for being in the <u>regular binger class</u> were White race and ODD symptoms.

- The risk factors related to the highest probabilities for being in the <u>experimenter class</u> were non-white race and ODD symptoms.

# Conclusion

- The results suggest that heterogeneous profiles of concurrent alcohol, tobacco and marijuana use exist in the older adolescent population, and these profiles are associated with specific risk factors.

- Knowledge about the typological heterogeneity of substance users in this age group can aid in developing more targeted prevention and intervention strategies.

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