Prescription Stimulant Misuse: The Relationship between Executive Functioning and Academic Outcomes

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Outline

• Introduction
• Hypotheses
• Methods
• Results
• Conclusions
Introduction

• Prescription Stimulant Misuse among Students
  • Prevalence
  • Risk Factors
  • Motivations

Benson et al., 2015; Weyandt, 2005; Weyandt et al., 2014
Introduction continued..

• Executive Functioning (EF)
  • Abilities that allow for planning, self-regulation, cognitive flexibility, goal-directed behavior

• Prescription Stimulants and Executive Function
The purpose of the present study was to examine the relationship between prescription stimulant misuse, EF, and academic outcomes among a sample of college students.
Hypotheses

1. Students who reported EF deficits would be more likely to report misusing prescription stimulants than students who reported normal EF skills (i.e., no EF deficits)

2. Students who reported below or above average academic outcomes would be more likely to report misusing prescription stimulants than students who reported average academic outcomes (average referring to C GPA; 2.0 on a 4.0 scale)

3. Prescription stimulant misuse would moderate the relationship between EF and academic performance. Specifically, prescription stimulant misuse was expected to alter the strength and/or direction of the relationship between EF and academic performance.
A secondary purpose of this study was to explore the relationship between onset and frequency of prescription stimulant misuse & academic outcomes.

It was predicted that the earlier the onset (pre-college) & the greater the frequency of prescription stimulant misuse, the more likely students would report lower academic outcomes i.e., it was hypothesized that there would be a negative correlation between onset and frequency of prescription stimulant misuse and academic performance.
Methods
Methods

• URI IRB approval

• Students were recruited from six public universities located in five regions of the US: Northeast, Southeast, Central-Midwest, Northwest & Southwest to participate in an anonymous, online survey
Interested participants who provided consent were provided with electronic versions of three measures:

- Demographics form
- Stimulant Survey Questionnaire (SSQ)
- Barkley Deficits in Executive Functioning Scale (BDEFS for Adults)

Weyandt et al., 2009; Barkley, 2011
Statistical Analyses

Hypothesis 1
- Independent samples T-Test
  - One dichotomous IV group (EF groups)
  - One continuous DV (Self-Reported Prescription Stimulant Misuse SSQ Subscale)

Hypothesis 2
- Binomial logistic regression
  - Continuous Predictor Variables (IVs): GPA, hours studying, classes skipped
  - Dichotomous Outcome (DV): Prescription stimulant misuse
Statistical Analyses continued..

Hypothesis 3
- Two-way between subjects ANOVA
  - Two dichotomous IVs: Prescription stimulant misuse & EF group
  - One continuous DV: GPA

Secondary Hypothesis
- Multiple regression
  - Predictor variables (IVs): onset and frequency of misuse
  - Continuous Outcome (DV): Academic outcome (GPA)
Results
Descriptive statistics

- Sample included 308 undergraduate students
  - Mean age = 20.77 years (SD = 3.59)
  - 73.4% was female
  - Identified as White (74.0%), Black or African American (3.6%), Asian (7.8%), American Indian or Alaska Native (0.3%), Native Hawaiian or Other Pacific Island (1%), Other (13.3%)
  - Class year: Freshman (19.5%), Sophomore (24.0%), Junior (31.8%), Senior (24.7%)
## Participant Demographics: Academics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>3.292</td>
<td>.482</td>
</tr>
<tr>
<td>Number of class sessions in schedule each week</td>
<td>9.80</td>
<td>4.193</td>
</tr>
<tr>
<td>Average hours per week spent studying</td>
<td>14.10</td>
<td>10.489</td>
</tr>
<tr>
<td>Number of classes typically skipped per week</td>
<td>.469</td>
<td>1.049</td>
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</table>
Prescription Stimulant Misuse

• 18.8% reported prescription stimulant misuse
  o Three most frequently reported reasons for misuse were academically related
    o To perform better in school work (25%)
    o To focus better in class (22.1%)
    o To perform better on tests (20.5%)
  o **Gender**: 17.7% females, 22.0% of males reported misusing ($p = .401$)
Results: Hypothesis 1

Group differences statistically significant ($p < .001$)

The group with EF deficits reported higher scores on the Self-reported Prescription Stimulant Misuse ($M = 35.31, SD = 14.56$) compared to the group with no EF deficiencies ($M = 28.24, SD = 7.92$)

This finding indicates that students with reported EF deficits (i.e., lower EF skills) were more likely to report misuse of prescription stimulants
Results: Hypothesis 2

The regression model was found not to be statistically significant, $x^2(3) = 3.165, p = .367$.

Results revealed, contrary to what was expected, that GPA, hours spent studying and classes skipped were not useful in predicting students report of prescription stimulant misuse.
Results: Hypothesis 3

There was a significant main effect for EF group \((p = .007)\) but not a statistically significant main effect for misuse on GPA \((p = .890)\) or a statistically significant interaction effect \((p = .660)\)

This suggests the effect of EF skills on GPA is the same for those who did and did not misuse prescription stimulants
Results: Secondary Hypothesis

The regression model was not statistically significant, $F (6, 298) = 1.881, p = .084$, $R^2 = .036$

Results revealed that onset and frequency of misuse were not useful predictors of GPA
Conclusions
Conclusions

• A substantial proportion reported misusing
  o Top reasons were for academic reasons

• Individuals identified as having EF deficits were significantly more likely to report misusing prescription stimulants

• Participants with EF deficits reported significantly lower GPAs than individuals with normal EF, and prescription stimulant misuse was not found to moderate this relationship

• The present study has many important implications for prevention & intervention policies on college campuses, specifically in identifying those at risk for misusing prescription stimulants.
Limitations & Future Directions

● Sample was disproportionately female and White
  ○ Limits generalizability of findings
● Response bias
● Correlational design
  ○ Causal inferences can not be made

● Future directions:
  ○ Longitudinal, prospective design
  ○ Investigate relationship of prescription stimulant misuse and its relationship with EF among high school & middle school students
Thank you!
References


References continued


Van Eck, K., Markle, R. S., & Flory, K. (2012). Do conduct problems and sensation seeking moderate the association between ADHD and three types of stimulant use in a college population?. Psychology of Addictive Behaviors, 26(4), 939.


### Results: Hypothesis 1

**Group Statistics**

<table>
<thead>
<tr>
<th>EF Clinical 2 Groups</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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<tr>
<td>No EF deficiencies</td>
<td>199</td>
<td>28.24</td>
<td>7.920</td>
<td>.561</td>
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<tr>
<td>EF deficiencies</td>
<td>109</td>
<td>35.31</td>
<td>14.559</td>
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**Independent Samples Test**

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<tr>
<th>SSQ Factor 1 Self-reported prescription stimulant use</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>t-test for Equality of Means</th>
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<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
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<td>Equal variances not assumed</td>
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<td>-4.707</td>
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### Hypothesis 2: Descriptive Results

<table>
<thead>
<tr>
<th>Ever misused prescription stimulant</th>
<th>GPA</th>
<th>Class sessions in schedule each week</th>
<th>Hours per week spent studying</th>
<th>Standardized Class Sessions Skipped</th>
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<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
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<td>.50</td>
<td>9.97</td>
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<td>3.28</td>
<td>.42</td>
<td>9.09</td>
<td>4.05</td>
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Results: Hypothesis 2

Binomial Logistic Regression not statistically significant \( \chi^2(3) = 3.165, p = .367 \)

<table>
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<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>( p )</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Ratio</th>
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<td></td>
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<td>GPA</td>
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<td>Hours Studying</td>
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<td>.124</td>
<td>.976</td>
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<td>Stand Classes Skipped</td>
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Results: Hypothesis 3

<table>
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<tr>
<th>Misused P.S.</th>
<th>EF Groups</th>
<th>Mean</th>
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<tr>
<td>No</td>
<td>No EF deficiencies</td>
<td>3.34722</td>
<td>.445372</td>
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<td>EF deficiencies</td>
<td>3.18744</td>
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<td></td>
<td>Total</td>
<td>3.29482</td>
<td>.495758</td>
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<tr>
<td>Yes</td>
<td>No EF deficiencies</td>
<td>3.38800</td>
<td>.370325</td>
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<tr>
<td></td>
<td>EF deficiencies</td>
<td>3.16611</td>
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<td></td>
<td>Total</td>
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<tr>
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<td>No EF deficiencies</td>
<td>3.35346</td>
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<td>3.29217</td>
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### Results: Hypothesis 3 continued..

#### Tests of Between-Subjects Effects

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<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<td>Misuse</td>
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<td>.000</td>
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<td>EFGroup</td>
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<td>.024</td>
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<td>Misuse* EFGroup</td>
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<td>0.044</td>
<td>0.194</td>
<td>.660</td>
<td>.001</td>
<td>.194</td>
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<td>Error</td>
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<tr>
<td>Total</td>
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<td>Corrected Total</td>
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Note: R Squared = .030 (Adjusted R Squared = .020)