

Nicotine-Dependence-Varying Effects of Smoking Events on Momentary Mood Changes among Adolescents



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The roles of reinforcement in addiction



- Positive reinforcement
 - Hedonic effects of nicotine
 - Thought to be important in early stages of nicotine addiction
- Negative reinforcement
 - Smoking to relieve withdrawal symptoms
 - Thought to *maintain* addiction after early stages
- Russell, 1971; Baker et al., 2004; Tiffany et al., 2004

A time-varying effect (TVE) interpretation



- Positive reinforcement initially has a strong association with smoking regularity, but this decreases over time
- Negative reinforcement initially has a weak relationship with smoking regularity, but this grows over time
- Using a TVE model, these theories are supported among adolescent smokers (Selya et al., 2012)

What about “momentary” reinforcement?



- Previous study used longitudinal data (past-week or past-month reports)
 - Positive affect (PA) and negative affect (NA) can more directly measure +/- reinforcement
- > Do smoking-related mood changes vary over the course of smoking development?

Varying Effect Model (VEM)



- SAS macro publicly available from <http://methodology.psu.edu>
- Developed for intensive longitudinal data
- Unlike traditional VEM's, empirically estimates shape of trend
- Commonly used as “time-varying effect models”
 - Can be thought of as moderation by time
- Here, a new application of the VEM to examine moderation by Nicotine Dependence (ND)

SECASP Study



- Robin Mermelstein at UIC
- ~1200 9th and 10th graders at baseline in full longitudinal component
- Oversampled novice (<100 cigarettes/life) and light (≤ 5 cigarettes/day) smokers
- Followed over 4+ years
 - Baseline; 6-, 15-, 24-, 33-, 48-month follow-ups

EMA component



- 451 adolescent smokers also participated in EMA
- 7-day EMA collection intervals at baseline, 6-, 15, and 24-month waves
- Asked about PA, NA, amount smoked, location, environment, social factors
- Random prompts up to 5x daily
- Self-initiated smoking prompts for every “smoking event”
 - Smoking events included before/after smoking PA/NA reports

“ND-VEM” model

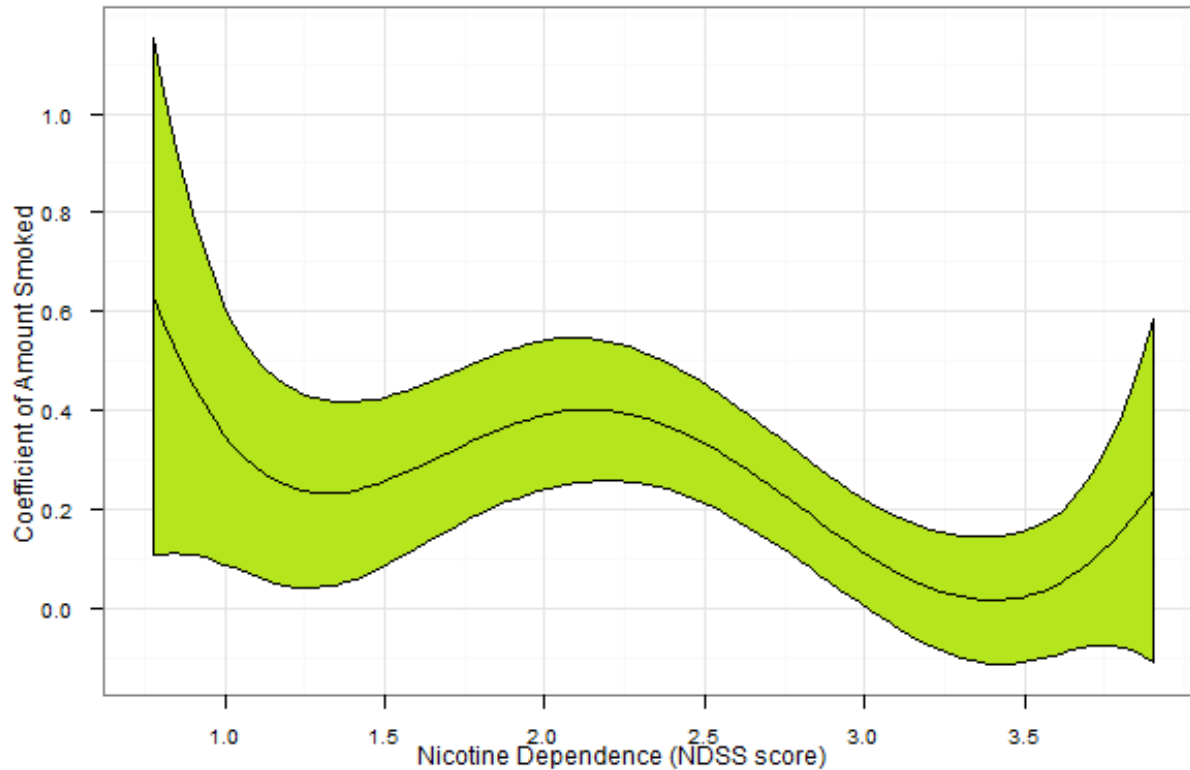


- DV's:
 - Change in PA = after-smoking PA – before-smoking PA
 - Change in NA = after-smoking NA – before-smoking NA
- Time-varying IV: amount smoked per prompt
 - “a puff” (0.2) to “more than one cigarette” (2)
- Other covariates: past-month smoking frequency & quantity; past-month NDSS; weekday; gender; white ethnicity
- 24-month assessment wave
 - Assess effects *across* subjects at different levels of ND

Nicotine-Dependence-Varying Effects

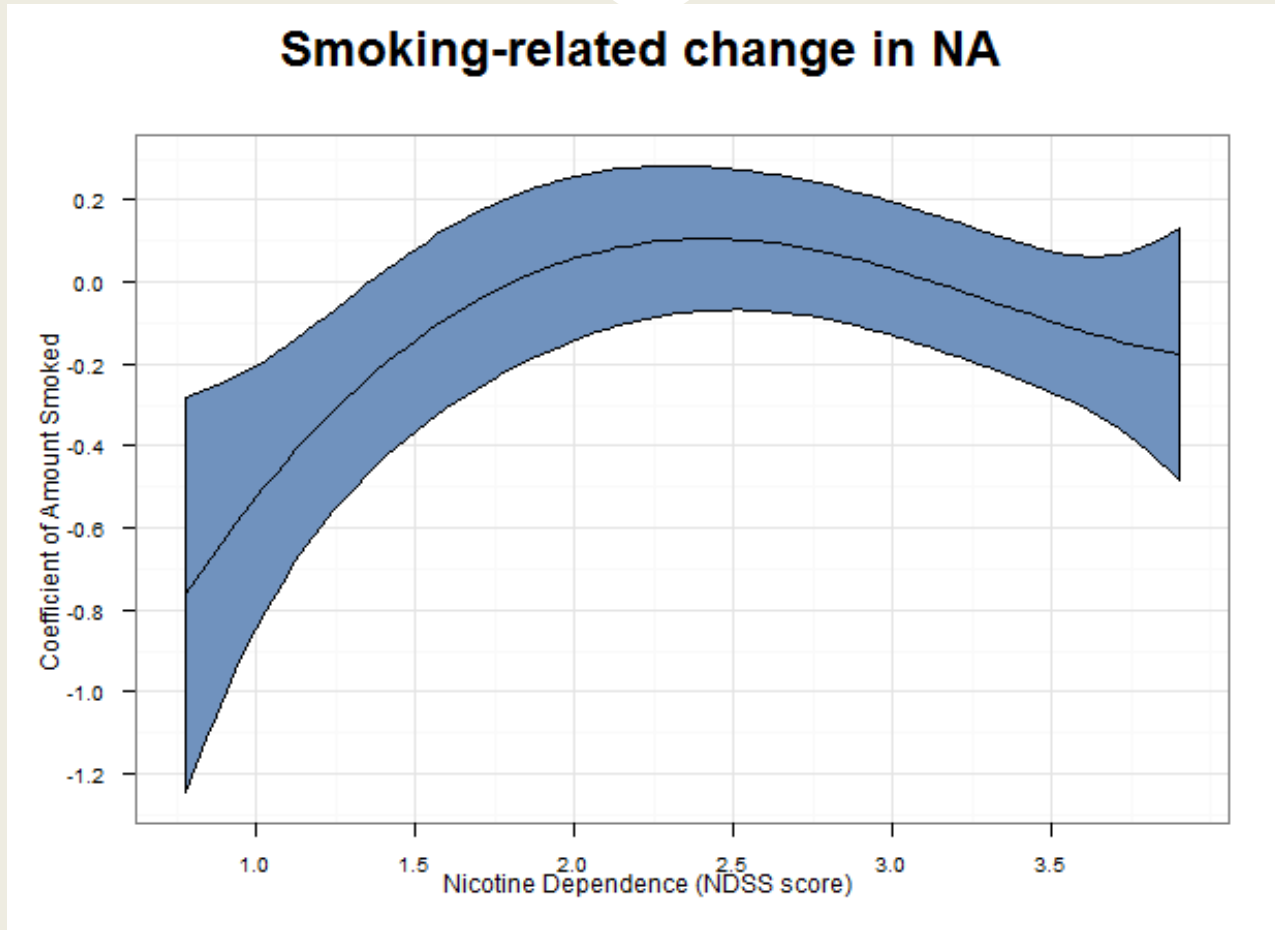


Smoking-related change in PA



Selya et al., revised & resubmitted to EMA special issue of NTR

Nicotine-Dependence-Varying Effects



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Conclusions



- Smoking-related mood changes significantly vary over levels of ND
- Theory of positive reinforcement is supported
- Role of negative reinforcement does not match theory
 - Participants may be preemptively smoking to prevent withdrawal
 - ✦ DiFranza et al., 2011
 - May reflect mood stabilization at higher levels of smoking
 - ✦ Hedeker et al., 2009; Hedeker & Mermelstein, 2012

Strengths & Limitations



- **Strengths:**

- Informative sample
- EMA data
- VEM macro
- Extension of VEM to dimensions other than time

- **Limitations:**

- Across-subject, not within-subject
- Using PA/NA *change* scores excluded using random prompts; this required dose, rather than binary, effects of smoking

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