The Changing Effects of Positive and Negative Affect in Explaining Adolescent Smoking Behavior

Nicole Updegrove, Arielle Selya, Lisa Dierker, Wesleyan University, QAC Apprenticeship 2012

WESLEYAN UNIVERSITY

Introduction

Many models implicate first positive reinforcement and then negative reinforcement (relief of negative affect) as major motivations for cigarette smoking [1]. Surveys and daily diaries are insufficient for studying these short-term motivations; ecological momentary assessment (EMA) allows researchers to examine in-the-moment affect around smoking events [2].

It has been shown that over time, 1) the effect of tobacco exposure on smoking regularity declines while, 2) the effect of nicotine dependence grows. Selya et al. speculate that finding 1 relates to positive reinforcement at early smoking stages, and finding 2 relates to negative reinforcement once more regular smoking is established [3]. Thus, it is thought that the role of positive affect may decline while the role of negative affect grows. No study has yet directly examined this theory.

Question

How do the effects of positive reinforcement (an increase in positive affect) and negative reinforcement (a decrease in negative affect) in adolescents' smoking evolve over time?

Methods

Sample

• The Social-Economic Contexts of Adolescent Smoking Patterns Study followed a group of adolescent (9th and 10th grade) smokers for 6 waves. Of the 1263 subjects in the survey data, 461 participated in at least one wave of the ecological momentary assessment (EMA) study. For 7 days, subjects entered into handheld devices data about mood, activities, and social context after (1) smoking incidences, (2) incidences in which they wanted to smoke but did not, and (3) random prompts initiated by pings from the device.
• Data was drawn from Waves I - IV (baseline, 6 month, 15 month, and 24 month) EMA and survey data, and in each wave, the sample included only subjects who entered at least 1 smoking prompt (total n=313).

Measure

The independent variable, *cigarette amount,* is a numeric variable based on quantity of cigarettes smoked – 0 for random prompts, 0.2 for "a puff", 0.5 for "a few puffs", 0.75 for "less than one", 1.0 for "one", and 2.0 for "more than one."

The dependent variables each reflect two aspects of affect.
*Negative affect** consists of random prompt affect and affect *before* smoking, in order to reflect negative affect prompting smoking, compared to average (random) negative affect.
*Positive affect*** consists of random prompt affect and affect *after* smoking, in order to reflect anticipated increased positive affect prompting smoking, compared to average (random) positive affect.

* reflects an average of five continuous numeric variables – *Angry, Frustrated, Irritable, Sad,* and *Stressed.*
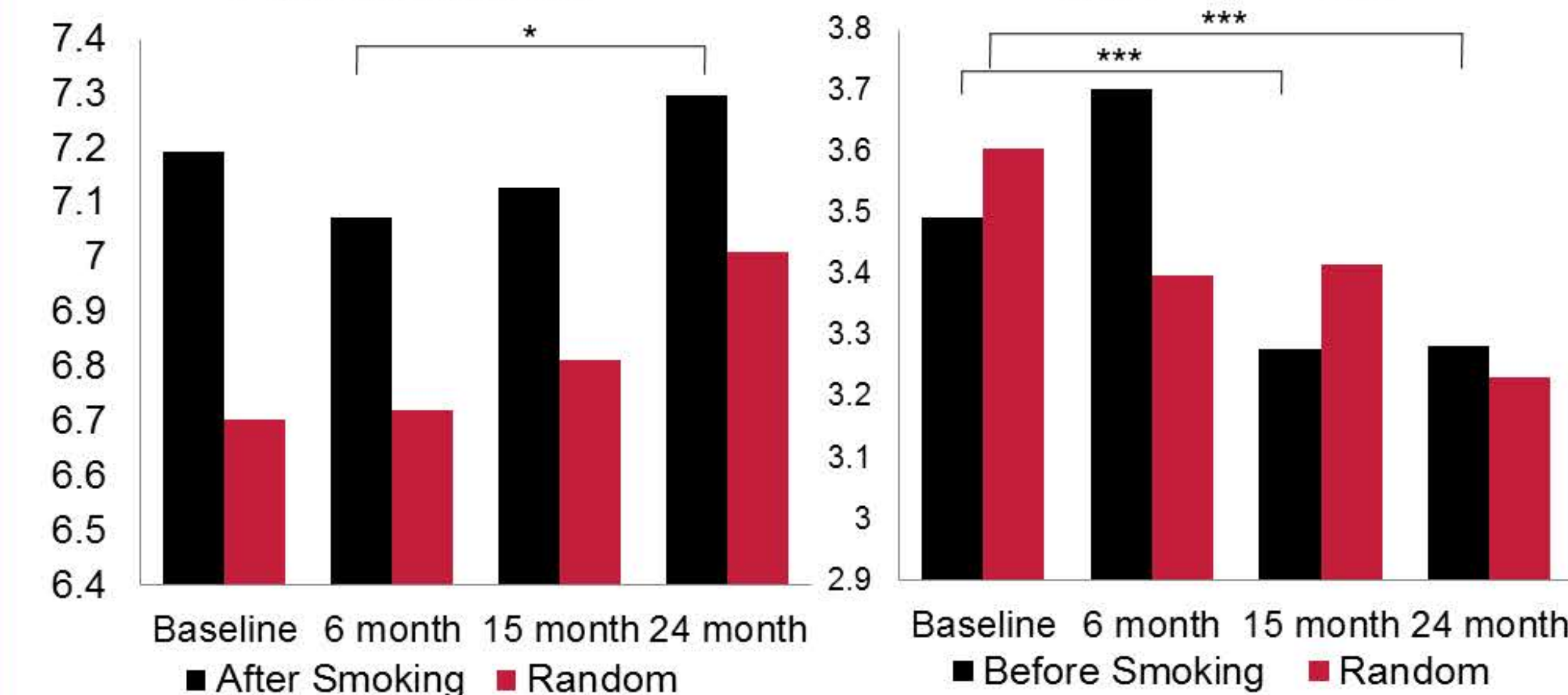** reflects an average of five continuous numeric variables – *Happy, Relaxed, Cheer, Confident,* and *Accepted.*

Results

Fig. 1. *ANOVAs and Tukey HSD post hoc tests reveal significant changes in affect related to smoking over time. * <0.05; ** <0.01; *** <0.001.*
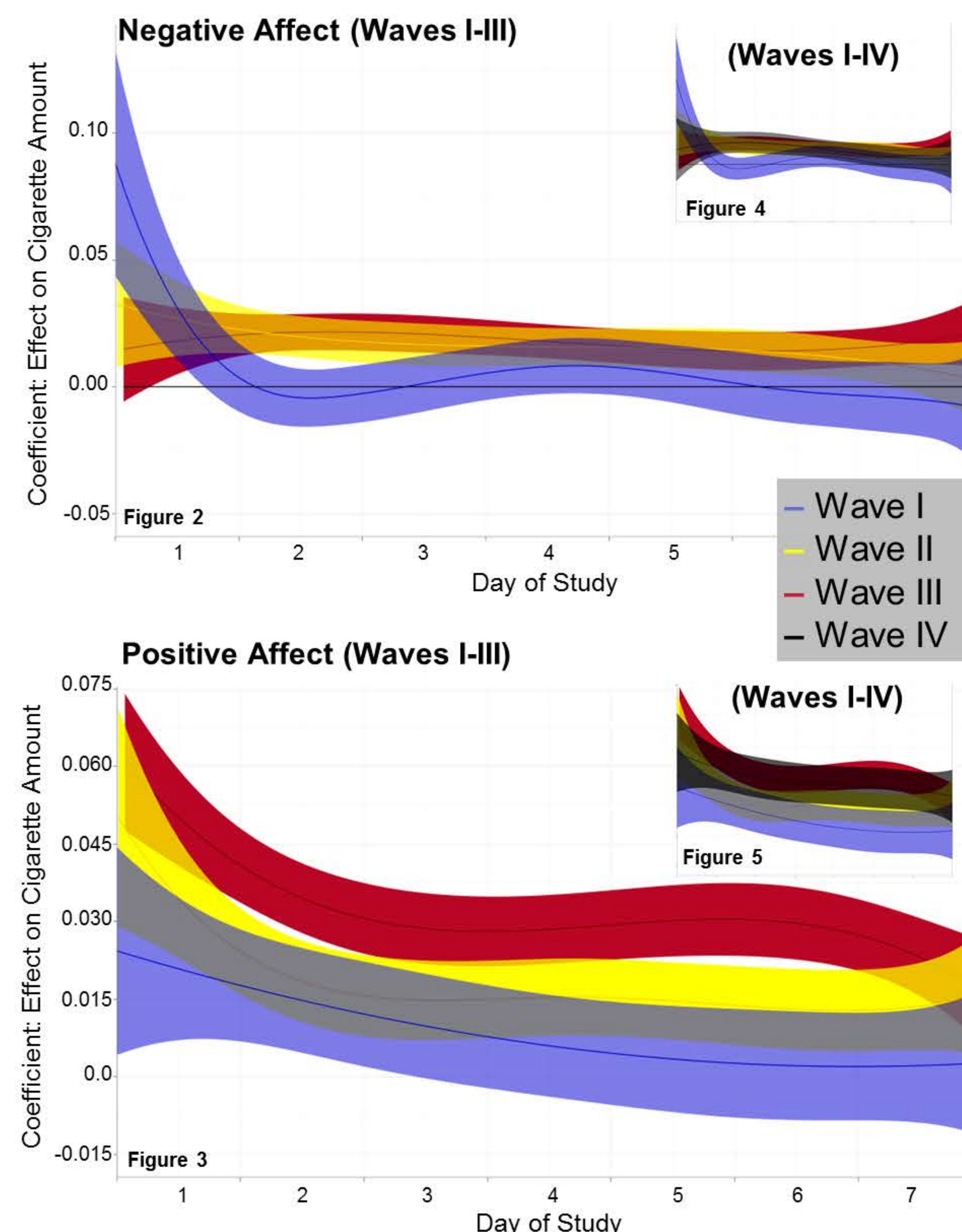

Fig. 2 & 3. *95% confidence intervals reveal a significant decrease in the effects of both negative and positive affect so that at Wave III, the effect is not always significantly different from 0. **Fig. 4 & 5.** This trend is not seen in Wave IV, in which effects significantly overlap with those of Waves I and II.*

Methods (cont'd.)

Models controlled for gender, smoking status (current experimenter, former experimenter, or regular smoker), smoking frequency in last 30 days, smoking quantity in last 7 days, other tobacco use in last 30 days, nicotine dependence symptoms, mean smoke-to-random ratio, and mean cigarettes per smoke prompt.

Analyses

• Pearson's correlations reveal significant negative correlation between positive and negative affect (r = -0.44 to -0.55), but they are *not* measures of the same items.
• ANOVAs and Tukey HSD tests reveal significant differences between affect scores during random vs. smoking prompts at different waves.
• Mixed-effects regression analysis reveal normal residuals for cigarettes smoked in my affect model, despite a non-normal variable, making possible models that usually call for normality.
• Time-varying effects models (TVEMs) [4] analyze changing effects of positive and negative affect on cigarettes smoked.

Discussion

Consistent with Selya et al.'s predictions, the effects of positive affect on cigarette smoking decreased between baseline and 15 month waves. However, negative affect also declined in effect. Additionally, for both positive and negative affect, the trend disappeared in Wave IV.

This may smoke theories that that, once a habit is established, smokers try to smoke often enough to avoid smoking-related negative affect [5].

This study builds upon limited previous research regarding the impact of affect on smoking, and specifically affect's effects on adolescent smokers. It needs further testing, but may hint at the time frame in which smoking becomes more of a habit rather than self-medication. These results were significant even after controlling for the previously mentioned covariates.

Implications

This study builds upon a limited amount of previous research regarding associations between affect and adolescent smoking behaviors. A better understanding of moment-to-moment motivations for smoking may assist in developing effective cessation intervention techniques.

References

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