

Cigarettes and Emotion: Affective processes involved in smoking and withdrawal



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Abstract

Negative reinforcement models suggest that nicotine use is reinforcing because it can reduce negative affect. Within this framework, this project was designed to examine the affective characteristics of dependent vs. occasional smokers and the affective consequences of acute nicotine withdrawal. Eighty subjects ages 18-40 were recruited from the university and surrounding community and assigned to one of four groups based on their smoking behavior determined at screening. Daily dependent smokers were randomly assigned to either a 24-hour withdrawal condition (WS) or a continued smoking condition (CS). The other two groups were never smokers (NS) and occasional smokers (OS; never daily smokers). During a screening session, all participants completed individual difference questionnaires that assessed dependence and trait emotionality. During the experimental session, various components of participants' stress response to a noxious stimulus (electric shock) were assessed prior to and following cigarette administration in the laboratory. Stress response was indexed with both self-report and psychophysiological indices of central nervous system (e.g. fear-potentiated startle). Trait measures of emotionality indicated that all smokers (dependent and occasional) were deficient on an index of behavioral control. In addition, dependent smokers displayed elevated trait negative emotionality, which may be a consequence of tobacco dependence or a risk factor for the development of dependence. In contrast, occasional smokers displayed elevated trait positive emotionality and relatively lower negative emotionality, which may represent protective factors against nicotine dependence. Acute withdrawal was associated with normal initial stress response but delay in the stress response recovery. In addition, stressor exposure during withdrawal resulted in greater decreases in positive affect.

Background

- Smokers self-report using cigarettes to reduce stress and anxiety
- Greater symptoms of negative affect predict a greater level of dependence.
- Negative affect appears also to play a central role during smoking withdrawal and relapse after cessation.
- Individual differences in negative emotionality predict smoking cessation success, with lower rates of success among persons prone to negative affect

Study Aims

- STUDY AIM #1:** Examine the affective processes that characterize Dependent vs. Occasional smokers
- STUDY AIM #2:** Examine the affective processes that characterize the acute nicotine withdrawal syndrome
- Affective processes are characterized with TRAIT indices of individual differences in emotionality and STATE indices of affective response and recovery (self report and physiological)

Methodology

Smoking Groups

- Eighty participant across 4 smoking groups (n=20 per group)
 - Dependent smokers:
 - Continuing smokers (CS)
 - Withdrawn smokers (WS; 24 hour period)
 - Occasional smokers (OS; >12 cigs/lifetime, >1 cig in last month)
 - Non-smokers (NS)

Session Procedures

Screening Session:

- Group assignment
- Carbon Monoxide (CO) assessment
- Individual differences assessment including:
 - Smoking History
 - Fagerstrom Test for Nicotine Dependence (FTND)
 - Wisconsin Index of Smoking Dependence Motives (WISDM)
 - Multidimensional Personality Questionnaire (MPQ)

Experimental Session:

- CO assessment to verify withdrawal
- Instructed fear conditioning procedure
 - Sixty 5 s presentations of colored squares (blue or yellow)
 - Shock paired with CUE+ color (color and order counter-balanced; 50% CUE+)
 - Shocks administered at 4 s post CUE onset (20% of CUE+ trials)
 - Procedure repeated after consumption of a cigarette by WS, CS, OS



- Stress response to CUE+ indexed with fear potentiated startle (FPS)
 - FPS= difference in eyeblink startle to probes during CUE+ vs. CUE-
 - Probes presented during CUE and 1, 3, & 5 s post CUE offset to assess initial stress response and recovery of stress response
- Self reported affective response to procedure assessed with Positive and Negative affect Scale (PANAS-20)

TRAIT Emotionality: MPQ

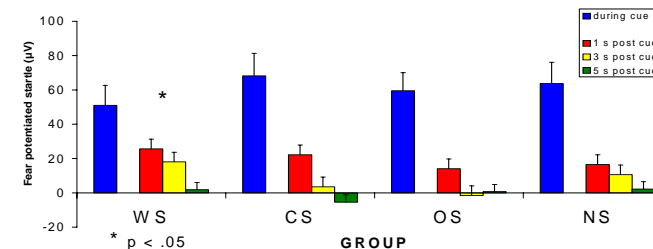
Scale	Dependent Smokers (DS)	Occasional Smokers (OS)	Non-Smokers (NS)	Significant contrasts
Negative emotionality	48.98 15.74	39.90 15.84	32.15 14.28	DS, OS > NS**
• Stress reactivity	7.72 3.19	5.45 3.82	3.90 2.5	DS, OS > NS** DS > OS*
• Alienation	4.07 3.24	2.25 2.31	1.55 1.88	DS, OS > NS**
• Aggression	3.35 2.68	3.35 2.37	2.40 2.70	
Positive Emotionality	75.82 13.21	82.75 10.25	81.75 16.11	DS < OS*
• Wellbeing	8.88 2.99	10.10 1.94	10.00 2.99	OS > DS*
• Social Potency	7.78 3.17	8.55 1.61	7.65 2.52	
• Achievement	7.40 3.53	6.40 3.46	9.05 3.10	OS < NS*
• Social Closeness	8.45 2.74	11.35 0.88	9.60 2.84	OS > DS** OS > NS*
Constraint	72.52 15.38	78.40 15.38	78.10 15.22	
• Control	7.68 3.2	7.30 2.98	9.50 2.86	DS, OS < NS*
• Harm Avoidance	7.33 2.81	6.00 3.58	6.20 3.59	
• Traditionalism	5.40 2.67	5.55 2.74	6.75 2.69	DS, OS < NS*

NOTE: ** p < .01; * p < .05; + p < .10 (Means in bold, standard deviations below)

Fear Potentiated Startle (FPS)

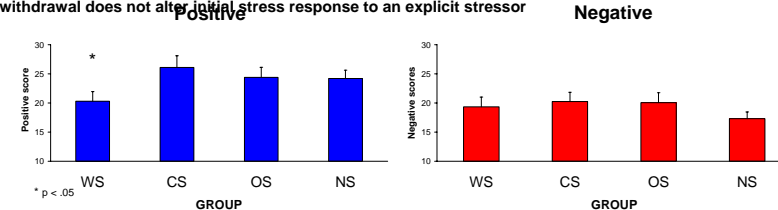
- There were no significant group differences in FPS during cue. Importantly, the withdrawn group did not show increased FPS during cue as compared to the other groups
- Withdrawn smokers displayed impaired recovery from the stressor. Specifically, FPS was elevated among withdrawn smokers in the interval after stressor offset

Fear potentiated startle across time



Self Reported Positive and Negative Affective Response

- PANAS was completed immediately following fear conditioning procedure.
- WS were significantly lower on PANAS Positive compared to other three groups.
- There were no significant differences on PANAS Negative. Scores on PANAS Negative were significantly correlated with Fear Potentiated Startle during cue (r = .259, p < .05), providing further evidence that acute withdrawal does not alter initial stress response to an explicit stressor



Implications

STUDY AIM #1: In terms of TRAIT affectivity, dependent smokers were found to be significantly higher on Negative Emotionality as measured by the MPQ, possibly representing a consequence or risk factor of developing dependence. In addition, smokers scored lower on behavioral control, which is thought to be linked to externalizing disorders including substance abuse and anti-social personality. Compared to dependent smokers and non-smokers, occasional smokers scored significantly higher on content scales of Positive Emotionality including well-being and social closeness. This increased level of trait positivity in occasional smokers, in conjunction with their relatively low levels of negative emotionality, could represent a protective factor from developing dependence.

STUDY AIM #2: Acute withdrawal did not affect scores on the PANAS Negative scale, nor were there significant group differences in Fear Potentiated Startle during the fear cue. This suggests that withdrawal does not modulate initial reactivity to an explicit stressor. In contrast, withdrawn smokers were significantly slower to recover from the stressor. Acute withdrawal also resulted in decreased positive affect in response to the stressor.