Title

Emotion differentiation and intensity during acute tobacco abstinence: A comparison of heavy and light smokers

Authors

Sheets, Erin S
Bujarski, Spencer
Leventhal, Adam M
et al.

Publication Date

2015-08-01

DOI

10.1016/j.addbeh.2015.03.024

Peer reviewed

Published in final edited form as:

Addict Behav. 2015 August ; 47: 70–73. doi:10.1016/j.addbeh.2015.03.024.

Emotion differentiation and intensity during acute tobacco abstinence: A comparison of heavy and light smokers

Erin S. Sheets[a,*], **Spencer Bujarski**[b], **Adam M. Leventhal**[c,d], and **Lara A. Ray**[b,e]

[a]Colby College, Department of Psychology, Waterville, ME, USA

[b]University of California Los Angeles, Department of Psychology, Los Angeles, CA, USA

[c]University of Southern California, Department of Preventive Medicine, Los Angeles, CA, USA

[d]University of Southern California, Department of Psychology, Los Angeles, CA, USA

[e]University of California, Los Angeles, Department of Psychiatry and Biobehavioral Sciences, United States, Los Angeles, CA, USA

Abstract

The ability to recognize and label discrete emotions, termed emotion differentiation, is particularly pertinent to overall emotion regulation abilities. Patterns of deficient emotion differentiation have been associated with mood and anxiety disorders but have yet to be examined in relation to nicotine dependence. This study employed ecological momentary assessment to examine smokers' subjective experience of discrete emotions during 24-h of forced tobacco abstinence. Thirty daily smokers rated their emotions up to 23 times over the 24-hour period, and smoking abstinence was biologically verified. From these data, we computed individual difference measures of emotion differentiation, overall emotion intensity, and emotional variability. As hypothesized, heavy smokers reported poorer negative emotion differentiation than light smokers (d = 0.55), along with more intense negative emotion (d = 0.97) and greater negative emotion variability (d = 0.97). No differences were observed in positive emotion differentiation. Across the sample, poorer negative emotion differentiation was associated with greater endorsement of psychological motives to smoke, including negative and positive reinforcement motives, while positive emotion differentiation was not.

Keywords

Emotion differentiation; Smoking; Negative affect; Emotion; Ecological momentary assessment

*Corresponding author at: Department of Psychology, Colby College, 5550 Mayflower Hill, ME 04901, USA. Tel.: +1 207 213 0017; fax: +1 207 855 5555. essheets@colby.edu (E.S. Sheets).

Contributors

Spencer Bujarski and Lara Ray designed the study and supervised data collection. Erin Sheets conducted the statistical analyses and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest statement

The authors declare no conflicts of interest pertaining to the data or analysis presented herein.

1. Introduction

Affective processes have long been a primary focus of smoking theory and treatment. The majority of smokers report smoking when they experience negative affect (McKennell, 1970), and negative affect is associated with cigarette craving (Dunbar, Scharf, Kirchner, & Shiffman, 2010; Heckman et al., 2013; Shiyko, Naab, Shiffman, & Li, 2014). Frequent smokers also exhibit greater emotional lability (Dvorak & Simons, 2008). Real-time, ecological momentary assessment (EMA) of smoking behavior shows that those who smoke to regulate negative affect have a heightened risk for lapse and relapse during quit attempts (Minami, McCarthy, Jorenby, & Baker, 2011; Shiffman, Paty, Gnys, Kassel, & Hickcox, 1996; Shiffman et al., 2007). Identifying factors that inhibit effective regulation of negative affect is critical to understanding the dynamic associations of affect, smoking behavior, and successful cessation.

The ability to distinguish discrete emotions within broad affective experiences, termed *emotion differentiation*, is a crucial skill for effective emotion regulation (Feldman Barrett, Gross, Conner Christensen, & Benvenuto, 2001). Some individuals experience emotion in broad, global terms – good versus bad or pleasant versus unpleasant – while others can distinguish different states of the same valence, such as sadness versus anger versus anxiety. Distinct emotions require distinct regulatory responses. When individuals label a discrete emotional state, they also access knowledge regarding regulatory options for that emotion (Feldman Barrett et al., 2001); poor differentiators consequently are at a disadvantage in effectively regulating intense emotions (O'Toole, Jensen, Fentz, Zachariae, & Hougaard, 2014; Tugade, Fredrickson, & Barrett, 2004). With limited access to effective regulation strategies, poor differentiators are more likely to employ broad, maladaptive regulation strategies such as substance use.

The repeated, intensive nature of EMA affords researchers the opportunity to assess how well emotions are distinguished in real-time. Impaired emotion differentiation has been consistently associated with greater levels of psychopathology in recent EMA studies. Depressed individuals report poorer negative emotion differentiation than healthy controls, as do those with social anxiety and those who engage in non-suicidal self-injury (Demiralp et al., 2012; Erbas, Ceulemans, Pe, Koval, & Kuppens, 2014; Kashdan & Farmer, 2014). Furthermore, poor negative emotion differentiation is associated with increased alcohol use and alcohol-related problems (Emery, Simons, Clarke, & Gaher, 2014; Kashdan, Ferssizidis, Collins, & Muraven, 2010). Despite the abundance of EMA studies in tobacco research, prior investigations have not capitalized on these data to examine emotion differentiation in smokers.

The current study is the first to examine differences in emotion differentiation between light and heavy smokers. Heavy smokers were expected to demonstrate poorer negative emotion differentiation, as well as greater negative emotion intensity and emotion lability. No differences were expected in positive emotion differentiation, based on prior studies with other clinical disorders (Bresin, 2014; Demiralp et al., 2012; Kashdan & Farmer, 2014). Because of its role in adaptive emotion regulation, emotion differentiation was examined in

relation to smoking motives. It was expected that poorer differentiators would be more likely to report smoking to regulate affect.

2. Method

2.1. Participants

Participants were 30 adults (30% female, 27% Caucasian) recruited from the community into a pilot study examining affect, craving, and withdrawal during 24 h of tobacco deprivation. Participants' mean age was 37.47 years. Light smokers (n = 15, 40% female) smoked between 5 and 14 cigarettes per day and heavy smokers (n = 15, 20% female) smoked 15 to 24 cigarettes per day. Current smoking status was also verified by a cotinine test (≥100 ng/ml of cotinine) and participants' expired carbon monoxide (CO) reading level was recorded at baseline. Additional sample characteristics and study procedures have been described elsewhere, in an article examining dynamic change in craving, withdrawal, and affect during the first day of tobacco abstinence (Bujarski et al., in press).

2.2. Procedure

Study procedures were approved by the Institutional Review Board at the University of California, Los Angeles; all participants provided written informed consent after receiving a full explanation of the study. After initial telephone screening, participants completed a 1-hour in-person assessment visit. Interviews and questionnaires assessing cigarette smoking, alcohol, and drug use were administered and participants were training in the EMA protocol. Participants had to produce a BrAC of 0.000 g/dl on a breathalyzer, a negative urine toxicology screen, and a negative pregnancy test (if female) to be enrolled in the present study.

2.2.1. EMA procedures—EMA data were collected on a Samsung i200 phone using the open source EMA tool MyExperience (Froehlich, Chen, Consolvo, Harrison, & Landay, 2007). Immediately after smoking the last cigarette for the next 24 h, participants completed the first momentary assessment. Participants completed one additional assessment in the lab (5 min after the last cigarette) and then carried the device for 24 h, the forced tobacco abstinence. Participants responded to prompts until midnight of Day 1 and after waking until returning to the lab on Day 2. If a participant could not immediately complete an assessment, they could delay the assessment for 60 min. Target assessment points were 0, 5, 15, and 30 min and then hourly after participants smoked their last cigarette (Day 1) or woke up (Day 2). Expired CO readings were collected at the second visit to verify smoking abstinence; only those with verified abstinence were included in the analyses.

2.3. Measures

2.3.1. EMA measures—Current affect was assessed by items selected from the Profile of Mood States (POMS; (McNair, Lorr, & Droppleman, 1971)) and the Minnesota Nicotine Withdrawal Scale (MNWS; (Etter & Hughes, 2006; Hughes & Hatsukami, 1986)). Negative affect was assessed with four POMS items (downhearted, discouraged, uneasy, and anxious) and two MNWS items (irritability/frustration and impatience). Positive affect was assessed with four POMS items (joyful, cheerful, energetic, and lively). All POMS items were rated

on a scale of 1 (*not at all*) to 5 (*extremely*). MNWS items were rated on a similar scale of 1 (*none*) to 5 (*severe*). All items were selected based on principal component analyses in a similar sample of current smokers (Ray et al., 2013).

2.3.2. Calculation of negative and positive emotion differentiation, intensity, and lability—To measure negative and positive emotion differentiation, between-person variables were created from the within-person assessments. For each participant, the intraclass correlation coefficient (ICC) with absolute agreement was calculated across the six negative affect items to determine the negative emotion differentiation value; similarly, the ICC across the four positive affect items indicated positive emotion differentiation (Emery et al., 2014; Hill & Updegraff, 2012; Kashdan et al., 2010; Tugade et al., 2004). The ICC calculates the percent of the total variation in affect ratings due to variability across assessments versus variability within assessments (Emery et al., 2014). As calculated, a small ICC indicates that an individual can distinguish between different emotional states and label nuances in emotional experience (i.e. high emotion differentiation). A large correlation indicates that different emotional terms are being used in a similar manner to describe experiences (i.e. low emotion differentiation). A Fisher's *z* transformation was performed before including emotion differentiation in subsequent analyses (Kashdan & Farmer, 2014).[1] For ease of interpretation, emotion differentiation was reverse-scored so that larger values indicated greater emotion differentiation.

To calculate negative and positive emotion intensity, the six negative and four positive items were averaged, separately, at each assessment. The person-level mean of these values indicated average negative and positive emotion intensity (Demiralp et al., 2012; Kashdan et al., 2010). Higher scores indicated greater intensity.

To calculate negative and positive emotion lability, each affect item's standard deviation across all assessments was calculated. The average standard deviation of the six negative emotions indicated negative emotion lability, and the average of the four positive emotions indicated positive emotion lability (Eaton & Funder, 2001; Hill & Updegraff, 2012). Higher scores indicated greater lability.

2.3.3. Wisconsin Inventory of Smoking Dependence Motives (WISDM)—The WISDM is a 68-item self-report measure that yields two overarching scores of Primary Dependence Motives (PDM) and Secondary Dependence Motives (SDM) and 13 subscale scores (Piper et al., 2004; Piper et al., 2008). The WISDM was administered during the first 1-hour assessment session. To reduce the analyses conducted relative to sample size, an a priori decision was made to focus on four WISDM scales: PDM, SDM, and two subscales summarizing emotional motivations for smoking, Negative and Positive Reinforcement. All scales demonstrated high internal consistency in this sample (PDM: $\alpha = 0.93$; SDM: $\alpha = 0.97$; Negative Reinforcement: $\alpha = 0.84$; Positive Reinforcement: $\alpha = 0.89$).

[1]ICCs could not be calculated when a participant reported no variance in emotions (one participant each for negative and positive emotion differentiation). One outlier was identified, on positive emotion differentiation, and was winsorized by replacing the value with one just above the next highest value (Tabachnick & Fidell, 2007).

3. Results

3.1. Assessment completion

A total of 457 separate assessments were completed. Participants received an average of 16.75 prompts (*SD* = 4.50) and completed an average of 14.59 assessments (*SD* = 4.49, range = 2–23) per person over 24 h.

3.2. Between-group differences on emotion differentiation, intensity, and lability

Independent samples *t*-tests were conducted to examine group differences in emotion differentiation, intensity, and lability. As predicted, heavy smokers experienced more intense negative emotions, $t(28) = 2.65$, $p = 0.01$, $d = 0.97$, and greater negative emotion lability, $t(28) = 2.65$, $p = 0.01$, $d = 0.97$. Also as predicted, heavy smokers ($M = 0.76$) demonstrated poorer negative emotion differentiation than light smokers ($M = 0.99$), $t(27) = 1.48$, $p = 0.15$, $d = 0.55$, as depicted in Fig. 1. While this difference did not reach statistical significance due to the pilot sample size, the medium effect size – not affected by sample size – suggests a clinically meaningful difference between groups (Cohen, 1988; Cumming, 2014).

Of note, differences between heavy and light smokers largely were limited to negative emotions. There were no significant differences in positive emotion intensity, $t(28) = 0.92$, $p = 0.36$, $d = 0.34$, or positive emotion differentiation, $t(27) = 0.45$, $p = 0.65$, $d = 0.17$ (Fig. 1). There was a trend, with medium effect size, for heavy smokers to experience greater lability in positive emotion states, $t(28) = 1.72$, $p = 0.10$, $d = 0.63$.

3.3. Emotion differentiation and smoking motives

Descriptive statistics and the correlation matrix are presented in Table 1. Negative emotion differentiation was moderately associated with the WISDM PDM scale, $r = -0.31$, $p = 0.10$, and was more strongly correlated with the more situational SDM scale, $r = -0.50$, $p < 0.01$. Significant correlations between negative emotion differentiation and both negative reinforcement, $r = -0.39$, $p = 0.04$, and positive reinforcement motives, $r = -0.41$, $p = 0.03$, indicated that those with poorer ability to distinguish between negative emotions were more likely to smoke to improve a negative mood and to experience positive affect.[2] Positive emotion differentiation was not associated with the WISDM scales.

4. Discussion

The current study is the first to examine emotion differentiation in smokers during nicotine deprivation. As hypothesized, heavy smokers demonstrated poorer emotion differentiation. Notably, the difference between heavy and light smokers ($d = 0.55$) is similar to the effects reported for individuals with major depression ($d = 0.54$) and social anxiety ($d = 0.63$) relative to healthy controls (Demiralp et al., 2012; Kashdan & Farmer, 2014). Heavy smokers also reported greater negative emotion intensity and negative emotion variability

[2]Nine participants (5 heavy smokers, 4 light smokers) reported drinking alcohol and/or using marijuana during the abstinence period, but emotional motivations for substance use were not assessed. Those who used alcohol or marijuana did not differ from those who did not in negative emotion differentiation, intensity, or lability (*p*s > 0.64).

during deprivation, replicating and extending prior findings linking heavier smoking to greater intensity and volatility of negative affect and withdrawal symptoms during abstinence (Ameringer, Leventhal, Ameringer, & Leventhal, 2010; Leventhal et al., 2007; Piasecki, Jorenby, Smith, Fiore, & Baker, 2003). Positive emotion differentiation did not differ between light and heavy smokers. This distinction by valence negates the possibility that light and heavy smokers simply differed in EMA response styles, which would have produced consistent findings across negative and positive emotions. The consistent delineation between negative and positive emotion differentiation across studies suggests that these abilities depend on different processes (Bresin, 2014; Demiralp et al., 2012; Kashdan & Farmer, 2014). The current findings indicate that negative emotion differentiation may be important to understanding smoking behavior as a maladaptive attempt at affect change, and therefore emotion differentiation warrants further investigation in tobacco research. EMA studies are particularly suited to address its role.

As predicted, those who demonstrated poorer negative emotion differentiation endorsed greater situational reasons for electing to smoke, particularly the desire to improve a negative mood and to experience positive emotions. It is therefore possible that individuals who have difficulty differentiating beyond “feeling bad” are unlikely to employ emotion regulation strategies tailored to specific types of negative affect and thus are more likely to elect to smoke to improve any negative affect. During a quit attempt, negative affect is a situational factor likely to lead to lapse; affect-related lapses often progress to relapses (Shiffman et al., 2007). These findings suggest that, for heavy smokers, instruction in emotional awareness may be a useful component of effective smoking cessation intervention.

These findings should be interpreted within the context of the study’s limitations. First, the sample size of this pilot study limits power to detect between-subject differences. However, participants’ emotion scores were calculated from over 450 intensive observations collected within 24 h. Additionally, all participants were not actively seeking treatment nor attempting to maintain abstinence after this study which limits generalizability. Nevertheless, the study provides preliminary evidence of the potential etiologic significance of emotion differentiation deficits in heavy smokers. Future tobacco research should examine emotion differentiation in abstinent versus non-abstinent smokers and in the prediction of lapse and relapse.

Acknowledgments

Role of funding sources

This study was supported by seed funds from the Department of Psychology at the University of California, Los Angeles. Preparation of this manuscript was supported by Colby College Social Science Grant 01.2215. SEB was supported as a predoctoral trainee from the National Institutes of Alcohol Abuse and Alcoholism (F31 AA022569). The funding sources did not have a role in the study design, data collection, data analysis and interpretation, writing of the manuscript, or the decision to submit the manuscript for publication.

The authors wish to thank Iris Guzman who assisted in study coordination and data collection.

References

Ameringer KJ, Leventhal AM, Ameringer KJ, Leventhal AM. Applying the tripartite model of anxiety and depression to cigarette smoking: An integrative review. Nicotine & Tobacco Research. 2010; 12(12):1183–1194. [PubMed: 21036959]

Bresin K. Five indices of emotion regulation in participants with a history of nonsuicidal self-injury: A daily diary study. Behavior Therapy. 2014; 45:56–66. [PubMed: 24411115]

Bujarski S, Roche DJO, Sheets ES, Krull JL, Guzman I, Ray LA. Modeling naturalistic craving, withdrawal, and affect during early nicotine abstinence: A pilot EMA study. Experimental and Clinical Psychopharmacology. 2015 (in press).

Cohen, J. Statistical power analysis for the behavioral sciences. 2. New York: Academic Press; 1988.

Cumming G. The new statistics: Why and how. Psychological Science. 2014; 25(1):7–29. [PubMed: 24220629]

Demiralp E, Thompson RJ, Mata J, Jaeggi SM, Buschkuehl M, Barrett LF, et al. Feeling blue or turquoise? Emotional differentiation in major depressive disorder. Psychological Science. 2012; 23(11):1410–1416. [PubMed: 23070307]

Dunbar MS, Scharf D, Kirchner T, Shiffman S. Do smokers crave cigarettes in some smoking situations more than others? Situational correlates of craving when smoking. Nicotine & Tobacco Research. 2010; 12(3):226–234. [PubMed: 20133379]

Dvorak RD, Simons JS. Affective differences among daily tobacco users, occasional users, and non-users. Addictive Behaviors. 2008; 33(1):211–216. [PubMed: 17919829]

Eaton LG, Funder DC. Emotional experience in daily life: Valence, variability, and rate of change. Emotion. 2001; 1(4):413–421. [PubMed: 12901400]

Emery NN, Simons JS, Clarke JC, Gaher RM. Emotion differentiation and alcohol-related problems: The mediating role of urgency. Addictive Behaviors. 2014; 39(10):1459–1463. [PubMed: 24935796]

Erbas Y, Ceulemans E, Pe ML, Koval P, Kuppens P. Negative emotion differentiation: Its personality and well-being correlates and a comparison of different assessment methods. Cognition and Emotion. 2014; 28(7):1196–1213. [PubMed: 24410047]

Etter J-F, Hughes JR. A comparison of the psychometric properties of three cigarette withdrawal scales. Addiction. 2006; 101(3):362–372. [PubMed: 16499509]

Feldman Barrett L, Gross J, Conner Christensen T, Benvenuto M. Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. Cognition and Emotion. 2001; 15(6):713–724.

Froehlich, J.; Chen, MY.; Consolvo, S.; Harrison, B.; Landay, JA. Proceedings of the 5th international conference on Mobile systems, applications and services. ACM; 2007. MyExperience: a system for in situ tracing and capturing of user feedback on mobile phones; p. 57-70.(Retrieved from http://dl.acm.org/citation.cfm?id=1247670)

Heckman BW, Kovacs MA, Marquinez NS, Meltzer LR, Tsambarlis ME, Drobes DJ, et al. Influence of affective manipulations on cigarette craving: A meta-analysis. Addiction. 2013; 108:2068–2078. [PubMed: 23795674]

Hill CLM, Updegraff JA. Mindfulness and its relationship to emotional regulation. Emotion. 2012; 12(1):81–90. [PubMed: 22148996]

Hughes JR, Hatsukami D. Signs and symptoms of tobacco withdrawal. Archives of General Psychiatry. 1986; 43(3):289–294. [PubMed: 3954551]

Kashdan TB, Farmer AS. Differentiating emotions across contexts: Comparing adults with and without social anxiety disorder using random, social interaction, and daily experience sampling. Emotion. 2014; 14(3):629–638. [PubMed: 24512246]

Kashdan TB, Ferssizidis P, Collins RL, Muraven M. Emotion differentiation as resilience against excessive alcohol use: An ecological momentary assessment in underage social drinkers. Psychological Science. 2010; 21(9):1341–1347. [PubMed: 20696854]

Leventhal AM, Waters AJ, Boyd S, Moolchan ET, Heishman SJ, Lerman C, et al. Associations between Cloninger's temperament dimensions and acute tobacco withdrawal. Addictive Behaviors. 2007; 32(12):2976–2989. [PubMed: 17624682]

McKennell AC. Smoking motivation factors. British Journal of Social and Clinical Psychology. 1970; 9:8–22. [PubMed: 5488969]

McNair, D.; Lorr, M.; Droppleman, L. Two EITS manual for the profile of mood states (1971 & 1992). 1971. Retrieved from http://ubir.buffalo.edu/xmlui/handle/10477/1893

Minami H, McCarthy DE, Jorenby DE, Baker TB. An ecological momentary assessment analysis of relations among coping, affect, and smoking during a quit attempt. Addiction. 2011; 106(3):641–650. [PubMed: 21182550]

O'Toole MS, Jensen MB, Fentz HN, Zachariae R, Hougaard E. Emotion differentiation and emotion regulation in high and low socially anxious individuals: An experience-sampling study. Cognitive Therapy and Research. 2014; 38:428–438.

Piasecki TM, Jorenby DE, Smith SS, Fiore MC, Baker TB. Smoking withdrawal dynamics III: Correlates of withdrawal heterogeneity. Experimental and Clinical Psychopharmacology. 2003; 11(4):276–285. [PubMed: 14599261]

Piper ME, Bolt DM, Kim S-Y, Japuntich SJ, Smith SS, Niederdeppe J, et al. Refining the tobacco dependence phenotype using the Wisconsin Inventory of Smoking Dependence Motives. Journal of Abnormal Psychology. 2008; 117(4):747–761. [PubMed: 19025223]

Piper ME, Piasecki TM, Federman EB, Bolt DM, Smith SS, Fiore MC, et al. A multiple motives approach to tobacco dependence: The Wisconsin Inventory of Smoking Dependence Motives (WISDM-68). Journal of Consulting and Clinical Psychology. 2004; 72(2):139–154. [PubMed: 15065950]

Ray LA, Lunny K, Bujarski S, Moallem N, Krull JL, Miotto K. The effects of varenicline on stress-induced and cue-induced craving for cigarettes. Drug and Alcohol Dependence. 2013; 131(1–2): 136–142. [PubMed: 23298651]

Shiffman S, Balabanis MH, Gwaltney CJ, Paty JA, Gnys M, Kassel JD, et al. Prediction of lapse from associations between smoking and situational antecedents assessed by ecological momentary assessment. Drug and Alcohol Dependence. 2007; 91 (2–3):159–168. [PubMed: 17628353]

Shiffman S, Paty JA, Gnys M, Kassel JA, Hickcox M. First lapses to smoking: Within-subjects analysis of real-time reports. Journal of Consulting and Clinical Psychology. 1996; 64(2):366–379. [PubMed: 8871421]

Shiyko M, Naab P, Shiffman S, Li R. Modeling complexity of EMA data: Time-varying lagged effects of negative affect on smoking urges for subgroups of nicotine addiction. Nicotine & Tobacco Research. 2014; 16(Suppl 2):S144–S150. [PubMed: 23911846]

Tabachnick, BG.; Fidell, LS. Using multivariate statistics. 5. Boston, MA: Pearson; 2007.

Tugade MM, Fredrickson BL, Barrett LF. Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. Journal of Personality. 2004; 72:1161–1190. [PubMed: 15509280]

HIGHLIGHTS

- Examined patterns of emotion differentiation in relation to nicotine dependence
- Heavy smokers demonstrated poorer negative emotion differentiation.
- Heavy smokers experienced greater negative emotion intensity and lability.
- Emotion differentiation was negatively associated with secondary dependence motives.

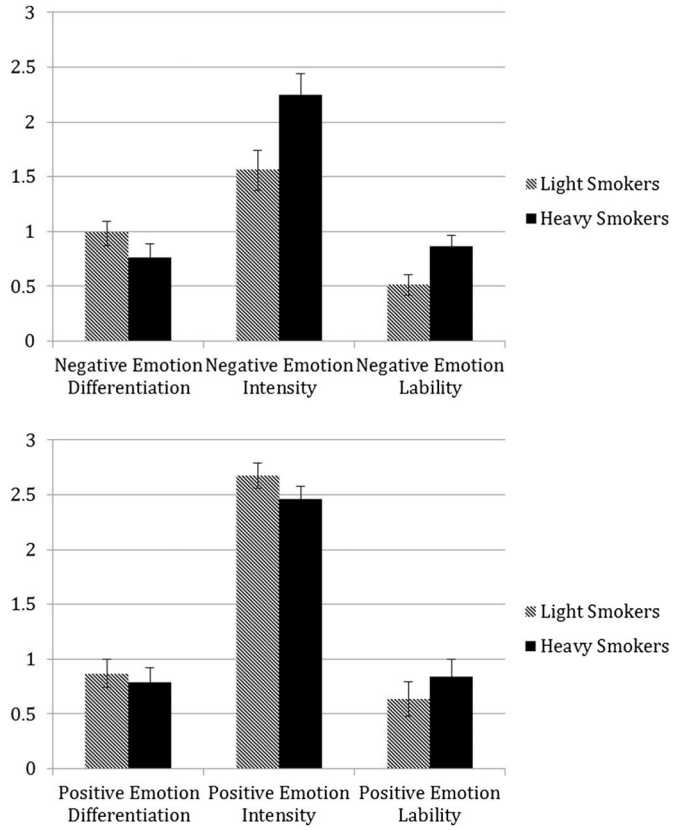

Fig. 1.

Emotion differentiation, emotion intensity, and emotion lability in light versus heavy smokers during a 24-hour forced quit attempt. Error bars represent standard errors.

Table 1

Descriptive statistics and correlations of emotion differentiation and WISDM (Wisconsin Inventory of Smoking Dependence Motives) variables.

Variables	*M*	*(SD)*	1	2	3	4	5	6	7	8	9
1. Negative emotion differentiation	0.87	0.43									
2. Positive emotion differentiation	0.83	0.46	0.27								
3. Negative emotion intensity	1.91	0.78	−0.55**	−0.20							
4. Positive emotion intensity	2.57	0.64	0.45*	−0.13	−0.37*						
5. Negative emotion lability	0.69	0.40	−0.69***	−0.27	0.89***	−0.37*					
6. Positive emotion lability	0.74	0.34	−0.48**	−0.66***	0.62***	−0.16	0.68***				
7. WISDM primary motives	4.73	1.22	−0.31	−0.09	0.57**	−0.11	0.63***	0.20			
8. WISDM secondary motives	4.42	1.05	−0.50**	−0.25	0.50**	−0.30	0.65***	0.35	0.77***		
9. WISDM negative reinforcement	5.08	1.17	−0.39*	−0.25	0.41*	−0.26	0.58**	0.43*	0.62***	0.91***	
10. WISDM positive reinforcement	5.03	1.24	−0.41*	−0.27	0.40*	−0.31	0.57**	0.35	0.60***	0.88***	0.84***

Note.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.