

# The Role of Emotion Differentiation in the Association Between Momentary Affect and Tobacco/Nicotine Craving in Young Adults

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## Abstract

**Introduction** Tobacco/nicotine use is commonly initiated during adolescence or young adulthood, which increases the likelihood of continued use into adulthood and related adverse health outcomes. Despite interest in cessation, achieving and maintaining abstinence is difficult among this population. Cravings are often a barrier to abstinence, which have been associated with intensity of affect at the moment level. Emotion differentiation involves the ability to distinguish between discrete emotion states, and previous work suggests it may moderate the effect of momentary affect on craving, which has never been explored among young adults who are smoking or vaping nicotine.

**Aims and Methods:** In a sample of young adults ( $N=37$ , observations = 2020, ages 18–25, 51% female, and 78% white) interested in quitting smoking or vaping, we used real-time, naturalistic data capture via mobile phones to examine the interaction of momentary affect and trait emotion differentiation on nicotine craving. Participants were prompted with four surveys per day for 35 days and asked to make a 48-h quit attempt on day 7.

**Results:** Multilevel models showed moments of higher-than-average momentary negative affect (NA;  $b=0.39$ ,  $p<.001$ ), and positive affect (PA;  $b=0.26$ ,  $p=.001$ ) were associated with greater levels of craving. NA emotion differentiation significantly moderated the associations between PA and craving ( $b=-0.63$ ,  $p=.031$ ) and NA and craving ( $b=-0.67$ ,  $p=.003$ ).

**Conclusions:** Findings from this exploratory analysis suggest that for young adults engaging in a nicotine quit attempt, greater ability to differentiate NA weakens the momentary association between intense affect and craving.

**Implications:** Results of this study show that the ability to differentiate between discrete emotional experiences may protect young adults against nicotine craving during moments of intense affective experience. These preliminary findings suggest that emotion differentiation, a modifiable construct, could be an important treatment target for individuals engaged in treatment for nicotine dependence.

## Introduction

Nicotine use (inclusive of combustible tobacco, nicotine vaping, etc.) is commonly initiated during adolescence or young adulthood<sup>1</sup> and tends to continue into adulthood, which increases the likelihood of health problems later in life.<sup>2,3</sup> However, electronic nicotine delivery system use (ENDS; ie, vaping) is on the rise among adolescents<sup>4</sup> and is associated with transitioning to cigarette smoking.<sup>5</sup> Despite a rich literature focused on tobacco cessation,<sup>6</sup> achieving and maintaining abstinence is difficult among this population.<sup>7</sup> Young adults (ie, aged 18–24 years) are more likely to engage in a smoking quit attempt compared to adults older than 24 years<sup>8</sup> but rarely succeed in achieving long-term abstinence.<sup>9</sup> Craving has been among the most consistent predictors of relapse<sup>10</sup> and has been associated with intensity of affect (ie, positive and negative emotions) at the moment level.<sup>11,12</sup> Better characterization and understanding of the relationship between intense emotional states as they contribute to nicotine craving is critical for disrupting that relationship, which may lead to an increased rate of relapse at the moment level. Factors may be identified to address this relationship and potentially intervene at moments of high risk.

Affect refers to emotional states such as feelings, emotions, and moods,<sup>13,14</sup> and has been conceptualized through two dominant dimensions: one that includes affective states with a positive valence (eg, joy, relaxed, and energized) and the other including affective states with a negative valence (eg, irritable, angry, sad, etc.<sup>15–17</sup>). The relationship between affect and craving has long been established in the tobacco literature. Negative affect (NA) has been strongly associated with increased cigarette craving in laboratory paradigms and in the natural environment.<sup>18–21</sup> However, research on the association between positive affect (PA) and craving has been mixed. A meta-analysis found that while NA manipulations in the laboratory produced a moderate effect on cigarette craving, the effect of PA manipulations was not significant.<sup>22</sup> Conversely, several studies using ecological momentary assessment (EMA) methods have reported associations between PA and increased cigarette craving in adolescents, and adults in the natural environment.<sup>12,19</sup> There is considerable evidence that intense affect (negative and potentially PA) is associated with increased craving, particularly in the natural environment. On the one hand, craving may simply be a particular

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form of affect, which might explain these associations.<sup>23,24</sup> On the other hand, intense affect can have a profound adverse influence on self-regulation processes, for example, urgency;<sup>25</sup> and craving may be an indicator of impending self-regulatory abstinence failure. Thus, it is important to identify malleable person-level factors that may attenuate the association between affect and craving.

Emotion differentiation is one such factor that is important for emotion regulation and involves the ability to distinguish between discrete emotion states (eg, sad vs. irritated<sup>26</sup>); rather than experiencing them as undifferentiated negative or positive experiences. Emotion differentiation is one of multiple the constructs related to emotional functioning, which may be generally referred to as emotional complexity.<sup>27–29</sup> Whereas emotional complexity, broadly construed, can refer to covariation and variability of emotional experience, emotion differentiation refers to the granularity or precision of emotional experience.<sup>27</sup> Instead of experiencing emotions in broad, non-specific terms (eg, good vs. bad), individuals high in emotion differentiation have a more complex experience composed of distinct emotions of similar valence.

The importance of emotion differentiation is based on constructionist and functional accounts of emotion, which posit that emotional experiences are adaptive insofar as they provide contextually sensitive and relevant information.<sup>27,30,31</sup> A more differentiated emotional experience affords more contextual information that can inform the choice of adaptive regulation strategies. For example, for individuals low in emotion differentiation engaged in a quit attempt, feeling “bad” may result in the desire (ie, craving) to decrease NA with nicotine. In contrast, an individual high in emotion differentiation who specifically feels sad and lonely may reach out to a close friend for support, rather than avoiding the current aversive state through nicotine consumption. Indeed, low emotion differentiation has been shown to undermine successful emotion regulation.<sup>32</sup> In addition, emotion differentiation has been inversely associated with a host of maladaptive behaviors. A recent meta-analysis concluded that emotion differentiation was negatively associated with engagement in maladaptive behaviors including substance use, impulsive aggression, binge eating, and non-suicidal self-injury.<sup>33</sup> Specific to substance use, greater emotion differentiation has been shown to buffer the effects of negative emotion on increased alcohol use.<sup>34</sup> Low emotion differentiation increased the likelihood of initial lapse<sup>35</sup> and percent drinking days<sup>36</sup> following substance use treatment,<sup>35</sup> and poor emotion differentiation was associated with heavier cigarette smoking in adults.<sup>37</sup>

Less is understood regarding the effect of emotion differentiation on the link between intense affect (positive or negative) and craving for nicotine/tobacco, particularly in young adults. Individuals with better emotion differentiation are likely to experience discrete emotions (eg, sad, energized, and irritated) independent of craving, but that has not been tested among young adults who use nicotine regularly (ie, cigarettes or ENDS) and are engaging in a quit attempt. Furthermore, to our knowledge, no research has investigated the role of emotion differentiation on nicotine craving in ENDS users. Therefore, the present study is the first to examine the role of trait emotion differentiation in the association between momentary affect and nicotine craving in young adults.

Understanding moment- and person-level correlates of craving among young adults is an important step in improving low success rates found in tobacco/nicotine cessation studies

with young adults.<sup>9</sup> In addition, affect dynamics in general, and emotion differentiation in particular, have been identified as important yet understudied constructs among adolescents and young adults.<sup>38</sup> We used EMA data collected over a 5-week monitoring period that included a nicotine quit attempt from smoking and vaping among a sub-sample of participants to investigate the moderating role of trait emotion differentiation on the momentary association between affect and nicotine craving. We expected momentary positive affect (PA) and NA to be positively associated with momentary nicotine craving at the within-person level. We expected trait positive affect emotion differentiation (PAED) and trait negative affect emotion differentiation (NAED) to attenuate the associations between momentary affect (PA and NA) and craving.

## Materials and Methods

### Participants

As part of the parent study,<sup>39</sup> we recruited young adults (ages 18–25) from the Charleston, SC, USA area from April, 2017 to June, 2019 using various recruitment methods, including social media and other digital advertisements, print ads, respondent-driven sampling, and recruitment from other youth tobacco studies. Participants were daily cigarette smokers and a sub-sample who primarily used ENDS exclusively or in addition to combustible tobacco. Nicotine vaping as the primary method of tobacco use was initially exclusionary for this study, though given the prevalence of vaping among this age group during the course of enrollment, youth who used ENDS primarily were included in study procedures during the final six months of enrollment (January, 2019), yielding a lower number of primary ENDS participants ( $n=6$ ) compared to participants primarily smoking cigarettes ( $n=31$ ) included in the current analysis. Given that the relationship between affect, emotion differentiation, and craving has never been studied among those who are vaping, ENDS participants were retained in the current study along with participants who smoked cigarettes. Eligible participants smoked an average of at least five cigarettes per day for at least three months or vaped near daily (at least 25 per month) for at least three months and were willing to engage in a quit attempt for 48  $n$ =hours. Exclusion criteria included having any serious unstable psychiatric or medical disorder, current use of smoking cessation medication, or pregnancy or plans to become pregnant during the study period.

Of 62 participants who consented and screened for eligibility, 46 were eligible and enrolled in the study. In the parent study,<sup>39</sup> participants were randomized to different biochemical assessment groups (ie, remote vs. in-person), though group assignment was not relevant to the current analysis. Participants were excluded from the present analysis for not providing at least 14 days of affect-related EMA data ( $N=5$ ) or for having insufficient variability in affect-related EMA data (eg, responding with “1” to all items;  $N=4$ ), which precluded us from deriving the ICC. The final analytic sample for the current exploratory analysis ( $N=37$ ) was 51% female, 78% White, 8% Black, and 14% more than one race or not reported. Thirteen percent of participants identified as Latino/Hispanic. Participants were 21 years old on average ( $SD=2.1$ ). Most of the sample was working either full-time (41%) or part-time (32%). Nineteen percent

of participants were full-time students and 8% were unemployed. Participants included combustible cigarette smokers ( $N=31$ ,  $M=9.2$  cigarettes per day) and ENDS users ( $N=6$ ,  $M=18.47$  e-cig episodes per day). De-identified data are available upon written request to the corresponding author and with the execution of a data use agreement.

## Procedures

Participants were trained to use the EMA app at day 0. Participants were asked to make a quit attempt starting on the morning of day 7 and attempt to quit smoking for 48 h (days 7 and 8). Participants were given a two-week pack of combination nicotine replacement therapy (patches and lozenges) and brief counseling to support their quit attempt. Participants completed 35 days of EMA monitoring, which consisted of self-initiated cigarette or ENDS use logs (event-based prompts) and random assessments (random prompts). Following two random cigarette/ENDS use entries during the day, an EMA assessment followed and asked the participant about several contextual factors surrounding that occasion. Participants had 45 min to respond to the prompt before it expired. In addition, participants were prompted with two random non-smoking/non-vaping assessments, at least 30 min apart. Participants also received EMA assessments when they reported smoking or vaping during their quit attempt. Experimental groups in the parent study varied based on remote breath carbon monoxide (CO) measurement or in-person breath CO collection.<sup>39</sup> For the current analysis, experimental groups have collapsed since all participants completed EMA self-report measures through the 35-day study, all participants engaged in the quit attempt, and we have no reason to believe that the experimental condition affected emotion differentiation or craving.

## Baseline Measures

### Screening/Demographics.

Demographics (ie, age and biological sex), smoking history, and ENDS use history (ie, past 30-day use via timeline follow-back procedures) were assessed.<sup>40,41</sup>

## EMA Measures

### Momentary Affect.

During random EMA assessments, momentary positive and NA were assessed by items from the positive and negative affect schedule-expanded form;<sup>15</sup> and Larsen and Diener's affect circumplex model.<sup>42</sup> All affect items were rated on a 5-point scale ranging from 1 (Not at all) to 5 (Extremely). PA was represented by relaxed, cheerful, and energized. NA was represented by stressed, sad, fidgety, and irritable. We followed recommended procedures to calculate reliability at within- and between-person levels.<sup>43</sup> PA exhibited adequate reliability at the within- and between-person levels,  $\omega=0.67$  and  $\omega=0.81$ , respectively. Standardized factor loadings ranged from 0.46 to 0.88 at the within-person level and 0.40 to 0.90 at the between-person level. NA exhibited good reliability at both levels of analysis (within-person  $\omega=0.77$  and between-person  $\omega=0.91$ ) with standardized factor loadings ranging from 0.51 to 0.76 at the within-person level and 0.93 to 0.96 at the between-person level. For the present analyses, measures of momentary PA and NA were calculated by taking the mean of the respective items at each moment.

## Tobacco/Nicotine Craving.

During random assessments, the craving was assessed with one item: How much do you crave a cigarette/e-cig right now? Responses could range from 1 (Not at all) to 5 (Extremely).

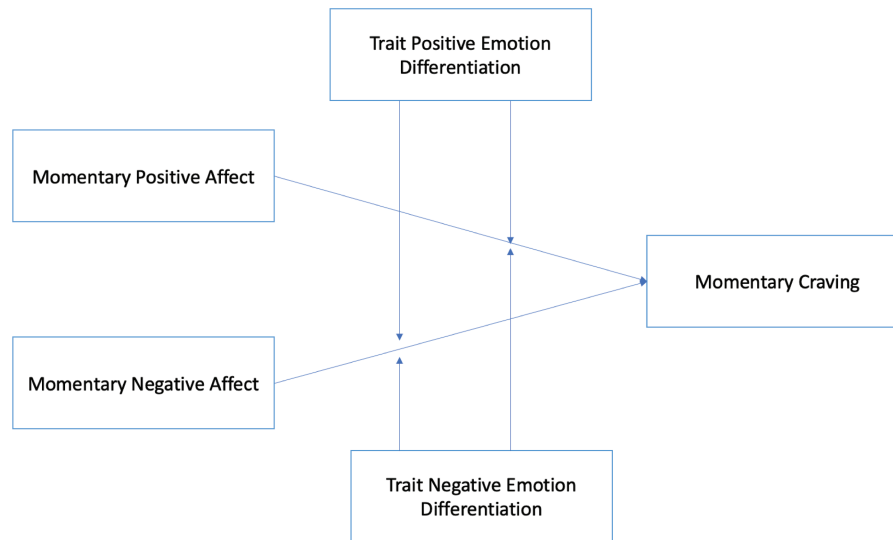
## Emotion Differentiation.

Emotion differentiation is operationalized as the extent to which intensity of same-valenced emotion items (eg, sad, irritated, and stressed) covary across assessments (eg, intraclass-class correlation [ICC]).<sup>44</sup> This results in an aggregate person- (trait-) level estimate of differentiation. An ICC was calculated, measuring the average consistency between emotion ratings.<sup>44,45</sup> This yields a single index that captures the covariation between emotions across measurement occasions. Separate indices were calculated for positive emotions (PAED) and negative emotions (NAED) for each individual across all available sessions. A high ICC indicates high levels of covariation, and thus low emotion differentiation, whereas lower ICCs represent better emotion differentiation. The indices were multiplied by  $-1$  so that higher values reflect better emotion differentiation. In addition, ICC values were normalized using the Fisher's  $z$  transformation.<sup>26</sup>

## Analysis Plan

We used multilevel modeling to test the effects of affect and emotion differentiation on momentary craving for nicotine/tobacco. The data were structured such that observations (level 1; within-person) were nested within persons (level 2; between-persons). Multilevel modeling accounts for the nonindependence of observations resulting from the nested data structure. Our model contained momentary PA, momentary NA, person-level PAED, and person-level NAED as focal predictors of momentary craving. Mixed effects ordered logistic regression model was estimated in Stata 15 (Statacorp, 2017) with random intercepts and an unstructured variance-covariance matrix. Momentary craving was regressed on momentary NA and PA, person-level PA, NA, PAED, and NAED, and the following cross-level interactions: momentary NA by person-level NAED, momentary NA by person-level PAED, momentary PA by person-level PAED, momentary PA by person-level NAED. In addition, we controlled for person-level PA, person-level NA, and sex. To account for daily variation in craving and potential autocorrelation across days, six day-of-the-week indicator variables were included as covariates. Time in the study was also included in the model to control for changes in craving over the course of the study not accounted for by predictors in the model.

Person-level PA and NA were between-person aggregates of momentary affect. Moment-level variables were person-centered, such that momentary affect scores represented deviations from the individual's mean affect rating. Person-level variables were grand-mean centered, such that an individual's score represented a deviation from the sample mean. Thus, the model includes both state (eg, moment-level PA) and trait (eg, person-level PA) affect. This allowed us to estimate effects of affect at both the within- and between-persons levels. We also included person-level PAED and NAED to test the hypothesized cross-level interactions with moment-level affect. [Figure 1](#) shows a conceptual depiction of the model.



**Figure 1.** Conceptual model. *Notes:* Conceptual model of the analysis and research question. Sex, elapsed time in the study, day of the week, between-person positive affect, and between-person negative affect were included as covariates but omitted from the figure for clarity.

## Results

### Descriptive Statistics

Our analysis sample consisted of 37 participants and 2020 observations. Participants submitted data between 14 and 35 study days ( $M=33.29$ ,  $SD=3.41$ ), completing 97.8% of event-based smoking prompts (following a cigarette/e-cig entry initiated by the participant) and 51.3% of random prompts (nonsmoking). Descriptive statistics for level 1 and level 2 variables are shown in Table 1. The ICCs for craving, PA, and NA were 0.18, 0.31, and 0.50, respectively. This indicates that 82% of the variance in craving responses and 69% of the variance in aggregated PA was at the within-person level. Half the variance in aggregated NA was at the within-person level. This suggests that craving and affect are time-varying constructs that are appropriately modeled using multilevel methods.

### Multilevel Model Analysis

Results for the multilevel model are presented in Table 2. As hypothesized, momentary PA and NA were positively associated with increased momentary craving ( $b=0.26$ ,  $p=.001$ ;  $b=0.39$ ,  $p<.001$ , respectively). Between-person NAED and PAED were not significantly associated with momentary craving. However, there were significant cross-level interactions such that higher levels of trait NAED were associated with weaker associations between momentary PA and craving ( $b=-0.97$ ,  $p=.006$ ) and momentary NA and craving ( $b=-0.70$ ,  $p=.014$ ). Cross-level interactions with PAED were not significant. We also conducted analyses that excluded ENDS users, and the same pattern of results was held. Figure 2 shows the average marginal effects of momentary NA across levels of trait NAED. Figure 3 shows average marginal effects of momentary PA across levels of NAED.

## Discussion

This secondary analysis from a brief cessation and relapse monitoring study among young adults who either smoked cigarettes or used ENDS daily<sup>39</sup> used an ecologically valid

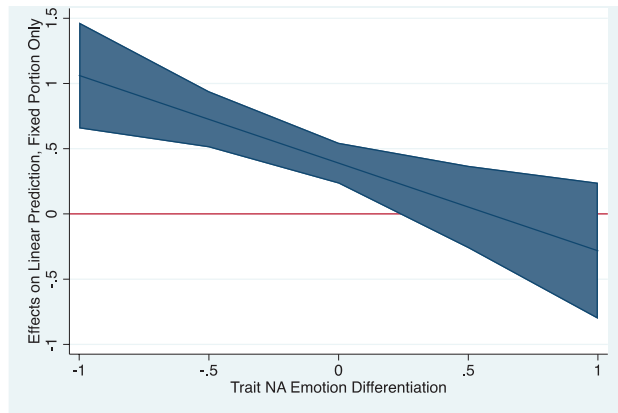
**Table 1.** Descriptive Statistics

Variable	M	SD	Range
Within-person (L1; time-varying)			
Negative affect	1.84	0.90	1–5
Positive affect	2.83	0.79	1–5
Craving	2.41	1.20	1–5
Between-person (L2; time-invariant)			
Negative affect	1.96	0.68	1.07–3.56
Positive affect	2.81	0.49	2.02–4.29
Negative emotion differentiation	0.68	0.16	0.30–0.93
Positive emotion differentiation	0.61	0.17	0.13–0.92

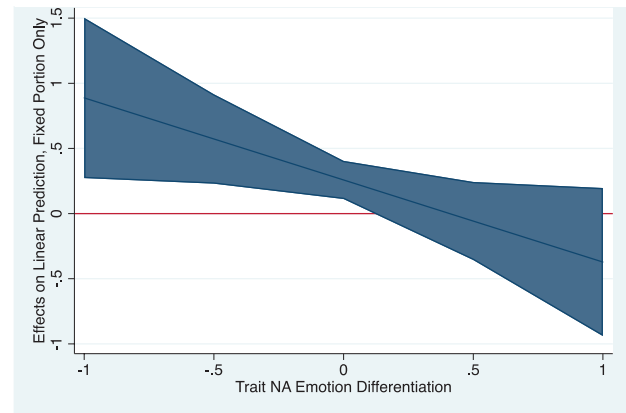
$N=37$ ; level 1 observations = 2050;  $M$  = mean;  $SD$  = standard deviation. L1 variables are “states” varying within-person across time and L2 are dispositional characteristics aggregated from multiple state assessments (ie, “traits”). To aid interpretability, emotion differentiation is represented as raw ICC (ie, prior to Fisher Z transformation).

approach to explore the impact of emotion differentiation on the association between momentary affect and nicotine craving. Consistent with previous research,<sup>12</sup> moment-level affect, but not person-level affect, was associated with craving. Moments in which individuals experienced higher PA or NA than is typical of their baseline patterns were associated with increased craving. As hypothesized, person-level emotion differentiation moderated the association between momentary affect and craving. That is, the effect of PA and NA on craving was attenuated for individuals higher in NA emotion differentiation. Our findings, though exploratory, may suggest a protective effect of negative emotion differentiation (the ability to differentiate negative emotions) on the link between affect and craving in young adults engaged in a nicotine quit attempt and relapse monitoring.

This study provides preliminary support for the conceptualization of craving as a form of affect. Indeed, craving can be experienced as intense desire, which is often classified as



**Figure 2.** Average marginal effects of momentary negative affect. *Notes:* Marginal effects of momentary negative affect on momentary craving as a function of trait negative affect emotion differentiation. Effects of momentary negative affect are significant in regions where the 95% confidence interval does not overlap with 0, which is indicated by the horizontal red reference line. Trait negative affect emotion differentiation if grand-mean centered.



**Figure 3.** Average marginal effects of momentary positive affect. *Notes:* Marginal effects of momentary positive affect on momentary craving as a function of trait negative affect emotion differentiation. Effects of momentary positive affect are significant in regions where the 95% confidence interval does not overlap with 0, which is indicated by the horizontal red reference line. Trait negative affect emotion differentiation if grand-mean centered.

**Table 2.** Multilevel Model of Craving

Within-person (L1; time-varying)	<i>b</i>	<i>SE</i>	<i>p</i> -value
Negative affect	0.39	0.080	<.001
Positive affect	0.26	0.075	.001
Monday	-0.01	0.156	.966
Tuesday	-0.05	0.157	.735
Wednesday	0.19	0.154	.207
Thursday	0.35	0.149	.019
Friday	0.00	0.152	.991
Saturday	0.05	0.154	.767
Day in the study	-0.01	0.004	.007
Between-person (L2; time-invariant)	<i>b</i>	<i>SE</i>	<i>p</i> -value
Negative affect	0.57	0.251	.023
Positive affect	-0.26	0.345	.454
NA emotion differentiation	0.85	0.587	.147
PA emotion differentiation	-0.99	0.632	.117
Sex	-0.32	0.298	.079
Cross-level interaction	<i>B</i>	<i>SE</i>	<i>p</i> -value
NA × NA emotion differentiation	-0.67	0.225	.003
NA × PA emotion differentiation	-0.02	0.290	.933
PA × NA emotion differentiation	-0.63	0.293	.031
PA × PA emotion differentiation	0.57	0.304	.061

*N* = 37. Level 1 observations = 2,050. Sex is coded 0 = women, 1 = men. *b* = unstandardized coefficients. *SE* = standard error. Level 1 variables were person-centered and Level 2 variables were grand-mean centered. Sunday was the reference group for day of the week indicators.

an affective state.<sup>23,46</sup> The relationship between momentary NA and momentary PA and craving decreased as a function of NA emotion differentiation. Individuals who were better able to differentiate between feeling stressed, sad, fidgety, and irritable

(ie, had a lower ICC on NA measures) had a smaller association between momentary affect and craving. In other words, experiences of momentary craving were largely independent of momentary affect for individuals high in NA emotion differentiation. These results suggest that individuals who experience NA in a global, undifferentiated way may be more likely to experience more intense craving in moments of intense NA and PA, indicating that experiences of craving and affect are dependent for individuals low in emotion differentiation. This relationship has a direct impact on sustained abstinence because moments of intense affect (eg, anger, sadness, and stress) may be misinterpreted as craving, which has implications for cessation fatigue, lapse, and relapse. Indeed, smoking or vaping may be behavior that results in the reduction of craving, whereas intense emotions such as anger or sadness are likely more functionally regulated with alternative behaviors (eg, standing up for oneself and reaching out for support).

The hypothesized moderating role of emotion differentiation only held for NA emotion differentiation in the current analysis. Contrary to expectation, PA emotion differentiation did not moderate the link between affect and craving. Research on substance use and emotion differentiation has largely focused on negative emotion differentiation to date. The research on positive emotion differentiation in other areas (eg, depression), has been inconsistent.<sup>26,45,47</sup> However, Starr et al.<sup>48</sup> found that low NA emotion differentiation, and not PA emotion differentiation, increased associations between daily hassles and momentary depressed mood. Whereas both PA and NA were associated with momentary craving, our results suggest that the ability to differentiate negative emotions (eg, stressed, sad, fidgety, and irritable) is particularly important in managing the link between intense affective experiences (positive or negative) and nicotine craving. To speculate, good differentiation of PA may indicate a lack of persisting positive emotionality whereas poor PA differentiation may be adaptive insofar as activation of one positive emotion may trigger multiple other positive emotions resulting in a global, undifferentiated state of positive emotionality. Thus, differentiating positive emotions may be relatively less important in attenuating the link between affect and craving.

Several limitations of the current study should be noted. First, although our analytic approach was rigorous in its disaggregation of within- and between-person effects, the small  $N$  at the between-person level may have limited power to detect significant cross-level interactions with PA emotion differentiation. The small sample size also precluded our ability to test more complex models that incorporate lagged effects or other important research questions such as the extent to which the moderating effect of emotional differentiation on affect and craving changes during and after a quit attempt. In addition, participants included in these analyses were heterogeneous, as they smoked cigarettes or used ENDS daily. We retained the ENDS sub-sample in the current analysis, given that no emotion differentiation work has been done with young adults who are smoking or vaping. It is possible that the ENDS sample is a qualitatively distinct group from those smoking cigarettes. However, we ran analyses without participants using ENDS and the pattern of observed effects did not change. Thus, we concluded it was reasonable to retain participants using ENDS in this investigation of nicotine craving, though future work may benefit from exploring qualitative differences among those smoking or vaping in terms of emotion differentiation, craving, and affect. The sample was also racially and ethnically homogeneous, which would preclude generalization to other groups. We note that caution is warranted in interpreting our preliminary findings. The outcome in this analysis was craving, not smoking, and/or relapse. To assess whether the moderating effect of emotion differentiation results in adaptive behavioral regulation, sufficiently powered studies should investigate whether the effects of emotion differentiation on affect and craving result in decreased tobacco use or improved cessation outcomes (eg, via moderated mediation, and conditional process models). However, understanding the extent to which craving, a potentially relevant treatment construct,<sup>9</sup> is associated with affective experience more broadly<sup>24</sup> is an important preliminary step for developing and refining affective treatments for tobacco cessation.

Though results from this secondary analysis should be interpreted with caution, several clinical implications of this work warrant further study. Results from the current analysis comport with existing evidence for emotion differentiation's role in adaptive emotion, and potentially behavioral, regulation.<sup>49</sup> Better emotion differentiation theoretically provides one with more accurate information in a given situation, which is necessary to engage in an appropriate response. Information derived from highly differentiated emotional experiences can be readily related to relevant goals and leveraged to select adaptive strategies to achieve those goals.<sup>49</sup> Emotion differentiation has also been considered adaptive via its links with emotion regulation.<sup>26,50</sup> Indeed, emotion differentiation involves identifying, labeling, and distinguishing emotions, which can help individuals decide how to respond to emotions<sup>50,51</sup> and pursue valued goals. The stress associated with early abstinence from nicotine, in addition to nicotine withdrawal symptoms, may leave young adults vulnerable to intense affect<sup>52</sup> and, as a result, increased craving. Important for intervention development, emotion differentiation is a modifiable construct<sup>53,54</sup> that may be a key treatment target leading up to and during a quit attempt to manage emotional responses and how they may threaten abstinence. Future work should investigate whether the reduced effect that emotion differentiation imparts on the affect and craving relationship

results in longer-term adaptive behavioral responses (eg, tobacco cessation and engagement in alternative reinforcers) among young adults.

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## Declaration of Interests

Gray has provided consultation to Pfizer, Inc. and Jazz Pharmaceuticals. There are no other conflicts of interest to declare.

## Data Availability Statement

De-identified data are available upon written request to the corresponding author and with the execution of a data use agreement.

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