Loneliness and smoking: The costs of the desire to reconnect

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People have a fundamental need to belong, which influences self and identity regulation processes and health outcomes. Deficits in belongingness motivate people to seek out sources of renewed affiliation. What consequences might this desire for reconnection have for smoking? The current work proposes a theoretical model in which feelings of social exclusion predict higher rates of smoking, presumably out of desire to regain a sense of social belonging. To provide an initial test of this theoretical model, we show that loneliness consistently predicted higher smoking in nationally representative samples of adults (Studies 1 and 1) and late adolescents (Study 3). The effect of loneliness on smoking was strongest among people living in environments in which smoking was socially acceptable. Discussion centers on the fruitfulness of bridging perspectives on self and identity regulation processes to understand the causes of negative health behaviors.

Keywords: Loneliness; Social exclusion; Affiliation; Smoking; Health.

People have a fundamental desire for positive and lasting relationships (Baumeister & Leary, 1995). The need to belong is closely related to many, if not all, processes related to self and identity regulation. Social exclusion and inclusion relate to self-esteem (Leary & Baumeister, 2000), self-enhancement processes (Katz & Beach, 2000), self-regulation (Baumeister, DeWall, Ciarocco, & Twenge, 2005), and navigating one’s identity and group membership (Brewer, 1991).

The need to belong also relates to many health outcomes. A lack of social connection thwarts the need to belong and can have damaging consequences for mental and physical health (Cacioppo & Patrick, 2008; Williams, Cheung, & Choi, 2000). Indeed, feelings of social exclusion negatively impact mental and physical health as much as smoking and obesity (House, Landis, & Umberson, 1988).

Because the need to belong is a fundamental motivation, depriving people of social connectedness should intensify their motivation to gain social acceptance. Therefore, it would follow that lonely and excluded people would be motivated to reconnect with potential sources of affiliation. This is indeed the case. Lonely and excluded people are highly motivated to regain a sense of belonging (DeWall, Maner, & Rouby, 2009; Epley, Akalis, Waytz, & Cacioppo, 2008).

What has not been explored, however, is how the desire to reconnect can place lonely and excluded people at risk for smoking. Whereas prior research has shown that the desire for reconnection can lead excluded people to behave prosocially (Maner, DeWall, Baumeister, & Schaller, 2007), no work has investigated the potentially negative consequences of the desire to reconnect. We propose a
theoretical model in which a lack of social connectedness triggers the desire to reconnect, which may increase smoking. Crucially, the relationship between loneliness and smoking should be strongest among people living in environments in which smoking is socially acceptable, presumably because smoking is most strongly linked to the prospect of acceptance in these settings. To provide initial evidence supporting our hypothesized link between loneliness and smoking, we present new data from three nationally representative samples. We conclude by explaining how our theoretical framework can be used to inform interventions designed to reduce smoking behavior.

Smoking and Social Exclusion

Smoking confers serious health risks in the USA. Indeed, smoking is the leading cause of mortality in the USA, being linked to approximately 435,000 annual deaths (Mokdad, Marks, Stroup, & Gerberding, 2004). Despite widespread campaigns to reduce smoking, it continues to be a rampant phenomenon. In a recent nationally representative sample, 47.6% of respondents met criteria used to identify established smokers (Cantor et al., 2009).

Although smoking is linked to a variety of problems, there is little research that has examined the importance of social exclusion on smoking behavior and mediators and moderators of this relationship. Given prior work showing a desire to affiliate with others among excluded people, feelings of social exclusion may relate to increased smoking behavior, especially when such behavior is linked to the prospect of gaining acceptance (see Figure 1).

There are at least three reasons why feelings of social exclusion should relate to higher levels of smoking. First, people who feel excluded are less willing than others to override their impulses to engage in behaviors that undermine their physical health (cf. DeWall, Baumeister, & Vohs, 2008). For example, social exclusion causes people to consume more fatty foods and consume lower amounts of a healthy beverage compared to non-rejected people (e.g., Oaten, Williams, Jones, & Zadro, 2008). Second, social exclusion causes self-defeating behavior and irrational decision making (Baumeister, Twenge, & Nuss, 2002; Twenge, Catanese, & Baumeister, 2002).

**FIGURE 1** Theoretical model predicting a positive relationship between social exclusion and smoking behavior that is mediated by a desire for social connection and moderated by expectations that smoking is linked to the prospect of social acceptance.
Third, excluded people are highly sensitive to cues that signal potential sources of affiliation. Excluded people form attitudes on the basis of peer consensus, control their impulses to gain acceptance, fixate their attention on signs of acceptance, and mimic others’ behavior as a means of gaining acceptance (DeWall, 2010; DeWall et al., 2008, 2009; Lakin, Chartrand, & Arkin, 2008). Thus, excluded people may be at a heightened risk for smoking, especially when smoking is linked to the prospect of acceptance.

To date, relatively little research has examined the potential relationship between feelings of social exclusion and smoking behavior—and the research conducted thus far has yielded somewhat mixed findings. Lauder, Mummery, Caperchione, and Jones (2006) reported that lonely people were more likely to be smokers compared to non-lonely people. In contrast, other investigations have shown that loneliness is not a risk factor for smoking (Cacioppo et al., 2000; Hawkley, Burleson, Berntson, & Cacioppo, 2003). Hence it is somewhat unclear whether feelings of social exclusion relate to higher rates of smoking.

By using three large, nationally representative samples of adults and late adolescents, the current research has the potential to determine whether feelings of social exclusion relate to higher rates of smoking, the reliability and strength of such a relationship, and whether the relationship among people living in environments in which smoking is prevalent. Our first prediction, tested in Studies 1–3, was that feelings of social exclusion would relate to higher rates of smoking. Our second prediction, tested in Study 3, was that the relationship between feelings of social exclusion and smoking would be strongest among people living in environments where smoking was socially acceptable and hence a possible means of procuring acceptance.

**Study 1**

Study 1 provided an initial test of the hypothesis that feelings of social exclusion would correlate with higher rates of smoking. A nationally representative sample of adults reported on how much they had been rejected during their childhood. Childhood social rejection was used because it was the variable that was most closely related to feelings of social exclusion. In addition, longitudinal data suggest that childhood social rejection can predict negative outcomes during adolescence and adulthood (Parker & Asher, 1987). Participants then reported on their actual smoking behavior.

**Method**

The National Comorbidity Survey-Baseline (NCS-B) was carried out in the early 1990s with a household sample of over 8,000 respondents, with a second survey administered to a subsample of the respondents (N = 5,877) that included questions on tobacco use. The present study used data from respondents of the second survey. Detail on the sampling, weighting, and interviewers can be found in Kessler (1994).

**Participants**

Nearly equal numbers of men and women participated (2,938 men; 2,939 women). Average age was 33.2 years (SD = 10.71; range 15–59). Ethnicity was as follows: 75.6% Caucasian, 11.6% African American, 9.4% Hispanic, and 3.4% “Other.”
Measures

Childhood social rejection. Participants completed a brief measure that assessed childhood social rejection. Participants answered two items that measured level of childhood social inclusion (e.g., “Did you have a lot of friends, a few friends, or no friends at all?”) and two items that assessed the level of connectedness participants felt with their friends (e.g., “When you were growing up, how much could you count on your friends when things went wrong—a lot, some, a little, or not at all?”). Participants rated their answers on 4-point or 3-point Likert-type scales, anchored by 1 = A lot and 4 = Not at all or 1 = A lot and 3 = No friends. Possible scores accordingly ranged from 4 to 15, with higher scores indicated higher levels of childhood rejection. Responses across the four items (α = .71) were summed to create a childhood rejection index.

History of smoking. Participants responded to two items related to their history of smoking. The first item asked participants to report the age at which they first began smoking cigarettes regularly (i.e., daily for a month or more). The second item asked participants to report how many cigarettes they smoked daily, during the period which they were smoking most.

Results and Discussion

Analysis Strategy
We conducted WLS regression analyses predicting cigarette use from the composite of childhood rejection, with age, gender and ethnicity included as covariates.

Link Between Childhood Rejection and Cigarette Use
Our first prediction was that childhood rejection would be negatively associated with age of onset of smoking. As expected, participants who experienced higher levels of childhood rejection began smoking at an earlier age, β = −0.09, t(1483) = −3.31, p < .001. In addition, participants who experienced higher levels of childhood rejection tended to smoke more cigarettes daily during the time that they were smoking most, β = 0.05, t(1482) = 1.89, p = .059. These findings provide preliminary evidence that childhood rejection is related to an earlier age at which people begin to smoke and somewhat more smoking behavior.

Study 2
In Study 2, we sought to extend our previous findings that feelings of social exclusion relate to higher rates of smoking. To rule out the possibility of memory artifact in Study 1, participants reported their current level of loneliness and their smoking behavior. We predicted that current loneliness would relate to higher rates of smoking.

Method
The National Comorbidity Survey-Replication (NCS-R) is a nationwide epidemiological study designed to replicate and expand on the original NCS (Alegria, Jackson, Kessler, & Takeuchi, 2007). The NCS-R was administered between 2001 and 2003 with a sample of 9,282 participants. A second smaller survey was given to a subsample (N = 5,692) of the respondents to reduce participant burden and study costs. This study used data from the respondents of the second survey. Detail on the sampling, weighting, and interviewers can be found in Alegria et al. (2007).
Participants
Of the participants, 55.4% were female. Average age was 44.73 years ($SD = 17.5$; range 18–99 years). Ethnicity was as follows: 72.1% Caucasian, 12.7% African American, 9.5% Hispanic, 2.0% Asian, and 3.1% “Other.”

Measures

**Loneliness.** Participants answered an item measuring loneliness over a 30-day period (i.e., “Over the past month, how lonely did you feel?”). Loneliness was assessed on a 5-point Likert-type scale, anchored by $1 = \text{Often}$ and $5 = \text{Never}$. To facilitate interpretation, responses were reversed-scored so that higher numbers indicated more feelings of loneliness.

**History of smoking.** Participants answered four items on general smoking behavior (“Have you ever smoked a cigarette, cigar, or pipe, even a single puff?”, “Was there ever a period in your life lasting at least two months when you smoked at least once per week?”, “Was there ever a year in your life when you smoked more than you did in the past 12 months?”, and “Have you chain smoked for several days or more?”). Each of these questions was rated as Yes or No.

Results and Discussion

**Analysis Strategy**
After the cases were appropriately weighted, logistic regression analyses were conducted predicting the dichotomous outcomes from feelings of loneliness. Age, gender, and ethnicity were again included as covariates.

**Link Between Loneliness and Tobacco Use**
Our main prediction was that loneliness would relate to increased tobacco use. As predicted, loneliness was positively associated with having ever smoked, $OR = 1.17$, 95% CI = 1.08–1.28, Wald’s $\chi^2(1, N = 2,649) = 14.00$, $p < .001$. Loneliness was related to increased likelihood of smoking once per week for two months, $OR = 1.37$, 95% CI = 1.18–1.59, Wald’s $\chi^2(1, N = 1,328) = 17.73$, $p < .001$. Loneliness was also associated with smoking more in a past year than in the past 12 months, $OR = 1.15$, 95% CI = 1.05–1.25, Wald’s $\chi^2(1, N = 1,924) = 9.23$, $p < .002$. Last, loneliness was positively associated with chain smoking, $OR = 1.25$, 95% CI = 1.13–1.37, Wald’s $\chi^2(1, N = 2,061) = 19.25$, $p < .001$. These data offer additional evidence that higher feelings of loneliness relate to higher tobacco use.

Study 3
For Study 3, we sought to extend our previous findings by examining the association between loneliness and smoking behavior within the context of regional differences in smoking prevalence. According to the Center for Disease Control (CDC), the Midwest region of the United States (e.g., Illinois, Indiana, Missouri, Ohio) has the largest percentage of adult smokers in the country, whereas the Western region of the United States (e.g., California, Oregon, Utah, Washington) has the lowest proportion of smokers (Pleis, Lucas, & Ward, 2009). In Study 3, we examined whether the relationship between loneliness and smoking would be highest among people living in the Midwest region of the United States. The implication is that when smoking is normative, it is used more frequently as a way to connect with others.
Method
The Monitoring the Future (MTF) Project surveys high-school seniors nationwide annually in an attempt to assess the prevalence of substance abuse behaviors and related attitudes (Johnston, O’Malley, Bachman, & Schulenberg, 2008). Core questions are asked of the entire sample, whereas other questions (e.g., self-esteem, religiosity) are divided amongst nearly identical subsamples of students. The present study used data from participating seniors who completed Form 5 of the MTF project between 1977 and 2007 (N = 89,348, 16.9% of entire MTF 12th grade sample). Loneliness data were not available prior to 1977.

Sampling and Weighting
Participants were selected through a multistage random sampling procedure based on geographic area and school size, representing an accurate cross-section of 12th graders across the continental United States. Between 95% and 99% of the sample school slots were filled for each year, and the student response rate ranged between 77% and 86%. Weights were assigned to account for differences in the probability of being selected at each stage of the sampling procedure. More detail on the sampling and weighting can be found in Johnston et al. (2008).

Participants
The participants were split nearly equally in gender (49.2% female). In earlier versions of the MTF survey, respondents reported race as either White or Non-White. In more contemporary versions (i.e., years 2005–2007) respondents reported race as White, African American, or Hispanic. Therefore, we report ethnicity was as follows: 86.3% Caucasian and 16.4% Non-white.

Measures
Region of residence. Participants were grouped according to Census classifications for: Northeast, Northcentral, South, and West. The Northcentral classification is synonymous with the Midwest classification of the Census (see Johnston et al., 2008).

Loneliness. Participants answered an item measuring current loneliness (i.e., “A lot of times I feel lonely”) by indicating their agreement on a 5-point Likert scale, anchored by 1 = Disagree and 5 = Agree.

Cigarette use. Participants answered two items measuring cigarette use. The first item (i.e., “How frequently have you smoked cigarettes in the past 30 days?”) was measured on a 7-point scale anchored by 1 = None and 7 = 2 Packs or More a Day. The second item (i.e., “Have you ever smoked cigarettes?”) was measured on a 5-point scale anchored by 1 = Never and 5 = Regularly Now.

Results and Discussion
Analysis Strategy
To provide a conservative test of our hypothesis, weighted least squares (WLS) regression analyses were conducted using year of administration, participant gender, and participant ethnicity as covariates. Moderation was examined with an interaction term created using a centered predictor for level of loneliness and a
dummy code representing whether a participant lived in the Midwest or not. Separate analyses were conducted for each of the cigarette-use items.

**Link Between Loneliness and Cigarette Use**

Our prediction was that loneliness would relate to higher cigarette use, and that this relationship would be strongest for Midwesterners. Reporting on smoking behavior from the past 30 days is likely to be more sensitive than participant reports of having ever smoked. Therefore, we expected that regional differences would moderate the relationship between loneliness and smoking within the past 30 days, such that the relationship would be strongest for participants residing within the Midwest.

As expected, the relationship between loneliness and smoking within the past 30 days was moderated by Midwestern regional status, $\beta = 0.012$, $t(67,812) = 2.61$, $p = .009$ (see Figure 2). We also observed main effects for loneliness, $\beta = 0.04$, $t(67,812) = 8.58$, $p < .001$, and Midwestern regional status, $\beta = 0.02$, $t(67,812) = 5.67$, $p < .001$.

To clarify the nature of the interaction, we examined the association between loneliness and smoking among participants who were or were not from the Midwest. Among participants who were not from the Midwest, feelings of loneliness predicted more smoking, $\beta = 0.04$, $t(67,812) = 2.70$, $p = .007$, but this association was stronger among Midwestern participants, $\beta = 0.07$, $t(67,812) = 4.74$, $p < .001$. Thus, among areas where smoking is normative, loneliness is more strongly associated with smoking.

Feelings of loneliness also correlated positively with having ever smoked cigarettes, $\beta = 0.05$, $t(67,857) = 10.45$, $p < .001$. Yet, even though living in the Midwest was positively associated with having ever smoked, $\beta = 0.03$, $t(67,857) = 6.74$, $p < .001$, regional differences did not moderate the relationship between loneliness and having ever smoked a cigarette, $\beta = 0.002$, $t < 1$. Thus, living in a region in which smoking was relatively prevalent strengthened the relationship between loneliness and recent smoking, but it did not moderate the link between loneliness and having ever smoked.

![Figure 2](image-url) **FIGURE 2** Midwestern regional status moderates the association between loneliness and smoking. Study 3.
General Discussion

The need to belong is among the most basic and fundamental of all motivations. It is intimately linked to self and identity regulation processes, including self-esteem, self-enhancement, self-regulation, and optimal distinctiveness theories. Having a sense of social connection in one’s life also has profound consequences for many mental and physical health outcomes. Thus, our conceptions of ourselves as socially included and accepted people have a direct bearing on our mental and physical health.

Like any motivation, the need to belong should follow standard motivational patterns. Just as deprivation of food increases the motivation to seek out sources of sustenance, deprivation of desired levels of social inclusion and acceptance should increase the motivation to seek out sources of renewed affiliation. Consistent with this reasoning, several prior investigations have shown that social exclusion influences cognitive and behavioral responses aimed at restoring a sense of belonging (DeWall et al., 2009; Lakin et al., 2008). What is less clear, however, is whether this desire for social connection can drive excluded and lonely people to engage in smoking, especially when smoking may be linked to the prospect of acceptance.

Before providing a complete test of our theoretical model, it was first necessary to examine whether feelings of social exclusion correlate positively with smoking behavior, to determine the reliability and size of such a relationship, if one exists, and to investigate whether a relationship between loneliness and smoking would be strongest in regions in which smoking is socially acceptable. To this end, we analyzed data from three nationally representative samples of late adolescents and adults. Across all three studies, indicators of social exclusion related to higher rates of smoking behavior. In Study 3, using nationally representative samples of high-school seniors over 30 years, feelings of loneliness were related to higher rates of smoking behavior. Crucially, the relationship between loneliness and smoking over the past 30 days was strongest among participants from the Midwest, a region marked by elevated smoking prevalence rates. Thus, the current findings provided converging evidence that feelings of social exclusion can be considered a small, but reliable, risk factor for higher rates of smoking, and this effect is strongest among people living in environments in which smoking is socially acceptable.

The current findings offer a first step in understanding the relationship between feelings of social exclusion and smoking behavior. They demonstrate that the capacity to detect a reliable relationship between loneliness and smoking requires very large samples. Not having adequate statistical power may help explain the inconsistent findings in the literature regarding the relationship between loneliness and smoking behavior. In addition, the current findings highlight the importance of considering regional variation in smoking behavior as a moderator of the relationship between loneliness and smoking. Whereas prior findings have examined the relationship between loneliness and smoking within a single geographic region, Study 3 showed that using a nationally representative sample can enable researchers to better understand the importance of regional smoking prevalence in moderating the relationship between loneliness and smoking behavior.

More broadly, our findings may have implications for interventions aimed at reducing smoking behavior. Because the putative mediator underlying the loneliness–smoking relationship is motivational in nature, interventions designed to reduce smoking could implement strategies designed to satiate the desire for social connection that accompanies social exclusion. Having people spend time each day speaking with people with whom they have a positive and lasting relationship, for...
example, may reduce their desire to smoke behavior when feeling socially excluded because their desire for connection has been satiated.

Another application of our findings could involve modifying advertisements and warning labels to frame smoking as an ineffective means of gaining social connection. Recent findings indicate that framing standards for health behaviors can increase intentions for engaging in healthy behaviors when people experience a threat to the self (Cox et al., 2009). Warning labels on cigarette packets suggesting that smoking will not enable people to experience acceptance from others may have a similar effect on reducing smoking among lonely or excluded people.

Limitations and Future Directions

Although the current studies showed that feelings of social exclusion related to higher rates of smoking, several limitations warrant consideration. First, the size of effect regarding the relationship between feelings of social exclusion was quite small. The small size of this relationship may help explain why prior investigations, which did not contain as many participants as in the current samples, have not shown a reliable association between loneliness and smoking. We recognize that small effects, such as those we document in the current paper, can have important consequences, especially when they involve a behavior that is linked to the leading cause of US deaths (e.g., Prentice & Miller, 1992). Although the relationship between feelings of social exclusion and smoking was quite small, it was also very reliable, replicating each time it was tested. Thus, we acknowledge that feelings of social exclusion have a consistent, albeit quite small, positive association with smoking.

Second, none of the three studies tested the putative mediator of the link between social exclusion and smoking—the desire for social connection. We did not test this crucial aspect of our theoretical model because we could not locate data that included measures of social exclusion, smoking behavior, and the desire for social connection. Study 3 showed that lonely people were more likely to smoke if they lived in a region of the US where smoking was socially acceptable, which suggests that loneliness is a stronger risk factor for smoking in situations in which smoking is normative. Future research should explore whether the desire for social connection mediates the social exclusion–smoking link.

A third limitation is that our results are correlational, thereby precluding our ability to draw causal inferences regarding the effect of social exclusion on smoking. Although our results showed that feelings of social exclusion correlated positively with smoking even after controlling for third variables (e.g., gender, ethnicity, year in which data were collected), the cross-sectional nature of our data did not permit us to make causal inferences.

To be sure, the causal arrow could go in the opposite direction, in which smokers experience greater loneliness because they experience frequent rejection or ostracism. If smoking causes people to experience loneliness as a result of being rejected or ostracized, then the relationship between smoking and loneliness should be weakest among people living in regions in which smoking is socially acceptable, presumably because they would experience infrequent rejection and ostracism because of their smoking. The results from Study 3 contradict this possibility. In that study, the relationship between smoking and loneliness was strongest among participants who lived in a region in which smoking was socially acceptable. Future research should use both experimental and longitudinal designs to address the directionality problem inherent in our findings.
A final limitation is that the current findings do not indicate whether smoking actually provides lonely people with an effective means to gain social connection. Lonely people may smoke to gain social connections, especially in situations in which smoking is socially acceptable. But gaining social acceptance is multiply determined and never guaranteed. Lonely people may continue to smoke when such acceptance is not forthcoming because they continue to believe that doing so will enable them to make friends. Future longitudinal research can examine whether smoking does enable lonely people to gain social acceptance and how that acceptance (or non-acceptance) influences future smoking behavior.

Conclusion

People, unlike non-human animals, have a sense of self. We know who we are, where we’ve been, and where we’re going in the future. Integral to our sense of self and identity is how we relate to others, including whether other people make us feel socially connected or rejected. Our findings suggest that feelings of social exclusion predict higher rates of smoking, possibly as a means of gaining social acceptance from others. Together with the other contributions to this special issue, the current work demonstrates the fruitfulness of bridging perspectives on self and identity regulation processes to better understand the causes and consequences of health behaviors.

References


