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# Does Cigarette Smoking Cause Stress?

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*Smokers often report that cigarettes help relieve feelings of stress. However, the stress levels of adult smokers are slightly higher than those of nonsmokers, adolescent smokers report increasing levels of stress as they develop regular patterns of smoking, and smoking cessation leads to reduced stress. Far from acting as an aid for mood control, nicotine dependency seems to exacerbate stress. This is confirmed in the daily mood patterns described by smokers, with normal moods during smoking and worsening moods between cigarettes. Thus, the apparent relaxant effect of smoking only reflects the reversal of the tension and irritability that develop during nicotine depletion. Dependent smokers need nicotine to remain feeling normal. The message that tobacco use does not alleviate stress but actually increases it needs to be far more widely known. It could help those adult smokers who wish to quit and might prevent some schoolchildren from starting.*

**T**he relationship between tobacco smoking and stress has long been an area for controversy. The basic conundrum is that although adult smokers state that cigarettes help them feel relaxed, in a paradoxical fashion they also report feeling slightly more stressed than nonsmokers. This positive association between smoking and stress is also evident in adolescent smokers, who report increasing levels of stress as they develop regular patterns of smoking. Furthermore, when smokers manage to quit smoking, they gradually become less stressed over time. Why do smokers believe that cigarettes help relieve stress, when the empirical evidence shows that tobacco dependency is associated with heightened stress? The aim of this article is to review the empirical evidence on the smoking–stress relationship, first in adult smokers, then in novice adolescent smokers, and last during smoking cessation. Finally, an explanatory model for the smoking–stress relationship is proposed, based on the concept of nicotine dependency as a direct cause of stress.

## Smoking and Stress in Adult Regular Smokers

The majority of smokers report feeling more relaxed when they smoke a cigarette and state that mood control is an important reason for smoking cigarettes. Ikard, Green, and Horn (1969) found that 80% of smokers agreed with statements indicting that cigarette smoking was “relaxing” or “pleasurable.” In questionnaire surveys, most smokers respond positively to statements such as “Smoking relaxes me when I am upset or nervous,” “Smoking calms me

down,” and “I am not contented for long unless I am smoking a cigarette” (Ikard et al., 1969; Russell, Peto, & Pavel, 1974; Spielberger, 1986; Tomkins, 1968). These findings suggest that smoking aids mood control: “Cigarette smoking is a mood modifier for smokers, calming and reducing the smokers’ feelings of anxiety and anger” (Warburton, 1992, p. 57). However, regular smokers also report adverse moods when they have not smoked recently, with feelings of stress and irritability building up during periods of nicotine abstinence (Hughes, Higgins, & Hatsukami, 1990; Parrott, Garnham, Wesnes, & Pincock, 1996; Office of the U.S. Surgeon General, 1988). The positive mood changes experienced during smoking may therefore reflect instead the simple reversal of these unpleasant abstinence effects: “Smoking doesn’t make the smoker less irritable or vulnerable to annoyance, not smoking or insufficient nicotine makes him more vulnerable” (Schachter, 1978, p. 210).

When smokers are asked about their moods over the day, they typically report a pattern of repetitive mood fluctuations, with normal moods during smoke inhalation followed by periods of increasing stress between cigarettes (O’Neill & Parrott, 1992; Parrott, 1994a, 1994b). These mood fluctuations also tend to be strongest in the most dependent smokers, who also report mood control is a core reason for their smoking (Parrott, 1994b). However, smokers’ stress levels tend to be similar to nonsmokers’ only when they have just smoked and become worse during periods of nicotine abstinence (Parrott & Garnham, 1998). Moreover, when nicotine-deprived and nondeprived smokers were allowed to smoke a single cigarette, mood improvements occurred only in the deprived smokers, who were already suffering from poor moods. When nondeprived smokers had a cigarette, their self-rated stress levels were hardly affected by smoking; rather, they remained at normal or average levels very similar to those of nonsmokers (Parrott & Garnham, 1998). This shows that the apparent mood benefits of smoking only reflect a process of mood normalization: the simple reversal of the tension and irritability that build up during nicotine abstinence (Schachter, 1978).

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Regular smokers, therefore, experience periods of heightened stress between cigarettes, and smoking briefly restores their stress levels to normal. However, soon they need another cigarette to forestall abstinence symptoms from developing again. The repeated occurrence of negative moods between cigarettes means that smokers tend to experience slightly above-average levels of daily stress. Thus, nicotine dependency seems to be a direct cause of stress. Various surveys have shown that smokers report slightly higher levels of daily stress than do nonsmokers. In the U.K. Health and Lifestyle Survey of 9,003 participants, significantly more smokers than nonsmokers reported feeling constantly under stress and strain (Warburton, Revell, & Thompson, 1991). In a survey of male shift workers, the cigarette smokers reported significantly higher levels of self-rated stress than did the nonsmokers during both day and night shifts (Jones & Parrott, 1997). West (1992, p. 166) has similarly noted, "Against the anxiety reduction theory, is the finding that smokers do not present as less anxious than non-smokers. Indeed, in surveys they emerge as significantly more anxious overall."

### **Smoking Initiation and Stress During Adolescence**

If nicotine dependency leads to heightened stress, then novice smokers should report increasing stress as they develop regular patterns of smoking. The empirical evidence is consistent with this model. In a cross-sectional survey of 1,684 Canadian schoolchildren, the regular and heavy smokers reported significantly higher stress (nervousness, anxiety, worry) than did similarly aged nonsmokers (Mitic, McGuire, & Neumann, 1985). When adolescents in British schools were surveyed, the lowest levels of self-rated stress were found with the nonsmokers, com-

paratively greater stress was noted by occasional smokers, and the highest levels of self-rated stress emerged from the regular smokers (Lloyd & Lucas, 1997). When American adolescents were asked to retrospectively describe their changes in smoking behavior and feeling states over the previous two years, an increase in affective distress accompanied the move from experimental to more regular smoking (Hirschman, Leventhal, & Glynn, 1984). In a two-year prospective study, stress levels increased in schoolchildren who became more frequent smokers (Wills, 1986). When female schoolchildren were asked about their moods during smoking, the regular smokers reported that they felt calmer when actually smoking but suffered abstinence symptoms without their cigarettes. The authors concluded that the apparent mood benefits of smoking only reflected the relief of withdrawal symptoms. Moreover, nicotine dependency was evident even among the youngest smokers: "The relationship between feeling calmer when smoking and reports of aversive symptoms when attempting to give up was evident even among those in their first year of smoking" (McNeill, 1991, p. 591).

### **Smoking Cessation and Stress**

If smoking does lead to increased stress, then quitting should reduce stress. Again, this has been empirically confirmed in a number of studies. In a review of cross-sectional studies in this area, the U.S. Surgeon General concluded that former smokers were found to be less stressed than current smokers in some studies, whereas in other studies the two groups did not differ significantly; however, not a single study found former smokers to be more stressed than continuing smokers (Davis, 1990, pp. 533-541). Longitudinal or prospective research designs are more powerful than cross-sectional studies; they generally demonstrate a pattern of poor moods for the first few weeks after cessation, followed by mood improvements in the longer term. Hughes (1992) found increased anger, anxiety, and restlessness in the first few days after quitting. By the 14-day session, the group average mood scores had returned to baseline; at subsequent sessions, these moods gradually improved over those found at baseline. Cohen and Lichtenstein (1990) monitored smokers who were attempting to quit unaided. Over the six-month period, each volunteer regularly completed the Perceived Stress Scale, at which time their current smoking status was also noted. Those smokers who failed to quit reported unchanging levels of high stress at every session. In contrast, those former smokers who completely abstained for the six-month period reported a steady decrease in stress over time. Crucially, the successful and unsuccessful quitters reported similar stress levels at baseline; thus, it was not just the less stressed smokers who managed to quit. Other longitudinal studies have confirmed that quitting leads to a significant reduction in self-reported stress. Parrott (1995) found a slight reduction in stress levels three months postcessation, followed by a further lowering of stress six months after quitting. Carey, Kalra, Carey, Halperin, and Richards (1993) noted a significant reduction in self-rated stress in Australians who successfully quit smoking. West and Ha-

jek (1997, p. 1589) similarly found that quitting resulted in significantly lower state anxiety scores: "Giving up smoking is quite rapidly followed by a reduction in anxiety that may reflect removal of an anxiolytic agent, nicotine." However, one prospective study (Gilbert et al., 1998) failed to find mood improvements after quitting; instead, their "former" smokers reported mood decrements during the month after quitting. However, abstinence was not biochemically confirmed, and their volunteers were allowed to smoke a few cigarettes and still be counted as quitters. Overall, therefore, Gilbert et al. (1998) cannot be seen as a true cessation study. It is crucial that abstinence is total, because any smoking relapse will probably reestablish nicotine dependency as a problem (Parrott, 1995; West & Hajek, 1997); merely cutting down will probably lead to increased stress.

### **Traditional Explanations for the Smoking-Stress Relationship**

The traditional explanation for the smoking-stress relationship is that smoking relieves stress. The smoker feels relaxed when smoking and tense without nicotine; thus, their tobacco and cigarettes are seen as helping them cope with the stresses and strains of everyday life (Warburton, 1992). Certainly the positive association between smoke inhalation and stress relief is so strong that few smokers question it. Schoolchildren in the mid-1990s gave stress control as a reason for smoking (Lloyd & Lucas, 1997), just as their parents did in earlier surveys (Ikard et al., 1969). However, this raises the crucial question: Why does the smoker feel stressed without nicotine? There seem to be two possible answers to this. Smokers may be constitutionally neurotic. Alternatively, their stress may be caused by nicotine dependency.

In support of the first explanation, in a number of studies researchers have found above-average neuroticism scores in adult smokers compared with nonsmokers, although some studies have failed to confirm this (see Gilbert, 1995, p. 152). Thus, it may be suggested that nicotine helps constitutionally anxious (i.e., neurotic) individuals cope with stress. However, there are several problems with this notion. Most importantly, there is no empirical evidence to support it. When tobacco-naïve adults are first administered nicotine, they report feelings of anxiety and tension rather than relaxation (Newhouse et al., 1990). Similarly, when adolescents take up occasional smoking, they become more rather than less stressed, and their stress levels increase as they become regular smokers (see the Smoking Initiation and Stress During Adolescence section). Thus, there is no empirical evidence that nicotine does alleviate stress. Furthermore, when adults quit smoking, they become less stressed rather than more stressed (see the Smoking Cessation and Stress section). Thus, there is no evidence that smokers suffer without tobacco or nicotine (other than during the initial brief period after quitting; Hughes, 1992; Parrott, 1998). There is also no neurochemical rationale for predicting that nicotine should alleviate stress, because it is a cholinergic agonist with sympathomimetic rather than sedative properties (Davis, 1990; Office of the U.S. Surgeon General, 1988; Parrott, 1998). Given that nicotine does not alleviate stress, explanations for the (slight) positive associa-

tion between neuroticism and smoking need to be sought. One possible explanation is that neurotic individuals develop nicotine dependency more readily. Another is that if nicotine dependency causes stress, then some smokers may become slightly more neurotic as they develop regular patterns of smoking (note that these explanations are not alternatives and may be linked).

### **Nicotine Dependency: A Cause of Stress?**

The model proposed here is that nicotine dependency can cause stress. The regular smoker needs nicotine to maintain normal moods and suffers from unpleasant feelings of irritability and tension between cigarettes, when his or her plasma nicotine levels are falling. Abstinence symptoms are therefore central to any understanding of nicotine dependency, just as they are with many other addictive drugs (e.g., heroin, cocaine). The main difference between nicotine and these other drugs is that nicotine users feel normal on the drug. Thus, there are few differences between smokers replete with nicotine and nonsmokers. This means that regular smokers need to maintain their nicotine intake in every type of situation: at work, rest, and play. This model also explains why smoking is most pleasurable after an extended period of abstinence (e.g., the first cigarette of the day). Indeed, the degree of satisfaction provided by a cigarette has been shown to be a direct monotonic function of the duration of prior abstinence (Fant, Schuh, & Stizer, 1995).

Smokers also learn that regular smoking prevents abstinence symptoms from developing. Thus, the link between regular smoke intake and keeping moods within normal bounds becomes strongly conditioned over time. With around 60,000 inhalations each year, a regular smoker soon finds smoking is a highly overlearned behavior, which is why quitting can be so difficult. Many smokers also use cigarettes to cope with adverse moods in stressful situations (Office of the U.S. Surgeon General, 1988; Schachter, 1978). The indirect coping strategy of "lighting up" under stress is reported by both adult and adolescent smokers (Lloyd & Lucas, 1997; Office of the U.S. Surgeon General, 1988). However, this drug-based strategy may be counterproductive, because although the smoker may feel somewhat relieved, it can leave the real problem unresolved (Lloyd & Lucas, 1997). The frequent failure of smokers to tackle problems directly may provide a further reason why they suffer from more stress than do nonsmokers.

This model raises a number of practical and theoretical issues, which need to be empirically investigated. If stress levels are increased by smoking, what exactly is the nature of this link—is it direct and causal or more subtle and indirect? What neurochemical changes occur in the novice child smoker, which lead the child to feel irritable when without nicotine? How crucial are the ineffectual coping strategies cigarette use provides (e.g., lighting up instead of tackling the problem); do they make the smoker less effective at handling negative life events? Are there individual differences (e.g., in neuroticism) that influence the development of adverse moods during abstinence, and

how crucial are these withdrawal symptoms for explaining nicotine dependency? Shiffman (1989, p. 545) noted, "While dependent smokers showed signs of acute withdrawal that were relieved by smoking, chippers (light occasional smokers) showed no signs of withdrawal prior to smoking, and little subjective reaction to smoking." Does the absence of withdrawal symptoms in light or occasional smokers explain how they manage to avoid becoming nicotine dependent? Patterns of cigarette uptake also differ across socioeconomic group, race, gender, and psychiatric status; is there a common factor of susceptibility to stress in at-risk groups? Finally, what are the effects of no-smoking policies? They may exacerbate stress in highly dependent smokers. However, because drug use, craving, and expectancy are strongly context dependent, the widespread adoption of no-smoking policies could help prevent some occasional smokers from becoming more habitual smokers.

## Implications for Health Education

The message that smoking can increase stress needs to be more widely known. The majority of smokers recognize that smoking is physically unhealthy but mistakenly believe it has positive psychological functions. In particular, most smokers state that cigarettes help relieve the feelings of stress that they seem to experience so frequently (Lloyd & Lucas, 1997; Office of the U.S. Surgeon General, 1988). Smokers need to become aware of why these beliefs are incorrect. Health education packages should contain information on how smoking can exacerbate stress, and how quitting can lead to reduced stress. This may help many adults to stop smoking. Former smokers who have recently quit are also in danger of relapse (Davis, 1990); one way to help maintain abstinence would be to inform them that their stress levels will probably increase again if they do relapse (Cohen & Lichtenstein, 1990). Preteenage and adolescent schoolchildren also need to be taught that not only is nicotine highly addictive but it can also increase stress. Hopefully, this might help more youngsters withstand the social pressures to initially try cigarettes.

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