

# Dream content in cigarette smokers

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**Summary.** Numerous studies have investigated the different ways in which the content of everyday dreams relates to the dreamer's waking concerns, thoughts and activities. The aim of the present study was to further examine which types of waking behaviors are likely to be incorporated into everyday dreams by examining the frequency of smoking dreams in the home dream reports of 45 adult smokers and 45 non-smokers. In addition, since nicotine consumption impacts sleep, including REM sleep, we also explored if smokers and non-smokers differ in their self-reported and dream diary-based dream recall frequency. A total of 1458 dream reports were collected. No significant difference between smokers and non-smokers was found in the proportion of their dream reports containing references to smoking (slightly less than 1% in both groups). In addition, smokers and non-smokers did not differ significantly in their estimated levels of weekly dream recall, nor in the actual number and word length of dreams reported in their home dream logs. These results are discussed in relation to previous studies of smoking dreams as well as in light of the continuity hypothesis of dreaming.

**Keywords:** Dream; dreaming; dream recall; nicotine; smoking; continuity hypothesis

## 1. Introduction

One of the most widely studied models of dream content is the continuity hypothesis of dreaming (e.g., Domhoff, 2011; Hall & Nordby, 1972; Schredl 2003; 2019) which posits that dreams are generally continuous with the dreamer's current thoughts, concerns and salient experiences. In line with this conceptualization of dreams, numerous studies (e.g., De Koninck et al., 2016; Malinowski, Fylan & Horton, 2014; Schredl, 2006; Schredl & Hofmann, 2003; Sikka et al., 2018; Vogelsang et al., 2016) have examined the extent to which different dimensions of people's waking life (e.g., day-to-day actions, ongoing concerns, learning tasks, stressful experiences) are reflected or embodied in people's everyday dreams. This vast and ever-growing body of research has helped refine our conceptualization of continuity hypothesis (and better understand which facets of waking life are most likely to be incorporated into dreams, and under what conditions (e.g., Domhoff, 2011; 2018; Schredl, 2019). There remain, however, understudied relationships between specific waking activities and dreaming. One of these wake-related activities is daily cigarette smoking.

While some studies have investigated the relationship between dream content and various forms of drug use and addiction (e.g., Christo & Franey, 1996; Colace, 2004; Reid & Simeon, 2001; Tanguay, Zadra, Good and Leri, 2015), most have focused on the consumption of, or the withdrawal from, illicit substances and few have focused on cigarette smoking. In one intriguing study of almost 300 smokers enrolled in a smoking cessation program, Hajek and Belcher (1991)

found that 33% of participants reported dreams about smoking while in the treatment program, and of these, 63% noted that the dreams were more vivid than usual. Interestingly, almost all of the participants who reported dreams of smoking while abstinent did not recall having had the same type of dream while they had been still smoking. Similar results were reported by Persico (1992).

What's more, smoking dreams can appear in the dreams of life-long non-smokers. In one study (Schredl, 2014) of a long dream series of over 9100 dream reports collected over a 33-year period, 131 dreams, or 1.4% of the total sample, were found to contain smoking-related themes or elements, even though the participant had never smoked in his life. In this same paper, Schredl noted that smoking dreams are similarly rare in other large dream data sets, such as the normative dream content reports collected by Hall and Van de Castle (1966) and the series of 3116 dream reports collected over a 20-year period from Barb Sanders (Domhoff, 2003), who quit smoking about halfway through this collection period. Of note, the handful (N=3) of smoking dreams found in Sanders' dream records all took place after she had quit smoking. These observations support the notion that it is not necessarily people's actual behaviors that become incorporated in their dreams, but more the thoughts and emotions that can arise in association with these behaviors (e.g., cigarette cravings, fear of relapsing, aversion to cigarette smoke exposure, etc). To our knowledge, however, no study has examined everyday dream content in a group of active smokers.

Finally, since nicotine consumption impacts sleep in several ways, including increased sleep latency and sleep fragmentation, reduced sleep efficiency, and suppression of REM sleep (e.g., Jaehne et al., 2008), whether habitual smoking affects general dream recall is an interesting, albeit unexplored question.

The first objective of the present study was thus to examine the frequency of smoking-related dreams in a group of smokers in comparison to a group of non-smokers. Since the smokers in the present study were not in a smoking cessation program, as in the Hajek and Belcher (1991) study, that smoking dreams are typically rare in everyday dreams,

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and that they can be sometimes experiences by life-long non-smokers, we expected the prevalence of smoking dreams to be very low in both groups. The second objective was to determine if dream recall frequency differs between smokers and non-smokers. Since very little is known about dream recall in smokers who are not in the process of abstinence, that nicotine induced sleep fragmentation could result in increased dream recall but its REM sleep suppression effect lead to diminished dream recall, this objective was exploratory.

## 2. Method

### 2.1. Procedure

Participants were recruited through newspaper announcements as non-paid volunteers as part of a larger program of research investigating the relationship between dream content, personality and well-being. They were then required to provide, upon awakening, a complete written description of each remembered dream in a daily log (pen and paper format) for a minimum of two consecutive weeks. In addition, participants completed several measures of personality and well-being as well as a 72-item Sleep & Dream Questionnaire. The protocol was accepted by the university's Ethics Committee and a signed consent was obtained from each participant.

### 2.2. Measures

#### 2.2.1 Smoking status

One item on the sleep and dream questionnaire asked if the participant was a smoker and, if yes, the approximate number of cigarettes smoked per day. This question was used to identify cigarette smokers within the larger sample. Smokers were then compared to a group of non-smokers paired for sex and age (plus or minus 2 years) also obtained from the larger sample.

#### 2.2.2 Dream recall

One open-ended question on the sleep and dream questionnaire required participants to estimate the number dreams recalled on average per week. In addition, the number of dreams reported in each participant's home dream log was calculated and expressed as a weekly mean. The average number of words per dream report was also calculated.

#### 2.2.3 Cigarette dreams

Dream reports were read by the first and last authors (MMG, AZ) who manually identified all dream reports that contained any reference to cigarette smoking (e.g., active smoking, presence or reference to cigarettes, having other people in the dream smoke). These reports were then reviewed by a research assistant before being tabulated as a "smoking dream."

### 2.3. Participants

To be included, participants needed to have completed their home dream log for at least two consecutive weeks. In addition, to limit variability in daily smoking frequency and to focus on habitual as opposed to occasional smokers, only

those participants reporting smoking 10 or more cigarettes per day were selected for inclusion in the smoking group.

A total of 45 smokers (37 women, 8 men; mean age of  $29.4 \pm 8.9$  years) reporting smoking at least 10 cigarettes per day (daily mean number of cigarettes smoked =  $16.8 \pm 6.7$ ; max = 35 cigarettes /day) and who completed at least two consecutive weeks of a home dream diary were identified. This group was then compared to a group of 45 non-smokers matched for sex (37 women, 8 men) and age ( $29.6 \pm 9.1$  years) who also had completed at least two consecutive weeks of home dream logs as part of the program of research. All analyses were computed using IBM SPSS Version 28. For all group comparisons, the Bayes factor statistic was included to indicate the strength of the evidence in favor of the null hypothesis, with values between 1 and 3 representing anecdotal evidence, values between 3 and 10 moderate evidence, and values above 10 as strong evidence in favor of  $H_0$  (e.g., Lee & Wagenmakers, 2013; Schmalz, Biurrun Manresa & Zhang, 2021).

## 3. Results

When asked to estimate the average number of dreams typically recalled per week, smokers reported remembering  $4.11 \pm 2.45$  dreams per week while non-smokers reported an estimated average of  $4.88 \pm 2.62$  dreams per week. An independent samples t-test revealed that this difference was not statistically significant ( $t(88) = 1.44$ ;  $p = .155$ ; Bayes factor = 2.38).

A total of 1458 dream reports were collected from the 90 participants; 675 dream reports from the 45 smokers and 783 reports from non-smokers. Smokers kept their home dream logs for an average of  $22.6 \pm 5.7$  days (max = 30 days) and non-smokers for  $23.8 \pm 4.9$  days (max = 31 days), a non-significant difference ( $t(88) = 1.05$ ;  $p = .297$ ; Bayes factor = 3.70). A weekly mean of  $4.55 \pm 1.92$  dreams was reported in the smokers' home dream logs while non-smokers reported a weekly average of  $4.92 \pm 2.34$  dreams in their journals. This difference was not statistically significant ( $t(88) = 0.81$ ;  $p = .418$ ; Bayes factor = 4.55). Similarly, the mean number of words per dream report for smokers ( $101.9 \pm 30.1$ ) and non-smokers ( $116.1 \pm 42.1$ ) was not significantly different ( $t(88) = 1.84$ ;  $p = .070$ ; Bayes factor = 1.31).

Of the 1458 dream reports, 13 were smoking dreams, or 0.9% of all dreams collected, and each of these dreams featured either the participant or another dream character actively smoking a cigarette, including one case where a character was described as smoking a cigarette containing a mixture of tobacco and marijuana. Of the 13 smoking dreams, seven were reported by smokers (one smoking dream each; 1.03% of all smokers' dream reports) and the other six dreams by six non-smokers (0.77% of all control participants' dream reports). Although the sample of smoking dreams found in our participants' dream logs is limited, it is worth noting that of the six smoking dreams reported by non-smokers, only one featured solely the participant smoking, one had both the dreamer as well as several other dream characters smoking, while the remaining four smoking dreams all featured non-self dream characters smoking. By contrast, only one of the seven smoking dreams reported by current smokers featured a character other than the dream self engaged in smoking behavior.

#### 4. Discussion

The first objective of the present study was to determine if smokers reported more dreams with smoking-related references when compared to a group of non-smokers. Our results show that smoking dreams can be experienced by smokers and non-smokers alike but that their occurrence is rare (about 1% of all dream reports) in both groups. While these findings are consistent with previous studies of long individual dream series (e.g., Domhoff, 2003; Schredl, 2014), they add to the limited and circumscribed literature on smoking dreams by providing results more easily generalizable to larger groups of participants. Moreover, as detailed below, these results support the view that it is not so much the amount of time spent engaging in certain daily activities that impacts whether or not these activities are incorporated into people's dreams, but the emotional salience of the experiences themselves (e.g., Eichenlaub et al, 2018; Malinowski & Horton, 2014; Schredl, 2000; 2006).

Habitual smokers, who may smoke 10-20 or more cigarettes per day, typically do so while engaged in other activities (e.g., while driving, listening to music, working in front of a computer, talking with others outside of their work building or within designated smoking areas, etc). Hence, over time, the smoking behavior itself can be taken for granted and become entwined in a variety of other everyday routines. By contrast, people newly abstaining from smoking typically experience challenging cravings and emotionally charged thoughts related to nicotine consumption and other difficulties related to maintained abstinence. In all likelihood, it is these emotionally charged thoughts, ongoing concerns and personally meaningful experiences that most contribute to the increased appearance of smoking dreams in these individuals, as reported by Hajek and Belcher (1991). In other words, as suggested by others (e.g., Eichenlaub et al., 2018; Malinowski & Horton, 2014; Schredl, 2000; 2006), dream content may be more continuous with emotionally intense waking-life experiences than with the associated behaviors in and of themselves. That said, the finding that the seven smokers who experienced a smoking dream during the study reported consuming a considerably greater number of cigarettes per day (24.4) than the 37 smokers who did not experience a smoking dream (15.1 cigarettes/day) suggests that these people's stronger need for, preoccupation with, or addiction to, cigarettes may have played a role in their experiencing a smoking dream. Finally, it should be noted that the one self-smoking dream reported by a non-smoker was described as a "relapse" dream in which the participant became distraught and very upset in her dream by the fact that she had started smoking again after a successful period of abstinence. This dream report is in line with the idea that smoking dreams, like other kinds of drug-related dreams, can be related to periodic cravings or concerns about relapses in abstinent individuals and highlights the need for studies such as the present one to assess participants' past experiences with smoking.

The study's second, exploratory goal was to examine if smokers and non-smokers differed in terms of dream recall frequency. We found no significant between group differences in questionnaire based or log-based measures of dream recall, nor in mean dream report length as indexed by the number of words per dream. That said, it is worth noting that non-smokers obtained somewhat higher values on all three of these variables. In addition, since participation in this dream-related study was purely voluntary, people

with very low levels of dream recall (regardless of smoking status) may not have been interested in taking part in a study on dreams. This possibility is supported by the fact that participants in both groups recalled approximately 4.5 dreams per week, a level of dream recall markedly greater than the roughly one dream people generally remember per week (e.g., Schredl, 2008) and that they maintained their home dream journals for an average of close to three weeks, speaking to their probable motivation and interest in dreams. Hence, both groups are not representative of the general population and the finding that smokers and non-smokers do not differ in levels of dream recall needs to be viewed with caution.

Finally, several methodological limitations need to be taken into account. In the present study, smoking status was assessed with a single question asking whether the person was a smoker and, if so, the average number of cigarettes consumed per day. Future studies aiming to clarify the nature and content of smoking dreams in relation to waking-life parameters would benefit from additional information, such as smoking history, attempts or intentions to quit, attitudes towards smoking, impact of smoking restrictions (e.g., at work, in bars, restaurants), whether others in their immediate environment also smoke, exposure to second-hand smoke, etc. In addition, when compared to regular smokers, occasional smokers (e.g., those who smoke only at parties, in the evening, on weekends) may have very different motivations for smoking (e.g., relaxation, social considerations) and thus show different relations to smoking representations in their dreams. Finally, laboratory studies are needed to explore the possible effects of cigarette smoking, including of pre-sleep nicotine consumption, on dreams across sleep cycles and stages.

In sum, the results of the present study indicate that smoking dreams occur with a similarly low frequency (approximately 1% of dream reports) in the everyday home dreams of smokers and non-smokers alike and suggest that both groups report similar levels of dream recall.

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