Abstract

Background: To examine a behavioral mechanism that might have helped occasional smokers maintain their non-daily consumption pattern: their cigarette-carrying habit.

Methods: Current smokers (N=2,732) from the 2008 California Tobacco Survey were grouped into four categories: occasional smokers who had never smoked daily (N=255), occasional smokers who used to smoke daily (N=365), low-rate daily smokers who smoked ≤ 5 cigarettes per day (N=280), and regular daily smokers who smoked > 5 cigarettes per day (N=1,832). Percentages in response to the cigarette-carrying question were weighted to the California population.

Results: Most occasional smokers, 78.3% of those who had never smoked daily and 74.1% of those who used to smoke daily, reported not usually carrying cigarettes with them. In contrast, 10.2% of the regular daily smokers reported not carrying their cigarettes. In between were the low-rate daily smokers (38.1%). The pattern of results is consistent across ethnic groups.

Conclusions: Cigarette-carrying habit appears to be a major behavioral difference between occasional and regular daily smokers. That most occasional smokers (regardless of whether they used to smoke daily) do not carry their cigarettes suggests the habit of carrying cigarettes and nicotine dependence are correlated, and changing one might lead to change in the other.

Keywords: Light smoking; Nicotine dependence; Harm reduction

Abbreviations: CTS: California Tobacco Survey; CPD: Cigarettes per day

Introduction

A substantial proportion of smokers are intermittent or occasional smokers, so called because they do not smoke daily [1-4]. Some groups, such as Latino smokers, have particularly high proportions of occasional smokers [1,3-5]. Occasional smokers on average smoke about 15 days in a month [2,6], too infrequently to maintain a plasma nicotine threshold needed to be considered nicotine dependent [7]. However, nicotine is a known addictive substance, the repeated use of which generally leads to development of tolerance [8-11]. Given that cigarettes are an efficient nicotine delivery device [12-14] and a highly accessible commodity, it seems that occasional smokers would eventually increase their smoking frequency over time to reach a consistent level of plasma nicotine. However, many occasional smokers never establish a daily smoking habit [15,16]. Even more interesting is that some smokers who have established a daily habit later reduce their consumption to become occasional smokers [6,17-19]. This group of former-daily occasional smokers has reduced their consumption so much that they now smoke only about half of the days in a month [20]. It is not well understood how either of these two groups of occasional smokers maintain their low-frequency smoking.

It has been hypothesized that one mechanism for occasional smokers to maintain a low frequency of smoking is that they often do not carry cigarettes with them [5]. When they do not have cigarettes with them, they will likely not smoke even if they develop an unexpected craving when going about their daily routines. On a behavioral level, therefore, the unavailability of cigarettes helps to keep some days of the month completely non-smoking. This could be a major smoking-related behavior that distinguishes occasional smokers from daily smokers. To our knowledge, except for one conference poster that reported asking this question with a convenience sample of occasional smokers [21], no study has tested this hypothesis with the general smoking population.

A related hypothesis has to do with two subgroups of occasional smokers. As mentioned earlier, occasional smokers can be divided into those who have never smoked daily and those who used to smoke daily. In terms of the habit of carrying cigarettes, will the second group of occasional smokers be more like daily smokers, whom they once were, or will they be more like occasional smokers who have never smoked daily? Previous studies have shown that occasional smokers who used to smoke daily are in many ways more like occasional smokers who have never smoked daily and less like daily smokers [20]. By extrapolation, we hypothesized that the same would be true when it comes to the habit of carrying cigarettes.

The present study tests these two hypotheses with a representative sample of smokers from a population survey: the 2008 California Tobacco Survey. The California survey includes a substantial number of Latino smokers, a group known to have a high proportion of occasional smokers [1,3-5,22]. In fact, it was the attempt to explain the particularly high proportion of occasional smokers among Latinos that led to the hypothesis that occasional smokers do not carry their cigarettes [5]. Thus, this study also analyzes Latinos separately from the other ethnic groups to check if the finding is specific to Latinos only.

Methods

Data source and participants

California Tobacco Survey (CTS) is an ongoing population survey.
that has been conducted every three years since 1990 to evaluate the tobacco control program in California [23,24]. All of the CTS surveys used a modified Waksberg random-digit dialing telephone sample of households [25] followed by an in-depth survey of a subsample of adult household members designed to recruit a sample of respondents representative of the California population. For the 2008 CTS, this two-stage sampling methodology included a total of 22,225 households with at least one member over 17 years old in the screener survey. Then, all young adults between the age of 18 and 29, all adult smokers, and a random subset of adult nonsmokers in the screener survey were included in the extended interview (N=10,397). The response rate for young adults was 47.0%, while the rate for older adults was 61.0%. The methodology for these surveys has been presented elsewhere in detail [26]. The survey response rate for population surveys has decreased in the last decade, but studies have shown that this decrease does not significantly affect the relative relationship among subgroups [27]. This study is based on CTS 2008, the seventh cross-sectional survey in the series [28]. The data collection of the survey and the data analysis for this study were approved by the Research Ethics Committee at the University of California, San Diego.

The study focuses on the established current smokers who were at least 18 years old at the time of the 2008 survey (N = 2,732). About half (50.3%) of them are male, with a median age of 49 (range 18-93). The ethnic distribution was 65.7% non-Hispanic White, 17.3% Latino, 8.2% African American, and 8.7% Asian or other ethnicity.

Measures

The survey first asked respondents "Have you smoked at least 100 cigarettes in your entire life?" If the answer was "Yes", they were further asked "Do you smoke cigarettes every day, some days or not at all?" If the answer was "Every day", they would be asked "How many cigarettes on average do you smoke per day?" If the answer was "Some days", they would be asked "On how many of the past 30 days did you smoke cigarettes?" Current smokers were defined as those who had smoked at least 100 cigarettes in their lifetime and who are currently smoking every day or some days. Daily smokers were defined as those who answered "every day" in the second question. Occasional smokers were those who answered "some days." However, if they stated that they had smoked 25 days or more in the past 30 days, they would be reclassified as daily smokers. This is in accordance to the classification of daily and non-daily smokers of other studies [1,29,30].

Daily smokers were asked how many cigarettes a day they smoked. They were defined as low-rate daily smokers if they smoked 5 cigarettes per Day (CPD) or less. Those who smoked more than 5 cigarettes per day are called regular smokers in this paper. Daily smokers who smoke ≤5 CPD are distinguished from other daily smokers because their consumption is so low that they are considered non-dependent on nicotine [31,32].

Occasional smokers were asked, "Have you ever smoked daily for 6 months or more?" They were categorized as former-daily occasional if they answered "yes" and as never-daily occasional if they answered "no." This has been the criteria used to distinguish these two groups of occasional smokers in the literature [15,20].

All current smokers (daily and non-daily) were asked the question as part of the extended CTS adult survey "Do you usually carry cigarettes with you?" The answers were Yes or No. About 0.5% (n = 8) of the smokers had missing values for this question (refused or responded "don’t know") and were excluded from the analysis.

Analysis

All percentages were weighted to the California state population, and 95% confidence intervals were estimated using SAS-callable SUDAAN version 9.0.1 with the replicate-weight jackknife method (SAS®: SAS Institute Inc, Cary, N.C.; SUDAAN: Research Triangle Institute (RTI), Research Triangle Park, N.C.) [33]. This allows the results to represent the smoking population in California.

Results

Figure 1 shows the percentages of four groups of smokers who answered "no" to whether they usually carry cigarettes with them. Overall, about three-quarters of occasional smokers who never smoked daily and occasional smokers who used to smoke daily reported that they usually did not carry cigarettes with them (78.3% and 74.1%, respectively). The rates were not statistically different (p = 0.35). In contrast, only 10.2% of daily smokers who smoked more than 5 cigarettes per day (CPD) reported not carrying their cigarettes, which differed significantly from both subgroups of occasional smokers (p’s < 0.001). About 38.1% of the low-rate daily smokers, who smoked daily but no more than 5 cigarettes per day, reported not carrying cigarettes! Statistically, low-rate daily smokers were different from both subgroups of occasional smokers and from the daily smokers who smoke more than 5 CPD (p’s < 0.001).

Two logistical regressions that compared these four smoking subgroups with gender, age, ethnicity and education as covariates found the same results (one with never-daily occasional smokers as the reference, and the other with daily smokers as the reference). There was no significant difference between never-daily occasional and former daily occasional smokers. But occasional smoker groups were significantly different from the daily smoker groups (p’s < 0.001). Also, daily smokers who smoke more than 5 CPD were significantly more likely to carry cigarettes than the daily smokers who smoked ≤5 CPD (p < 0.001). There was no difference across any of the demographic variables, except that the oldest group of smokers (65+) was less likely to carry cigarettes than the younger age groups.

Table 1 presents the data separately for Latinos, Whites, and other ethnicity groups (the other ethnic groups were combined because of small sample sizes for the two subgroups of occasional smokers). The
pattern of whether they carry their cigarettes was the same for Latinos, Whites, and the combined other ethnic groups: (1) Most occasional smokers did not carry cigarettes with them. (2) Occasional smokers who used to smoke daily were not significantly different from occasional smokers who had never smoked daily. (3) Occasional smokers differed significantly from regular daily smokers. (4) Low-rate daily smokers came in between the occasional groups and the regular daily smokers.

### Discussion

The results from this study support the hypothesis that occasional smokers generally do not carry cigarettes with them. This appears to be a major behavioral difference that distinguishes occasional from daily smokers. Furthermore, the hypothesis applies to all current occasional smokers regardless of whether they were previously daily smokers or not. The occasional smokers who used to smoke daily are more like occasional smokers who have never smoked daily and less like the current daily smokers.

The fact that most occasional smokers do not usually carry their cigarettes suggests that not carrying cigarettes might indeed be an external constraint that prevents occasional smokers from increasing their smoking frequency and allows them to go whole days without smoking. When occasional smokers do not have cigarettes with them, they may simply go without cigarettes even if they develop an unexpected craving. It is unclear whether they would stop having cravings for cigarettes on days when cigarettes are unavailable. It is also unclear how their craving for cigarettes changes if they become aware of the availability of cigarettes from other sources (e.g. seeing another smoker). What is clear is that most occasional smokers continue the pattern of not carrying cigarettes. Otherwise, their smoking frequency most likely would increase.

Studies on youth who are experimenting with smoking have reported that they often “bum” cigarettes from others [34,35]. This suggests many of these experimenters initially do not carry cigarettes with them. Some of them become established smokers but never proceed to daily smoking. These are the never-daily occasional smokers. It is possible that some of these occasional smokers never developed a habit of carrying their cigarettes, and that helps keep them from increasing their smoking frequency to a level that leads to nicotine dependence.

What is most interesting is that occasional smokers who used to smoke daily were not different from these never-daily occasional smokers in the likelihood of carrying cigarettes. Was their likelihood of carrying cigarettes when they were daily smokers similar to that of other regular daily smokers shown in Table 1? This survey does not have such data. But previous longitudinal studies have shown that many of these former-daily (but now occasional) smokers used to smoke more than 5 cigarettes per day [6,17,18,36]. If we assume that most of them used to carry cigarettes like other regular daily smokers, then many questions arise. When do these former-daily smokers stop carrying cigarettes? Do they first become occasional smokers and gradually stop carrying their cigarettes, or do they stop carrying their cigarettes to help themselves become occasional smokers? Is it a conscious effort to change the cigarette-carrying habit, or is it more of an accidental process in which these occasional smokers gradually forget to carry cigarettes because of their new low consumption level?

One clue comes from a study in which former-daily occasional smokers were asked if they gradually reduced to smoke only occasionally or if they quit smoking and later relapsed to smoke occasionally [21]. The majority of them reported the quit-and-relapse route [21]. If this is the case with most former-daily occasional smokers, then the change of cigarette-carrying habit is more likely to take place after a prolonged quit attempt. This can be tested in future studies.

It is worth noting that the data pattern found in this study is not limited to Latino smokers, who have the greatest proportion of occasional smokers [1,3-5] and the greatest proportion of never-daily occasional smokers of all ethnic groups [5,16,20]. In other words, occasional smokers’ habit of not carrying cigarettes appears to be a cross-cultural phenomenon. It is a behavioral pattern associated with individuals who do not smoke daily, regardless of how prevalent occasional smoking is among their own ethnic groups, and regardless of whether more occasional smokers in a given group are never daily or former daily smokers.

This study has several limitations. It is based on a simple survey question where smokers gave a global self-report on their cigarette-carrying habit. No details are available as to what proportion of the smoking days the occasional smokers actually did carry their cigarettes, nor what distinguishes cigarette-carrying days from non-cigarette-carrying days. Since occasional smokers are smoking some days, where do they usually obtain their cigarettes? Also lacking is the information that can help gauge how intentional it is for the smokers not to carry their cigarettes. The study, however, is the first to report a clear pattern of cigarette-carrying habit based on a representative sample. It provides a starting point for more comprehensive research in the future.

The strong association between not carrying cigarettes and occasional smoking has implications for research in population differences in smoking behavior. Latinos, for example, have a very high proportion of occasional smokers [5,16]. It is not well understood what prevents the large proportion of Latino young cigarette-experimenters from becoming regular daily smokers later. The genetic research on nicotine metabolism to date would have predicted Asians, not Latinos, to have the highest proportion of very light smokers [37]. The results from this study suggest that a better understanding of the “culture of smoking” including the cigarette-carrying habit among Latinos may be a useful lead in this inquiry.

The strong association also suggests that a change in one might lead to a change in the other. Historically, heavy smoking on the population level took place only after the invention of the cigarette-making machine [38-40]. The ready-made, pre-packaged cigarettes made it convenient for smokers to carry cigarettes around to be smoked in most places. Modern tobacco control policies, however, have increasingly restricted the settings where smoking is allowed, and this has led to a reduction in consumption among smokers living in areas where such policies are consistently applied [41-45]. It is possible that this change has also affected smokers’ cigarette-carrying habits. Some smokers

<table>
<thead>
<tr>
<th>Occasional Smokers</th>
<th>Daily Smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never Daily</td>
<td>Former Daily</td>
</tr>
<tr>
<td>Hispanic N</td>
<td>99</td>
</tr>
<tr>
<td>% (+ 95% CI)</td>
<td>78.8 (11.6)</td>
</tr>
<tr>
<td>Non-Hispanic Whites N</td>
<td>108</td>
</tr>
<tr>
<td>% (+ 95% CI)</td>
<td>77.2 (9.6)</td>
</tr>
<tr>
<td>Others N</td>
<td>48</td>
</tr>
<tr>
<td>% (+ 95% CI)</td>
<td>78.9 (11.8)</td>
</tr>
</tbody>
</table>

Note: All percentages are weighted by population parameters.

*CPD = Cigarettes per day.

Table 1: Percentage of smokers who reported not usually carrying cigarettes with them, by ethnic group.
carrying cigarettes on certain days when they realize that they cannot smoke anywhere on those days. This in turn could impact their cigarette consumption level. The present study is based on a cross-sectional survey and an observed correlation does not necessarily mean causality in either direction. Future research could examine individual smokers in a longitudinal design to clarify these issues.

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References


