Smoking behaviour under intense terrorist attacks

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Background: Smoking is one of the varied psychological reactions to stress. This study examined the rate and changes in cigarette smoking among former Gaza and current West Bank Jewish settlers subjected to direct and indirect terrorist attacks during the Al-Aksa Intifada. The relationship with degree of religious observance and emotional distress was explored as well. Methods: In this cross-sectional study, the respondents were settlers randomly selected and interviewed by telephone (N = 706). The interview schedule included socio-demographic items, information on direct exposure to terrorist attacks (e.g. threat to life or physical integrity, personal losses, property damage) and on steady and changes in smoking habits, and a scale to measure emotional distress. Results: In contrast with the country population, a larger percentage of settlers who smoked increased the number of cigarettes consumed with exposure to terrorism (10 and 27%, respectively). Respondents who were injured or had their home damaged reported a higher rate of smoking during the preceding year (30 and 20%, respectively). Emotional distress was related to cigarette smoking, but not in the controlled analysis. Religious observance had no effect. Conclusion: Direct or indirect exposure to terrorist attacks had an impact on smoking prevalence rates and on changes in smoking habits. Studies investigating reactions to traumatic events should include a detailed section on smoking while mental health interventions should address the needs of smokers.

Keywords: emotional distress, Israel, smoking behaviour, terrorism

Introduction

Smoking is one of the many stress-related psychological reactions following terrorist attacks.2-12 American2-10 and Israeli11,12 studies have examined reported changes in the number of cigarettes smoked among probable nicotine-dependent individuals across the age spectrum, following indirect and direct exposure to terrorist attacks. All the American studies were conducted as a follow-up to the 11 September 2001 event and addressed subjects working or residing at different distances from the World Trade Center in Manhattan3-9 and to the 1995 Oklahoma City bombing.10 Both Israeli studies were conducted during the Al-Aksa Intifada (2000-04).11,12 All studies, except one,10 were community based, using randomly selected school children6,12 and adult7,8,11 respondents, of both civilians6-8,10,11 and military personnel.5 Most studies noted an increase in the number of cigarettes smoked following direct or indirect exposure to terror events,2-8,10,11 with a sustainable effect,2-4 especially in nicotine-dependent individuals.7,8 Grunberg and Shafer13 discussed the tobacco-stress relationship, arguing that this relationship is actually a result of the stress-nicotine relationship. Several explanations were offered: (i) nicotine acts as a mood-modulating drug; (ii) stress decreases the actions of nicotine, thereby resulting in increased nicotine self-administration to reach levels of activity occurring in routine situations; (iii) stress decreases the bio-availability of nicotine, precipitating withdrawal and resulting in subsequent increased tobacco use; and (iv) tobacco smoking enhances cognitive function which overcomes deleterious effects of stress on cognitive function.12 Breslau et al.14 also noted the increase effect on nicotine use following other traumatic events.

The setting for the current study was the Jewish settlements in Gaza (now fully evacuated) and the West Bank located outside the pre-June 1967 Israeli borders.15 These communities were heavily subjected to terrorism over several years since 2000, with the result that some residents were directly affected (e.g. threat to life or physical integrity, personal losses or property damage). An important feature of these communities was their heterogeneity with regard to the degree of observance of religion, increasing from secular to traditional, religious and ultra-religious settlers. Interestingly, the latter of the four groups, and especially the last two, have lower smoking rates than those reported for the general Israeli Jewish population. Prevalent smoking rate for religious and ultra-religious Jews was 13.0 and 8.5%, respectively, in 2004, lower smoking rates than those reported for the general Israeli Jewish population. Prevalent smoking rate for religious and ultra-religious Jews was 13.0 and 8.5%, respectively, in 2004, as compared with 26.5 and 25.1% in secular and traditional Jews, respectively.16 Furthermore, those two groups, and most traditional Jews, refrain from smoking at least on the Sabbath, thus exerting some control over their addiction in obedience to religious prescriptions.

Our objective was to examine the rate and change of cigarette smoking among community residents affected by direct and indirect exposure to terrorism, modified by their degree of religious observance. In addition, the correlation between emotional distress and smoking was explored.
Methods

Participants

The study sample in this cross-sectional survey comprised of Jewish settlers from the Gaza Strip and the West Bank.

Gaza strip settlers

By early 2005, the Jewish population in this area reached about 1600 families or 8000 inhabitants, who because of political and religious reasons, in addition to financial investments, had nurtured a firm attachment to the land. This population was exposed to armed attacks both at close range and from a distance. From early October 2000, when the Al-Aksa Intifada (Arabic for insurrection) began until December 2004, 49 of these civilian settlers, children included, were killed; at least 59, injured; and between 10% and 15% of all houses were damaged at least once by the several thousand mortar attacks that were launched against the settlements. In the summer of 2005, the Israeli settlements in the Gaza Strip were fully evacuated.

West bank settlers

The 124 officially recognized settlements in the two districts of the West Bank, also known by the Biblical names of Judea, in the South, and Samaria, in the North, in contrast to those that were in Gaza, are more heavily populated, particularly in Judea, with more than 250 000 Jewish residents. The settlements are rural, semi-urban and urban. Ten attacks took place in the West Bank against civilians during the study period, with a human toll of 16 dead and 91 injured.

Sample design and selection

The target population comprised of 18 years of age and older, who were heads of households in the Gaza Strip and the West Bank settlements.

The sample was based on households in 13 rural Gaza settlements (excluding those that were mixed communal and agricultural settlements) and 20 rural settlements in the West Bank, with an active land telephone line. The telephone directory was used to locate the respective telephone numbers of selected households. According to the Central Bureau of Statistics, 90.9% of Israeli households had at least one landline in 2002. Male and female heads of households were interviewed in equal proportion by alternating every other home.

In the Gaza Strip sample, every fifth household listed in the telephone directory was selected. Since there were people listed in the directory that no longer lived in the Gaza Strip by the time of the study, a second sampling was conducted, taking every 10th entry. In total, 541 telephone numbers were selected. A total of 222 subjects refused to participate; eight subjects were deceased; an additional 4.8% were defined as non-available, i.e. non-Hebrew speakers, incorrect telephone numbers or respondents of the non-selected gender. Of the total 541 telephone calls that were made, 289 interviews were completed (response rate: 53.4%).

For the West Bank sample, 20 rural settlements of three different types, religious and secular non-farming communities and religious farming settlements were selected. The organization of these settlements was analogous to those selected in Gaza. Respondents were selected from the same telephone company directory according to a quota sample of one in seven subscribers. The sampling included 804 residences. As above, an equal male–female balance was maintained. Of them, 284 refused to participate, nine died or were killed during the Intifada and 11.8% were defined as non-available (moved, were non-Hebrew speakers or were not at home). A total of 417 respondents completed the questionnaire (response rate: 51.9%).

In total, 706 participants completed the study questionnaire with 697 fully answering the smoking questions. The total response rate for the smoking items was 52.5%.

Study instruments

The interview questionnaire included socio-demographic variables and the 27-item Demoralization Scale of the Psychiatric Epidemiological Research Interview (PERI-D), to ascertain the presence of emotional distress during the past week where the higher the score the more emotionally distressed the respondent. Direct exposure to terrorist attacks was defined by detailed questions on injury to self, damage to the home by a rocket and loss of a relative and/or friend during the Intifada. Those having no direct exposure to any of the events described were defined as non-directly exposed.

Current smoking status was ascertained by a direct question on whether the participants were or were not smoking by the day of the interview, while change in the habit (increased, decreased or same) was identified by the number of cigarettes smoked in the previous year compared to the year before that.

The interviews were conducted by telephone by well-supervised interviewers from June to August 2005. Since the second Intifada started in early October 2000 and lasted up to December 2004, this time frame allowed for capturing smoking behaviour during the Intifada (the previous year) and following it (the time of the interview).

The study received institutional review board approval, and informed consent was obtained verbally at the beginning of each interview.

Statistical analysis

The t-test was used to examine differences in the mean scores of PERI-D. The four terrorism-related events, i.e. (i) injury to self; (ii) damage to the home by a rocket; (iii) loss of a relative; and (iv) loss of a friend during the Intifada, were analysed separately and in a category labelled ‘any’ that included at least one of the four events. The comparison group for exposure to a specific terrorist event was no direct exposure to one of the Intifada-related events. Chi-square analysis was used for categorical bi-variate analyses. Logistic regression analysis was conducted to ascertain the existence of risk for smoking and the effect of direct exposure to terrorism, the degree of religious observance, the PERI-D score and variables previously found associated with smoking in the bi-variate analysis.

Results

Smoking status

Among the subjects interviewed in the three regions of the occupied territories (Judea and Samaria and the Gaza strip), 13.5% reported current cigarette smoking. Smoking was significantly greater among men, those that were settled in Gaza or Samaria and those with a secular orientation (table 1). Smokers were not statistically significantly different in age than non-smokers [mean age ± SD (in years): 44 ± 9 and 42 ± 11, respectively] and attained statistically significant less education (mean years of education ± SD: 13.6 ± 3.6 and 15.2 ± 3.3, respectively, t = 4.40, df = 691, P < 0.0001). Those who smoked had statistically significant higher PERI-D scores: 1.10 ± 0.62 as compared with 0.9 ± 0.54 in non-smokers, t = −3.17, df = 695, P < 0.002).
A significantly higher smoking rate was reported by respondents who were injured during the Intifada compared with those not injured (P < 0.006). Those who sustained any terrorist event, e.g. had their homes damaged or lost a relative and/or a friend, were not significantly different in their rates of smoking compared to those who were indirectly exposed to terrorism (table 2).

A logistic regression analysis with current smoking as the dependent variable (dichotomous) was conducted with each of the terrorist-related events as an independent variable and gender and religious observance as covariates. Smoking was statistically more frequent among settlers who were under such an attack had increased risk for smoking. No other gender interaction was noted. No significant interaction terms were found between religious observance and terrorism on smoking. The risk for smoking increased with exposure to an increasing number of different types of terrorist events (P < 0.008) (table 3). PERI-D no longer had a statistically significant relationship with smoking when it was added to a logistic regression model controlling for education, gender and religious observance, and thus it was excluded from the final model.

### Change in smoking

Of those who smoked at the time of the interview (n = 89), 10.1% reported a decrease in the number of cigarettes smoked in the past year, 27.0% reported an increase and 62.9% had no change. When stratified by direct and indirect exposure to terror events, smoking rates were mostly unchanged or increased in both groups, with no statistical differences. The subgroup that reported mostly no change during the previous year was that of people whose houses were destroyed (71.4%). The subgroups that reported mostly an increase during the preceding year included individuals injured (36.4%) and those who lost a relative (33.3%), while those that mostly reported a decrease during the same period were also those who were injured (18.2%) and those indirectly exposed to terror events (13.3%) (table 4). Religious observance, gender and emotional distress did not modify the results.

### Logistic regression model for smoking status by the number of Intifada-related terrorist events the participants were exposed to

<table>
<thead>
<tr>
<th>Number of events</th>
<th>n</th>
<th>Smokers (%)</th>
<th>P-value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>221</td>
<td>14.5</td>
<td>0.05</td>
<td>7.41 (0.11–1.00)</td>
</tr>
<tr>
<td>1</td>
<td>343</td>
<td>10.8</td>
<td>0.02</td>
<td>2.53 (0.10–0.81)</td>
</tr>
<tr>
<td>2</td>
<td>84</td>
<td>21.4</td>
<td>0.68</td>
<td>1.20 (0.25–2.48)</td>
</tr>
<tr>
<td>(contrast)</td>
<td>27</td>
<td>25.9</td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Full model</td>
<td>675</td>
<td>13.9</td>
<td>0.008</td>
<td></td>
</tr>
</tbody>
</table>

Logistic regression analysis controlled for sex, education and religious observance. There were two cases with four events that were collapsed into three events; those two cases did not smoke.

### Change in the amount of smoking in the past year directly related to terrorist events

<table>
<thead>
<tr>
<th>n</th>
<th>Decreased (%)</th>
<th>No change (%)</th>
<th>Increased (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injured</td>
<td>11</td>
<td>18.2</td>
<td>45.5</td>
</tr>
<tr>
<td>Home destroyed</td>
<td>21</td>
<td>9.5</td>
<td>71.4</td>
</tr>
<tr>
<td>Loss of relative</td>
<td>3</td>
<td>0.0</td>
<td>66.7</td>
</tr>
<tr>
<td>Loss of friend</td>
<td>54</td>
<td>9.3</td>
<td>63.0</td>
</tr>
<tr>
<td>Any terrorist event</td>
<td>59</td>
<td>8.5</td>
<td>64.4</td>
</tr>
<tr>
<td>Indirectly exposed</td>
<td>30</td>
<td>13.3</td>
<td>60.0</td>
</tr>
<tr>
<td>Total population</td>
<td>89</td>
<td>10.1</td>
<td>62.9</td>
</tr>
</tbody>
</table>

### Change in smoking

A significantly higher smoking rate was reported by respondents who were injured during the Intifada compared with those not injured (P < 0.006). Those who sustained any terrorist event, e.g. had their homes damaged or lost a relative and/or a friend, were not significantly different in their rates of smoking compared to those who were indirectly exposed to terrorism (table 2).

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### Change in smoking

Of those who smoked at the time of the interview (n = 89), 10.1% reported a decrease in the number of cigarettes smoked in the past year, 27.0% reported an increase and 62.9% had no change. When stratified by direct and indirect exposure to terror events, smoking rates were mostly unchanged or increased in both groups, with no statistical differences. The subgroup that reported mostly no change during the previous year was that of people whose houses were destroyed (71.4%). The subgroups that reported mostly an increase during the preceding year included individuals injured (36.4%) and those who lost a relative (33.3%), while those that mostly reported a decrease during the same period were also those who were injured (18.2%) and those indirectly exposed to terror events (13.3%) (table 4). Religious observance, gender and emotional distress did not modify the results.

The analysis with regard to changes in smoking during the preceding year was repeated using a dichotomous categorization, into those reporting an increase in smoking and those either reporting decrease or no change. No significant differences were found in the proportion of those who reported increased smoking in the preceding year when stratified by direct and indirect exposure and by type of exposure, similar to the results presented prior to dichotomization (data not shown). Therefore, logistic regression models were not applied.
Discussion

This study, aimed to assess smoking rates and change in smoking habits in those affected by terrorism indicates that such an exposure did have an impact on both outcomes. These changes were not modified by religious observance or emotional distress.

In general, the rate of current cigarette smoking reported by the West Bank and the former Gaza Strip settlers, 13.5%, was lower than the national average for Jewish citizens in Israel in 2004, 25.0%. However, the distribution of religious observance in the survey population was very different from that of the general Israeli population, with 75.5% religious, 13.5% traditional and only 12.0% secular (as opposed to 20.0, 30.0 and 50.0%, respectively, in the general population). This distribution was also reflected in the breakdown of the settlements (75% religious and 25% secular). Prevalent smoking rates for religious (13.0%) and ultra-religious (8.5%) Israeli citizens in 2004 were indeed lower than the rate reported for the general population, and thus the observed smoking rate in this survey was actually higher than that expected for a population mostly based on religious people.

The prevalence rate of smoking was greatest among individuals that sustained traumatic events with a greater risk to personal integrity, in particular men, and among individuals who had an increased dose-response. Some support to the dose-response association is found in the study by Vlahov et al., where persons who increased smoking of cigarettes and marijuana following the 11th September terror attacks in the USA were more likely to have had reactions with post-traumatic stress disorder (PTSD) than were those who did not (24.2 versus 5.6% PTSD for cigarettes, respectively; and 36.0 versus 6.6% for marijuana, respectively).

Interestingly, emotional distress did not seem to affect prevalent smoking rates. This finding is in contrast with Forman-Hoffman et al.’s report, which showed that an increase in smoking among smokers following exposure to the 11th September terror attacks was modestly associated with emotional distress. The different methods used in the two surveys may have accounted for the difference. Although both surveys applied a questionnaire that referred to events in the week preceding the interview, Forman-Hoffman used the Impact of Events Scale-Revised which mostly measures PTSD severity or symptoms, while the current study used the PERI-D questionnaire, which is designed to capture the more general dimension of emotional distress.

Some evidence was noted for an increase in cigarette smoking over the past year for all respondents, directly and indirectly exposed to terrorist events. This change, 27.0%, was greater than that found among smokers in the whole country at the same time, about 10.0%. Increased cigarette smoking following recent exposure to trauma was previously reported in studies from Israel and the USA. Furthermore, the findings of a new survey, investigating the change in smoking habits of Jewish smokers in the South of Israel during the military operation in Gaza (December 2008 to January 2009), also indicated that although most (>60%) of the regular smokers did not change their smoking habits at the time, a rate similar to the rate reported in the current survey, those who did, mostly reported higher smoking rates (Keinan-Boker L, Enav T, Rozentraub T, Shohat T, personal communication).

Interestingly, a decrease in smoking during the year preceding the survey was most often reported by the subgroup injured during the Intifada, a subgroup with the highest reported prevalent smoking rate and one that also most often reported an increased smoking during the preceding year. This may have identified a group of risk-takers, which is thereby more likely to smoke, while the decrease in smoking rates may be an outcome of the medical care required following their injury.

The differences in reported smoking changes between those directly and indirectly exposed to terrorist attacks were not statistically significant, perhaps due to the fact that everyone living in those geographical areas was being equally affected throughout the Intifada.

This report has a number of limitations: first, the response rate was ~50%. Yet, such a response rate was actually higher than that reported for other telephone-based prevalence surveys conducted in Israel, ~30%. Furthermore, it was similar among both the Gaza Strip and the West Bank settlers. Still, since no data are available regarding those refusing to participate and those non-available for the study, a selection bias cannot be ruled out. Second, our inquiry about smoking referred only to current smoking and did not explore the number of cigarettes smoked, the number of quitters, whether smoking initiation was recent and its relationship to the first exposure to a terrorist event. We also did not address issues previously raised, e.g. ‘the identification of the psychological mechanisms underlying the stress–tobacco relationship’, that would have advanced the state of knowledge beyond the mere establishment of associations. Since not all respondents increased the use of tobacco, further inquiry about those who increased, decreased or did not change their consumption of cigarettes could have shed light on a relatively newly investigated subject. Third, the cross-sectional design of the study limited the ability to establish a temporal relationship between smoking behaviour, traumatic events exposure and psychological distress. Fourth, the emotional distress questionnaire used, PERI-D, is designed to capture current distress (in the week preceding the interview), thus limiting the ability to establish direct associations between exposure to longer term terrorist events and emotional distress.

Another limitation may be the fact that the previous year which participants referred to when asked on change in their smoking habits (May–June 2004 to May–June 2005, when the study was carried out), included both Intifada (up to December 2004) and non-Intifada time periods. Furthermore, the removal of the Gaza Strip settlers from their settlements, a nationally debated as well as a traumatic event for the affected individuals, took place by the end of August 2005, just following the current survey, and some of the changes reported may had been associated with the impending removal threat as well.

To conclude, this study supports former findings, that direct or indirect exposure to terrorism may have long-term health consequences such as increased smoking. As stated earlier, psychological and behavioural responses to man-made disasters result in health risks beyond the disaster itself. Laboratory studies on the relationship of stress and tobacco preceded by two decades the community field studies. There remains a scarcity of references on this subject, based on studies conducted on randomly selected community populations. Ours and the research conducted post-11th September in the USA as well as the new survey referring to the South Israel smokers during the above-mentioned military operation (personal communication) show that more detailed inquiries on smoking should be included in future studies on the behavioural consequences of terrorism. Additionally, mental health specific interventions should address the needs of smokers.

Conflicts of interest: None declared.
Key points

- Direct or indirect exposure to terrorist attacks has an impact on smoking prevalence rates and on current smoking habits.
- Studies on traumatic events should include a section on smoking.
- Mental health interventions in regard with terrorist attack exposure should address the special needs of smokers.

References