Intention to quit smoking: role of personal and family member cancer diagnosis

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Abstract

Individuals who have ever experienced a cancer diagnosis and their family members may be priority audiences for health improving interventions. Guided by the heuristic model of the ‘teachable moment’ and using data from the 2003 National Cancer Institute’s Health Information National Trends Survey, we explored whether having a lifetime history of cancer or having a family member with a lifetime history of cancer was associated with intention to quit smoking. Results showed that having a personal lifetime history of cancer was not associated with intention to quit, while having a family member with a lifetime history of cancer was (χ² = 7.08, P < 0.01). Path analysis showed that individual perceived risk of cancer mediated the relationship between having a family member with a history of cancer and quitting intention: smokers who had a family member with a history of cancer in addition to an elevated level of perceived cancer risk were 36% more likely to report intending to quit. These preliminary data suggest that family members of cancer patients may be a viable target population for smoking cessation interventions, especially when they have heightened levels of perceived cancer risk. An adequately powered, controlled trial is needed to fully evaluate this hypothesis.

Introduction

In the public health context, a ‘teachable moment’ has been conceptualized as a negative health event that can prompt individuals to adopt risk-reducing behaviors [1]. A cancer diagnosis for a smoker could be considered such a teachable moment, and smoking cessation the subsequently adopted risk-reducing behavior [2–4]. Given that tobacco use is accountable for at least 30% of all cancer deaths in the United States [5] and that continued smoking following a cancer diagnosis has been shown to inhibit response to treatment [6, 7], decrease quality of life [8], increase risk of recurrence [6, 9, 10] and reduce survival time [6], the benefits of quitting are clear. Yet, approximately one-third (30–40%) of cancer patients report that they continue to smoke even after a diagnosis [11, 12]. Moreover, uptake of smoking cessation programs among cancer patients has been poor [13].

Another dimension of the teachable moment may relate to a cancer diagnosis in close family members. For example, female relatives of breast cancer patients are reported to be more likely to adopt...
healthy behaviors (e.g. increased physical activity, mammogram screening) than females without a relative with breast cancer [14, 15]. The negative health effects of smoking may be particularly salient for family members of cancer patients [16] and there is evidence that smokers who have a family member with a smoking-related cancer may be at heightened risk for developing cancer themselves [17]. However, the impact of this circumstance is not clear. Two studies were found that compared smoking cessation rates among smokers with a family member who had a smoking-related disorder versus smokers without a family member with a smoking-related condition failed to show a between-group difference in quit rates [18, 19].

The limited amount of research in this area renders the effect of having a family member who smokes with cancer on a smokers’ quitting intention and behavior an open question.

A heuristic model of the teachable moment [1] proposes that three factors will determine whether a cueing event, such as a cancer diagnosis, will suffice as a teachable moment. This includes whether the cancer diagnosis increases levels of perceived risk, whether it incites an affective or emotional response and whether it prompts the individual to redefine their self-concept or social role. While there is evidence to support these model constructs [1, 20, 21], questions about their relative contributions to the outcome of quitting or intending to quit remain unanswered. The extent to which a smoker who has a family member with a history of cancer experiences increased, intention to quit also requires exploration.

Guided by the heuristic model of the teachable moment and using data from the 2003 National Cancer Institute’s Health Information National Trends Survey (HINTS), the current study examined whether having a lifetime history of cancer or having a family member with a lifetime history of cancer was predictive of intention to quit. We hypothesized that constructs such as levels of negative affect and perceived cancer risk would mediate the relationship between personal or family history of cancer and intention to quit.

## Methods

### Data source

The HINTS is a cross-sectional assessment of the US civilian, non-institutionalized adult population that was designed to assess cancer-relevant knowledge, attitudes and behaviors of US adults [22]. This data source was chosen because of the availability of data on cancer diagnosis, smoking behavior, perceived risk and health information, as well as the large sample size. Data for the current study were collected between 31 October 2002 and 13 April 2003 by random digit dial telephone survey, using a computer-assisted telephone interview format. Telephone numbers were generated at random from a sampling frame of all telephone exchanges throughout the 50 United States. Interviewers followed an on-screen sampling algorithm to select a single-sampled person from adults 18 years and older in the household, and to over sample selected minority groups (Hispanics, African-Americans). Survey administration averaged 30 min per respondent. Data were collected from 6369 respondents [22]. The final response rate for the household screener was 55% and for the extended interview was 62.8% [22]. Given the study hypotheses, the sample was restricted to the 1145 respondents who reported current smoking (daily and non-daily).

### Measures

The HINTS survey items used in this study were initially selected for their content validity and congruence with the core constructs of the guiding conceptual model (Fig. 1). A confirmatory factor analysis using a rotated factor matrix to solve for the factors proposed by the conceptual model using HINTS survey items was run using SPSS [23]. Since the final model for this confirmatory factor analysis only accounted for 39.7% of the variance, an exploratory factor analysis was run. Results from the exploratory factor analysis showed that when survey items with eigenvalues >1 were extracted and items loading with ≥0.5 were retained, the final model identified six factors that accounted for 56.3% of the variance. The factors identified were labeled as: negative affect, individual cancer risk,
attention to health information, cancer preventability and cancer avoidance. To provide further verification of the construct independence, the sample was split in half, the exploratory factor analysis run with half the sample and a confirmatory factor analysis run with the other half of the sample. Results from this ‘split-halves’ approach were congruent with the full-sample factor analysis. A correlation matrix including these constructs was also estimated, and all coefficients were <0.2. The constructs identified by this approach along with the other study variables are described below.

**Independent variables**

*Cancer diagnosis.* ‘Personal lifetime history of cancer’ was identified by the question, ‘Have you ever been told by your doctor that you had cancer?’ Responses were a dichotomous yes/no. ‘Family history of cancer’ was identified by the question, ‘Have any of your brothers, sisters, children or close family members ever had cancer?’. Response options were dichotomous as yes/no.

**Potential mediating variables**

*Negative affect.* The level of distress and emotion reported by respondents in the 30 days before being surveyed was assessed using this seven-item construct. The items were: (i) During the past 30 days, how often did you feel so sad that nothing could cheer you up? (loading = 0.83), (ii) During the past 30 days, how often did you feel nervous? (loading = 0.80), (iii) During the past 30 days, how often did you feel...
feel restless or fidgety? (loading = 0.69), (iv) During the past 30 days, how often did you feel hopeless? (loading = 0.83), (v) During the past 30 days, how often did you feel that everything was an effort? (loading = 0.70), (vi) During the past 30 days, how often did you feel worthless? (loading = 0.80) and (vii) In the past 30 days, how often did these feelings interfere with your life? (loading = 0.79). Individuals were asked to respond to these items on a 5-point scale (1 = all of the time, 5 = none of the time). This negative affect construct had a total eigenvalue of 4.2 and accounted for 18.3% of the variance.

**Individual cancer risk perceptions.** Five items were used to assess the extent to which the participant felt that they were at risk for developing cancer and the extent that their smoking behavior contributed to that risk. These items were: (i) How much higher is your chance of getting lung cancer? (loading = 0.75) (five point, 1 = low risk compared with non-smoker, 5 = very high risk), (ii) How likely are you to get lung cancer? (loading = 0.70) (five point, 1 = very low, 5 = very high), (iii) How likely do you think it is that you will develop cancer in the future? (loading = 0.69) (five point, 1 = very low, 5 = very high), (iv) Is there anything about your behavior or your lifestyle that you would like to change to reduce your chances of getting cancer? (loading = 0.60) (three point, 0 = nothing, 1 = other, 2 = quit smoking) and (v) Can you think of anything that people can do to reduce their chances of getting cancer? (loading = 0.51) (three point: 0 = nothing, 1 = other, 2 = quit smoking). Response scales for these items were either five point (questions i, ii, iii: 1 = low risk, 5 = high risk) or dichotomous (questions iv and v: 0 = no, 1 = yes). The eigenvalue for this construct was 2.33 and accounted for 10.7% of the variance.

**Attention to health information.** Four items were used to evaluate how much the participant paid attention to health information provided by different media. Data have shown a positive correlation between attention to and use of health information as part of the quitting process [24, 25]. The items were: (i) How much attention did you pay to health information in magazines? (loading = 0.74), (ii) How much attention did you pay to health information in newspapers? (loading = 0.75), (iii) How much attention did you pay to health information on television? (loading = 0.77) and (iv) How much attention did you pay to health information on the radio? (loading = 0.70). Participants rated their responses on a four-point scale (1 = a lot, 4 = not at all). The eigenvalue for this construct was 2.29 and accounted for 9.9% of the variance.

**Cancer preventability.** This factor captured the extent to which the individual believed that cancer can be prevented and was assessed using three items: (i) People can’t do much to lower their chances of getting cancer (loading = 0.70), (ii) There are too many recommendations (loading = 0.66) and (iii) Everything causes cancer (loading = 0.63). These items prompted a response on a five-point scale and were coded so that a low score reflected high agreement with these statements (i.e. people can’t do much to prevent cancer and there are too many recommendations). The eigenvalue for this construct was 1.43 and accounted for 6.2% of the variance.

**Cancer avoidance.** Two 5-point items comprised the cancer avoidance construct: ‘There’s no risk of getting cancer if someone only smokes a few years’ (loading = 0.71) and ‘Exercise can undo the effects of smoking’ (loading = 0.65). These items reflected how much the individuals felt they could avoid or ‘get away’ with their smoking behaviors without developing cancer. A low score on this factor indicated that the individual endorsed a low level of cancer avoidance (i.e. cannot avoid cancer by exercising more). The eigenvalue for this construct was 1.34 and accounted for 5.4% of the variance.

**Dependent variable**

**Intention to quit smoking.** Participants were asked to report whether they planned to quit smoking or not, or if they were undecided. For the purposes of this analysis, participants who responded that they were ‘undecided’ were classified as ‘no’ and a dichotomous (yes/no) variable was used in the analysis. Quitting intention has been shown to predict smoking abstinence [26].
Covariates

Current smoking behavior. Respondents self-reported whether they were ‘daily’ or ‘non-daily’ smokers [27].

Demographics. Demographic variables included sex, age, race and educational attainment.

Statistical analysis
As described, factor analyses were used to define constructs based on the conceptual model of the teachable moment proposed by this study. Varimax rotation was used and survey items with eigenvalues >1 were extracted and items loading with ≥0.5 were retained. Weighted factor scores were estimated [28] where the product of the loading value for each variable within the factor was summed (see Fig. 1). Specifically, in a factor with two items (1 and 2), the following formula would apply:

\[
\text{Factor name} = (\text{loading value}_1 \times \text{item name}_1) + (\text{loading value}_2 \times \text{item name}_2).
\]

To evaluate the relationship between cancer diagnosis (both personal and that of a family member) and intention to quit smoking, bivariate analyses (chi square) were run. Similarly, bivariate analyses were used to assess the relationship between cancer diagnosis and the hypothesized mediating variables (negative affect, individual cancer risk, cancer preventability and cancer avoidance). Non-parametric Mann–Whitney U tests or parametric t-tests were used. Finally, path analysis was used to evaluate whether the variables of negative affect, individual cancer risk, cancer preventability, health information seeking behavior or cancer avoidance mediated the relationship between cancer diagnosis and intention to quit. Demographic (sex, race and educational attainment) and smoking behavior variables (daily versus non-daily smoker) were controlled in the path analysis model.

Results

Participants
Study participants were 1145 respondents to the 2003 HINTS who reported current smoking (daily and non-daily) (Table I). The majority of the sample was Caucasian \((n = 911, 80\%)\) and reported smoking daily \((n = 882, 77\%)\). The median age was 42 years and almost half had completed some college \((n = 533, 47\%)\). Twelve percent of the sample reported ever having a diagnosis of cancer \((n = 140)\) while 66% reported having a family member who had ever had a diagnosis of cancer \((n = 761)\).

Cancer diagnosis and intention to quit smoking
Having a personal lifetime history of cancer was not related to intention to quit in the bivariate analysis \((62\% \text{ versus } 64\%, \chi^2 = 0.11, P = 0.74)\). Participants who reported having a family member with a lifetime history of cancer were significantly more likely to report intending to quit (66%) than smokers who did not have a family member with a lifetime history of cancer \((58\%; \chi^2 = 7.08, P < 0.01)\).

Bivariate relationships between cancer diagnosis and hypothesized mediators
Participants with a personal lifetime history of cancer reported elevated levels of negative affect \((z = -2.28, P = 0.02)\) and lower levels of cancer avoidance \((z = 2.61, P < 0.01)\) compared with those who

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**Table I. Participant characteristics \((n = 1145 \text{ current smokers})\)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>(n) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>480 (42)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>665 (58)</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian</td>
<td>911 (80)</td>
</tr>
<tr>
<td></td>
<td>Non-Caucasian</td>
<td>234 (20)</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;42 years</td>
<td>545 (48)</td>
</tr>
<tr>
<td></td>
<td>≥42 years</td>
<td>600 (52)</td>
</tr>
<tr>
<td>Education</td>
<td>Some college</td>
<td>533 (47)</td>
</tr>
<tr>
<td></td>
<td>No college</td>
<td>612 (53)</td>
</tr>
<tr>
<td>Smoking rate</td>
<td>Daily smoker</td>
<td>882 (77)</td>
</tr>
<tr>
<td></td>
<td>Not daily smoker</td>
<td>263 (23)</td>
</tr>
<tr>
<td>Personal history of cancer</td>
<td>Yes</td>
<td>140 (12)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1005 (88)</td>
</tr>
<tr>
<td>Family member with</td>
<td>Yes</td>
<td>761 (66)</td>
</tr>
<tr>
<td>a history of cancer</td>
<td>No</td>
<td>384 (34)</td>
</tr>
</tbody>
</table>
did not have a lifetime history of cancer. No relationships between ever having cancer and individual cancer risk, attention to health information and cancer preventability were found (Table II).

With regard to having a family member with a lifetime history of cancer, smokers who reported having a family member with a lifetime history of cancer had significantly higher levels of negative affect \((z = -3.09, P < 0.01)\) and individual risk \((z = -4.25, P < 0.01)\) and lower levels of cancer avoidance \((z = 2.01, P < 0.05)\) compared with smokers who did not have a family member with a lifetime history of cancer. No relationship between having a family member with a lifetime history of cancer and health information seeking behavior or cancer preventability were found (Table II).

**Evaluating potential mediators of the relationship between cancer diagnosis and intention to quit smoking**

Since a main effect of personal cancer diagnosis on intention to quit was not found, there was no basis to test for mediation effects.

To assess whether the variables negative affect, individual cancer risk and attention to health information, cancer preventability and cancer avoidance mediated the relationship between having a close family member with a cancer diagnosis and intention to quit, a path analysis model that controlled for personal cancer history, sex, age, race, education and smoking rate was estimated. Although only the variables negative affect, individual cancer risk and avoid cancer were significantly associated with having a family member with a lifetime history of cancer, the variables attention to health information and cancer preventability were also included. The rationale for including these variables was, first, the path analysis results would not be altered by their inclusion (i.e. testing the mediation effects of the hypothesized mediators that did have a significant relationship with the independent variable would be unaffected); and second, inclusion of these variables would provide a more comprehensive reflection of the relative magnitude that each of the hypothesized mediators contributes to the relationship between

<table>
<thead>
<tr>
<th>Lifetime history of cancer</th>
<th>Yes ((n = 140))</th>
<th>No ((n = 1005))</th>
<th>(z) score</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative affect</td>
<td>19.38 (5.04)</td>
<td>20.57 (4.26)</td>
<td>-2.28</td>
<td>0.02</td>
</tr>
<tr>
<td>Individual risk</td>
<td>7.97 (2.57)</td>
<td>8.16 (2.36)</td>
<td>0.87</td>
<td>0.39</td>
</tr>
<tr>
<td>Attention</td>
<td>7.15 (2.29)</td>
<td>7.40 (2.38)</td>
<td>-1.56</td>
<td>0.12</td>
</tr>
<tr>
<td>Cancer preventability</td>
<td>4.84 (1.51)</td>
<td>5.20 (1.53)</td>
<td>-0.24</td>
<td>0.81</td>
</tr>
<tr>
<td>Cancer avoidance</td>
<td>4.67 (0.98)</td>
<td>4.42 (1.13)</td>
<td>2.61</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family member with a lifetime history of cancer</th>
<th>Yes ((n = 761))</th>
<th>No ((n = 384))</th>
<th>(z) score</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative affect</td>
<td>20.12 (4.51)</td>
<td>21.01 (4.04)</td>
<td>-3.09</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Individual risk</td>
<td>8.36 (2.36)</td>
<td>7.71 (2.38)</td>
<td>-4.25</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Attention</td>
<td>7.33 (2.37)</td>
<td>7.45 (2.37)</td>
<td>1.33</td>
<td>0.18</td>
</tr>
<tr>
<td>Cancer preventability</td>
<td>5.08 (1.50)</td>
<td>5.30 (1.58)</td>
<td>-0.11</td>
<td>0.91</td>
</tr>
<tr>
<td>Cancer avoidance</td>
<td>4.51 (1.06)</td>
<td>4.35 (1.20)</td>
<td>2.01</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

SD = standard deviation.
having a family member with a history of cancer and intention to quit.

The final path model is shown in Fig. 2. The model depicts the strength of the relationship between family cancer and intention to quit, both directly ($B = 0.087$) and indirectly, when the potential mediators are considered ($B = 0.62$). Both the direct and indirect models control for personal cancer history, sex, age, race, education and smoking rate. The indirect model shows that having a family member with a lifetime history of cancer was significantly associated with the variables of negative affect and personal cancer risk, while negative affect, personal cancer risk and attention to health information were significantly associated with intention to quit.

When the final model testing for complete mediation effects was estimated, only individual risk perceptions emerged as a significant mediator in the relationship between having a family member with a lifetime history of cancer and intention to quit (Table III). Individual risk perceptions had a significant positive coefficient of 0.028 ($P = 0.001$), suggesting that smokers who had a family member with a lifetime history of cancer were more likely to report intending to quit if they also reported elevated levels of perceived individual risk for cancer.

When the path analysis was re-run to include only the mediating variable of individual risk perceptions, the coefficient for individual risk increased to 0.036 ($P = 0.001$), providing further verification of this mediation effect. To further examine this mediation effect, a post hoc model was run such that the composite individual risk perceptions variable was substituted with the single general cancer risk perception item ‘How likely do you think it is that you will develop cancer in the future?’. A positive, significant association between having a family history of cancer ($P < 0.01$) and intention to quit ($P < 0.01$) was found, and the coefficient for the path strength was 0.022, suggesting that this general cancer risk item contributed substantially to the mediation effect of the composite, individual risk perceptions variable.

**Discussion**

The purpose of this study was to explore whether having a personal lifetime history of cancer or having a relative with a personal history of cancer...
promoted intention to quit smoking. The selection of variables for this study was guided by a heuristic model for the teachable moment. The main finding was that having a personal lifetime history of cancer was not associated with intention to quit smoking; yet, having a family member with a lifetime history of cancer was. Further, individual cancer risk perception was identified as being a mediator of the relationship between family history of cancer and intention to quit. Specifically, smokers who had family members with a lifetime history of cancer in addition to an elevated level of perceived individual risk of cancer were 36% more likely to report intending to quit.

That personal cancer history was not significantly associated with intention to quit while family history of cancer was suggests that there may be other modifying variables that influenced this relationship between cueing events and intention to quit. Related work has shown that while concern about physical health is a primary motivator for making a quit attempt [29], a current cancer diagnosis does not necessarily predict smoking cessation program enrollment [30]. Although, there is evidence that smokers who had a personal history of a smoking-related disease reported significantly higher levels of perceived risk than smokers without a positive disease profile [20]. Research into the role of having a family member with a lifetime history of cancer on quitting intention has been sparse. One study showed that family members of cancer patients may be more aware of the negative health effects of smoking [31], but that this may not necessarily translate into increased readiness to quit or likelihood of maintaining abstinence [19, 32]. A recent cross-sectional study conducted in Australia showed that approximately one-third (36%) of individuals with a friend or relative with cancer reported quitting smoking [18].

Behavioral control and readiness to quit have been identified as variables that may modify the relationship between a cueing event and smoking cessation. Smokers who have had a diagnosis of myocardial infarction or angina pectoris in the last year were significantly more likely to intend to quit if they also had strong perceived behavioral control over their ability to quit [32]. Thus, it could be hypothesized that when undergoing treatment for cancer, or shortly after such treatments, the individual may have a diminished sense of perceived control over their health and health choices. Consistent with this, Schnoll et al. [13] compared the psychological characteristics of cancer patients who chose to enroll versus those who chose to decline to participate in a free smoking cessation program. Their results showed that decliners reported significantly lower readiness to quit. Among smokers being screened for lung disease, one in five reported they were ready to quit smoking within 30 days, independent of screening result [3].

Our finding that the relationship between family cancer and intention to quit was mediated by levels of individual risk perception is consistent with one of the premises of the heuristic model of the

<table>
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<tr>
<th>Table III. Final path model showing the overall mediation path strengths for each predictor a</th>
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</thead>
<tbody>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Negative affect</td>
</tr>
<tr>
<td>Individual risk</td>
</tr>
<tr>
<td>Attention to health information</td>
</tr>
<tr>
<td>Cancer prevention</td>
</tr>
<tr>
<td>Cancer avoidance</td>
</tr>
<tr>
<td>Total effect (indirect path: family cancer and intention to quit relationship with mediators considered)</td>
</tr>
<tr>
<td>Solo path (direct path: family cancer and intention to quit relationship)</td>
</tr>
</tbody>
</table>

SE = standard error; CI = confidence interval.

aPersonal cancer history, sex, age, race, education and smoking rate are controlled.
teachable moment [1, 21]. Specifically, smokers with a family member who had a lifetime history of cancer, who also reported elevated levels of perceived individual risk were more likely to intend to quit. This mediation effect is consistent with the evidence showing a positive association of individual risk with quitting intention [21, 33]. That individual risk is a mediator of the relationship between family history of cancer and quitting intention suggests that targeting this mediating variable may be an important intervention strategy for family members of cancer patients. Further, since the current data did not identify individual risk perception as a mediator of the relationship between personal cancer history and quitting intention, this suggests that alternative intervention strategies may be warranted for individuals with a lifetime history of cancer. Given that these are the first data to show that a potential distinction in smoking cessation programming is warranted for cancer patients and their families, the findings warrant replication.

Data from this study should be considered and interpreted in the context of several limitations. First, the data are from a national survey. Although rigorous sampling procedures were utilized, there is still the possibility that response bias exists, and that within responders, there may have been some recall bias. Related to this concern, is the fact that only 140 survey respondents reported having a lifetime history of cancer. This low number of participants reporting a lifetime history of cancer may have skewed the results.

Second, since the current study was a secondary analysis of an existing data set, the survey items were not designed to specifically address the teachable moment heuristic constructs [1] and some of the variables proposed by the model could not be explicitly assessed. For example, redefining social role, self-efficacy to quit, self-concept and motivation were not evaluated. Further, the construct of cancer avoidance is comprised of only two factors. Thus, the current study cannot claim to be a formal assessment of McBride’s (2003) heuristic model of the teachable moment; instead it is an initial assessment of the relationship between cancer diagnosis and intention to quit that has been guided by this model. Further, the factor analysis used the eigenvalue of 1 as a cutoff for construct identification, and while this cutoff is often used [34], there is debate about the reliability of this approach. Third, time since cancer diagnosis (for the individual or the family member) was not considered in the analysis, thus there is no basis to evaluate the time latency of the teachable moment concept. Related to this point is the absence of information about the number of family members with a lifetime history of cancer, and the closeness of the relation diagnosed (e.g. cousin versus spouse). Future studies are needed to examine the role that time since cancer diagnosis, the number of family members with a lifetime history of cancer, their relationship with the respondent and the extent to which their family member’s diagnosis evoked an emotional response should all be evaluated in the context of readiness to change health behaviors. Consideration of whether the cancer diagnosis is smoking related and a time frame for intention to quit would also be important.

From a clinical perspective, these data suggest that family members of people who have ever had a diagnosis of cancer are a viable intervention target for smoking cessation interventions. To date, most research into this population (family members of cancer patients) has been in the area of genetic risk counseling and testing and cancer screening behaviors [14, 35]. Future work should evaluate the extent to which smokers who have a family member with a cancer diagnosis are a receptive target for smoking cessation interventions.

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Conflict of interest statement

None declared.

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