Ethno-specific patterns of adolescent tobacco use and the mediating role of acculturation, peer smoking, and sibling smoking

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ABSTRACT

Aims The objectives of this study are to identify the relationship between ethnic identity and tobacco use, and to examine the mediating effects of peer and sibling smoking and acculturation.

Design and measurements Data were drawn from a cross-sectional survey of 3400 Toronto students, sampled from 30 schools between 1998 and 2000. Primary ethnic identity was based on adolescents’ self-identification of their ethnic heritage condensed to 12 groups for analysis. Tobacco use was measured as a dichotomy, predicting non-smoking in the past year. Multivariate logistic regression models were employed to test for baseline differences in non-smoking by ethnic identity. Subsequent models adjusted for controls (age, gender, social class, religious attendance, educational achievement) and introduced mediators.

Findings Results indicated that smoking varied among adolescents of differing ethnic identities. Adolescents of western European, eastern European and southern European ethnicity were considerably less likely to be non-smokers, while Chinese, South Asian and East Indian and West Indian youth were more inclined to be non-smokers. The discrepancies in rates of non-smoking among western European and South Asian and East Indian adolescents were explained by a combination of peer and sibling smoking and acculturation; among southern European and eastern European youth via peer and sibling smoking; and by neither peer and sibling smoking nor acculturation for Chinese and West Indian youth.

Conclusions This paper demonstrates that disparities in tobacco use among certain ethnic groups can be explained by peer and sibling smoking and acculturation; however, for other ethnic groups, knowledge of the processes that account for differences in tobacco use remains less clear.

KEYWORDS Acculturation, ethnicity, peer smoking, sibling smoking, smoking, social learning, youth.

INTRODUCTION

The growing diversity in the population of North American communities has revealed significant disparities in the rates of disease and health and wellness among ethnic minorities (Lee, Sobal & Frongillo 2000; Narayan et al. 2003). For people from these ethnic groups, health disparities can mean lower life expectancy, decreased quality of life, loss of economic opportunities and perceptions of injustice (MMWR 2004). While some of this discrepancy may be due to variations in socio-economic status, health-care quality and access, neighbourhood context
and other structural determinants, it may also be tied to health-related beliefs and behaviours common to specific ethnic cultures.

One of the leading sources of disparity in health across ethnic groups is tobacco use (MMWR 2004). The US Department of Health & Human Services (1998) notes that tobacco use is a leading cause of death and disease in ethnic populations across North America, and the relationship between ethnicity and tobacco use is an important public health issue. A substantial body of research has emerged over the last 15 years exploring tobacco use in multi-ethnic populations (Adlaf, Smart & Tan 1989; Beardall & Edwards 1995; Griesler & Kandel 1998; Holowaty et al. 2000; Johnson & Hoffman 2000; Ellickson, Perlman & Klein 2003) as well as tobacco use within specific ethnic groups such as the Chinese community (Health Canada 1992; Chen et al. 1999a; Au & Donaldson 2000), West Indians and Africans (Klonoff & Landrine 1999) and Hispanics and Latinos (Brook, Whitman & Elinor 1998; Epstein, Botvin & Diaz 1998; Unger et al. 2000). Two general findings from this research are that: (1) ethnic group members consume tobacco at differing rates relative to members of the host culture (Bachman et al. 1991; Beardall & Edwards 1995) and (2) tobacco use varies considerably among members of different ethnic groups (Bachman et al. 1991; Chen et al. 1999a; Johnson & Hoffman 2000).

A third observation drawn from the literature is that we know considerably less about the processes that help to explain the divergent patterns of tobacco use exhibited by ethnic individuals (US Department of Health & Human Services 1998; Au & Donaldson 2000; Unger et al. 2000). As Cheung (1991) suggests, the relationship between ethnicity and substance use is not well understood:

Most of the studies related to ethnicity and drug use are epidemiological in nature, with the primary objective of collecting data on ethnic or racial variations in various aspects of use such as rates, patterns, styles, sought-after actions, imputed meanings of use, and use contexts. As such, few studies have offered theoretical explanations for ethnic or racial variations in drug use (p. 588).

While addiction scholars have established tenable explanations of adolescent tobacco use, they have had less success in understanding differences in patterns of tobacco use among adolescents who are not of northern or western European ethnic origins (Johnson & Hoffman 2000). Moreover, traditional covariates/determinants of smoking and tobacco use have exhibited weak effects when employed in studies of ethnic individuals (Flay, Hu & Ohidul 1994; Griesler & Kandel 1998; Chen, Unger & Johnson 1999b). Recognizing these issues, the purpose of this paper is to explore ethnic variations in tobacco use in a multi-ethnic sample of Toronto high school students, and to explore some processes that may account for any disparities.

One approach for exploring ethnic differences in tobacco use is first to establish a baseline rate of smoking and then to model mediators that either enhance the risk or offer a protective effect on the likelihood of smoking among ethnic group members. Variables that mediate the relationship between two or more behaviours help to explain, either wholly or in part, their direct relationship. A mediator is a generative mechanism through which an independent variable is able to influence the dependent variable of interest (Baron & Kenny 1986). They can be the properties of a person, relationships or attitudes and values, and they speak to the nature of the association between an independent and dependent measure (Baron & Kenny 1986). Researchers have recognized the importance of mediating effects with respect to substance use (Wallace & Bachman 1991; Bhattacharya 1998; Ellickson et al. 2003).

In the current context, we draw upon measures from social learning theory as mediators for tobacco use. Social learning theory describes the process by which behaviours are learned and retained, a process that begins in childhood (Akers et al. 1979; Bandura 1986). Learning occurs either through modelling, based upon direct observation and imitation of the behaviour of important role models, or through vicarious learning and reinforcement (Bandura 1986; Flay et al. 1994). When behaviour is perceived to be positive, and rewarded as such, it is more likely to be repeated. Learning theory is useful for explaining participation in both conventional behaviour and through the work of Sutherland (1939), many non-conventional activities as well.

Two manifestations of social learning that are conducive to explaining smoking among ethnic adolescents are peer and sibling smoking and acculturation. The behaviour of significant role models is of particular importance to social learning theorists (Sutherland 1939; Akers et al. 1979). Significant others, particularly peers and family, are the mechanisms by which social learning shapes adolescent conduct. Adolescents who are exposed to pro-smoking attitudes from friends, siblings and parents are themselves more likely to smoke (Flay et al. 1994). Tobacco use is anticipated or unlikely to the extent that it has been differentially reinforced over alternative, conforming behaviour and is defined as desirable or justified (Akers & Lee 1996; Kobus 2003). Past research has shown the considerable influence of peer smoking on adolescent smoking behaviour, above and beyond familial smoking (West, Sweeting & Ecob 1999). This effect is manifest through the social networks of smokers, through shared norms and perceptions, and has been
demonstrated as a predictor in cross-cultural contexts (Alexander et al. 2001; Unger et al. 2002).

A second social learning measure with the potential to mediate smoking among ethnic adolescents is acculturation (Chen et al. 1999b; Nagasawa, Qian & Wong 2001). Acculturation is the process by which ethnic group members begin to learn the norms, beliefs and behaviours of a new host culture, often leading to the loss of ethnic identity (Gordon 1964). Ethnic identity (the subjective and psychological dimension of ethnicity) at its core is voluntary; and, although individuals are born into a particular ethnic heritage and are assigned the associated status or baggage belonging to a particular ethnic group, the practice of ethnicity through the retention of culture is something the individual chooses to do (Waters 1990; Cheung 1991; Nichter 2003). Acculturation manifests itself in the adoption of a number of activities and practices (Lee et al. 2000), yet less is known about its influence on health related behaviours and health and wellbeing (Bhattacharya 1998).

A number of ways are used to appraise the acculturation process, two of which are time spent in a host country and active cultural retention. Acculturation occurs as part of a linear process by which the greater the length of time an ethnic individual is in contact with the host culture, the more acculturated that individual becomes with respect to the norms and behaviours of host cultural members (Waters 1990). As Alba (1990, p. 5) notes, ‘ethnic differences appear to be strongest among the generations closest to the immigrant experience and grow fainter among those further away’. When applied to tobacco use, acculturation implies that, over time, ethnic minority norms and behaviours begin to mimic those of the broader host community. Thus, the acculturation process includes not only the adoption of socially desirable activities but also less desirable behaviours. Limited research on the association between acculturation and smoking has shown that as ethnic individuals spend more time in a new host culture, typically North America, they smoke at a level similar to host members (Chen et al. 1999a; Au & Donaldson 2000; Unger et al. 2000).

A second way in which the acculturation process is understood is through active cultural retention, which refers to the degree to which ethnic members partake in the replication of traditional culture in their daily lives (Alba 1990; Waters 1990). For ethnic identity to have social consequences it must be linked to activities and social interactions that have an ethnic character (Alba 1990, p. 26; Nichter 2003). Individuals can be tied strongly to a particular ethnic identity, yet not partake in the practice of cultural retention (via the celebration of ethnic events, language use, food), and the reverse is also true (Alba 1990; Waters 1990). Collectively, active cultural retention helps to explain why certain ethnic groups fail to become assimilated into the behaviours and social norms of the host society; active cultural retention is a marker for the degree to which ethnic members are more or less acculturated. In terms of tobacco use, active cultural retention helps to reinforce traditional cultural ties and the norms regarding smoking and health. As ties to traditional culture weaken through the loss of ethnic culture, smoking patterns may change (Adlaf et al. 1989; Epstein et al. 1998).

In summary, while a number of studies have uncovered differences in tobacco use among ethnic adolescents, these studies are inconsistent in explaining why these variations exist (Au & Donaldson 2000; Unger et al. 2000). Employing a mediator model, the current study looks at the influence of peer and sibling tobacco use and acculturation, on ethno-specific smoking patterns, employing a multi-ethnic sample of Toronto adolescents between the ages of 13 and 19 years. Exploring ethnic disparities in tobacco use in adolescence is important for prevention, given that most life-time smokers begin using tobacco in their teenage years, and more than 80% of adult smokers started using tobacco before age 18 (Health Canada 2000; MMWR 2000).

**METHODS**

**Participants**

The data for this paper are drawn from the Toronto Youth Crime and Victimization Survey, a cross-sectional survey of Toronto adolescents, administered between December 1998 and May 2000. Self-administered questionnaires were completed by 3400 Toronto youth from 30 Metropolitan Toronto high schools. Informed consent was given for participation in the study. Anonymous questionnaires were administered to selected classrooms during school hours and the survey took approximately 45 minutes to complete. The response rate was 83%.

**Measures**

The study of ethnic identity is sensitive and often complex (Nichter 2003) due, in part, to the inadequate conceptualization of ‘ethnicity’ and the misuse of ethnic classification in many studies. Ethnicity is often used interchangeably with race and, in a worst-case scenario, used as a proxy for race (Heath 1991; Bhopal & Donaldson 1998). For instance, a number of studies employ ‘ethnic’ categorizations that include Hispanic, non-Hispanic white, black or Asian—divisions based racial characteristics. Race is a category defined by physical characteristics possessed by people, and are traits that include skin colour, eye colour, nose shape, hair type, etc. (Isajiw 1999). Conversely, ethnicity or ethnic identity can be
understood as ‘persons who share the same distinct culture or who are descendants of those who have shared a distinct culture and who identify with their ancestors, or their culture or group’ (Isajiw 1999, p. 19). Racial categories are far from homogeneous and understanding substance use patterns around such a framework is inherently flawed as the within-group differences, in many instances, may exceed between-group variations. Analytical studies, whenever possible, should employ ethnicity rather than race (Cheung 1991: 590).

The current project considers ethnic identity in the broadest possible sense given the data with the inclusion of 12 distinct ethnic groups [1]. These 12 ethnic groups were: Canadian, western European (including United Kingdom, France, Denmark, Sweden), eastern European (including Russia, Ukraine, Poland) southern European (including Italy, Portugal, Greece, Spain), Chinese. South Asian and East Indian (Pakistan, Sri Lanka, India), South-east Asian (Cambodia, Indonesia, Vietnam, Philippines), West Asian and Middle Eastern (including Lebanon, Iran, Egypt, Armenia), West Indian (including Jamaica, Barbados, Trinidad and Tobago, Guyana), Hispanic (Central and South American, Latin America), African, and other ethnic identity (remaining ethnic groups). Ethnic identity was constructed from responses to the question ‘People are often identified as belonging to a particular ethnic or cultural group. To which ethnic or cultural groups do you see yourself belonging?’ Thus we measured self-perceived ethnic identity, and it was the primary ethnicity with which respondents identified.

The dependent variable, self-reported tobacco use, is based on the following question: ‘How often have you used tobacco (cigarettes, cigars, etc.) in the past 12 months?’ Responses include ‘not at all’, ‘once or twice’, ‘2–10 times’, ‘about once a month’, ‘at least once a week’ and ‘daily’. These responses are collapsed into a dichotomous measure: ‘non-smoker’ and ‘smoker’, with an emphasis on non-smoking. It is more important to focus on current non-smoking, which is clearly defined, relative to the diverse gradients of smoking frequency (i.e. experimental versus occasional versus regular smoking) and the qualitative meaning these variations hold [2]. Approximately 62% of respondents report that they had not used tobacco in the past year.

Mediators are peer smoking, sibling smoking, time spent in Canada and active cultural retention. Sibling and peer smoking are derived from the questions ‘How many of your close friends use tobacco (cigarettes, cigars, etc.)?’ and ‘Do any of your siblings use tobacco (cigarettes, cigars, etc.)?’ Responses to both questions are collapsed and dichotomized to measure whether or not peers and siblings smoke, with 74% respondents having peers who smoke and 22% with siblings who are smokers. Time spent in Canada is based upon whether or not the adolescent was born in Canada and in what year they moved to Canada. From this we derive whether an adolescent had spent most or all of their life in Canada, versus the country of their birth or another country in which they lived. Sixty-seven per cent of respondents report spending most or all of their life in Canada. We measure active cultural retention from three questions: ‘What language is spoken in your home?’, ‘How often do you attend an ethnic or cultural event?’ and ‘How much do you like ethnic music?’ These measures of active cultural retention have been considered in a number of studies of ethnic populations (Alba 1990; Waters 1990; Cheung 1991; Isajiw 1999). Questions are dichotomized to measure whether or not respondents speak a language other than English in the home (41%), whether respondents listen to ethnic music (42%) and whether respondents attend ethnic/cultural events on a weekly basis (10%).

Five control measures are included. These measures are gender (50% male), age (mean age of 16.6 years), educational attainment (38% of respondents reported being among the best in their class), frequency of religious attendance (22% never attend, 40% attend a few times a year, 14% attending a few times a month, 24% attend once a week or more) and social class (mean occupational prestige scores of parents or guardians, ranging from 1 to 100 with a mean of 44).

Statistical analysis

We follow an analytical strategy employed by Wallace & Bachman (1991) to explore mediating effects. To follow this framework requires first uncovering the presence of disparities in tobacco use among ethnic youth. Upon determining the unique ethno-specific ‘starting’ points for tobacco consumption, we introduce peer and sibling smoking and acculturation to discover their mediating effects on smoking. It may be that ethnicity is uniquely related to particular mediating factors, such that certain ethnic adolescents are protected from tobacco use while for others, the risk of using tobacco is amplified.

We estimate a series of models employing logistic regression. A change in the direct relationship between ethnicity and tobacco use, from significant to non-significant (odds ratios approaching 1.00), was indicative of a mediating effect, and suggested that much of the disparity in ethnic group smoking was overstated. The Hosmer and Lemeshow test, among other statistics, is used to confirm model ‘goodness of fit’.

RESULTS

Figure 1 describes the distribution of past-year non-smoking across 12 ethnic groups. Just over seven in 10
adolescents classify themselves as non-smokers; these results are consistent with adolescent smoking patterns in Canada and the United States (Health Canada 2000; MMWR 2000). Non-smoking varies significantly across ethnic groups ($F = 14.76, P < 0.001$). Non-smoking is less prevalent among adolescents who identify themselves as belonging to one of three European ethnic groups—western (62.5%), eastern (57.5%) and southern (61.7%)—and adolescents in the ‘other’ category (57.7%). Meanwhile adolescents whose ethnic identity is Chinese (79.9%), South Asian and East Indian (84.1%), West Indian (84.3%) or African (80.9%) have a higher than average propensity for non-smoking. Rates for adolescents who identify their ethnicity as being Canadian sit extremely close to the overall sample mean (70.9% versus 71.2%). As such, Canadian ethnicity was employed as a reference category in our multivariate analyses.

Table 1 is divided into four logistic regression models. The first model regresses primary ethnic identity on past year non-smoking to obtain a baseline for assessing changes in the likelihood of non-smoking attributed to other measures. Model 2 introduces the main control measures—age, gender, social class, religious attendance and educational achievement—on past-year smoking. Model 3 introduces the first two mediators, peer smoking and sibling smoking, while model 4 regresses non-smoking on the second set of mediators, time spent in Canada and active cultural retention. We argue that peer and sibling smoking, along with time spent in Canada and active cultural retention, will significantly mediate tobacco use, such that baseline ethnic differences in tobacco use will be explained by the introduction of mediators in subsequent models.

The findings from Model 1 confirm what was discovered in Fig. 1—there is significant variation in rates of non-smoking by primary ethnic identity. Relative to Canadian adolescents, the percentage change in the odds [$100*(e^{b}-1)$] of non-smoking is significantly ($P < 0.01$) decreased for adolescents with a western European (-36%), eastern European (-48%) or southern European (-37%) ethnicity. Conversely, the odds of non-smoking are increased for Chinese (100%), South Asian and East Indian (118%), and West Indian (74%) adolescents, relative to Canadian youth.

Figure 1 Rates of no-smoking by ethnic identity. An ANOVA, with a Bonferroni post hoc test, was employed to test for ethnic group differences from the mean for non-smoking.
non-smoking is reduced for youth whose primary ethnic identity is western European, eastern European, southern European or South Asian and East Indian adolescents. Southern European youth remain less likely to be non-smokers, while Chinese and West Indian youth maintain a higher rate of non-smoking, relative to Canadian youth. For eastern European youth, the introduction of acculturation enhances the direct effect of ethnic identity on non-smoking.

The coefficients in Model 4 also suggest that time spent in Canada and listening to ethnic and cultural music have significant direct effects on the propensity for non-smoking, while attending ethnic and cultural events was marginally significant. Adolescents who have spent most of their life in Canada are about 40% less likely to be non-smokers compared to new immigrants. Similarly, adolescents who listen to ethnic and cultural music are 29% more likely to be non-smokers and those who attend ethnic and cultural events are 40% more likely to be non-smokers.

Table 2 estimates the effect of primary ethnic identity, adjusting for age, gender, social class, religious atten-

### Table 1 Logistic regression of non-smoking on primary ethnic identity, controls and mediators.

<table>
<thead>
<tr>
<th>Independent and mediator measures</th>
<th>Non-smoking</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td>Model 4</td>
<td></td>
</tr>
<tr>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td></td>
</tr>
<tr>
<td>Primary ethnic identity (Canadian)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western European</td>
<td>0.63</td>
<td>0.64</td>
<td>0.76</td>
<td>0.67</td>
<td>0.49-0.93</td>
</tr>
<tr>
<td>Eastern European</td>
<td>0.52</td>
<td>0.52</td>
<td>0.61</td>
<td>0.46</td>
<td>0.32-0.66</td>
</tr>
<tr>
<td>Southern European/Mediterranean</td>
<td>0.63</td>
<td>0.61</td>
<td>0.77</td>
<td>0.66</td>
<td>0.48-0.91</td>
</tr>
<tr>
<td>Chinese</td>
<td>2.00</td>
<td>1.95</td>
<td>1.89</td>
<td>1.75</td>
<td>1.21-2.52</td>
</tr>
<tr>
<td>South Asian and East Indian</td>
<td>2.18</td>
<td>1.88</td>
<td>1.55</td>
<td>1.57</td>
<td>1.07-2.31</td>
</tr>
<tr>
<td>South-east Asian</td>
<td>1.34</td>
<td>1.21</td>
<td>1.42</td>
<td>1.57</td>
<td>0.72-1.65</td>
</tr>
<tr>
<td>West Asian and Middle Eastern</td>
<td>0.88</td>
<td>0.85</td>
<td>0.72</td>
<td>0.71</td>
<td>0.42-1.18</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.67</td>
<td>0.67</td>
<td>0.80</td>
<td>0.59</td>
<td>0.37-0.97</td>
</tr>
<tr>
<td>West Indian</td>
<td>1.74</td>
<td>1.85</td>
<td>1.76</td>
<td>1.92</td>
<td>1.33-2.76</td>
</tr>
<tr>
<td>African</td>
<td>1.25</td>
<td>1.08</td>
<td>0.95</td>
<td>0.91</td>
<td>0.53-1.55</td>
</tr>
<tr>
<td>Other ethnic identity</td>
<td>0.55</td>
<td>0.53</td>
<td>0.64</td>
<td>0.55</td>
<td>0.33-0.93</td>
</tr>
<tr>
<td>Control measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>0.90</td>
<td>0.92</td>
<td>0.92</td>
<td>0.89</td>
<td>0.85-0.94</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>0.92</td>
<td>0.91</td>
<td>0.87</td>
<td>0.75</td>
<td>0.75-1.02</td>
</tr>
<tr>
<td>Social class</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.98-1.00</td>
</tr>
<tr>
<td>Religious attendance</td>
<td>1.16</td>
<td>1.13</td>
<td>1.28</td>
<td>1.28</td>
<td>1.05-1.58</td>
</tr>
<tr>
<td>Educational achievement (above avg.)</td>
<td>2.15</td>
<td>1.94</td>
<td>2.11</td>
<td>1.79</td>
<td>1.79-2.50</td>
</tr>
<tr>
<td>Mediators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers smoke</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.09-0.16</td>
</tr>
<tr>
<td>Siblings smoke</td>
<td>0.47</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38-0.56</td>
</tr>
<tr>
<td>Time spent in Canada</td>
<td></td>
<td></td>
<td>0.58</td>
<td>0.47</td>
<td>0.47-0.71</td>
</tr>
<tr>
<td>Attend ethnic/cultural events</td>
<td></td>
<td></td>
<td>1.40</td>
<td>1.03</td>
<td>1.03-1.91</td>
</tr>
<tr>
<td>Listen to ethnic/cultural music</td>
<td></td>
<td></td>
<td>1.26</td>
<td>1.06</td>
<td>1.06-1.50</td>
</tr>
<tr>
<td>Speak language other English/home</td>
<td></td>
<td></td>
<td>0.95</td>
<td>0.78</td>
<td>0.78-1.16</td>
</tr>
<tr>
<td>Pseudo R² (Nagelkerke)</td>
<td>0.08</td>
<td>0.13</td>
<td>0.28</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Hosmer Lemeshow goodness-of-fit</td>
<td>0.97</td>
<td>0.47</td>
<td>0.23</td>
<td>0.48</td>
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</tr>
</tbody>
</table>

^aP < 0.01; ^bP < 0.001.
dance and educational achievement on each mediator. We want to examine whether the nature of the relationship between ethnic identity and non-smoking, as found in Table 1, may be explained by the relationship between ethnic identity and each mediator. Results from this table indicate that ethnic identity, to varying degrees, significantly predicts peer and sibling smoking, ratio of time in Canada and active cultural retention. Given that adolescents who identified themselves as western European, eastern European, southern European, Chinese, South Asian and East Indian or West Indian exhibited significant variation in non-smoking in the baseline model (Model 1, Table 1), our discussion focuses on these six groups.

The first two columns predict peer and sibling smoking. Compared to Canadian youth, western European, eastern European and southern European youth are significantly ($P < 0.01$) more likely to have peers who smoke, while South Asian and East Indian youth are significantly ($P < 0.001$) less likely to have smoking peers. These results were anticipated, given that the direct effect of European ethnicity, as well as South Asian and East Indian ethnicity, on non-smoking becomes non-significant when peer and sibling smoking are introduced in Model 3 of Table 1. Prevalence estimates from ethnic subgroups (not presented here) indicate that western European (83%), eastern European (83%) and southern European (85%) youth all have a greater than average (74%) proportion of smoking peers, while South Asian and East Indian (57%) have far fewer smoking peers. Meanwhile, western European young people are more likely (28% versus 22%) to have siblings who smoke, while Chinese adolescents (13%) are significantly less likely. West Indian ethnicity fails to predict peer and sibling smoking, and neither measure mediates the high rate of non-smoking among West Indian youth.

The final four columns in Table 2 present adjusted estimates of ethnic identity predicting time spent in Canada and three measures of active cultural retention. As with peer and sibling smoking, being of West Indian ethnic identity is generally unrelated to acculturation measures. These results are consistent with the results from Table 1; acculturation does not explain the high rate of non-smoking among West Indian youth. Conversely, among western European and South Asian and East Indian youth, certain acculturation measures appear to mediate fully the direct effect of ethnic identity on smoking. Western European youth are more likely to have

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**Table 2** Logistic regression of peer smoking, sibling smoking, ratio of time in Canada and measures of active cultural retention on ethnic identity and controls.

<table>
<thead>
<tr>
<th>Mediators</th>
<th>Peer smoking OR</th>
<th>Sibling smoking OR</th>
<th>Time spent in Canada OR</th>
<th>Attend ethnic and cultural events OR</th>
<th>Listen to ethnic and cultural music OR</th>
<th>Speak language other English home OR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent and mediator measures</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Primary ethnic identity (Canadian)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Western European</td>
<td>1.87$^b$</td>
<td>1.48</td>
<td>3.00$^b$</td>
<td>0.66</td>
<td>0.79</td>
<td>0.27$^b$</td>
</tr>
<tr>
<td>Eastern European</td>
<td>1.87$^a$</td>
<td>1.51</td>
<td>0.34$^a$</td>
<td>0.99</td>
<td>0.89</td>
<td>3.86$^b$</td>
</tr>
<tr>
<td>Southern European/Mediterranean</td>
<td>2.36$^b$</td>
<td>1.32</td>
<td>2.85$^b$</td>
<td>0.69</td>
<td>0.66</td>
<td>1.39</td>
</tr>
<tr>
<td>Chinese</td>
<td>0.77</td>
<td>0.61$^a$</td>
<td>0.58$^b$</td>
<td>0.60</td>
<td>3.19$^b$</td>
<td>5.02$^b$</td>
</tr>
<tr>
<td>South Asian and East Indian</td>
<td>0.55$^b$</td>
<td>0.78</td>
<td>0.29$^b$</td>
<td>1.89$^a$</td>
<td>5.77$^b$</td>
<td>3.27$^b$</td>
</tr>
<tr>
<td>South-east Asian</td>
<td>0.79</td>
<td>0.82</td>
<td>0.40$^b$</td>
<td>1.12</td>
<td>1.61</td>
<td>2.62$^b$</td>
</tr>
<tr>
<td>West Asian and Middle Eastern</td>
<td>1.66</td>
<td>1.73$^a$</td>
<td>0.40$^b$</td>
<td>0.79</td>
<td>2.04$^a$</td>
<td>7.32$^b$</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.70</td>
<td>0.85</td>
<td>0.79</td>
<td>1.02</td>
<td>0.79</td>
<td>0.18$^b$</td>
</tr>
<tr>
<td>West Indian</td>
<td>0.66</td>
<td>0.89</td>
<td>0.29$^b$</td>
<td>1.71</td>
<td>1.66</td>
<td>2.48$^b$</td>
</tr>
<tr>
<td>Other ethnic identity</td>
<td>2.68$^a$</td>
<td>1.12</td>
<td>1.25</td>
<td>0.75</td>
<td>0.70</td>
<td>0.65</td>
</tr>
<tr>
<td>Control measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>1.16$^b$</td>
<td>1.01</td>
<td>0.87$^b$</td>
<td>1.01</td>
<td>1.15$^b$</td>
<td>0.99</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>0.85</td>
<td>1.21</td>
<td>0.81</td>
<td>0.74</td>
<td>1.51$^b$</td>
<td>1.26$^a$</td>
</tr>
<tr>
<td>Social class</td>
<td>1.01</td>
<td>0.99</td>
<td>1.01</td>
<td>1.00</td>
<td>1.00</td>
<td>0.98$^b$</td>
</tr>
<tr>
<td>Religious attendance</td>
<td>0.89$^a$</td>
<td>0.95</td>
<td>0.93</td>
<td>7.85$^b$</td>
<td>1.27$^a$</td>
<td>1.14</td>
</tr>
<tr>
<td>Educational achievement</td>
<td>0.61$^b$</td>
<td>0.66$^b$</td>
<td>0.80$^a$</td>
<td>0.88</td>
<td>1.16</td>
<td>1.11</td>
</tr>
<tr>
<td>(above avg.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo $R^2$ (Nagelkerke)</td>
<td>0.10</td>
<td>0.04</td>
<td>0.21</td>
<td>0.20</td>
<td>0.18</td>
<td>0.31</td>
</tr>
<tr>
<td>Hosmer Lemeshow goodness-of-fit</td>
<td>0.29</td>
<td>0.84</td>
<td>0.23</td>
<td>0.78</td>
<td>0.90</td>
<td>0.06</td>
</tr>
</tbody>
</table>

$^aP < 0.01; ^bP < 0.001.$
spent most or all of their lives in Canada, but are not more involved in active cultural retention. Meanwhile, South Asian and East Indian adolescents are less likely to have grown up in Canada, and are much more likely to participate in active cultural retention.

The relationship between ethnic identity and acculturation among eastern European, southern European and Chinese youth is less clear. Eastern European and Chinese youth are more likely to be recent immigrants and speak a language other than English at home, while Chinese youth are also more likely to listen to ethnic and cultural music. For these youth, ethnic identity exhibits direct and indirect effects in shaping tobacco consumption. Conversely, southern European identity is unrelated to acculturation which explains the lack of a mediating influence on smoking exhibited in Table 1 [3].

**DISCUSSION AND CONCLUSIONS**

Our research set out to explore how ethnic identity shapes tobacco use. Employing a large, multi-ethnic sample of Toronto high school students we found that, indeed, the propensity to use tobacco varied considerably by ethnicity. More importantly, the bulk of this study was directed toward understanding the processes by which ethnic identity shapes tobacco use by drawing on social learning theory to examine the mediating influences of peer and sibling smoking and acculturation. The discrepancies in rates of non-smoking among western European and South Asian and East Indian adolescents were explained by a combination of peer and sibling smoking and acculturation; among southern European and eastern European youth via peer and sibling smoking; and by neither peer and sibling smoking nor acculturation for Chinese and West Indian youth. There was no significant variation in the rate of non-smoking between Canadian youth and those who identified themselves as South-east Asian, West Asian and Middle Eastern, Hispanic or African. The finding of disparities in the rates of tobacco use among ethnic adolescents were consistent with previous research on smoking among ethnic adolescents in Canada and other nations (Bachman et al. 1991; Beardall & Edwards 1995; Chen et al. 1999a; Holowaty et al. 2000; Johnson & Hoffman 2000).

Overall, social learning measures appear to explain, in part, the observed variations in smoking among ethnic adolescents from certain ethnic groups. These findings suggest that above and beyond the important role of ethnicity in shaping adolescent tobacco use, young people actively learn important cues that shape whether they decide to smoke or remain smoke-free from interactions with their peers, siblings and, to a lesser extent, through the interplay of ethnic heritage and mainstream culture. Specifically, peer and sibling smoking mediated the direct influence of ethnic identity on smoking among western European, eastern European and southern European, and South Asian and East Indian youth. For these adolescents, ethnic identity holds an intricate link to the likelihood of having friends and, to a lesser extent, siblings who smoke (Holowaty et al. 2000; Ellickson et al. 2003). The low propensity of non-smoking among European adolescents was not a direct product of ethnic identity but an artefact of having a higher proportion of peers and siblings who smoke: for these young people ethnic identity, through peers and siblings, enhances the risk of tobacco use. Conversely, the high rate of non-smoking observed among South Asian and East Indian youth was a result of having fewer peers and siblings who smoke; the low levels of smoking exhibited by South Asian and East Indian youth was due, in part, to the protective effects of having fewer peers and siblings who smoke. We cannot, however, rule out whether the ethnicity—peer smoking relationship was not a selection effect of smoking adolescents’ befriending smoking peers or whether young people were more inclined to befriend peers from the same ethnic group—further reinforcing cultural propensities for tobacco use.

Time spent in Canada and measures of active cultural retention played a less important role as mediators. None the less, as with the introduction of peer and sibling smoking, baseline differences in non-smoking among western European and South Asian and East Indian youth disappeared when acculturation was introduced. Western European youth have spent most of their life in Canada and were uninvolved in active cultural retention, whereas South Asian and East Indian youth have spent the least amount of time in Canada and were involved most actively in maintaining traditional culture. These differences in acculturation, in conjunction with peer and sibling smoking, helped to explain tobacco use disparities among youth from these ethnic groups. After accounting for these mediators a convergence towards the tobacco use patterns of ‘Canadian’ youth was exhibited by adolescents from these ethnic groups.

Denscomb (2001) recently discussed the notion of ‘uncertain identities’ as a contributing factor in an adolescent’s desire to smoke. By pointing to the uncertainty associated with adolescent identity, he argued for the importance that smoking holds in terms of self-image and also as a reflexive construction of self. Behaviours such as smoking offer certain individuals the ability to deal with an uncertain identity by reducing many of the stresses connected with migration to a new culture (Crutchfield & Gove 1984). Adolescents of various ethnic backgrounds might be more inclined to smoke like typical ‘Canadian’ youth as a means to construct and transform their identity, while obtaining a more equal footing.
in the eyes of mainstream cultural adolescents (Den-  
scomb 2001).

For adolescents identifying as Chinese and West  
Indian, the presence of mediators offered little in explain-  
ing their higher propensity for non-smoking. Peer and sib-  
ling smoking and acculturation, as measured here, failed  
to explain the direct effect of ethnic identity on tobacco  
use. What is it about the ethnic identity of these adoles-  
cents that accounts for their persistent and divergent  
smoking patterns? We offer two possible explanations.  
First, it may be that the features of the acculturation pro-  
cess that are most important as mechanism in shaping  
health and health-related behaviour were not properly  
specified (Lee et al. 2000, p. 160). Each ethnic group has  
quale experiences of acculturation, which may not be  
related to all behaviours for all ethnic groups equally.  
The acculturation process has been defined as both structural  
and cultural, where assimilation shapes aspects of the  
lives of ethnic minorities including diet, social networks  
and social support, as well as the maintenance of tradi-  
tional values and norms. We have included some ele-  
ments of structural acculturation, such as peer networks,  
as well as elements of cultural assimilation, through our  
measures of active cultural retention. However, impor-  
tant elements may be missing. For example, ethnic minor-  
ity youth hold culturally specific health beliefs and might  
have clear normative standards regarding tobacco use  
which have followed them in their transition to Canada.  
This ‘culture of tobacco use’ either enhances the risk of  
smoking or acts as a protective mechanism reducing  
tobacco use contingent on cultural origin.

We can draw parallels from West Indian culture. The  
rate of smoking among males in the West Indies is one of  
the lowest in the world, with prevalence rates of below  
20%, compared to smoking rates of 35% and greater in  
many nations in the developed world (Mackay & Eriksen  
2002). West Indian youth appear to come from a ‘culture  
of non-smoking’ and have maintained that cultural norm  
irrespective of the pressures of acculturation or the sway  
of peer groups. These youth have rejected more rigorously  
the process of assimilation that is strived for by youth  
from other ethnic groups and have, instead, held onto  
traditional patterns of smoking—or non-smoking—as it  
is an important to cultural identity (Durrant & Thakker  

Tobacco use among Chinese youth is more complex;  
however, the argument for a ‘culture of tobacco use’ can  
also apply. In China, cultural prescriptions around youth-  
ful smoking place value on abstinence and moderation  
(Ellickson et al. 2003). As Li et al. (1999) have found,  
despite the extremely high smoking prevalence of Chi-  
nese adults (over 50%), smoking among Chinese adoles-  
cents remains about 15%, a lower rate than exhibited by  
Canadian Chinese adolescents in this study. Asia-Pacific  
culture exerts stronger control over the behaviour of chil-  
dren, relative to adults, which results in lower participa-  
tion in substance use and greater conformity to family,  
community and culture (Bhattacharya 1998; Chen et al.  
1999a; Johnson & Hoffman 2000). Our findings indicate  
that traditional cultural patterns of smoking that pro-  
mote abstinence and restraint until early adulthood, as  
evident in China—or the freedom to smoke at one’s plea-  
sure, as evident in Eastern Europe—may have also immi-  
grated to Canada.

A second possibility is that health-related behaviour,  
rather than a product of acculturation or ethnic identity,  
represents a specific element of by which ethnic identity is  
constructed. As Freund & McGuire (1999, p. 144) note,  
‘Persons raised in different ethnic subcultures . . .  
typically learn their group’s ideas about health and ill-  
ness, including: What is health? What can cause illness . . . ?’ Health-related behaviour or the practice of  
health embodies a distinct form of cultural retention  
among ethnic individuals; ethnicity and ethnic identity  
represent a social construct with respect to health and  
health-related behaviours (Alba 1990; Leischow,  
Ranger-Moore & Lawrence 2000; Nichter 2003). Health-  
related behaviour—in this instance, the choice to use  
tobacco—symbolizes an active mechanism or culturally  
prescribed pattern of behaviour by which young people  
situated in multi-cultural environments attempt to fur-  
ther define their ethnic identity.

One final note draws attention to the measurement of  
ethnicity and race in studies of substance use. If, instead  
of ethnicity, we employed race as our object of study, we  
would find that white youth were less likely to be non-  
smokers, while black and Asian youth had a higher  
propensity for non-smoking. This would be an easy  
conclusion to accept, given the large body of research  
pointing to significantly lower rates of drug use among  
non-whites, particularly among black and Asian youth,  
relative to Caucasian adolescents (US Department of  
Health & Human Services 1998; Bachman et al. 1991;  
Griesler & Kandel 1998; Leischow et al. 2000). However,  
these differences based on visible minority status are not  
consistent across all ethnic identities. For example, ado-  
lescents of West Indian and African identity in our sam-  
ples were predominately black, yet, their patterns of  
tobacco use were quite distinct. Whereas West Indian  
adolescents had a lower propensity for smoking, the same  
cannot be said for African youth whose smoking patterns  
were quite similar to Canadian youth. These findings  
serve as a cautionary warning for researchers about the  
dangers of misusing measures of ethnicity and race [4].

There were three main limitations to this study. First,  
data were cross-sectional rather than longitudinal, and  
therefore this study was unable to capture the temporal  
nature of acculturation and the potential cause-and-
effect relationship between mediators and tobacco use. Secondly, our measure of ethnic identity was derived from self-identification and categories were collapsed on the basis of geography and nationality. As such, we were not able to capture the strength of respondent’s ethnic identity, their commitment to their ethnicity, or their ethnic pride. Future research should include measures of the strength of ethnic identity as well as experiences of ethnicity such as discrimination or injustice (Nazroo 2003; Nichter 2003). Moreover, our question on ethnic identity may be biased as it calls for young people to self-identify ethnicity whether or not they feel strongly towards that ethnicity. Finally, this study would benefit from the inclusion of measures tapping into cultural attitudes, norms and expectancies regarding tobacco use and other health-related behaviours. Further study is necessary to determine how adolescents from various ethnic backgrounds come to understand health, and how cultural knowledge shapes decision making regarding health-related behaviours.

In summary, there are a number of important implications of the current study. As the 1998 US Surgeon General’s Report indicates, certain ethnic minority populations remain at high risk for using tobacco and often bear a disproportionate share of the human and economic cost of tobacco use (US Department of Health & Human Services 1998). While we have accounted for some of the ethnic disparity in smoking, certain ethnic groups continue to have differing risks for tobacco use. Where do we go from here? First, while our findings add to the complexity of the relationship between ethnic culture and substance use, they reinforce the need for researchers to measure ethnic identity in models of risk buffering and risk protection. Secondly, if the goal of research is prevention, education and treatment, better knowledge of tobacco use patterns in various ethnic communities is still a necessity (Lee et al. 2000). Smoking prevention efforts have largely been directed towards the general population rather than being tailored to specific subgroups. It is uncertain that treatment programs and prevention messages successfully reach the particular ethnic communities in which they would be most helpful. And, if they do reach such communities, do they have any noticeable impact? Better data are needed, not only on ethno-specific tobacco use, but evaluations of prevention and treatment programmes tailored to ethnic populations. Moreover, general prevention approaches must find a balance between offering effective strategies to reduce the harm from tobacco without dismantling any protective mechanism that are already in place due to ethnic heritage. Together these issues must translate into the development of tobacco programmes that target ethnic communities and that are credible and acceptable to members of these communities (Cheung 1991; US Department of Health & Human Services 1998).

Acknowledgements

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Notes

[1] Each of the 12 constructed ethnic groups contains at least 100 respondents. Remaining adolescents from ethnic groups that did not fit into our categorization (i.e. Aboriginal people) or respondents who were unable to self-identify their ethnicity were subsumed into a category labelled ‘other’ ethnicity.

[2] The relationship between ethnic identity and smoking was also estimated using a categorical measure of smoking (non-smoker, occasional smoker, and regular smoker) using multinomial logistic regression. There were no substantive differences in the relationship between ethnic identity and smoking between models. Results are available upon request.

[3] We also tested for interaction effects (not shown here) between all four mediators and all 12 ethnic groups. There were no significant interactions at $P < 0.01$.

[4] We re-ran our analyses estimating differences in non-smoking across racial categories. The results of these analyses further confirm our suspicions, as youth who self-identified as black exhibited no significant difference in rates of non-smoking relative to white youth ($P = 0.418$). Results are available on request.

References


Ethno-specific patterns of adolescent tobacco use


General. Atlanta, GA: Centre for Disease Control and Prevention.


