

Tobacco Use among Native Hawaiian Middle School Students: Its Prevalence, Correlates and Implications

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Objectives. *This study sought to explore whether Native Hawaiian primary ethnic identity is associated with cigarette use among Native Hawaiian middle school students. This study also explored whether social influence, psychosocial and cultural factors are associated with cigarette use in this sample.*

Design. *The data are from a cross-sectional survey of 1,695 Native Hawaiian middle school students at 22 public and private schools on five islands in Hawaii. A subset of these students from Native Hawaiian serving schools (N = 136) completed additional measures of Hawaiian cultural variables.*

Results. *Based on univariate analyses, students whose primary ethnic identification was Hawaiian were more likely to have tried smoking ($p < 0.001$) and to be current smokers ($p < 0.05$) as compared to those classified as part Hawaiian. However, these findings were no longer significant in multivariate analyses. Social influence variables (i.e. peer and parental smoking) were most influential in explaining both prior and current smoking. Attendance at public school was also an important factor in explaining previous (OR = 2.43; 95% CI = 1.74, 3.38) and current (OR = 7.20; 95% CI = 4.58, 11.32) smoking behavior. Finally, cultural variables such as valuing Hawaiian folklore, customs, activities and lifestyle were largely unassociated with smoking behavior among Native Hawaiian middle school youth.*

Conclusions. *Additional research is needed to understand what aspects of ethnic identity are associated with smoking behavior among Native Hawaiian youth. The strong*

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influence of peer and parental smoking suggests the need for interventions that support the creation of social environments that discourage tobacco use.

Keywords: Tobacco; Adolescents; Native Hawaiian; Smoking

Introduction

Adolescent use of tobacco products continues to be an important public health problem. It is estimated that each year, 734,000 individuals under 18 years smoke their first cigarette (Substance Abuse and Mental Health Services Administration 2004). For many adolescents this early cigarette use continues throughout adulthood and ultimately contributes to negative health outcomes such as cancer, coronary heart disease, emphysema and chronic bronchitis. In Hawaii, where 75% of the population consists of people from non-White ethnic groups (US Census Bureau 2005), there is increasing concern of the health consequences of smoking among non-White youth.

Native Hawaiian middle school students have the highest smoking prevalence rates of any ethnic group of youth in their age group in the state (Klingler & Miller 1999; Appleyard *et al.* 2001). Data suggest that 13% of Hawaiian/Pacific Islander 7th grade girls are current smokers, a prevalence rate that is several times that of girls of other ethnic backgrounds (Glanz *et al.* 2005). A similar picture emerges for boys though it is less dramatic. The prevalence of current smoking among Hawaiian/Pacific Islander 7th grade boys (10%) exceeds the rate for boys of all other ethnic backgrounds. However, by high school, current smoking rates for white male and female students (26–32%) equal those of Hawaiian/Pacific Islander youth (27–32%; Appleyard *et al.* 2001; Wong *et al.* 2004). Nevertheless, little is known about the determinants of tobacco use among Native Hawaiian youth. Specifically, aside from media influences, low socioeconomic status and issues of access to tobacco products, there may be cultural values and belief systems that shape smoking behavior among this population. The purpose of the current study is to explore those psychosocial and cultural factors that may be associated with cigarette use among Native Hawaiian youth to inform the development of culturally relevant prevention programs for this population.

Native Hawaiian Ethnic Identity and Youth Smoking

Hawaii is characterized by great cultural diversity, perhaps more so than any other state. About 21% of the population identifies with two or more ethnicities, and about 23% report having Native Hawaiian ancestry (this includes those of single ethnicities and those with ethnic admixture; Mokuau 2002). The various ethnic groups in Hawaii reflect a wide range of Western, Eastern and Polynesian values, customs, attitudes and behaviors (Okamura 1982, Mokuau 1990; Paxman 1993). Caucasians, Japanese and Chinese individuals tend to be more affluent, and Native Hawaiians and Filipinos are more often economically disadvantaged as measured by levels of

receiving social welfare assistance (Mariane 1984). Compared to other ethnic groups, Native Hawaiians and Filipinos experience higher rates of poverty, incarceration and unemployment, lower rates of educational attainment, and poorer health outcomes (Kuramoto & Nakashima 2000). In light of research linking socioeconomic disadvantage to cigarette consumption (Flint & Novotny 1997; Graham & Der 1999), one might therefore expect that smoking may be a widespread habit among Native Hawaiians.

Yet, one aspect of Native Hawaiian culture that may mitigate the adverse effects of smoking is the nurturing of close relationships with immediate and extended family members (Kuramoto & Nakashima 2000). Thus, it is thought that family values may be one of many cultural strengths that may be used to develop health promotion interventions for Native Hawaiians (Mokuau 2002). However, the impact of cultural values incorporated into health promotion interventions may not be universally effective at inducing health behavior change because Native Hawaiian individuals may vary in the extent to which they identify with these traditional values and belief systems. Thus, researchers are beginning to explore the extent to which ethnic identity is associated with health behaviors among Asian, Pacific Islander and Native Hawaiian adolescents (Wiecha 1996; Chen *et al.* 1999a, b; Ma *et al.* 2004).

Although there is no widely agreed-on definition, ethnic identity may be defined as:

... a set of self-ideas specifically related to one's ethnic group membership ... [referring] directly to one's knowledge of personal ownership or membership in the ethnic group, and the correlated knowledge, understanding, values, behaviors, and proud feelings that are direct implications of that ownership. (Casas & Pytluk 1995, p. 159)

This definition of ethnicity is consistent with the four attributes of ethnic identity as conceptualized by Phinney (1992): identifying with one's ethnic group, engaging in ethnic behaviors and practices, affirming and feeling a sense of belonging to one's ethnic group, and internalizing the achievement of ethnic identity as part of one's personal development. Ethnic self-identification is considered a crucial starting point in any exploration of ethnic identity (Phinney 1990). Self-identification of ethnicity is particularly relevant to the current study because ethnic admixture (i.e. having parents from two or more distinct ethnic groups) is so common among Native Hawaiians; thus, many individuals have multiple ethnic labels from which to choose.

Research generally finds that stronger ethnic identity is associated with less tobacco use among African American and Hispanic adolescents (Parker *et al.* 1998); however, much less is known about Asians, Pacific Islanders and Native Hawaiians. The few existing studies that explore ethnic identity (or some similar construct such as acculturation) in this population have yielded conflicting findings, perhaps due to differences in how ethnic identity is operationalized and measured (Dusenbery *et al.* 1994; Wiecha 1996; Chen *et al.* 1999a, b). As re-emphasized in a Federal report on tobacco use in minorities (US Department of Health and Human Services 1998) and by the Federal agenda to eliminate racial/ethnic health disparities by 2010

(US Department of Health and Human Services 2000), information about Asian, Pacific Islanders and Native Hawaiians is essential to develop a better understanding and achieve tobacco use reductions in this population.

Study Purpose

The current study will explore self-identification as one aspect of ethnic identity as it relates to smoking behavior among Native Hawaiian adolescents. Additionally, it seeks to understand the extent to which demographic, social influence, psychosocial and cultural variables are associated with smoking behavior in this sample. This information can be used to develop knowledge to inform the development of smoking prevention interventions for Native Hawaiian adolescents. Specifically, this study will explore the following research questions:

1. What is the prevalence of tobacco use in Native Hawaiian middle school students and how does it differ by self-identification with Native Hawaiian ethnicity?
2. What are the most important sociodemographic and psychosocial correlates of tobacco use among Native Hawaiian middle school students?
3. In a subgroup of students from predominantly Native Hawaiian middle schools, what is the association of cultural factors with tobacco use onset and current smoking?

Methods

Project SPLASH (Smoking Prevention Launch among Students in Hawaii)

All students in this study responded to the Project SPLASH baseline survey and self-identified as Native Hawaiian. Project SPLASH was a two-year school-based smoking prevention intervention for 7th and 8th grade students that took place between 2000 and 2002 in 22 middle schools in Hawaii (Glanz *et al.* in press). The participating schools are located on five of the seven populated islands in the state (Oahu, the Big Island of Hawaii, Maui, Molokai and Kauai).

Public (or state) schools in the state were eligible to participate in the main study if they had at least 40 7th grade students, taught both 7th and 8th grade, were willing to be randomized, agreed to designate a teacher as liaison to the study, agreed to allow classroom-administered surveys and were willing to carry out a smoking prevention intervention program. The State Superintendent of Schools sent a letter to all middle school principals encouraging them to participate in the study. From the initial list of 48 candidate schools, 33 eligible schools from the three largest islands (Oahu, Hawaii and Maui) were invited to participate. Of these, 18 (54.5%) agreed. In order to meet the target sample size of 20 schools, two schools from Kauai were added to the study, for a net participation rate of 57.1%.

During the main recruitment process for this study, teachers from a private (or fee-paying) school on Oahu that enrolls predominantly youth of Native Hawaiian ancestry expressed interest in participating in this study, and additional supplemental funding was acquired to include them in the ongoing study. A second middle school located on the rural island of Molokai that serves primarily Native Hawaiian public school students was also included in the supplemental funding (note that approximately 84% of Molokai residents are Native Hawaiian or part Native Hawaiian; Department of Business, Economic Development & Tourism 2005). Thus, students from two predominantly Native Hawaiian middle schools (one public and the other private) were included in this study for a total of 22 schools. Principals and 7th grade teachers who were committed to participating in the study signed letters of agreement for their schools, confirming their understanding of the expectations and benefits of the study. Schools that agreed to take part in the study were comparable to schools that declined to participate with respect to size and smoking prevalence, although more rural schools agreed to be in the study.

Participants

Among the 1,695 Native Hawaiian students who took part in this study, 1,559 were from the 20 schools that participated in the 7th grade baseline administration of the main study of Project SPLASH. The remaining 136 students were enrolled from the two predominantly Native Hawaiian schools that subsequently joined the supplement-funded study. Among the 136, 43 were 7th grade students from the rural public school and 93 were 8th grade students at the private school on Oahu.

Data Collection Procedures

The baseline survey was completed at the beginning of the 7th grade year for students at all of the schools except for the predominantly Native Hawaiian private school on Oahu which received the baseline survey at the beginning of the 8th grade year. Active parental consent and student assent were required, and consent forms were distributed one week before the survey distribution date. Classes received a group incentive (a pizza party) for returning at least 90% of the consent forms, regardless of whether parental permission to complete the survey was granted. Teachers provided class rosters to the study staff to prepare for the surveys. Study staff administered the surveys to the students in the classroom; students silently read the questions and independently indicated their responses on their survey. Student names were tracked and kept confidential. The Institutional Review Board of the University of Hawaii approved the project and all procedures.

Data Collection Instrument

Smoking behavior. The main dependent variables for the study are the prevalence of ever having smoked and 30-day smoking prevalence. Respondents were asked 'Have you ever tried smoking, even one or two puffs?', and response options were yes or no. Those who responded in the affirmative were subsequently asked 'During the past 30 days, on how many days did you smoke?' There were six response categories ranging from 'none' to '20 or more days'. Responses to these questions were used to categorize participants as ever having smoked (or not) and having smoked within the past 30 days (or not). These and other tobacco use questions included in the survey are commonly used (Jessor *et al.* 1991), and are the same ones used in the Hawaii Student Alcohol and Drug Use Survey (Klingle & Miller 1999), which allows for comparisons with the statewide sample.

Demographics. Information about student demographic characteristics included self-identified ethnicity, gender, age, socioeconomic status and number of biological parents in the home. In terms of ethnicity, all participants met the criteria for being of Native Hawaiian ethnicity based on the student's response to the following questions: (1) 'What ethnic group do you most identify with? Please mark only one' and (2) 'Are you part Hawaiian?' This method is consistent with procedures prescribed by the Hawaii State Department of Health's Vital Statistics Program (Hawaii State Department of Health 1997). Students were classified as 'Primary Hawaiian' (Primary HI) if students selected Hawaiian in response to the first question, even if they selected more than one ethnicity. Because these are self-report data, it is notable that students who were classified as Primary HI may only have had a very small percentage of Native Hawaiian ancestry, and that few individuals would be 100% Native Hawaiian because of great ethnic admixture. Students were 'Part Hawaiian' (Part HI) based on if they identified as being Native Hawaiian by responding yes to the second question only. The majority (63%) of Primary HI also endorsed the part Hawaiian question. Socioeconomic status was determined by proxy measures based on the student's zip code of residence, using four census-based indicators: mean neighborhood household income, percent of families on public assistance, median value of owner-occupied housing units and median gross rent as a percent of household income (Chen *et al.* 1998; Scarinci *et al.* 2000). These variables were used to create a dichotomous socioeconomic status variable that indicates whether students were below (or above) the average.

School environment and social influences. The baseline survey measured aspects of the school and social environment that may be associated with smoking. In terms of *academic achievement*, respondents were asked to indicate their grade point average ranging from 'A' to 'D or below'. Questions about *social exposure to tobacco* asked whether family and close friends (mom, dad, siblings, friends, dating partner) smoke (Johnston *et al.* 1994).

Psychosocial factors. Psychosocial factors measured in the baseline survey assessed sense of coherence, sensation seeking and attitudes towards smoking. *Sense of*

coherence was measured by a 29-item scale adapted from Antonovsky (1987), and was comprised of statements with bipolar response options ranging from 1 to 7 ($a=0.84$). One item from the original scale measuring how life has changed 'in the past ten years' was modified to reflect how life has changed in the last 'three years' to be more relevant to the adolescent population. The scale consists of three subscales: manageability, meaningfulness and comprehensibility. *Sensation seeking* was measured by 13 items ($a=0.86$) with 7-point response scales asking if each description was 'unlike me' or 'like me'. The instrument contains two subscales measuring impulsiveness and adventurousness (Ferguson & Valenti 1991). *Perceived risks and benefits of smoking* were measured by a 10-item scale ($a=0.78$). Response options were on a 5-point scale from strongly disagree to strongly agree (Lynch & Bonnie 1994).

Only the 136 students at the predominantly Native Hawaiian schools completed a modified version of the Na Mea Hawaii, which is a Hawaiian Acculturation Scale (Rezentes 1993). The adapted scale that was used in the current study consists of 24 items that capture aspects of Hawaiian folklore, customs, activities and the importance of acquiring Hawaiian culture. Included in the scale were two additional items that assess the importance of following ethnic customs and having the same ethnicity friends.

Data Analysis Methods

All analyses were conducted using SAS statistical software. After computing frequency distributions and descriptive statistics, bivariate analyses were performed to examine whether the Primary HI and Part HI students responded differently. Multivariate analyses were conducted to identify factors related to smoking among Native Hawaiian youth. Bivariate analyses using chi-square and *t*-tests were used to screen variables for inclusion in multivariate models to predict ever smoking and smoking within the past 30 days, both binary measures. Final variables were chosen to minimize overlap among constructs, to use more reliable measures and/or to use constructs more logically related to the dependent variables. Missing values resulted in a loss of 16% of sample, with missing status being related to smoking behavior. Therefore, imputation was done using the mean, median or mode (depending on the variable) based on stratification using demographic variables. We conducted sensitivity analyses and determined that the findings did not significantly differ with imputation. The variables with the highest proportion of missing values were imputed; they were Sense of Coherence, Impulsiveness, Attitudes Toward Smoking (perceived risks and benefits), parents' and friends' smoking, and grade point average. This reduced missing values to 3.4% of the sample.

PROC GENMOD with the REPEATED statement was used to analyze these logistic models using the GEE method to calculate robust standard errors to correct for the clustering of respondents within schools (Liang & Zeger 1986). The GEE models to predict ever smoking and smoking in the past 30 days were nearly identical to logistic

regression results. PROC LOGISTIC was then used to test the contributions of blocks of variables entered in the following order: demographics, school related measures, social influence and psychosocial measures (see Table 2 for a list of the variables within these blocks). The order of psychosocial and social influence measures was also reversed to clarify the strength of those categories given their potential overlap. PROC LOGISTIC provides c , a measure of association that represents the probability of correct classification, which was used to compare models after each block of variables was added.

Secondarily, the culture specific items administered to students from the two predominantly Native Hawaiian schools were analyzed. Culture specific items were examined with univariate analyses including frequency distributions and descriptive statistics. A priori scales and subscales suggested by the original author of the items were tested using coefficient alpha. Composite scores were then created as the mean of the items. Response scales differed slightly across nine questions about Hawaiian culture; items using 2- and 3-point scales were extrapolated to a 4-point scale. t -Tests and Mann–Whitney U-tests were used to test the bivariate relationships between these cultural composite scores and the Primary HI and Part HI designations.

Results

Sample Description

This study included 1,695 students of Native Hawaiian ancestry; of these 1,088 students were categorized as being primary Hawaiian and 607 students were categorized as part Hawaiian. There were 851 girls and 844 boys. Students ranged in age from 11 to 14 years ($M = 12$ years; see Table 1). Students who identified as primary Hawaiian were more likely to report that their parents smoke and that people in their social circle smoke as compared to those who identified as part Hawaiian ($p < 0.05$ for both variables; see Table 1). There were no differences between groups in terms of psychosocial variables, gender, age and prevalence of both biological parents living in the home. However, students who identified as primary Hawaiian had lower socioeconomic status, performed more poorly in school and were more likely to be enrolled in public school compared to those who self-reported as part Hawaiian.

Prevalence of Smoking by Gender

Regarding the first research question related to smoking prevalence, primary Hawaiian students were more likely to have ever tried smoking ($p < 0.001$) and to have smoked in the past 30 days ($p < 0.05$) compared to part Hawaiian students (see Table 1). Across both ethnicities, there were significant gender differences in smoking prevalence among public school students such that a greater proportion of girls (35%) smoked than boys (29%; $p < 0.01$). However, there were no significant gender differences in current smoking behavior among public and private school students

Table 1 Description of Sample—By Primary Hawaiian and Part Hawaiian

Characteristic	Primary Hawaiian		Part Hawaiian		<i>p</i> -Value
	<i>n</i>	% ^a	<i>n</i>	% ^a	
<i>Demographics</i>					
Gender (% male)	1,088	49.6	607	50.1	n.s.
Age (M (SD); range 11–14)	1,083	12.0 (0.54)	605	12.0 (0.56)	n.s.
Socioeconomic status (% below average)	1,088	35.7	607	29.2	<0.05
Biological parents in home (% with both)	1,088	59.3	607	62.8	n.s.
<i>School</i>					
Grade point average (% 'A')	1,057	24.2	597	33.0	<0.001
Public school (% in public school)	1,088	96.2	607	91.4	<0.0001
<i>Smoking behavior</i>					
Ever tried smoking (%)	1,066	34.1	592	26.0	<0.001
Smoked in the past 30 days (%)	1,088	11.9	607	8.1	<0.05
<i>Social influences</i>					
Parents smoke (% yes)	1,073	54.2	599	49.1	<0.05
Friend/dating partner/sibling smoke (% with 1 or more)	1,078	45.2	600	38.7	<0.05
<i>Psychosocial</i>					
Sense of coherence (M (SD); range 2–7)	1,042	4.4 (0.69)	584	4.4 (0.72)	n.s.
Impulsiveness (M (SD); range 1–7)	1,017	3.9 (1.07)	561	3.9 (1.22)	n.s.
Attitudes toward smoking (M (SD); range 1–5)	1,043	1.6 (0.66)	595	1.5 (0.60)	n.s.

Note: *n*'s vary due to missing data.

^aExcept where otherwise indicated.

nor were there significant gender differences in smoking prevalence among private school students.

Correlates of Smoking

Next, we explored the second research question concerning factors associated with smoking behavior using logistic regression procedures. This allowed us to explore the effect of each independent variable on the dependent variable while controlling for other variables in the model. The statistical models predicted ever smoking slightly better than smoking during the last 30 days. We found that lower socioeconomic status, older age, female gender and having fewer biological parents in the home were associated with an increased likelihood of ever having tried smoking (see Table 2). Other factors associated with an increased likelihood of ever having smoked include attending public school, having a lower grade point average, and having parents and peers who smoke. Notably, primary Hawaiian ethnicity was no longer associated with

ever having smoked with other demographic variables included in the model. The social influence variables (i.e. peer smoking and parent smoking) caused the greatest increase in c after controlling for demographic variables, indicating that adding these variables to the model accounted for a large amount of the explained variance. Among the psychosocial variables, only two variables were associated with a greater likelihood of ever having smoked: impulsiveness and more positive attitudes towards smoking (see Table 2).

Fewer variables were associated with smoking behavior within the past 30 days. As before, older age, enrollment in public school, lower grade point average, peer smoking and more positive attitudes towards smoking were associated with an increased likelihood of smoking whereas Hawaiian ethnicity was not. As before, the social influence block of variables caused the greatest change in c after controlling for demographic variables, which reflects their importance in explaining current smoking behavior (Table 2).

Cultural Factors Associated with Smoking

Approximately half of the students in the two predominantly Native Hawaiian schools were classified as primarily Native Hawaiian. Related to the third research

Table 2 Multivariate Analyses, Correlates of Smoking—For Ever Smoked and Smoked in Past 30 Days ($n = 1,695$)

Variables	Tried smoking Odds ratio (95% confidence interval)	Smoked past 30 days Odds ratio (95% confidence interval)
<i>Demographic</i>	$c = 0.62$	$c = 0.62$
Socioeconomic status	0.62 (0.50–0.78)	0.97 (0.70–1.34)
Age	1.48 (1.10–2.01)	1.73 (1.31–2.29)
Hawaiian as primary ethnicity	1.18 (0.87–1.58)	1.17 (0.82–1.69)
Gender (females as referent)	0.76 (0.59–0.98)	0.79 (0.52–1.22)
Number of biological parents in home (having two parents as referent)	0.78 (0.68–0.89)	0.93 (0.70–1.23)
<i>School</i>	$c = 0.67$	$c = 0.69$
Public school	2.43 (1.74–3.38)	7.20 (4.58–11.32)
Grade point average	0.75 (0.65–0.86)	0.69 (0.54–0.89)
<i>Social influence</i>	$c = 0.79$	$c = 0.81$
Peer smoking	2.92 (2.43–3.49)	2.82 (2.45–3.25)
Parent smoking	1.54 (1.35–1.76)	1.34 (0.98–1.82)
<i>Psychosocial</i>	$c = 0.80$	$c = 0.82$
Sense of coherence	0.77 (0.58–1.02)	0.75 (0.55–1.03)
Impulsiveness	1.17 (1.06–1.29)	1.04 (0.91–1.20)
Attitudes toward smoking	1.66 (1.26–2.19)	1.77 (1.45–2.17)
Importance of same ethnicity friends	1.00 (0.92–1.09)	1.01 (0.91–1.12)

Odds ratios are based on the full model using GEE. The measure of association, c , is based on logistic models when each block of variables was entered.

question, there were no significant differences between primary Hawaiian and part Hawaiian students in terms of their participation in Hawaiian folklore, customs, and activities and the overall culture composite. However, the primary Hawaiian students scored higher in the questions about the acquisition and importance of Hawaiian culture ($p < 0.05$), frequency of following ethnic customs ($p < 0.05$) and the importance of having same ethnicity friends ($p < 0.01$; see Table 3). Ethnic identification scores and the composite index for all Hawaiian culture were considerably higher in the public than in the private school, but the number of students enrolled in the private school ($n = 93$) was too small to repeat all tests by type of school.

Regarding smoking behavior, there was no significant relationship with any of the cultural variables with one exception: those who had ever smoked (i.e. had tried smoking or had smoked within the past 30 days) reported that having same ethnicity friends was of greater importance than those who had never smoked ($p < 0.001$; see Table 3).

Discussion

This study explored the prevalence and correlates of smoking behavior among Native Hawaiian middle school youth separately by whether youth identified as primarily Native Hawaiian. Findings suggest that primary Hawaiian ethnicity was associated with smoking behavior based on univariate analyses, but once other demographic variables were taken into consideration this variable was no longer significantly associated with smoking behavior. Instead, the social influence variables (i.e. peer and parental smoking) were most influential in explaining both prior and current smoking. Attendance at public school was also an important factor in explaining smoking behavior. Finally, cultural variables such as valuing Hawaiian folklore, customs, activities and lifestyle were largely unassociated with smoking behavior among Native Hawaiian middle school youth.

The current study used the 'primary Hawaiian' vs 'part Hawaiian' designation as a means for operationalizing identification with Hawaiian ethnicity. This study operationalized ethnic identity such that those classified as primary Hawaiian were considered to have stronger Hawaiian ethnic identity as compared to those classified as part Hawaiian. Study findings do not support the hypothesis of a relationship between ethnic identity and smoking behavior among 7th and 8th grade students when demographic variables are taken into consideration. In an effort to identify reasons for this null finding, one might consider the possibility that methodological problems with how ethnic identity was conceptualized contributed to the non-significant findings. Perhaps this method of categorization lacks the sensitivity to capture true differences between the two groups. Or perhaps the creation of these two groups is not a meaningful way to categorize Native Hawaiians (i.e. the group designations are somewhat arbitrary). Nevertheless, despite the acknowledged difficulties of creating meaningful ethnic categories, this is the most widely accepted

Table 3 Hawaiian Cultural Variables, Descriptive and Association with Primary Hawaiian and Smoking in Predominantly Native Hawaiian Serving Middle Schools ($N = 136$)

Cultural variables	Ethnicity		<i>p</i> -Value	Smoking			<i>p</i> -Value ^a
	Primary Hawaiian <i>n</i> = 79 M (SD)	Part Hawaiian <i>n</i> = 57 M (SD)		Never smoked <i>n</i> = 103 M (SD)	Tried smoking <i>n</i> = 27 M (SD)	Smoked past 30 days <i>n</i> = 6 M (SD)	
HI folklore	3.0 (0.67)	3.0 (0.78)	n.s.	3.0 (0.69)	3.1 (0.81)	3.5 (0.55)	n.s.
HI customs	3.4 (0.38)	3.4 (0.60)	n.s.	3.4 (0.47)	3.3 (0.56)	3.5 (0.39)	n.s.
HI activities and lifestyle	2.7 (0.54)	2.6 (0.62)	n.s.	2.6 (0.57)	2.7 (0.64)	3.0 (0.29)	n.s.
HI culture composite	3.0 (0.44)	2.9 (0.52)	n.s.	2.9 (0.46)	3.0 (0.52)	3.3 (0.33)	n.s.
HI culture acquisition and importance	3.4 (0.86)	3.1 (0.74)	<0.05	3.2 (0.78)	3.5 (0.87)	3.5 (1.26)	n.s.
How often following ethnic customs	3.0 (1.10)	2.5 (1.28)	<0.05	2.7 (1.16)	3.3 (1.26)	2.7 (1.37)	n.s.
Importance of same ethnicity friends	2.8 (1.44)	2.1 (1.18)	<0.01	2.2 (1.26)	3.1 (1.49)	3.5 (1.64)	<0.001

^aStatistical comparisons were made comparing never smoked to tried or recent smoking combined.

method for categorizing Native Hawaiians. Moreover, even in the small sample of students attending the predominantly Native Hawaiian serving middle schools, self-categorization of ethnic identity (i.e. the primary vs part Hawaiian designation) was associated with three of the seven cultural variables (acquisition of Hawaiian culture and its importance, frequency of following Hawaiian ethnic customs and the importance of same ethnicity friends). This provides some evidence for the construct validity of the measure.

If one accepts this as a valid method of categorizing Native Hawaiians, the question remains why ethnic identity is not associated with smoking behavior. In other words, having a strong Native Hawaiian ethnic identity confers no greater risk for or protection from smoking among 7th and 8th grade students. These findings run counter to research with African American, Latino and Asian American youth that finds that ethnic identification may be protective against smoking (Parker *et al.* 1998; Chen *et al.* 1999a,b; Ma *et al.* 2004). Given the great ethnic admixture that is characteristic of Native Hawaiians, it may be that identification with some other ethnicity confers protection against smoking. For example, perhaps among multi-ethnic adolescents with some Native Hawaiian lineage, identification with Japanese or Filipino ethnicities may confer a reduced risk for smoking. Clearly more research is needed with large multi-ethnic samples of adolescents in Hawaii. Ideally, this research would use a similar classification system (i.e. the same two questions used in the current study) to allow students to primarily identify with one of several ethnic groups.

Surprisingly, only one of the seven cultural variables was significantly associated with smoking behavior among the subgroup of youth attending the predominantly Native Hawaiian private school: the importance of having same ethnicity friends. However, this study also explored this relationship in the full sample of students from both public and private schools using multivariate analyses and did not find a significant relationship between the importance of having same ethnicity friends and smoking behavior. Thus, it is not clear whether multivariate analyses (in which confounding variables are being controlled) conducted with the subgroup of youth attending the predominantly Native Hawaiian private school would yield different findings (the sample size was too small to explore this possibility in the current study) or if there may be something unique about the students attending the Native Hawaiian serving schools that would cause this relationship to be different in this population. For example in the Native Hawaiian serving schools, having same ethnicity friends may be the norm (since students have less contact with friends of other ethnicities), which may impact the nature of its relationship to smoking behavior. Additional research with a larger sample of students attending Native Hawaiian serving schools could help to better explain the complex nature of this relationship.

Instead of cultural variables and ethnic identity being strongly associated with adolescent smoking, this study found that parent and peer smoking behavior are strongly related to adolescent smoking behavior. This finding is consistent with a

large literature that finds that social surrounding (i.e. parent, sibling and peer smoking) is strongly related to adolescent smoking regardless of ethnicity (Tyas & Pederson 1998; Backinger *et al.* 2003; Kobus 2003; Tyc *et al.* 2004). Bandura's (1986) social learning theory recognizes that complex behaviors can be acquired simply through vicarious learning. Thus, these findings suggest that successful anti-smoking interventions targeting Hawaiian youth must address the smoking behaviors of their parents, peers, siblings or other influential people in their social surroundings.

Limitations

This study has limitations as does any other. First, the assessment of ethnic identity only addressed one of four attributes hypothesized by Phinney (1992) (i.e. self-categorization). Findings may have differed if the other three aspects were measured and examined in relation to smoking behavior as well (i.e. ethnic behaviors and practices, affirmation and belonging, and ethnic identity achievement). Secondly, the cross-sectional design inhibits our ability to make causal statements regarding the relationship between ethnic identity and smoking behavior in the study population. Additionally, there may have been bias in respondents' self-reports of their smoking behavior. However, data from 947 students participating in a biochemical validation study (another component of Project SPLASH) suggest that young adolescents may have a tendency to overreport their levels of tobacco use rather than underreport (Glanz *et al.* 2006).

Regarding data collection, it is noted that the survey was completed at the beginning of the 7th grade year for students at all of the schools except for the predominantly native Hawaiian private school on Oahu, where students received the survey at the beginning of their 8th grade year. Given that smoking status increases with age it might be that measuring smoking behavior among students of two different grade levels impacted the findings. Nevertheless, we do not believe that this time lag significantly impacted the findings because smoking status is not dramatically altered in a one-year period of time. Moreover, the assessment of socioeconomic status has to be considered one of the limitations in this dataset as well. This ecologic measure does not provide a direct measure of the students' socioeconomic status, but assigns an estimated value based on averaged parameters in a neighborhood. Contrary to other states, many of Hawaii's census tracts include residents with a wide range of incomes, educational levels and ethnic backgrounds. In addition, the selection of schools for this project resulted in some bias by excluding the smallest (often rural) schools and those with very low smoking rates and high turnover.

Given the sampling constraints, the population who answered the questions about cultural factors is rather small. Similar to other minority or native populations, there exists some controversy as to what constitutes Native Hawaiian culture. Furthermore, the comparability of the students from a rural neighbor island school (i.e. Molokai) vs an urban, private school on Oahu is problematic because of the differences in

socioeconomic status, the geographic location and other potential unmeasured confounders.

Conclusions

Data from the Behavioral Risk Factor Surveillance System continue to show that Native Hawaiian adults are more likely to be current smokers as compared to individuals of all other ethnic groups in Hawaii (State of Hawaii Behavioral Risk Factor Surveillance System 2004). The same is true for lung cancer incidence. Native Hawaiian men and women experience the highest lung cancer incidence rates in the State of Hawaii (American Cancer Society 2005). The high smoking rates are compounded by the fact that Native Hawaiians appear to have a higher risk to develop the disease than Japanese and Caucasians even after adjustment for the number of cigarettes smoked (Le Marchand *et al.* 1992). If any reductions are to be made in the incidence of lung cancer among Native Hawaiian adults, effective strategies to prevent youth smoking must be developed since smoking experimentation during adolescence oftentimes results in a lifelong addiction to tobacco.

Tobacco use among Native Hawaiian youth is generally on the decline (Centers for Disease Control and Prevention 2005), yet there still exists great variability in terms of smoking prevalence rates among different ethnic subgroups of youth (Appleyard *et al.* 2001; Glanz *et al.* 2005). The high rates of self-reported smoking among Native Hawaiian youth in combination with the high smoking prevalence among Native Hawaiian adults emphasize the need for better education within this population. The strong influence of peer and parent smoking in this population suggests the need for interventions that consider influencing parents to lower their tobacco use, whereas improved school-based programs may be able to address the behavior among peers. In addition to those factors that were studied, numerous unmeasured factors that predict smoking in this population may exist and will need further investigation as potential targets for interventions focused to address the problem of smoking in minority or native youth.

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