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Social Norms and Smoking Risk in *iTaukei* Fijian Adolescent Women

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Abstract

Objective—To investigate the association of a variety of social smoking exposures with cigarette smoking among *iTaukei* adolescent women in Fiji.

Methods—Self-report data were collected in a representative sample of school-going *iTaukei* adolescent women ($n=523$). We fitted logistic regression models of current cigarette smoking with school, peer, media, and other social exposures to smoking as predictors.

Results—Current cigarette smoking was associated with exposure to close friend, peer, and routine social smoking as well as higher prevalence of school peer smoking, but not parent tobacco use and media smoking exposures—in our fully adjusted model.

Conclusions—Peer and school-based smoking exposures may increase cigarette smoking risk in school-going *iTaukei* adolescent women and may be strategic interventional targets to augment existing preventive approaches.

Keywords

Tobacco; school-based; peers; adolescents; Fiji

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Human Subjects Approval Statement

The Fiji National Research Ethical Review Committee, the Partners Human Research Committee, and the Institutional Review Board of Harvard Medical School approved the overarching study protocol.

Conflict of Interest Disclosure Statement

Margaret E Gerbasi is currently an employee of Sage Therapeutics and was previously employed by Policy Analysis Inc, a healthcare research consultancy which has received funding from pharmaceutical and biotechnology companies. All other authors declare that they have no conflicts of interest.

Currently, 80% of the over 1 billion global smokers live in low- and middle-income countries (LMICs) and, by 2030, 80% of the 8.3 million estimated premature deaths attributable to tobacco will be in LMICs.^{1,2} While deaths attributable to tobacco are expected to decline (by a projected 9%) in high-income countries from 2002 to 2030, they are projected to increase by at least 100% in LMICs over the same period.¹ Although 180 countries signed and ratified the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC), LMICs have a substantially lower probability of reaching the voluntary 30% target for reduction in tobacco use by 2025.³ Since most adult smokers initiate smoking before age 18, understanding risk for adolescent smoking is a foundational step toward effective reduction. Therefore, secondary schools provide a strategic point of intervention during a critical window of risk. Although school-based surveillance of youth risk behaviors—including tobacco use—has broad global reach,⁴ few contextualizing data can inform school-based interventions in low- and middle-income settings.^{5–7}

Globally, smoking prevalence is highest in high- and upper middle-income countries (at 24.6% and 23.8%, respectively) whereas it is lower in lower middle-income (17.7%) and low-income countries (16.4%).⁸ Estimates of current smoking prevalence among 13–15 year olds from 45 countries range from 1.7% to 28.9%, further underscoring the global heterogeneity of risk.^{4,9} Likewise, an analysis of tobacco exposure in 12–15 year old adolescents from 68 LMICs by WHO region also found substantial heterogeneity across these areas, with the Western Pacific region consistently showing the highest prevalence—and the Europe region the lowest—across the key parameters of current tobacco use: any tobacco product (17.6% vs. 6.3%), cigarette smoking (13.9% vs. 5.3%), or tobacco products other than cigarettes (12.2% vs. 2.6%).¹⁰ Secondhand smoking exposure (SHS) was also most prevalent (63.5%) among LMICs in the Western Pacific region and least prevalent (42.3%) in the Europe region, likewise showing both particular risk in the Western Pacific as well as heterogeneity across LMICs.^{10,11}

All of the member countries in the WHO Western Pacific Region have signed the WHO FCTC, which took effect in 2005; moreover, in 2013, Pacific health ministers set ambitious new goals in adopting Tobacco Free Pacific 2025.^{12,13} However, prevalent teen smoking persists in areas of the region. For example, available school-based data from the Pacific Islands region show high rates of current cigarette smoking among 13–15 year olds in Palau (32.3%), Samoa (33.8%), and Papua New Guinea (43.8%).¹⁴ Notwithstanding the progress in smoking reduction noted in the Regional Action Plan for the Tobacco Free Initiative in the Western Pacific (2015–2019), this report also cautioned that smoking prevalence among girls in the region had actually increased since the prior 2010–2014 plan and noted in-country disparities with higher prevalence of tobacco use in some sub-populations, including among indigenous peoples.¹⁵

Given the heterogeneity in smoking risk, a more granular and population-specific understanding of usage patterns and risk correlates is essential to identify which interventional strategies can be most effective locally. Whereas more effective smoking prevention and reduction strategies for Pacific youth are especially critical, there is limited available understanding of local risk factors that can potentially better inform targeted local public health interventions for at-risk youth in this region.^{16,17}

This paper examines the association of key social exposures with cigarette smoking among school-going *iTaukei* adolescent women in Fiji, a middle-income country located in the Pacific Islands region and the second most populous country in the region.¹⁸ An estimated 20% of mortality in men and 10% in women in Fiji is attributable to tobacco.¹⁹ Fiji's indigenous community, the *iTaukei*, comprise just over half the population and have a higher mortality rate than in the Indo-Fijian community.¹⁸ Also of special concern, available data suggest that smoking might be especially prevalent in the *iTaukei* Fijian community, including among women. In 2002, NCD Steps Survey reported a prevalence of 27.2% of smoking (of any tobacco product) among *iTaukei* women (ages 15 years and up) versus just 3% among Indo-Fijian women.²⁰ More recent NCD Steps Survey data from 2011 reported that current smoking prevalence was significantly higher among *iTaukei* women (22.9%) than in Indo-Fijian women (2.1%) in the 25–64 year old population surveyed.²¹ Since this time, Fiji's Tobacco Control Regulations 2012 took effect (in 2013) and a 2014 tobacco control amendment decree addressed e-cigarettes; the former included the mandate that health warnings on tobacco packaging appear in three local languages (English, Hindi, and *iTaukei*).^{22–26} Our examination of the publicly available 2016 Global Youth Tobacco Survey (GYTS) data among high school girls 15 years and older in Fiji was consistent with this ethnic disparity in cigarette smoking, with a prevalence of 11.44% among *iTaukei* girls, compared with 5.29% among girls of other ethnicities.^{27,28} Although 11.44% is lower than the 17.6% cigarette smoking prevalence reported in *iTaukei* older adolescent girls assessed in a study related to the present one prior to these measures in 2007, it appears that cigarette smoking remains prevalent in this demographic.²⁹

Adolescence may be an especially vulnerable time for smoking initiation among *iTaukei* women. Research has demonstrated an impact of mass media and shifting social norms on health risk behaviors in the setting of rapid social change among these female youth.^{29–32} Moreover and concomitant with Fiji's rapid economic development, young people are increasingly exposed to imported media and recent evidence suggests that the majority of adolescent interaction with tobacco imagery in Fiji occurs through television, even as Fijian youth now have expanding opportunities to interact with social media.³³

Exposure to tobacco-related media and advertising is an established risk factor for smoking. Although the impact of these exposures has primarily been studied in Western contexts with relatively saturated media environments, cross-sectional studies find that viewing these media is also associated with smoking in some LMICs, whereas exposure to anti-smoking media is associated with lower rates of current smoking.^{34–36} However, media exposures vary across social contexts and time and little is known about how local media environments differentially impact smoking risk.

Numerous studies have also investigated the association of peer and parental smoking with adolescent smoking risk. In a large prospective study of adolescents in six European countries, adolescents' reports of smoking behaviors of friends, best friends, and parents were independently associated with greater risk for smoking.³⁷ In addition, a review of 27 prospective studies suggests classmates' and close friends' smoking are associated with adolescents' own smoking.³⁸ Adolescent smokers, and girls in particular, tend to overestimate both prevalence and approval for smoking among peers, and these

misperceptions are associated with increased smoking risk.^{39–41} Peer smoking norms are more strongly associated with smoking risk for girls, and this risk increases during adolescence.⁴² Although fewer studies have examined this association in LMICs, a cross-sectional analysis of GYTS data from 13–15 year olds in 168 countries found robust associations between reported exposure to smoking, peer smoking, parental smoking, and susceptibility to smoking.⁴³ We are not aware of research in Fiji that examines the association between social exposures to smoking and current smoking—factors associated with risk for smoking in youth older than 15—or that examines the association of current smoking with social- and media-based exposures concomitantly.

Research data also support the impact of school context on smoking risk and underscore that school settings provide a strategic point of preventive intervention.^{44–46} Indeed, available data show that school-based curricula that address social influences and social competencies are effective in reducing smoking onset. However, the vast majority of studies have been conducted in school settings in high-income countries and little is known about relevance to LMIC school settings and no data illuminate relevance in small Pacific Island states like Fiji.^{5–7}

Consistent with evidence supporting an association of several social norms-related exposures with elevated smoking risk, interventions targeting social norms have demonstrated success in reducing smoking.^{47,48} Previous research in Fiji supporting the centrality of social norms in underpinning other youth health risk behaviors suggests that a social normative approach may be fruitful in augmenting current smoking reduction efforts among adolescent women there.^{32,49} To our knowledge, however, such approaches have not been implemented in the Pacific Islands region. This paper aims to deepen the understanding of school peer and other social exposures that elevate cigarette smoking risk among school-going *iTaukei* Fijian adolescent women by examining the relation of peer smoking norms, social exposures to smoking, and tobacco-related media and advertising exposures to current cigarette smoking.

METHODS

We collected study data in 2007 as part of a cross-sectional school-based study of *iTaukei* Fijian adolescent women examining the effects of rapid social transition on risk behavior and mental health. A comprehensive description of study methods has been published; details relevant to the present study are summarized below.^{29,50}

Participants

All *iTaukei* Fijian women meeting eligibility criteria for age (15–20 years old) and school enrollment in forms 3–6 within the 12 schools identified by the Fiji Ministry of Education within a single administrative region were invited to participate in the study. A total of 523 eligible study participants provided written assent and parental informed consent, enrolled, and completed the self-report survey (71% response rate).

Procedures

Study staff administered a self-report battery of questionnaires in classrooms at respondents' schools for completion in a single session. Study participants completed the questionnaires

in their preferred language: either the local *iTaukei* dialect or English, the language of formal instruction. A subsample of study participants ($N = 81$) completed an identical self-report battery approximately one week following their initial response to examine test-retest reliability.

Study Measures

Global school-based student health survey (GSHS).—Students responded to 71 items drawn from WHO’s GSHS content—including 12 tobacco-related items—as part of the self-report battery of questionnaires.²⁷ Tobacco-related study measures are based on responses to these questions. Study questions adapted from GSHS content and their test-retest reliability in this Fiji-based study sample have been previously described.⁵⁰ We include test-retest reliability for these items for the present analytic sample below.

Tobacco use.—Current cigarette use was defined as smoking on one or more days during the past 30 days in response to the question, “During the past 30 days, on how many days did you smoke cigarettes?” Current use of other forms of tobacco was defined as use on one or more days during the past month in response to the question, “During the past 30 days, on how many days did you use any other form of tobacco such as Fijian tobacco, hand rolled cigarettes, cigars, or pipes?” Current use of any tobacco product was defined as use of cigarettes and/or any other tobacco products in the past 30 days as reported in response to the latter two questions. Past-month cigarette and tobacco use aligns with data available about cigarette and tobacco use in WHO GSHS country reporting.^{50,51} We have previously reported prevalence of current cigarette use in this study sample and its association with age, urban/rural location, access to spending money, and alcohol use.²⁹ Test-retest reliability for current cigarette smoking, use of other forms of tobacco, and any tobacco was substantial within the present analytic sample, $\kappa = .74$, $.74$, and $.78$, respectively.

Peer and school smoking norms.—We assessed both descriptive norms (i.e., prevalence of behavior) and injunctive norms (i.e., social acceptability or desirability of behavior) given evidence that each can influence behavior.⁵² We evaluated descriptive norms with two items, “Do any of your closest friends smoke cigarettes?” and “Do any of the girls at your school smoke cigarettes?” Both items were coded as, “None of them,” “Some of them,” or “Most or All of them” (see Table 2). The former item is drawn from existing GSHS content, whereas the latter was developed for this study to measure perceived same sex school-peer norms. Test-retest reliability within the analytic sample was substantial for cigarette smoking among close friends and moderate among same sex school peers, test-retest weighted $\kappa = .61$ and $.52$, for close friends’ and same sex school peers’ smoking, respectively.

We evaluated injunctive smoking norms with the item “Do you think girls who smoke cigarettes have more or less friends?”, test-retest weighted $\kappa = .42$, see Table 2 for response options and coding.⁵³

Measured prevalence of current smoking among same sex school peers—We calculated the prevalence of study participants affirming current cigarette smoking within each school as a proxy measure of school peer smoking norms.

Routine social exposures to smoking.—In order to examine additional social exposures to smoking via parents and others, we asked “Which of your parents or guardians use any form of tobacco?” (test-retest $\kappa=.90$) and “During the past 7 days, on how many days have people smoked in your presence?”, test-retest weighted $\kappa=.44$; see Table 2.

Tobacco-related media and advertising exposures.—We assessed three types of tobacco-related media and advertising exposures. Exposure to actors smoking was assessed with the item, “When you watch television, videos, or movies, how often do you see actors smoking?” Exposure to cigarette advertising on television was assessed with the item “During the past 30 days, when you watched sports events or other programmes on television how often did you see cigarette brand names?” Responses to these items were coded into three categories of relative exposure; test-retest weighted $\kappa=.28, .40$ for exposure to actors smoking and advertising on television, respectively (see Table 2). Exposure to cigarette advertising on billboards was assessed with the item “During the past 30 days, how many advertisements for cigarettes have you seen on billboards?”; test-retest weighted $\kappa=.44$, see Table 2.

Degree of certainty that smoking is harmful.—We assessed degree of certainty that smoking is harmful with the item, “Do you think smoking cigarettes is harmful to your health?” We coded responses dichotomously, with “Definitely yes” as high certainty, and “Probably yes,” “Probably not,” and “Definitely not” responses aggregated as lower certainty, due to low frequency of the latter two responses; test-retest $\kappa=.34$.

Cultural orientation.—We assessed cultural orientation and engagement with traditional *iTaukei* Fijian and/or Western/global cultural values, knowledge, and practices with two composite measures. Scores ranged from .50 to 7.25 and .73 to 6.34 for *iTaukei* and Western/global cultural orientations, respectively. These measures and their psychometric properties within this study sample are described elsewhere.^{31,49}

Translation.—Measures were translated from English into a local *iTaukei* dialect by a bilingual native speaker and then back-translated into English by a bilingual scholar of Fijian languages. Back-translated and original versions were subsequently compared and reconciled.

Data Analysis

We used multivariable logistic regression models to assess the associations of school and peer smoking norms, routine social exposures to smoking, exposure to tobacco-related media, and degree of certainty that smoking is harmful with current cigarette smoking. We first examined bivariate associations between all covariates of interest and cigarette smoking in separate logistic regression models. We then fitted a multivariable model with all

covariates. Generalized estimating equations were used to account for potential non-independence of responses from participants attending the same school.

Per scale authors' recommendations, we computed scale scores if 75% of items in measures of cultural orientation were complete (N = 523). For all other measures, we removed observations from the analytic sample when any data were missing. These procedures resulted in an analytic sample of N = 510, and N = 77 for the retest subsample.

RESULTS

The mean age was 16.7 years (Table 1). Respondents reported moderate orientation to and engagement with both traditional *iTaukei* and Western/global cultures, on average. Approximately 18% of the sample affirmed smoking cigarettes in the past month, 11% reported use of other tobacco, and 19% indicated use of any tobacco product. Among those who affirmed smoking cigarettes, approximately 52% used another tobacco product in the current month, compared to only 2% of those who did not smoke cigarettes. Characteristics were similar to those reported for other analytic samples related to the parent study.^{29,31}

Descriptive data for school and peer smoking norms, routine social exposures to smoking, tobacco-related media and advertising exposures, and certainty that smoking is harmful (Table 2) reflect prevalent exposures to cigarette smoking. Nearly all participants reported at least moderate or greater frequency of exposure to smokers and the majority of participants reported at least moderate levels of one or more tobacco-related media and advertising exposures. Three quarters of the respondents expressed certainty that smoking cigarettes is harmful to health.

Bivariate models showed that each level of exposure to close friend smoking, school peer smoking, and measured smoking among school peers was associated with a higher odds of current cigarette smoking; injunctive smoking norms were not associated with current smoking (Table 3). It should be noted that the magnitude of the odds ratios (ORs) for close friends' smoking associations reflect the very small numbers of smokers in the reference category of no exposure to friend smoking (N = 5). Additionally, higher frequency of exposure to persons smoking and exposure to either parent or guardian smoking were associated with higher odds of current smoking. Adolescents reporting higher exposure to actors smoking were also more likely to be current smokers. Exposure to cigarette advertising on television and billboards was more modestly associated with current smoking. Finally, high certainty that smoking is harmful to health was only marginally associated with a lower odds of current smoking.

The multivariable model revealed independent associations of several tobacco-related peer and social exposures with the risk of current smoking. As in the bivariate models, each level of exposure to close friend smoking and measured prevalence of smoking among school peers was associated with current smoking. Notably, exposure to smoking in some close friends was associated with a nearly nine-fold higher odds of current smoking, and exposure in most or all close friends was associated with a 17.12 times higher odds. Similarly, exposure to most or all school peers smoking was associated with 2.43 higher odds of

current smoking. Exposures to any level of persons smoking above 0 days were also significantly associated with higher odds of current smoking (OR=3.44, 95% confidence interval (CI)=1.52–7.77 for 1 or 2 days; OR=4.44, CI=2.69–7.34 for 3 or more days). Additionally, high certainty that smoking is harmful was significantly inversely associated with current smoking in the multivariable model (OR=.58, CI=.37-.91). However, parent/guardian smoking, exposure to actors smoking, and exposure to cigarette advertising on television were not significantly associated with current smoking in the multivariable model.

DISCUSSION

School-going *iTaukei* Fijian female adolescents who reported greater exposure to multiple tobacco-related peer norms and social exposures were at substantially greater risk for current cigarette smoking. Specifically, greater overall reported exposure to smoking among close friends, smoking among female school peers, routine exposure to persons smoking, and measured smoking prevalence among female school peers were significantly associated with current smoking in the multivariable model adjusted for age and cultural orientation. These findings are generally consistent with reported research findings elsewhere in both high-income countries (HICs) and LMICs.^{10,43,54–56} These findings also expand the understanding of risk factors for cigarette smoking in the Pacific Islands to older adolescents, ages 15–20 years.

Our results suggest that several distinctive types of social influences are associated with smoking and, moreover, that socially proximal influences may be more salient to smoking risk than more distal influences. That is, whereas in person exposure to others smoking was associated with a three to fourfold elevated odds of smoking in our multivariable model, media exposure to smoking was not. Likewise, while both school peer and close friend cigarette smoking were associated with current smoking in the multivariable model, parental tobacco use was not, in contrast to the reported association between parental and teen tobacco use in other LMICs.^{57,58} Moreover, perceived smoking among closest friends was the strongest predictor of smoking. This finding aligns with evidence that individuals with the same group membership are particularly influential and underscores the importance of developing countermeasures to tobacco industry targeting of adolescents through peer initiation.^{59,60}

Next, in contrast with the prevailing understanding of conventional media's impact on smoking risk, and even though study data were collected prior to Fiji's Tobacco Decree of 2010, regulating tobacco-related advertising and promotion, tobacco-related media and advertising were not associated with current smoking in our multivariable model.²³ Many studies examining the association between tobacco-related media and current smoking or smoking susceptibility do not examine more proximal exposures to tobacco, such as school and peer use or perceived school and peer use, in their analyses.^{34,61} Research including both media and social exposures to tobacco in analyses is relatively more scarce.^{62,63} Our finding is consistent with the limited extant research that media influence may be mediated by peer use and norms.^{62,64,65} This finding, moreover, warrants additional research, particularly among LMIC youth, on the association of media exposure and smoking to evaluate a possible mediating mechanism of more distal influences via peer and school

norms and social exposures. In contexts such as Fiji where television is frequently viewed communally, discussion or perceived acceptance among simultaneous consumers not actively expressing opposing views of the media may facilitate norm-based mediation of media exposure.^{66,67} Similar to youth in other LMICs where there is also rapid infrastructural development, Fijian youth have increasing access to relevant social media exposures that may not be adequately regulated by provisions within the WHO FCTC.^{15,68–70} Available GYTS data demonstrate that over a quarter of school-going youth in Fiji had seen videos on the internet in the past month that made smoking tobacco look fun or cool in 2016.²⁸ Such social media access may also increase exposure to and salience of peer-based norms, the impacts of this heightened exposure will need to be monitored.⁸

Our findings illuminate the potential impacts of social exposures to tobacco in a mid-to-late adolescent Pacific Islander female study population—an under-researched demographic—and can inform future research aimed at enhancing smoking risk prevention and reduction efforts for school-going Fijian adolescents. Taken together with existing evidence that cost-effective, simple interventions that target smoking norms may be effective in reducing smoking in some populations of youth, and that school-based curricula addressing social influences and social competencies based approaches have proven effectiveness, study findings suggest that a social norms based approach may be a particularly promising vehicle for reducing smoking among adolescent *iTaukei* girls and young women in Fiji.^{6,7, 71–73}

Moreover, study findings suggest that policy and other interventions focused on reducing school-based social exposures may be more fruitful than approaches placing additional focus on tobacco-related exposures in the conventional media. In contrast to a study reporting an association of parental smoking with smoking initiation in 26 LMICs (which excluded Fiji and other countries in the Pacific Islands region), and a study of youth in 68 LMICs, which included the Pacific Islands region and found an association of parental tobacco use with young adolescent tobacco use, our adjusted multivariable model did not support an independent association of parent tobacco use with adolescent current cigarette smoking in this Fijian study population.⁵⁸ Thus, our findings not only argue for a focus on school milieu and peers as targets for intervention but also for the exercise of caution in extrapolating from findings across distinctive social contexts in favor of understanding risk factors in their local social context. A school-based focus can also align with the overarching principle of multisectoral involvement—as well as recommended strategic actions that include a focus on 100% smoke-free places and reaching out to vulnerable groups—as articulated in the Regional Action Plan for the Tobacco Free Initiative in the Western Pacific (2015–2019).¹⁵

Study Strengths and Limitations

There are several limitations to interpretation of our study findings. First, our cross-sectional study design limits causal inference regarding the direction of association of exposures examined with current smoking. For example, current smokers may choose media or companions that result in increased exposure to smoking. However, the independent association of current smoking with measured prevalence of smoking among school peers as well as among close friends in the multivariable model suggests that normative peer

influence on smoking risk is not solely due to friend selection. Prospective research is necessary to establish a causal relationship in this study population; however, we note that our interpretation of social exposures and perceived norms contributing to smoking risk is consistent with prospective research findings in HICs.^{37,38} In addition, our sample was limited to *iTaukei* school-going adolescent women, and therefore differences not accounted for in culture and age may influence smoking risk in other Fijian populations. We would expect, moreover, that the impact of social exposures on smoking risk among adolescent women in Fiji may differ from risk factors among adolescent men, given *iTaukei* traditions that support gender segregation for many social activities. Finally, although our study data were collected after the WHO FCTC was ratified by Fiji in 2003, the Tobacco Free Pacific 2025 was not adopted until 2013, and the social context of tobacco use has likely changed since 2007.^{13,74} However, given available evidence supporting that cigarette smoking among *iTaukei* girls remains prevalent and that previously identified ethnic disparities in cigarette smoking may persist, the present data set augments available data and enriches understanding of risk factors for cigarette smoking in this at-risk population. In contrast to the GYTS or GSHS assessments—which generate data on a single or multiple health risks, respectively—the present study assessments encompassed additional relevant social characteristics and exposures and allowed for a more detailed analysis of the impact of peer norms to extend the understanding of salient factors associated with smoking.

A notable limitation of the present study is the absence of any data on e-cigarette use among Fijian youth. In fact, available GYTS data demonstrate that a substantial percentage (33.9%) of Fijian school-going youth aged 12–18 have already heard about e-cigarettes, and 12.6% have used e-cigarettes in the past month.^{11,28} Given the emerging understanding of how adolescents in high-income regions perceive and interact with e-cigarettes, as well as evidence supporting that e-cigarette use in U.S. adolescents and young adults is a risk factor for subsequent cigarette smoking, further research on e-cigarette usage among LMIC and Fijian youth should be a priority.^{75–77} Next, limited media access in Fiji may have rendered peer interactions relatively more salient; this possibility underscores the importance of local contextual factors in assessing smoking risk. Finally, we did not assess social media exposures to smoking. Given recent evidence that online exposure to friends' risk behavior may be associated with elevated adolescent smoking and given emerging exposures to social media in the region, future research should evaluate how peer norms and social media-related exposures increase smoking risk.^{8,78,79} Key study strengths include recruitment of a large community-based sample, representative of school-going mid- to late-adolescent *iTaukei* women in Fiji—an at-risk yet underrepresented population in the tobacco and health risk literature. In addition, our use of self-report assessments in the local vernacular *iTaukei* dialect in proctored school-based settings rendered questions comprehensible to students and facilitated confidential disclosure of potentially sensitive information. Finally, rigorous assessment of a broad array of socio-demographic and health-related characteristics within this sizeable study sample permitted an examination of independent associations of distinctive exposures with smoking behavior, while adjusting for numerous known and potential confounders.

Conclusions

The present study is the first to examine school peer influences on current smoking in a LMIC in the Pacific Islands region and supports that school and peer-based factors will be paramount considerations in future smoking prevention efforts in Fiji. Study findings of the association of school peer smoking exposures with current smoking in this school-going *iTaukei* Fijian population are consistent with well-established risk factors for smoking initiation that have been identified in high-income countries. In addition, given the paucity of available data that illuminate how school and peer influences elevate smoking risk in LMICs, findings address a critical knowledge gap that can inform strategies for local preventive interventions. Novel to our study is the augmentation of smoking-related peer exposures assessed through GSHS-based questions with two measures specific to school peer exposures. Findings illuminate the relative salience of school and peer smoking norms in Fiji, and taken together with available evidence supporting the effectiveness of school-based smoking preventive interventions in other regions, can strategically inform local preventive interventions.⁸ Further, our findings support the rationale for developing school-based tobacco preventive programming in this Fijian community as a complementary step to school-based youth risk surveillance.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

Notwithstanding the substantial progress in implementation of tobacco control measures in the Western Pacific Region, there is evidence that girls and some indigenous populations remain at risk and also that new threats continue to emerge.^{15,80} Findings that smoking-related school peer exposures—assessed by both self-report and measured prevalence—are associated with current smoking have important implications for school-based prevention for other LMIC populations in the Western Pacific region and suggest the potential value of more targeted, nuanced, school and peer-based approaches through creative use of media, de-normalization tactics, school policy, and education. For example, because study findings support that teenage respondents were already familiar with the health risks of tobacco use in 2007, prior to Fiji's Tobacco Control Decree of 2010, educational programming might instead focus on teaching about the impact of peer influence, critiquing social norms that either contradict traditional Fijian values or undermine health, and developing social skills that will enable teenagers to avoid smoking initiation. Indeed, the development of skills for critical media consumption may be particularly salient as Fijian, other Pacific Islander, and LMIC youth increasingly access social media. Future research in the region should evaluate the impacts of social media exposures to tobacco use and e-cigarettes as potentially important targets for future interventions.⁸ School-based platforms for health interventions are particularly attractive venues for expanding reach and accessibility to health promotion in resource-constrained settings. There is a robust empirical basis to support school-based preventive interventions for teen smoking and future research should examine how these approaches can be configured for low- and middle-income settings to maximize their beneficial impacts. Finally, study findings of a distinctive pattern of risk factors for cigarette smoking in this demographic underscore the importance of identifying specific social determinants associated with risk in sub-populations.^{15,81} Understanding these local risk

factors can help optimize the effectiveness of tobacco risk reduction approaches and ensure they respond to gender, promote equity, and are culturally appropriate.^{15,81}

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Table 1.Age, Cultural Orientation, and Current Smoking among *iTaukei* Fijian Airls Aged 15–20 Years (N = 510)

	Total	Current Non- Cigarette Smoker	Current Cigarette Smoker
Age, mean in years (SD)	16.7 (1.09)	16.7 (1.09)	16.8 (1.10)
Traditional <i>iTaukei</i> Fijian cultural orientation composite, Mean (SD)	4.83 (1.41)	4.88 (1.42)	4.58 (1.33)
Western/global cultural orientation composite, Mean (SD)	4.43 (.87)	4.47 (.87)	4.42 (.88)
Current cigarette smoker (Has smoked cigarettes on 1 or more days in past 30 days), % (N)	17.8% (91)	--	--
Current user of other forms of tobacco (Has used any other form of tobacco in past 30 days), % (N)	10.6% (54)	1.7% (7)	51.6% (47)
Current tobacco user (Has smoked cigarettes or used any other form of tobacco on 1 or more days in past 30 days), % (N)	19.2% (98)	1.7% (7)	100% (91)

Table 2.

Descriptive Statistics for Key Tobacco-Related Exposures (N = 510)

	Total % (N)	Current Smokers within each category % (N)
<i>Peer smoking norms</i>		
Reported exposure to smoking among close friends		
None of them	34.3% (175)	2.9% (5)
Some of them	45.9% (234)	20.9% (49)
Most of them or All of them	19.8% (101)	36.6% (37)
Reported exposure to smoking among school peers		
None of them	25.7% (131)	9.2% (12)
Some of them	54.3% (277)	18.1% (50)
Most of them or All of them	20.0% (102)	28.4% (29)
Measured prevalence of smoking among school peers		
Less than 14%	30.6% (156)	10.9% (17)
14% to 21%	34.9% (178)	18.0% (32)
21% or higher	34.5% (176)	23.9% (42)
Injunctive smoking norms		
Less friends	21.6% (110)	15.5% (17)
No difference from non-smokers	15.3% (78)	16.7% (13)
More friends	63.1% (322)	18.9% (61)
<i>Routine social exposures to smoking</i>		
Exposure to persons smoking		
0 days	32.5% (166)	6.6% (11)
1 or 2 days	35.9% (183)	18.6% (34)
3 or 4 days, 5 or 6 days, or All 7 days	31.6% (161)	28.6% (46)
Parent or guardian smoking		
Neither or I do not know	58.0% (296)	15.2% (45)
My father or male guardian, My mother or female guardian, or Both	42.0% (214)	21.5% (46)
<i>Tobacco-related media and advertising exposures</i>		
Exposure to actors smoking		
I never watch television, videos, or movies, Never, or Rarely	36.3% (185)	13.5% (25)
Sometimes	35.5% (181)	19.3% (35)
Most of the time or Always	28.2% (144)	21.5% (31)
Exposure to cigarette advertising on television		
I never watch television, videos, or movies, Never, or Rarely	53.1% (271)	16.2% (44)
Sometimes	33.9% (173)	17.3% (30)
Most of the time or Always	12.9% (66)	25.8% (17)
Exposure to cigarette advertising on billboards		
None	34.7% (177)	11.9% (21)
A few	47.5% (242)	23.1% (56)
A lot	17.8% (91)	15.4% (14)

	Total % (N)	Current Smokers within each category % (N)
<i>Degree of certainty that smoking is harmful</i>		
Certainty		
Definitely not, Probably not, or Probably yes	24.5% (125)	22.4% (28)
Definitely yes	75.5% (385)	16.4% (63)

Table 3.

Bivariate and Multivariable Logistic Associations with Current Cigarette Smoking (N = 510)

	Bivariate OR (95% CI)	Multivariable AOR (95% CI)
<i>Peer smoking norms</i>		
Reported exposure to smoking among close friends		
None of them	1.00	1.00
Some of them	9.01 (4.94, 16.42) ***	8.97 (4.67, 17.22) ***
Most of them or All of them	19.66 (6.87, 56.23) ***	17.12 (5.72, 51.26) ***
Reported exposure to smoking among school peers		
None of them	1.00	1.00
Some of them	2.18 (1.18, 4.05) *	1.55 (.78, 3.08)
Most of them or All of them	3.94 (1.54, 1.10) **	2.43 (1.10, 5.35) *
Measured prevalence of smoking among school peers		
Less than 14%	1.00	1.00
14% to 21%	1.79 (1.09, 2.94) *	1.97 (1.14, 3.39) *
21% or higher	2.56 (1.57, 4.19) ***	2.51 (1.52, 4.15) ***
Injunctive smoking norms		
Less friends	1.00	1.00
No difference from non-smokers	1.09 (.50, 2.40)	1.03 (.47, 2.22)
More friends	1.28 (.51, 3.21)	1.17 (.48, 2.86)
<i>Routine social exposures to smoking</i>		
Exposure to persons smoking		
0 days	1.00	1.00
1 or 2 days	3.22 (1.61, 6.44) **	3.44 (1.52, 7.77) **
3 or 4 days, 5 or 6 days, or All 7 days	5.64 (3.50, 9.07) ***	4.44 (2.69, 7.34) ***
Parent/guardian smoking		
Neither or I do not know	1.00	1.00
My father or male guardian, My mother or female guardian, or Both	1.53 (1.03, 2.26) *	1.33 (.82, 2.15)
<i>Tobacco-related media and advertising exposure</i>		
Exposure to Actors Smoking		
I never watch television, videos, or movies, Never, or Rarely	1.00	1.00
Sometimes	1.53 (1.01, 2.34) *	1.19 (.64, 2.23)
Most of the time or Always	1.76 (1.10, 2.79) *	.99 (.45, 2.19)
Exposure to cigarette advertising on television		
I never watch television, videos, or movies, Never, or Rarely	1.00	1.00
Sometimes	1.08 (.81, 1.44)	.72 (.38, 1.37)
Most of the time or Always	1.79 (1.13, 2.83) *	1.44 (.67, 3.11)
Exposure to cigarette advertising on billboards		

	Bivariate OR (95% CI)	Multivariable AOR (95% CI)
None	1.00	1.00
A few	2.24 (1.25, 4.00) *	1.38 (.66, 2.93)
A lot	1.35 (.83, 2.19)	.70 (.38, 1.30)
<i>Degree of certainty that smoking is harmful</i>		
Certainty		
Definitely not, Probably not, or Probably yes	1.00	1.00
Definitely yes	.68 (.44, 1.04) ^(*)	.58 (.37, .91) *

^(*) p < .10,

* p < .05,

** p < .01,

*** p < .001 (statistically significant values in bold font)

OR= Odds ratio, AOR=Adjusted odds ratio, CI=Confidence interval. Multivariable model is adjusted for age, *iTaukei* individual cultural orientation, and Western individual cultural orientation.