



## Psychosocial characteristics of smoking patterns among young adult Samoans and Tongans in California



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### ARTICLE INFO

#### Keywords:

Smoking  
Samoans  
Tongans  
California  
Young adults  
Gender  
Self-efficacy  
Perceived stress  
Sensation seeking  
Hostility  
Depression  
Impulsivity

### ABSTRACT

**Introduction:** Despite the high burden of tobacco-related diseases experienced by Samoans and Tongans, there is relatively little understanding of the factors that influence their smoking behaviors which could inform effective smoking cessation strategies. This study examined several psychosocial characteristics that intertwine to predict smoking patterns in these Pacific Islander subgroups.

**Methods:** Samoans and Tongans between the ages of 18 and 33, who consumed at least 100 cigarettes in their lifetime and were current smokers, were categorized as light, moderate, or heavy smokers. Baseline data from a randomized controlled smoking cessation trial were analyzed. Participants ( $n = 278$ ) were measured on self-efficacy, perceived stress, sensation seeking, hostility, depression, and impulsivity. Least square means estimated from General Linear Models were used to compare psychosocial characteristics across smoking groups, as well as by gender and ethnicity.

**Results:** Samoan male heavy smokers reported higher levels of self-efficacy compared to light smokers, and greater stress, hostility, depression, and urgency over moderate smokers. Samoan female heavy smokers demonstrated greater stress and hostility than moderate and light smokers. Tongan female heavy and light smokers had significantly elevated levels of sensation seeking compared to moderate smokers. Tongan male smokers did not display any meaningful associations with these psychosocial constructs.

**Conclusions:** This study underscores the important distinctions between smoking patterns, gender, and ethnic subgroups. Interventions that rely on aggregated smoking profiles or general Pacific Islander data may not adequately address the complex array of mental health factors that contribute to tobacco use.

### 1. Introduction

Smoking remains a critical public health concern among Pacific Islanders (PIs), including Samoans and Tongans residing in California. Analyses from the California Health Interview Survey found 32.6% of Samoans and 25% of Tongans were current smokers, compared to 21.3% of Native Hawaiians and 14% of the general California

population, underscoring particularly high rates for Samoans and Tongans (Ponce & Kil, 2014). Furthermore, the three foremost causes of mortality among PIs are cancer, heart disease, and stroke, all of which are strongly linked to cigarette smoking (Heron & Statistics NCH, 2016). National surveillance research revealed Tongan women have the highest incidence for all types of cancer compared to Native Hawaiian and Samoan women (US Department of Health and Human Services,

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2018). In addition, Samoan men have the highest incidence of lung cancer, and Samoan women the third highest, within Asian and PI populations in the U.S. (Torre et al., 2016) Samoans also exhibit lower smoking cessation success rates compared to their non-Hispanic, White counterparts (Mishra, Osann, & Luce, 2005).

Young adults (18–25 years old) have the highest smoking prevalence compared with other age groups, according to a 2014 report by the Substance Abuse and Mental Health Services Administration (Substance Abuse and Mental Health Services Administration, 2014). Minority, young adults are particularly at risk for smoking due to several key factors: past cultural-based traumas, social and family norms, discrimination, persistent economic hardships, and low college-degree attainment (Kassel, Stroud, & Paronis, 2003; Pokhrel et al., 2016; U.S. National Cancer Institute, 2017; Walker & Loprinzi, 2014). Nationally, Samoans and Tongans are more likely than Native Hawaiians to live in poverty (16%, 19% vs. 12%) (American Community Service Office, 2012) and less likely to earn a bachelor's degree (12%, 13% vs. 18%) (American Community Service Office, 2012). Young adult Samoans and Tongans may be especially prone to smoking onset and progression because of strongly embedded social norms around tobacco use (Pokhrel et al., 2016), which extend to their country of origin. A 2015 report of tobacco use in the Pacific region revealed that adults in Samoa and Tonga had high rates of current smoking at 38.8% and 30.3%, respectively, in part due to weak tobacco control policies (Kessaram, McKenzie, Girin, et al., 2015; Tautolo, Schluter, Paterson, & McRobbie, 2011). Focus group research conducted in Samoa revealed that, despite general knowledge of the harmful effects of tobacco use, smoking was often viewed as a vital means of connecting with friends. Moreover, smoking initiation frequently occurs in the company of parents and friends, and efforts to quit are often discouraged (Tanielu, McCool, Umali, & Whittaker, 2018).

Periods of life stress, depression, or anxiety among young adults can exacerbate smoking behavior, since smoking is viewed as a viable method to relax, cope, and self-medicate (Gough, Fry, Grogan, & Conner, 2009; Kassel et al., 2003; Morissette, Tull, Gulliver, Kamholz, & Zimering, 2007; Nichter, Nichter, & Carkoglu, 2007; Spielberger & Reheiser, 2006; Taylor, Fluharty, & Bjørngaard, 2014; Walker & Loprinzi, 2014). Studies of young adults have posited that smoking might be one technique employed to exert power over uncontrollable situations (Gough et al., 2009; Walker & Loprinzi, 2014). For example, some Tongans who migrated to New Zealand and encountered adverse living conditions and loss of their traditional social structure suffered from poor mental health outcomes (Foliaki, 1997) that could encourage smoking. The extent to which attitudes and behaviors around tobacco use change when Samoans and Tongans move to the US is not clear from the research to date. While some individuals and subsequent generations may acculturate and adapt more easily to U.S. tobacco use restrictions, others may remain tied to their traditional culture (Tautolo et al., 2011).

Psychosocial characteristics and behaviors can intertwine to predict smoking frequency and intensity that, in turn, lead to tobacco-related diseases (Johnson, Cen, & Gallaher, 2007; Kassel et al., 2003; Laska, Pasch, Lust, Story, & Ehlinger, 2009; U.S. National Cancer Institute, 2017; Walker & Loprinzi, 2014). Past research has found greater perceived stress, emotional distress, depression, and hostility can lead to elevated levels of smoking, or at a minimum greater cravings for cigarettes, potentially bolstering tobacco addiction (Buchmann et al., 2010; Childs & de Wit, 2010; Hickman III, Delucchi, & Prochaska, 2014; Kassel et al., 2003; Spielberger & Reheiser, 2006; U.S. National Cancer Institute, 2017; Watson, VanderVeen, Cohen, DeMarree, & Morrell, 2012). In fact, the relationship between stress and smoking has been well documented and has been linked to greater relapse (Buchmann et al., 2010; Childs & de Wit, 2010; Gough et al., 2009; Kassel et al., 2003; Nichter et al., 2007; Spielberger & Reheiser, 2006; U.S. National Cancer Institute, 2017; Walker & Loprinzi, 2014). Additionally, emotional distress and depression have shown to increase smoking and have

been a critical barrier to quitting (Hickman III et al., 2014; Taylor et al., 2014; U.S. National Cancer Institute, 2017). Research has also shown that people high on hostility smoke to calm themselves in stressful situations or to reduce anger, eventually creating a cycle of addiction (Jamner, Shapiro, & Jarvik, 1999). Hostility has been associated with poorer cessation outcomes as well (Jamner et al., 1999; Johnson et al., 2007).

Sensation seeking and impulsivity can reinforce smoking, as well as foster smoking progression from intermittent or light smoking to daily smoking (Doran, McChargue, & Cohen, 2007; Kassel, Shiffman, Gnys, Paty, & Zettler-Segal, 1994; Lee, Peters, Adams, Milich, & Lynam, 2015). Yet, research has suggested sensation seeking may be more symptomatic of smoking onset and less indicative of smoking level (Lee et al., 2015; Zuckerman, 2007). For sensation seekers, smoking serves as a method to reduce boredom while also providing gratification (Carton, Jouvent, & Widlöcher, 1994; Spielberg & Reheiser, 2006; Zuckerman, Ball, & Black, 1990). In a study of highly impulsive young adult light smokers, those who viewed smoking as a positive coping technique became addicted, heavy smokers over time and had a difficult time quitting (Doran et al., 2007).

Conversely, self-efficacy can positively mitigate the relationship between stressful circumstances and smoking (Niaura, 2000). In individuals with high self-efficacy, studies have typically found lower levels of smoking or improved smoking cessation outcomes (Kouimtsidis, Stahl, West, & Drummond, 2016; Niaura, 2000; Romero & Pulvers, 2013). On the other hand, smokers with low self-efficacy have greater success with abstinence when their self-efficacy has improved and strengthened (Nicki, Remington, & MacDonald, 1984; Sperry & Nicki, 1991).

Currently, our knowledge of the psychosocial contributors to smoking among young adult Samoans and Tongans is sparse, even though this population disproportionately suffers from the severe health consequences of tobacco use. This study, the first of its kind, aims to shed light on the psychosocial factors related to smoking patterns among these two distinct populations of young adult PIs. Specifically, the authors focus on quantities of perceived stress, depression, hostility, sensation seeking, impulsivity, and self-efficacy associated with heavy, moderate, and light smoking. Given that Pacific Islanders are among the fastest growing population in the country (Pokhrel et al., 2016), a better understanding of their determinants of smoking is warranted in order to provide effective smoking cessation programs and education.

## 2. Methods

### 2.1. Recruitment and participants

The study sample was drawn from the baseline assessment of the Motivating Pasifikas Against Cigarettes and Tobacco (MPACT) study, a randomized controlled smoking cessation trial designed for young adult PIs, utilizing a community-based participatory research (CBPR) approach (Kwan, Sabado-Liwag, & Lee, 2017). Recruitment occurred through five PI-serving community-based organizations (CBO) from the Weaving an Islander Network for Cancer Awareness, Research, and Training (WINCART) Center (Kwan et al., 2017). The primary mission of WINCART was to reduce cancer disparities among PIs in Southern California.

Participants were eligible for the study based on the following criteria: self-identified as a PI (e.g., Chamorro, Marshallese, Native Hawaiian, Samoan, or Tongan), between the ages of 18 and 33, consumed at least 100 cigarettes in their lifetime, smoked an average of four days per week during the past 30 days, and were not presently in a smoking cessation program. Additional criteria included: willingness to join a two-month smoking cessation program, having a cell phone, and access to a computer. A total of 316 met study criteria. Thirty-four participants were later disqualified for either not meeting study

conditions (e.g., missing consent, age;  $n = 4$ ) or, for this study, did not select Samoan or Tongan as the racial/ethnic group that best defined them ( $n = 17$ ) and failed to report past 30-day smoking ( $n = 13$ ).

## 2.2. Data collection procedures

CBO research staff met with eligible participants to outline the purpose of the study, answer any questions, and obtain written informed consent. Next, the CBO research staff provided a self-administered 227-item, computer-based assessment at baseline. Participants finished the assessment in 1 h or less and received a \$20 gift card for their time and travel expense.

Study protocols and data collection procedures were approved by the Institutional Review Boards at Claremont Graduate University and California State University, Fullerton.

## 2.3. Measures

### 2.3.1. Demographics and smoking behavior

Demographics included: gender, age, education, marital status, self-reported health, and employment or student status. Smoking behavior items consisted of reasons for smoking using the Meanings of Smoking Index (Spruijt-Metz, Gallaher, Unger, & Anderson-Johnson, 2004), family and friend smoking prevalence, number of days smoked in past 30 days (frequency), and number of cigarettes smoked daily within past 30 days (intensity).

### 2.3.2. Psychosocial characteristics

Self-efficacy was assessed using the 10-item Scale of Perceived Social Self-Efficacy to measure confidence in certain conditions (Smith & Betz, 2000). Items were ranked on a 5-point Likert scale, ranging from no confidence at all to complete confidence, with higher scores indicating higher self-efficacy. The scale demonstrated excellent internal consistency ( $\alpha = 0.91$ ) with this sample.

The Perceived Stress Scale - 10 (PSS10) was employed to gauge self-reported stress levels (Cohen, 1988). Responses were measured on a 5-point Likert scale, extending from never to very often, and higher scores represented greater perceived stress. The scale presented acceptable internal consistency ( $\alpha = 0.73$ ) among this sample.

Sensation seeking behaviors were evaluated with a shortened version of the Impulsive Sensation Seeking Scale (ImpSS), retaining six of the normally 19-item scale (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). These items were: 1) "I like to do things just for the thrill of it."; 2) "I sometimes like to do things that are a little frightening."; 3) "I sometimes do "crazy" things just for fun."; 4) "I like to have new and exciting experiences and sensations even if they are a little frightening."; 5) "I prefer friends who are exciting and unpredictable."; and 6) "I like "wild" uninhibited parties." (Zuckerman et al., 1993). Items were assessed on 4-point Likert scale from yes, definitely to no, definitely not, and greater scores indicated greater sensation seeking. This instrument had good internal consistency ( $\alpha = 0.87$ ) for the sample.

A brief version of the Hostility Inventory was utilized to measure irritability, employing the following three questions: 1) "I lose my temper easily."; 2) "I can't help being a little rude to people I don't like."; and 3) "Lately, I have been kind of grouchy." (Buss & Durkee, 1957). Items were ranked on a 4-point Likert scale ranging from strongly disagree to strongly agree, with greater scores signifying higher levels of personal hostility. The measurement demonstrated acceptable internal consistency ( $\alpha = 0.74$ ) for this sample.

The 20-item Center for Epidemiological Studies Depression Scale (CES-D) was used to evaluate depression (Radloff, 1977). Responses were assessed on a time scale ranging from the lowest possible score of < 1 day to the highest possible score of 5–7 days within a week, and higher totals implied a greater susceptibility for depression. This measurement exhibited excellent internal consistency ( $\alpha = 0.89$ ) among participants.

Impulsivity was measured utilizing the 12-item urgency and 10-item perseverance subscales of the UPPS Impulsive Behavior Scale to assess internal control traits and decision-making aptitude (urgency), and self-discipline and completing goals (perseverance) (Whiteside & Lynam, 2001). Rated on a 4-point Likert scale, from strongly agree to strongly disagree, the greater the score, the more likely the participant had traits akin to urgency or perseverance. The urgency subscale showed good internal consistency ( $\alpha = 0.88$ ), whereas the perseverance subscale was acceptable ( $\alpha = 0.70$ ) for this population.

Prefer Not to Answer was added as an option to each scale item, providing participants the choice to opt-out.

## 2.4. Statistical approach

Participants were placed into one of three groups: light smokers (LS), moderate smokers (MS), and heavy smokers (HS). Smoking categories were determined by both frequency (number of days smoked) and intensity (number of cigarettes smoked on days smoked). Historically, smoking patterns have been inconsistently defined across studies, particularly for LS (Husten, 2009; Schane, Ling, & Glantz, 2010). With this in mind plus the understanding that young adults (Schane et al., 2010; Trinidad et al., 2009) and PIs (Mishra et al., 2005; Mukherjee, Wackowski, Lee, & Delnevo, 2014; Romero & Pulvers, 2013) tend to consume fewer cigarettes per day, groups were defined as: LS smoked 10 or fewer cigarettes per day for 19 or fewer days within the past 30 days; MS consumed 10 or fewer cigarettes per day for 20 or more days within the past 30 days; and HS smoked 11 or more cigarettes per day for 20 or more days within the past 30 days. Based on these definitions, participants prone to sporadic smoking were dropped from statistical analyses ( $n = 4$ ), resulting in a total of 278 participants.

Descriptive statistics were calculated. Chi-Square tests (for categorical variables) and independent *t*-tests (for continuous variables) were used to compare participant characteristics among smoking categories and genders. Least Square Means, estimated from General Linear Models, were used to evaluate differences in psychosocial measures across smoking groups, by gender and race/ethnicity, and adjusted for covariates: age, educational level, and employment status, as well as gender for the total sample. Statistical significance was set at  $p < .05$ . Missing data represented 10.07% of the sample, resulting in the use of listwise deletion. All analyses were conducted using SAS version 9.4 (SAS Institute Inc, 2013).

## 3. Results

### 3.1. Descriptive characteristics

As presented in Table 1, participants ( $n = 278$ ) were mostly Samoan (65.5%), 18 to 25-years-old (53.6%), and female (51.4%). Over half of the sample self-rated their health as fair or poor. Furthermore, 67.3% of respondents reported cigarette smoking assisted with relaxing, 68.0% felt smoking helped to cope with stress, and 47.8% responded that smoking helped deal with anger. At 91.9%, most reported friends in their life currently smoked.

Nearly two-thirds of participants reported past month daily smoking, and of those, two-thirds consumed 6–20 cigarettes on every day they smoked. HS accounted for 20.1% ( $n = 56$ ) of the sample; MS comprised 53.6% ( $n = 149$ ); and LS were 26.3% ( $n = 73$ ). Significant associations were found between smoking category and using cigarettes to relax ( $\chi^2 = 17.36$ ,  $df = 2$ ,  $p = .0002$ ), and between smoking group and utilizing cigarettes to cope with stress ( $\chi^2 = 7.94$ ,  $df = 2$ ,  $p = .02$ ), with LS reporting the lowest proportions for each.

In contrast to men, women were slightly older ( $M = 24.8$ ,  $SD = 3.8$  and  $M = 25.8$ ,  $SD = 3.3$ , respectively), had higher educational achievement ( $p = .02$ ), and were more apt to report that smoking helped them deal with stress ( $p = .01$ ) and anger ( $p = .0009$ ). Regarding psychosocial characteristics, men were found to have higher

**Table 1**  
Selected descriptive statistics.

	Total N (%)	Men N (%)	Women N (%)
Overall	278 (100)	135 (100)	143 (100)
Age*			
18–25 years old	149 (53.6)	79 (58.5)	70 (49.0)
26–33 years old	126 (45.3)	55 (40.7)	71 (49.7)
Ethnicity			
Samoan	182 (65.5)	92 (68.2)	90 (62.9)
Tongan	96 (34.5)	43 (31.8)	53 (37.1)
Marital status			
Married or partnered	145 (52.2)	64 (47.4)	81 (56.6)
Not married or partnered	128 (46.0)	68 (50.4)	60 (42.0)
Education*			
High school or less	137 (49.3)	76 (56.3)	61 (42.7)
At least some college	139 (50.0)	57 (42.2)	82 (57.3)
Employment			
Yes	159 (57.2)	71 (52.6)	88 (61.5)
No	108 (38.9)	55 (40.7)	53 (37.1)
Self-reported health			
Excellent	31 (11.2)	16 (11.9)	15 (10.5)
Good	96 (34.5)	52 (38.5)	44 (30.8)
Fair	118 (42.5)	56 (41.5)	62 (43.4)
Poor	31 (11.2)	10 (7.4)	21 (14.7)
Smoking categories			
Heavy smoker	56 (20.1)	35 (25.9)	21 (14.7)
Moderate smoker	149 (53.6)	65 (48.2)	84 (58.7)
Light smoker	73 (26.3)	35 (25.9)	38 (26.6)
Reasons for smoking			
Gives me more energy	46 (16.6)	20 (14.8)	26 (18.2)
Helps me deal with anger*	133 (47.8)	50 (37.0)	83 (58.0)
Helps me deal with stress*	189 (68.0)	81 (60.0)	108 (75.5)
Helps me forget problems	59 (21.2)	27 (20.0)	32 (22.4)
Helps me relax	187 (67.3)	83 (61.5)	104 (72.7)
Keeps me from being bored	90 (32.4)	39 (28.9)	51 (35.7)
Smoking influence			
Mother or female who raised you	78 (29.0)	30 (23.4)	48 (34.0)
Father or male who raised you	88 (32.7)	45 (35.2)	43 (30.5)
Sibling(s)	189 (70.3)	87 (68.0)	102 (72.3)
Friend(s)	248 (91.9)	116 (89.9)	132 (93.6)
Psychosocial Measures	Mean (SD)	Mean (SD)	Mean (SD)
Self-efficacy*	2.40 (0.91)	2.68 (0.87)	2.14 (0.86)
Perceived stress*	1.83 (0.60)	1.73 (0.58)	1.93 (0.61)
Hostility	1.28 (0.75)	1.25 (0.73)	1.30 (0.76)
Sensation seeking*	1.95 (0.72)	2.11 (0.65)	1.80 (0.74)
Depression*	0.92 (0.59)	0.82 (0.55)	1.00 (0.60)
Impulsivity/urgency	1.55 (0.57)	1.57 (0.57)	1.54 (0.58)
Impulsivity/perseverance	2.09 (0.46)	2.07 (0.47)	2.12 (0.45)

\* Significant gender differences were detected at  $p < .05$  level using independent  $t$ -tests and Chi-Square tests.

self-efficacy ( $p \leq 0.0001$ ), but lower perceived stress ( $p = .006$ ), sensation seeking ( $p = .0004$ ), and depression ( $p = .015$ ) compared to women. Gender did not differ across smoking groups.

### 3.2. Psychological and social variables across smoking patterns

The results demonstrated significant differences in smoking patterns (presented in Table 2). HS were found to have higher means of perceived stress ( $p = .03$ ), depression ( $p = .03$ ), and hostility ( $p = .02$ ) compared to MS, as well as higher mean scores in urgency over LS ( $p = .04$ ) and MS ( $p = .003$ ). In fact, MS reported the lowest levels of perceived stress, hostility, depression, and urgency, though these findings were not always meaningfully different from other smoking groups. LS had significantly lower self-efficacy than both MS ( $p = .002$ ) and HS ( $p = .007$ ). Additionally, LS reported lower perseverance compared to MS ( $p = .04$ ), and nearly approached significance in comparison with HS.

In this study, men and women varied on psychosocial influences related to smoking patterns. As illustrated in Tables 2 and 3, male HS and male Samoan HS scored significantly higher on perceived stress,

hostility, depression, and urgency compared to their MS equivalents. Male LS and male Samoan LS reported lower self-efficacy when evaluated against their MS and HS counterparts. The similarity across these two groups (all male participants and Samoan males) could be attributed to the larger number of Samoan male participants compared with Tongan males in this sample. The two groups did differ on measures of impulsivity. Male LS had significantly less perseverance in comparison to male MS ( $p = .03$ ), while male Samoan LS had relatively high levels of urgency compared to male Samoan MS ( $p = .02$ ). Tongan males did not display significant variations in psychosocial characteristics among smoking groups.

As seen in Table 2, female MS had significantly lower levels of sensation seeking over female LS ( $p = .02$ ). A similar result was observed among Tongan females (refer to Table 4); female Tongan HS and LS had higher mean sensation seeking scores compared to MS ( $p = .007$  and  $p = .008$ , respectively). On the other hand, female Samoan HS demonstrated greater perceived stress and hostility than both their MS and LS counterparts. In addition, female Samoan LS were lower on depression compared with HS ( $p = .03$ ).

## 4. Discussion

Limited knowledge exists regarding smoking among young adult Samoans and Tongans. To our knowledge, this is the first exploration of the unique blend of psychosocial traits linked to smoking patterns within this population. Consistent with the aim of the study, findings revealed that selected psychosocial variables were related to smoking groups.

Self-efficacy is generally viewed as a positive buffer when dealing with challenging situations (Bandura, 2000; Kouimtsidis et al., 2016), but can be situation dependent (Gwaltney, Metrik, Kahler, & Shiffman, 2009), for example, when enrolling in a cessation program. Typically, self-efficacy increases as individuals gain mastery over their smoking urges and proceed to abstinence. In our study, self-efficacy was notably lower among the total sample of LS, male LS, and Samoan male LS. While these participants had completed the baseline survey, they had not yet received the smoking cessation curriculum. By contrast, long-term smokers who have broader experiences with quit attempts and relapse may possess greater self-assurance before starting a smoking cessation program, causing an overestimation of confidence, thereby rendering the assessment of self-efficacy among tobacco smokers at baseline skewed. In our sample, HS did report significantly more years smoking cigarettes ( $M = 11.6$ ;  $SD = 4.6$ ) than LS ( $M = 9.0$ ;  $SD = 4.6$ ) or MS ( $M = 9.7$ ;  $SD = 4.5$ ).

Consistent with earlier studies (Kassel et al., 2003; Laska et al., 2009; Lee et al., 2015; U.S. National Cancer Institute, 2017; Walker & Loprinzi, 2014), the total population of HS smokers, male HS, and Samoan male HS had significantly higher scores of perceived stress, hostility, depression, and urgency, when compared to their counterparts. To a lesser degree, Samoan female HS had higher levels of perceived stress and hostility compared to Samoan female MS and LS. Given the nature of cross-sectional analyses used, our findings support a covariation of these psychosocial variables and smoking. Current evidence further suggests that combinations of these psychosocial characteristics bolster cigarette smoking and pose substantial barriers to quitting (Buchmann et al., 2010; Childs & de Wit, 2010; Doran et al., 2007; Hickman III et al., 2014; Jamner et al., 1999; Johnson et al., 2007; Kassel et al., 2003; Spielberger & Reheiser, 2006; U.S. National Cancer Institute, 2017; Watson et al., 2012). Community-based smoking programs and educational campaigns aimed at Samoans and Tongans should be tailored to address these psychosocial characteristics, in order to improve cessation and prevention outcomes (Johnson et al., 2007).

Results also indicated that for women sensation seeking differentiated their smoking patterns. Specifically, female MS scored significantly lower on sensation seeking behaviors than female LS, and

**Table 2**  
Psychosocial measures across smoking patterns for total sample, males, and females.

Total sample	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 73	<i>n</i> = 149	<i>n</i> = 56	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	2.08 (0.11)	2.50 (0.07)	2.53 (0.12)	.002*	.007*	.81
Perceived stress	1.83 (0.08)	1.79 (0.05)	2.01 (0.09)	.71	.11	.03*
Hostility	1.26 (0.09)	1.20 (0.06)	1.51 (0.11)	.61	.09	.02*
Sensation seeking	2.02 (0.09)	1.90 (0.06)	2.02 (0.10)	.25	.97	.32
Depression	0.88 (0.07)	0.87 (0.05)	1.09 (0.09)	.95	.06	.03*
Impulsivity/urgency	1.54 (0.07)	1.48 (0.05)	1.77 (0.08)	.49	.04*	.003*
Impulsivity/perseverance	1.98 (0.06)	2.13 (0.04)	2.15 (0.07)	.04*	.06	.77

  

Male	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 35	<i>n</i> = 65	<i>n</i> = 35	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	2.20 (0.15)	2.88 (0.11)	2.80 (0.15)	.0004*	.006*	.68
Perceived stress	1.87 (0.10)	1.59 (0.07)	1.93 (0.10)	.03*	.67	.009*
Hostility	1.27 (0.13)	1.06 (0.09)	1.60 (0.13)	.21	.08	.001*
Sensation seeking	2.00 (0.13)	2.20 (0.09)	2.11 (0.12)	.20	.51	.59
Depression	0.90 (0.11)	0.70 (0.07)	1.03 (0.10)	.13	.39	.01*
Impulsivity/urgency	1.62 (0.11)	1.43 (0.07)	1.82 (0.11)	.15	.20	.003*
Impulsivity/perseverance	1.89 (0.09)	2.14 (0.06)	2.08 (0.09)	.03*	.14	.59

  

Female	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 38	<i>n</i> = 84	<i>n</i> = 21	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	1.99 (0.15)	2.20 (0.10)	2.29 (0.20)	.23	.22	.67
Perceived stress	1.81 (0.10)	1.94 (0.07)	2.05 (0.14)	.33	.17	.45
Hostility	1.26 (0.13)	1.30 (0.08)	1.35 (0.18)	.78	.70	.83
Sensation seeking	2.03 (0.12)	1.67 (0.08)	1.97 (0.17)	.02*	.78	.12
Depression	0.88 (0.10)	1.00 (0.07)	1.13 (0.14)	.34	.15	.38
Impulsivity/urgency	1.49 (0.10)	1.52 (0.06)	1.71 (0.13)	.79	.17	.18
Impulsivity/perseverance	2.05 (0.08)	2.13 (0.05)	2.23 (0.11)	.41	.19	.40

Adjusted for age, gender, educational level, and employment status (for total sample).

Adjusted for age, educational level, and employment status (for male and female).

\* Significance at or below .05.

Tongan female MS had the lowest levels compared to their LS and HS cohorts. Based on a study of French smokers, the connection between LS and MS can be explained by the need for LS to seek new experiences, while the association between HS and MS can be attributed to a strong craving for cortisol arousal among HS (Carton et al., 1994). Also, female smokers ranked higher than their male counterparts on the Experience Seeking subscale of the Sensation Seeking Scale (Zuckerman, Eysenck, & Eysenck, 1978; Carton et al., 1994). Research in non-minority populations has shown a similar pattern in which LS and regular, daily smokers are more apt to score higher on sensation seeking (Kassel et al., 1994). Interestingly, we found that Samoan females and Tongan females varied on sensation seeking and, because of this, we recommend future studies investigate this notable sub-population difference.

Even though this is a novel exploration of psychosocial profiles across smoking patterns for young adult Samoans and Tongans, the study has limitations; therefore, the results should be interpreted with caution. First, cross-sectional research does not provide insights into causation between constructs and smoking. Second, the sample size was relatively small and comprised of individuals who expressed a

willingness to quit, hindering its generalizability. Third, the authors realize that multiple comparisons were conducted during the analysis, which may lead to an inflated risk for Type 1 error. After applying a Bonferroni adjustment (Matthew, 2012) (i.e., *p*-value divided by the total number of comparisons) to obtain conservative alpha levels for cross-evaluation, several significant findings remain. Nonetheless, the benefits of this study provide a unique glimpse into potential reasons for tobacco-related health disparities within this population.

Future studies should further explore the underlying mechanisms between smoking patterns and psychosocial traits, as well as identifying any cultural explanations, among Samoans and Tongans. In addition, an investigation into the relationship between self-efficacy and smoking within PIs using more nuanced self-efficacy instruments (e.g., smoking cessation self-efficacy) would lead to a better understanding of the complexities inherent in this psychosocial construct. Smoking profiles of Tongan males did not elucidate any special psychosocial variations, so additional research with this underserved sub-group of PIs is warranted. Biological assessments should be employed to validate survey measures, such as those associated with smoking and stress.

**Table 3**  
Psychosocial measures across smoking patterns for Samoan and Tongan males.

Samoan male <i>n</i> = 92	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 27	<i>n</i> = 43	<i>n</i> = 22	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	2.04 (0.17)	2.84 (0.13)	2.96 (0.19)	.0003*	.0006*	.59
Perceived stress	1.87 (0.12)	1.58 (0.09)	1.92 (0.13)	.06	.77	.04*
Hostility	1.22 (0.14)	1.00 (0.11)	1.61 (0.16)	.21	.07	.002*
Sensation seeking	1.97 (0.14)	2.14 (0.10)	2.04 (0.16)	.33	.73	.59
Depression	0.87 (0.12)	0.64 (0.09)	1.05 (0.13)	.13	.31	.01*
Impulsivity/urgency	1.64 (0.11)	1.32 (0.08)	1.84 (0.12)	.02*	.24	.0006*
Impulsivity/perseverance	1.89 (0.09)	2.11 (0.07)	2.11 (0.10)	.06	.11	.98

  

Tongan male <i>n</i> = 43	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 8	<i>n</i> = 22	<i>n</i> = 13	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	2.80 (0.32)	2.98 (0.19)	2.52 (0.24)	.64	.51	.17
Perceived stress	1.85 (0.24)	1.59 (0.14)	1.99 (0.18)	.35	.66	.10
Hostility	1.41 (0.33)	1.13 (0.19)	1.72 (0.25)	.46	.48	.08
Sensation seeking	2.13 (0.24)	2.36 (0.14)	2.15 (0.18)	.41	.94	.40
Depression	1.03 (0.26)	0.80 (0.14)	1.07 (0.17)	.44	.88	.24
Impulsivity/urgency	1.59 (0.28)	1.67 (0.16)	1.76 (0.22)	.79	.65	.77
Impulsivity/perseverance	1.91 (0.26)	2.18 (0.16)	2.10 (0.20)	.38	.59	.74

Adjusted for age, educational level, and employment status.

\* Significance at or below .05.

**Table 4**  
Psychosocial measures across smoking patterns for Samoan and Tongan females.

Samoan female <i>n</i> = 90	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 23	<i>n</i> = 53	<i>n</i> = 14	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	1.93 (0.19)	2.30 (0.11)	2.29 (0.23)	.11	.25	.96
Perceived stress	1.79 (0.14)	1.89 (0.08)	2.29 (0.17)	.54	.03*	.04*
Hostility	1.22 (0.15)	1.31 (0.09)	1.76 (0.20)	.61	.03*	.04*
Sensation seeking	1.91 (0.17)	1.66 (0.10)	1.71 (0.22)	.21	.46	.85
Depression	0.83 (0.12)	0.95 (0.08)	1.28 (0.16)	.42	.03*	.07
Impulsivity/urgency	1.48 (0.12)	1.55 (0.08)	1.77 (0.16)	.66	.16	.21
Impulsivity/perseverance	2.13 (0.10)	2.19 (0.06)	2.34 (0.14)	.65	.24	.33

  

Tongan female <i>n</i> = 53	Smoking group					
	Light	Moderate	Heavy	Light vs moderate	Light vs heavy	Moderate vs heavy
	Mean (SE)	Mean (SE)	Mean (SE)			
	<i>n</i> = 15	<i>n</i> = 31	<i>n</i> = 7	<i>p</i>	<i>p</i>	<i>p</i>
Self-efficacy	2.04 (0.24)	2.03 (0.17)	2.38 (0.37)	.98	.44	.41
Perceived stress	1.86 (0.16)	2.02 (0.11)	1.64 (0.24)	.43	.46	.18
Hostility	1.36 (0.22)	1.26 (0.16)	0.75 (0.33)	.71	.13	.18
Sensation seeking	2.25 (0.18)	1.64 (0.13)	2.50 (0.27)	.008*	.45	.007*
Depression	0.96 (0.18)	1.06 (0.12)	0.91 (0.26)	.63	.88	.62
Impulsivity/urgency	1.46 (0.16)	1.50 (0.12)	1.53 (0.24)	.82	.80	.91
Impulsivity/perseverance	1.97 (0.11)	2.01 (0.08)	2.12 (0.17)	.81	.47	.55

Adjusted for age, educational level, and employment status.

\* Significance at or below .05.

In conclusion, this study provides fresh evidence that deepens our understanding of smoking behaviors in an underserved population. Self-efficacy was one area that was remarkably different from other studies and other populations. Men and women exhibited different psychosocial characteristics linked to smoking patterns. Ethnic variations also occurred, which underscore the value of data disaggregation. This research offers guidance for current and future smoking cessation programs to reduce tobacco-related health disparities within Samoans and Tongans.

## Funding

This work was supported by the National Cancer Institute, Center to Reduce Cancer Health Disparities (grant number 1U54CA153458). NCI CRCHD was not involved any part of the study design and collection, or analyses and data interpretation, or manuscript writing and publication submission decisions. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the NCI CRCHD.

## Conflict of interest

None.

## Acknowledgments

The authors wish to thank the directors, community and academic researchers, and project staff at the Guam Communications Network, Pacific Islander Health Partnership, Samoan National Nurses Association, Tongan Community Service Center/Special Services for Groups, Union of Pan Asian Communities, Orange County Asian Pacific Islander Community Alliance, California State University, Fullerton, and Claremont Graduate University for their contributions.

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