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Adolescent betel nut use in Guam: beliefs, attitudes and social norms

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Abstract

Betel (areca) nut is an addictive substance chewed with or without tobacco widely in Asia and the Pacific, including the U.S.-affiliated Pacific Islands (USPI). Betel nut use has been found to cause oral cancer. Research suggests that most betel nut use initiation occurs in adolescence. However, very little is currently known about the etiology of adolescent betel nut use. The present study reports findings of a formative, qualitative research conducted to understand the attitudinal and social factors associated with adolescent betel nut use in USAPI. The objective was to develop a theoretical framework of adolescent betel nut etiology that would guide the development of a prevention program. Semi-structured interviews were conducted with 20 adolescent betel nut users (M age = 14.5; SD = 2.2) from Guam. Findings suggested a framework of adolescent betel nut etiology in which intrapersonal, social, and environmental factors influence betel nut use behavior. The framework is consistent with ecological frameworks of adolescent substance use in which proximal personal and social influences on adolescent substance use occur within the context of a wider socio-cultural context conducive to adolescent substance use. Specifically, we found that beliefs such as betel nut tastes good and induces relaxation represent some of the betel nut use motives; parental permissiveness and peer and sibling use encourage betel nut use; and cultural acceptance and easy accessibility to betel nuts provide an environmental context conducive to betel nut use. Findings are discussed in the context of developing an adolescent betel nut use prevention program.

Keywords

betel nut; adolescents; Pacific Islander; drug use prevention

INTRODUCTION

Betel nut use and health consequences

Betel or areca nut is habitually chewed by approximately 600 million people worldwide (Gupta & Warnakulasuriya, 2002), mainly in South Asia and the Pacific. The patterns and mode of betel nut use tend to differ by cultures, customs, and individual preferences (Gupta & Warnakulasuriya, 2002; Paulino et al., 2011). Betel nut can be consumed when the fruit within the husk is fresh and soft; or, when the fruit is mature and the nut has dried to gain a wood-like consistency. Betel nut is chewed as a stimulant (Norton, 1998). Users also commonly report that they chew betel nut for relaxation (IARC, 2006). Betel nut contains a number of psychoactive alkaloids, including the psychostimulant arecoline, which has stimulating effects on the autonomic nervous system (Chu, 2001). The betel nut alkaloids arecaidine and guvacine, which are GABA-uptake inhibitors (Chu, 2001), likely contribute to inducing the feelings of relaxation (Chu, 2001). Thus, similar to other psychoactive substances such as tobacco, betel nut use is dependence-forming (IARC, 2006). Studies show that betel nut use dependence is common among regular users (Benegal et al., 2008; Lee et al., 2012; Herzog et al., 2016).

The International Agency for Cancer Research (IACR) regards betel nut as a Group 1 carcinogen (WHO, 2016). Betel nut use, in combination with tobacco or without, has been found to cause various types of head-and-neck cancer, including oral cancer (WHO, 2016). The causal association was established by reviewing historical evidence from several cohort and case-control studies conducted internationally (IARC, 2006). The review also indicated a dose-response association between betel nut use and oral cancer (IARC, 2006): that is, evidence suggested that the higher the frequency and quantity of betel nut use the higher the likelihood of cancer incidence. A meta-analysis (Gupta & Johnon, 2014) of 15 case-control studies shows that the odds ratio (OR) of the association between betel nut only chewing (i.e., without tobacco) and oral cancer is 2.82 [95% Confidence Interval: 2.35–3.40], compared with OR: 7.46 (95% CI: 5.86–9.50) for chewing tobacco. The pathway to oral cancer is mediated by precancerous conditions such as oral submucous fibrosis (OSF) and oral lichen planus and precancerous lesions such as leukoplakia and erythroplakia [for descriptions see Glossary B, IARC report (2006)]. OSF is a condition uniquely associated with betel nut use. The condition is not associated with tobacco use in any form, either smoking or chewing (Tilikaratne et al., 2006). Broadly defined, OSF involves the fibrosis (i.e., thickening and scarring) of the mucous membrane lining the oral cavity and other parts of the upper digestive tract, which results in the deposition of dense fibrous bands (Tilikaratne et al., 2006). The bands limit the ability to open a person's mouth, which is a defining characteristic of OSF.

Betel nut use in U.S.-Affiliated Pacific Islands (USAPI)

In the U.S.-Affiliated Pacific Islands (USAPI), betel nut is usually preferred relatively fresh and is commonly chewed wrapped in the leaf of a pepper plant (*Piper betle*), along with slaked lime (calcium hydroxide), spices (e.g., clove, catechu), and tobacco (WHO, 2012). The USAPI consists of Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (CNMI), which are U.S. territories, and three independent nations in free association with the U.S.: the Republic of Palau, the Federated States of Micronesia (FSM), and the Republic of the Marshall Islands. A 2012 World Health Organization (WHO) report recognizes betel nut use as an urgent public health threat faced by the Western Pacific region, which includes the USAPI (WHO, 2012). Cancer is one of the two leading causes of mortality in the USAPI, including Guam (CDC, 2013; 2016). Lung and oral cancer incidence and mortality rates are markedly higher in the USAPI than on the mainland U.S. (PCCCP, 2007). Reducing betel nut use prevalence through a concerted prevention and cessation effort appears to be the most logical step towards reducing the cancer burden faced by the USAPI.

Currently, betel nut use prevalence estimates based on a representative sample of the USAPI population, are lacking. However, studies based on regional data suggest that approximately 20% of USAPI adults may use betel nut daily (e.g., Paulino et al., 2017) and approximately 50% tend to use at least once a week (WHO, 2012). However, prevalence rates may vary greatly from island to island. For example, within the Federated States of Micronesia, the rates of use among adults are likely to vary from 21% in Chuuk to 94% in Yap (Paulino et al., 2017). Both men and women chew betel nuts, although men appear to show heavier use and earlier age of initiation (Paulino et al., 2017; Wang, Tsai, Huang, & Hong, 2004; Wilson, 1983).

Similar to much of the South Pacific, South Asia, and Southeast Asia, betel nut chewing has been a part of the Micronesian tradition for a long time (Ysaol, Chilton, & Callaghan, 1996; Gupta & Ray, 2004), having been incorporated into the customs and cultural practices. For example, in Micronesia, offering and receiving betel nuts are perceived as a means of fostering interpersonal bonds (Paulino et al., 2011). Because betel nuts and tobacco both are stimulants, some users combine them while using (Gupta & Ray, 2004). This is a common practice across all betel nut-using cultures. However, sometimes there are ethnic or regional variations. For example, Chamorro users in Micronesia tend to use betel nut without tobacco, whereas Yapese users tend to combine betel nuts with tobacco (Paulino et al., 2011). Although betel nut is freely available for purchase in Micronesia, in some parts of this region, such as the CNMI and Guam, selling or offering betel nuts to minors is legally prohibited (Guam Daily Post, 2016). In addition, betel nut use or spitting betel nut juice is prohibited in public premises, including government offices.

Adolescent betel nut use in USAPI

As with tobacco, betel nut use initiation appears to occur mostly during adolescence (Milgrom et al., 2013; Wang et al., 2004). USAPI adolescents have been rarely studied in the context of betel nut use. The few studies that exist in the area (Oakley, Demaine, & Warnakulasuriya, 2005; Milgrom, et al., 2013; Milgrom et al., 2016) indicate that betel nut

use initiation occurs early among USAPI youth, with the average age of initiation being approximately 11 years. According to Wilson et al. (1983), young children begin by chewing the betel nut husk, then progress into chewing the nut and regular use is established by middle adolescence. By high-school age regular users already show the signs of poor oral health (Oakley et al., 2005; Milgrom et al., 2013; Milgrom et al., 2016). Among youth from Saipan ($N = 309$; average age = 16), Oakley et al. (2005) found that the prevalence of regular use was 63%. Among slightly younger adolescents (average age = 14) from Saipan ($N = 151$), Pohnpei ($N = 159$) and Yap ($N = 100$), Milgrom et al. (2013) found that the lifetime betel nut use prevalence rates were 39%, 38%, and 85%, respectively. Past-30-day use rates across the Saipan, Pohnpei, and Yap samples were 24%, 17%, and 55%, respectively. In Oakley et al.'s (2005) sample, 10% of the adolescents were already showing symptoms of deteriorated oral health such as chewer's mucosa and submucous fibrosis (Trivedi, Craig, & Warnakulasuriya, 2006).

Clearly, adolescence appears to be a critical period during which betel nut use initiation occurs and progresses into regular use among Pacific Islanders. Thus far, however, very little is understood in terms of Pacific Islander adolescents' betel nut use motives, expectancies, and their normative beliefs and exposures. There has been limited effort in terms of developing a theoretical framework that would attempt to explain betel nut use etiology in the population. Developing an etiological framework would also help in deciding whether existing evidence-based adolescent substance use prevention programs can be revised to include a betel nut prevention component. Betel nut is not the only substance used by USAPI adolescents. Current cigarette smoking, alcohol, and marijuana use rates among Guam high school students are 13%, 18%, and 28%, respectively (CDC, 2017). Evidence suggests that adolescent substance use is usually positively correlated such that teens who use one substance are also likely to use another substance (Scheier, 2011). Hence, it is highly likely that betel nut use among Pacific Islander adolescents is positively correlated with use of tobacco products such as cigarettes and tobacco products. Thus, designing a prevention program for USAPI adolescents that would target multiple substances, including betel nut, may be particularly beneficial.

The present study

Currently, there is a lack of evidence-based programs that may be used to prevent or treat betel nut use. Thus the purpose of the present study was to collect formative data, by conducting in-depth interviews with adolescent betel nut chewers in Guam, to inform the development of a theoretical framework that would aid the development of an adolescent betel use prevention program. The framework would help represent variables that may be modulated to prevent betel nut use initiation or escalation.

Because betel nut use is culturally rooted in Micronesia, we assumed at the outset that probetel nut use beliefs and social norms are likely to be widely prevalent in the region and are likely to influence adolescent betel nut use. Perceived or prevalence social norms have strong influence on adolescents' substance use behavior (Eisenberg, Toumbourou, Catalano, & Hemphill, 2014). Social norms may be described in terms of injunctive and descriptive social norms (Rimal & Real, 2005). Descriptive social norms refer to individuals'

perceptions about the prevalence of a behavior in society or in immediate communities. Injunctive social norms refer to individuals' beliefs about what is approved or disapproved by society. Peer influence, which is one of the strongest predictors of adolescent use (Salvy, Pedersen, Miles, Tucker, & D'Amico, 2014), occurs in the broader context of social norms.

Several successful adolescent tobacco and other substance use prevention programs have been based on models of cognitive-behavioral skills training and social influence (Das, Salam, Arshad, Finkelstein, & Bhutta, 2016). Thus, by understanding how social influence, including peer and adult influence works, in the socio-cultural context of Micronesia, we expect this study to inform the development of a culturally-tailored and -sensitive prevention program. For example, evidence-based adolescent substance use programs such as Keepin' it REAL (KIR) are focused on training adolescents on resisting direct (e.g., peer pressure) and indirect social influence (Hecht, Graham, & Elek, 2006). For a program such as KIR to be adapted to the context of Micronesia and to be expanded to address betel nut use, it is necessary to understand the mechanics of social influence that operate in the specific context. In addition, a nuanced understanding of adolescents' beliefs about and attitudes towards betel nut will inform development of strategies to counter pro-betel nut use beliefs and attitudes.

METHOD

Participants

Participants were 20 adolescent, current betel nut chewers, ranging in age between 11 and 18 years. The average age of the participants was 14.5 (Standard Deviation = 2.2). The majority of the participants were girls (75%). Participants were diverse in terms of ethnic background: 40% Chamorro from Guam ($n = 8$), 5% Chamorro from Saipan ($n = 1$), 45% Chuukese ($n = 9$), and 10% Palauan ($n = 2$). Chamorros are the indigenous people of the Mariana Islands, which include Guam and Saipan. Chuukese and Palauans are the indigenous peoples of the islands of Chuuk, Palau, and Saipan, respectively. Nine out of 20 participants (45%) reported chewing betel nut with tobacco the last time they chewed betel nut.

Recruitment and data collection

The goal of our study was to conduct an in-depth exploration of a new subject area rather than make statistical inferences. Therefore, recruitment aimed at obtaining a convenience sample of participants. To be eligible to participate, participants had to be 1) middle or high school aged; 2) current betel nut chewers; and 3) able to comprehend English and fluent in English. Current betel nut chewer status was determined based on self-reported, current daily or occasional betel nut chewing behavior and having had chewed a betel nut in the past 30 days. Data collection and recruitment did not commence until the study was approved by the local/regional Institutional Review Board in Guam. Prior to interviewing each of the participants, we obtained a signed parental consent form, which explicitly and clearly stated the purpose of the study. Participants also had to complete and assign an assent form to participate. There were a few children whose parents did not approve of their participation in our study, and so these children were not permitted to participate. In some cases, parents

were present on the site of the interview, however, they could not be present at the same room as their child during the interview. In all cases, there was an adult representative or guardian, who was not a member of the research team, present at the site of the interview.

The study was advertised at middle and high schools, and at churches and community centers in Guam. Because adolescents were reluctant to come forward and identify themselves as betel nut chewers, research staff also used proactive approaches for recruitment. For example, research staff approached adolescents accompanied by parents in community parks. In addition, research staff welcomed referrals from community workers and teachers. Written parental consent and adolescent assent were obtained before the interview was conducted.

Interviews were conducted by the first and the third authors following a semi-structured guideline. Each interview session lasted approximately an hour. A total of 17 questions were asked; however, the guideline was flexible as to the use of relevant probes. The questions were focused on three domains: 1) demographics (age, ethnicity) and betel nut use form (e.g., with or without tobacco); 2) reasons for using betel nut and positive and negative consequences associated with betel nut use; and 3) social/cultural acceptability of betel nut use. Questions on social/cultural acceptability of betel nut use focused on parents', other adult family members', and teachers' attitudes towards betel nut use; siblings' and peers' attitudes towards betel nut use; and ease of betel nut accessibility.

Sample size was determined based on recommendations in the literature (Dworkin, 2012) and the concept of data saturation (Lincoln & Guba, 1985; Strauss, 1987). There is no empirical method to determine the right sample size for an in-depth interview study. In the literature, the sample sizes for such studies have ranged between five and 50 (Dworkin, 2012). Thus, we chose a sample size of 20 because the number is a compromise between the two extremes. As noted by Yin (2011), large sample sizes are not the only way of boosting confidence in qualitative studies. Attending to the composition of the study participants through a diverse recruitment strategy can help protect against rival explanations or undesirable biases. Further, as we continued to collect and analyze the data, interviewing the 18th participant onward, we began to observe data saturation.

Data analysis

The NVIVO software (Version 9) was used to code, manage and analyze the qualitative data. Data were analyzed following the principles of inductive content analysis (Elo & Kyngäs, 2008). For the current analysis, the focus areas were attitudes and social norms. To code attitudes, we defined two concepts: 1) perceived positive consequences of betel nut use that motivated youth to use betel nuts; 2) experienced negative consequences of betel nut use. To code social norms, we defined 1) pro-betel nut social norms and 2) anti-betel nut social norms. Pro- and anti-betel nut social norms were defined as social or cultural factors that encouraged and discouraged betel nut use among adolescents, respectively.

First, open coding was performed. Two research staff separately read the transcripts, noting down each concept related to 1) positive consequences, 2) negative consequences, 3) pro-betel nut social norms, and 4) anti-betel nut social norms. At this stage, the maximum

possible number of concept categories was generated separately for the four categories. Thus, a list of codes was created on an ongoing basis. Next, the codes were grouped under higher order concepts. We looked for themes across the interviews and identified convergent and divergent themes. A final master code list was created along with primary or higher order code definitions up to the point of saturation. We compared and contrasted the codes for all 20 interviews.

RESULTS

Participants' betel nut use history and environment

Seventeen out of 20 participants reported having at least one close friend who chewed betel nut. Nine of the 20 adolescents had first chewed betel nut when they were in elementary school or were of elementary school age (5 to 10 years old); another 9 had first chewed betel nut when they were in middle school or were of middle school age (11–13 years old); and the remaining two students had first chewed betel nut in high school or when they were 14 years of age or older. Seven of the 20 participants chewed their first betel in school, 6 at home, 4 at a relative's place, 2 at a friend's home, and 1 at a public place. Eleven participants obtained the betel nut that they first chewed from their friends, 3 directly from their parents, 2 picked the betel nut from a tree, and the remaining 4 obtained the betel nut from their siblings, cousins or other relatives (e.g., grandparents).

Ten participants reported that their parents disapproved of their using betel nut; 5 reported that their parents did not mind if they used betel nut; and 5 reported that their parents did not care as long as they did not chew in front of them. Fifteen participants mentioned that their teachers would disapprove of their chewing betel nut; 5 mentioned that their teachers did not care. Eight of the participants reported that at least one of their parents chewed betel nut habitually. Seventeen of the participants reported having at least one close family member who chewed betel nut regularly.

Perceived positive consequences of betel nut use

Table 1 shows the concepts generated under perceived positive consequences of betel nut use along with the quotes that exemplify the concepts. Perceived positive consequences concepts represent motives and outcome expectancies related to betel nut use which are likely to explain the beliefs and attitudes that encourage betel nut use. A total of four concepts emerged: good taste, relaxation, and fun and boredom relief.

Good taste.—Three participants reported that they tried betel nut or continue to use betel nut because they perceived or found the taste of betel nut to be pleasant. A 17 year old Chukese girl mentioned that she first tried betel nut because she expected a betel nut to taste sweet:

Interviewer (I) The first time you used it [betel nut], why did you use it?

Participant (P) Because I wanted to try it and see how it tasted.

I How did you think it would taste?

P Like sweetish.

An 11 year old Palauan boy reported being addicted to betel nut because of betel nut's taste, which he found to be sweet:

I Why do you think you got addicted to it [betel nut]?

P 'Cause the juice the way it tastes.

I How does it taste to you?

P It tastes like betel nut juice.

I Betel nut juice. How does betel nut juice taste? If you were to describe it to someone who has never tried it before, how would you say?

P Like a coconut, the outside of it; the green ones yeah and then once you just bite it that's how it tastes.

I Is it bitter, sweet, sour?

P Yeah, sweet.

However, the perceived good taste was not always described as sweet. A 17 year old Chuukese girl likened the taste of betel nut to that of olive:

I How does it [betel nut] taste?

P It's just like olive.

I Olives? Okay, you like the taste?

P Yes.

Relaxation.—Four participants reported that chewing betel nut helped them reduce stress or helped them relax. A 17 year old Chuukese girl reported that she used betel nut to reduce the feeling of stress. When probed whether the action of the betel nut made her feel physically better, she affirmed:

I Okay why do you chew betel nut?

P Like to calm myself down from stress.

I It makes you feel better?

P Yes

I Okay, can you describe how you feel when you chew betel nut? Does it give you a physical feeling?

P Yeah, of feeling good.

Other 3 participants also reported that chewing betel nut made them feel better. One participant, a 13 year old Palauan girl, believed that betel nut chewing induced positive feelings among chewers:

P Cause most the people that chew, they cheerful and when they don't they argue fight.

Fun and boredom relief.—Five participants mentioned the chewing betel nut was a fun activity, to be engaged in with friends, and to kill time when bored. For example, when asked why she uses betel nut, a 16 year old Chuukese girl said:

To kill time, like when it's boring.

I When it's boring, how does betel nut make it fun?

P Like when you're chewing and sitting there, yeah.

I How does it help kill time?

P Well when it's boring and you're not doing anything else, it makes your mouth move.

Comments from others participant were similar to this example, such as from a 14 year old Chuukese boy:

I Why do you use betel nut?

P Just chew it for fun.

I For fun, how does it make it fun?

P Like whenever we're doing something we just chew it. It get you in the mood.

I How does it make you feel?

P Feel good.

Negative consequences of betel nut use

Table 1 shows the negative consequences of betel nut use reported by the participants. These included 4 types of negative physical consequences that the participants had experienced from chewing: bitter taste, dizziness and headache, pain in mouth, and bad teeth.

Bitter taste.—Five participants reported that they did not like the taste of betel nut, or the taste of betel nut was off-putting for them. They variously described the taste of betel nut as “bitter,” “ugly,” “very bad,” and “like grass.” For example, a 14 year old Chuukese boy noted that his friends kept chewing and spitting betel nut because of the bitter taste, which he too disliked:

I Why do you think other people use betel nut?

P Well, I don't know. It's just their addicted to it. They just wanna. If they make one and they chew it, they spit it out, they wanna make it again 'cause they like the way it felt.

I The way it feels. How does it feel?

P It's bitter.

I Okay it tastes bitter. Does it make you feel any way?

P Yes. Not good for me.

Dizziness and headache.—Six participants reported that chewing betel nut made them feel dizzy or gave them a headache. In most cases, participants mentioned that they did not find the feelings of headache and dizziness pleasant. For some, such as a 14 year old Chuukese boy, headaches were being experienced only recently; presumably as betel nut consumption increased:

I Why do you use betel nut?

P I use betel nut 'cause like it.

I How does it make you feel?

P It feels like it gives me headache and all that.

I Gives you headache, but like a good or a bad headache?

P Bad.

I A bad headache, but you still like to chew it?

P No.

I No? Do you think you're gonna stopchewing?

P Yes.

I Yeah, was it recently that it gives you headache or right when you started?

P Recently.

Hurts the mouth.—Four participants mentioned that chewing betel nut hurts the mouth. They described the experience in different ways. An 11 year old Palauan boy mentioned that the slaked lime used in betel quid “cut inside the mouth”:

I Do you think betel nut use is harmful?

P Yeah.

I Why?

P ‘Cause it can like cut your mouth. ‘Cause you know the lime once you use it and put a lot on the betel nut the chew is gonna cut inside your mouth. It’s gonna get cut, it’s gonna make me like hurt. And later you’re not gonna be able to chew cause your mouth is aching.

A 13 year old Palauan girl recounted that chewing betel nut causes stiffness in the mouth and “creates sores”: Yet another participant, a 16 year old Chuukese girl, reported that she got “blisters” in her mouth from chewing:

I Okay, do you think betel nut use is harmful?

P I don’t know, well yes, it can harm you in many ways. It’ll give you mouth, you know mouth stuff. It’ll give you like I don’t know blisters in your mouth.

I Does it bother you?

P Yeah, you can’t eat any hot stuff.

I What happens if you eat hot stuff?

P It’s gonna burn.

Bad teeth: Six participants reported that betel nut chewing harmed their teeth or made their teeth look bad. For some, such as a 12 year old Chamorro boy, “bad teeth” was a consequence, not so much experienced but expected:

I Do you think betel nut use is harmful?

P Yes

I Yes, how?

P ‘Cause your teeth turn orange then starts falling out then it’s like “see what you did” (laughed).

The fear of teeth turning orange or red recurred across participants. When asked what she does not like about betel nut chewing, an 18 year old Chuukese girl said:

P I think it makes us dizzy.

I Dizzy, oh okay.

P And our teeth get red.

I Do you think there are other effects of betel nut?

P Yeah

I What kind?

P I think it makes you lose teeth.

Pro-betel nut social norms

Pro-betel social norms were categorized into the following five categories: parental/family permissiveness, cousins and sibling use, friend use, easy access, and cultural acceptance.

Parental/family permissiveness.—This category represented concepts such as adolescent betel nut use is explicitly or implicitly condoned by parents and/or adult family members and that parents and/or adult family members play a role in adolescents' betel nut use initiation or maintenance. One of the reasons why some participants began using betel nut was because they had always seen their family members use betel nut, as the following response from a 13 year old Chamorro girl shows:

I Okay, why did you use betel nut that first time?

P Just wanted to try it 'cause I saw so many of my family using it.

Some participants first used betel nut because they were actively offered a betel nut by one of their family members. When asked how he happened to use a betel nut for the first time, a 15 year old Chamorro boy said: "My grandma is the one who let me try."

Half of the sample reported that their parents were explicitly or implicitly permissive towards their betel nut use. Implicit permissiveness is exemplified in the following excerpt where a 14 year old Saipanese boy implies that his parents are fine with him using betel nut as long as he did not chew the nut in front of them:

I Do your parents or other family members mind if you use betel nut?

P Sometimes, but that's only if they're around. If they're not around they don't mind.

Some youth explicitly knew that their parents were fine with their using betel nut. For example, when asked whether her parents mind if she used a betel nut, a 13 year old Chamorro girl was curt and direct in her response: "No, not really." For some others, permissiveness, although true in practice, was somewhat more ambivalent in terms of explicitness. A 16 year old Chamorro girl mentioned:

I Do your parents or other family members mind if you use betel nut?

P We never really talk about it.

Cousin and sibling use.—In addition to adult betel nut use, widespread betel nut use by siblings and cousins, who are likely to be closer to the adolescents' in age, seem to be an important pro-betel nut influence. Six participants mentioned that cousins or siblings, in one way or the other, encouraged them to use betel nut. For example, a 16 year old Chamorro girl noted the role cousins played in her initiating betel nut use:

I Why did you use betel nut the first time?

P It was, I don't know we were all doing it.

I Um who is we?

P Like me and my cousins.

Similarly, a 13 year old Chamorro girl noted how her brothers influenced her decision to try betel nut:

I Okay why did you use betel nut the first time?

P It was actually 'cause I wanted to try it and everything and its cool...when I see my brothers chewing it, it's you know something that I want to try out.

Friend use.—Almost everyone in the sample had at least one friend who chewed betel nut. One main in which friends may influence betel nut use is by making the substance available for use, as illustrated by the comments of a 17 year old Chamorro girl:

I Where were you when you used betel nut for the first time?

P In school.

I In school, how did you get the betel nut?

P From my friends.

In addition, friends may actively offer betel nut. Here is an example based on the comments of a 15 year old Chamorro boy:

I Do people offer you betel nut?

P Sometimes.

I Can you identify their relationship to you?

P They're either my friends or sometimes my uncles.

Easy access.—Easy access to betel nut is another exemplifier of pro-betel nut use social norms in the current data. Eight participants reported how easy it was for them to access betel nut. Betel nut is perceived to be just around, as mentioned by a 16 year old Chamorro girl, for example:

I Okay, where were you when you first used betel nut?

P My grandpa's house.

I How did you get the betel nut?

P Well, it was around.

A 17 year old Chuukese girl reported that she obtained the first betel nut that she tried from her mother's handbag. As an indication of how socially acceptable betel nut use is, three

participants mentioned that betel nut trees are common in their environment and betel nuts can be easily picked from the trees. For example, a 16 year old Chamorro girl commented:

I Okay, how did you get the betel nut when you first used it?

P Mm, my cousins were climbing the tree so they just brought it down and we just tried it.

Cultural acceptance.—Two participants mentioned that for certain groups in Micronesia, such as those from Saipan and Yap, betel nut chewing ingrained in the culture and is considered customary. An 11 year old Palauan boy mentioned how it is common among his friends from Yap to use betel nut:

I Why do you think your friends use betel nut?

P I don't know, there's only one friend that uses betel nut. His siblings, his older siblings that gives them. They're from Yap. And their custom, they have chew for little kids; from first grade going up they can chew betel nut.

I So it's a part of their culture?

P Yeah it's a part of their culture.

A 16 year old Chamorro girl mentioned that chewing betel nut is cultural to her relatives from Saipan:

P Um, well, most of my cousins are from Saipan and it's a thing to, so they kinda started chewing young and just started yeah.

I Do you think it's a part of the culture?

P In some places, yes.

Anti-betel nut social norms

Far fewer anti-betel nut use social norms concepts emerged compared with pro-betel nut social norms. The following two categories of concepts, however, seemed pertinent in terms of representing important social control mechanisms against adolescent betel nut use: parent control and teacher control.

Parent control.—Half of the participants reported that their parents clearly disapproved of betel nut chewing. This suggests a proportion of parents see adolescent betel nut use as problematic. Compared with parental permissiveness, parental control is likely to discourage adolescent betel nut use, as illustrated below by comments from an 11 year old Palauan boy:

I Do your parents or other family members mind if you use betel nut?

P Yes

I What would they say if you used it?

P They're gonna get mad.

Teacher/school control.—The majority of the participants mentioned that their teachers disapproved of their using betel nut. Three participants also mentioned that they expected to be suspended from school if they were caught using betel nut. An example based on the comments of a 14 year old Chuukese boy is as follows:

I No, what do you think your teacher would say if they saw you use betel nut?

P They'll like suspend me.

These data suggest that some teachers and schools consider betel nut use by youth to be unacceptable.

DISCUSSION

This formative study was conducted to understand the attitudinal and social factors that may influence adolescent betel nut use in the USAPI. To our knowledge, this is the first study to have conducted in-depth interviews with adolescent betel nut users, in the USAPI or elsewhere. Our objective was to initiate investigation towards developing an etiological framework for adolescent betel nut use, with the goal of informing development of a prevention program. Our long-term goal is to develop a prevention program targeting adolescent betel nut use in USAPI, including Yap and Saipan, where betel nut use prevalence is particularly high.

Our findings argue for a theoretical framework that would include betel nut use motives and social influence. In addition, the framework will need to consider protective factors such as adolescents' awareness of negative consequences of betel nut chewing and parental and school sanctions against betel nut use. According to our data, social influence in the present context needs to be understood in terms of direct and indirect parental influence; other adult family member influence; the influence of peers, cousins, and siblings; and finally, cultural influence. Outside of schools, disapproval of adolescent betel nut use does not appear to be strong, which is consistent with previous research among USAPI adolescents (Milgrom et al., 2013; Milgrom et al., 2016; Oakley et al., 2005). Betel nut use appears to be highly prevalent in adolescents' social environment: parents' and/or other adults' use of betel nut appears to be high and betel nut use appears to be common among cousins, siblings, and friends. Furthermore, the youth found betel nuts to be easily accessible. Also, for some island groups such as Yapese and Saipanese, betel nut use appears to be a part of cultural tradition and possibly a symbol of cultural identity.

The risk and protective factors suggested by the current data are consistent with the findings of decades of research on risk and protective factors of adolescent substance use (Scheier, 2011). The risk and protective factors of adolescent substance use have been successfully integrated into several theoretical frameworks (Brook et al., 1990; Dishion et al., 2002; Pentz, 2011). Notable among them is the Theory of Triadic Influence (TTI) (Petratis, Miller, & Flay, 1995). The TTI integrates risks and protective factors of adolescent substance use into three main domains of causes, namely personal, social, and cultural/

environmental. Predictors of substance use in the personal domain include within-individual risk factors such as higher risk-taking tendencies, higher positive outcome expectancies associated with substance use, and lack of skills to resist social influence. Predictors in the social domain include peer, family, and other types of interpersonal influence. Societal-level norms, ease of access to substances, risk perceptions, and community-level policies are factors that fall in the cultural/environment domain.

In addition to categorizing the risk/protective factors in terms of the three causal domains, TTI also organizes the variables in terms of their level of influence. That is to say that variable are ordered in terms of whether their influence is proximal or distal. For example, adolescents' lack of skills to resist peer pressure to use a substance may be a proximal predictor of substance use whereas social norms, cultural context, and societal-level risk awareness are likely to be distal factors. Thus, in essence the TTI represents an ecological framework that places the proximal processes leading up to substance use in community and cultural contexts.

Figure 1 illustrates how the current findings fit the TTI domains. The perceived positive consequences of betel nut use represent adolescents' personal beliefs that encourage betel nut use. Similarly, negative consequences experienced by users represent personal factors that are likely to deter betel nut use. Parental use and permissiveness and influence of peers and cousins/siblings represent social factors that encourage betel nut use. On the other hand, parental and teacher control against betel nut use are likely to discourage betel nut use. Cultural acceptance and ease of access to betel nut represent cultural/environmental factors that are conducive to betel nut use.

Figure 1 also shows some of the intervention strategies that may act upon each of the three domains. Intervention programs may be designed to address one, two, or all three domains simultaneously. For example, adolescents can be trained on cognitive-behavioral skills to resist social influence and a different component of the same program may educate parents on the harms of betel nut use and train them on skills of parental monitoring. Traditionally, schools have served as a center for the implementation of adolescent substance use prevention programs (Blueprints Program, 2018), as schools provide an easy venue for interventions to impact a large number of youths. School-based programs are usually delivered in the form of a classroom curriculum (Botvin & Griffin, 2007). These programs may primarily address intrapersonal factors such as motivation, skills and decision-making or focus mainly on countering social influence (Botvin & Griffin, 2007). The programs may also combine, to varying extents, strategies to counter social influence (e.g., resisting pressure) with cognitive-behavioral training on, for example, impulse control.

Several school-based prevention programs have utilized family-based components to address personal and family-level influences on adolescent substance use prevention (Ryzin et al., 2016). The family-based components actively involve parents or other adult family members in intervention activities along with the adolescents, with the end goal of, for example, improving parent-child communication, parental monitoring, improving family-level understanding of health risks of substance use and substance use norms, values, and attitudes

(Ryzin et al., 2016). Adding a family-based component seems to enhance the effects of a school-based prevention program (Ryzin et al., 2016).

In general, research shows that multi-component programs that involve media, community, and parents, with schools as the center of program implementation, have the most enduring preventive effect (Pentz, 1999). The multicomponent programs can combine school and family-based components with mass-media campaigns, community-level activism or programs, and community-level policy development and enforcement (Pentz, 1999). Multicomponent programs are based on ecological frameworks and impact behavior change by addressing individuals' need for cognitive-behavioral skills as well as the need for change in social or cultural norms. In the context of betel nut, a media campaign may highlight the importance of oral health and the risks betel nut chewing that poses to oral health, including increased risk for oral cancer. Emphasizing oral diseases, including cancer, as an outcome of prolonged betel nut use is likely to be relatable to youth who have had their mouth cut by slaked lime or whose teeth have been hurt while chewing. The fact that for adolescent chewers chewing betel nut involves enduring pain and discomfort suggests that they may be receptive to anti-betel nut messages, if such messages are strategically conveyed. In addition, the addictive nature of betel nut use can be stressed to explain that betel nut use experimentation may lead to chronic use and eventually to disease and mortality.

It should be noted, however, that changing norms and normative behavior that have basis in traditional culture requires sensitivity in approach. Previous tobacco prevention and smoking cessation programs designed for American Indian/Alaska Natives (Choi et al., 2016; Kulis et al., 2017) can be valuable guides in this regard. These interventions, based on extensive formative research, developed culturally sensitive strategies to train participants on counteracting social influence and norms. For their example, adolescents may be trained to refuse betel nut offers by family members in a non-confrontational way that is respectful yet assertive. Similarly, media campaigns targeting pro-betel nut social norms may counteract the habit-forming use of betel nuts by adolescents while appreciating the symbolic, context-specific use of betel nuts by adults. Also, mass media campaigns may discourage betel nut use among adolescents but recommend harm reduction strategies for adults who like to continue using betel nut. This may be achieved by promoting, for example, betel nut only use versus use of betel nut with slaked lime and tobacco.

Thus, based on the current findings and the lessons learned from previous tobacco and other substance use prevention programs, a culturally-tailored, multicomponent school-based prevention program may be needed to reduce the rates of betel nut use among USAPI adolescents. Because betel nut etiology appears to be similar to the etiology of other substance use, as attested by the framework presented in Figure 1, an existing substance use prevention program may be revised to add betel nut component. Such a program may be implemented as a curriculum in schools, involve parents and a mass-media campaign, and address a range of substances, including tobacco, alcohol, and marijuana. The program may also involve community partners for help with policy development and implementation. Clearly, extensive formative research will be needed to design each component of the program. Care will be needed to ensure that each component is culturally-tailored. Such formative research may involve in-depth qualitative research with adolescents, parents, and

community stakeholders to identify culturally suitable prevention strategies. Next, each component will need to be tested separately for feasibility and acceptability. Then the components may be combined, pilot tested, and tested through Randomized Controlled Trials.

There are limitations to this study, which need to be noted. The study was based on a convenience sample. Hence, there is a chance high risk adolescents were excluded from the current sample. Further, some betel nut users probably did not participate because of the negative social norms associated with the behavior. This limitation should be considered in the light of the fact that this is a qualitative, formative research. Our goal was to generate new concepts rather than statistics generalizable to the population as a whole. Also, men make up the majority of betel nut chewers in USAPI, however, females comprised of the majority of our sample. We do not view this as a major problem because the aim of the study did not seek to make statistical inferences. On the other hand, because female users are rarely the focus of betel nut and/or tobacco research, we view our work as valuable to scholarship. We could have supplemented the interview with focus groups but in the interest of time, resources and more in-depth data we chose interviews over focus groups. Similarly, based on the current study one cannot make conclusions about the relative strengths of the beliefs regarding positive and negative consequences. A quantitative study is needed to assess the relative strengths of the variables in predicting behavior.

Conclusion

Despite the limitations, we believe the present study is significant for being novel and initiating formative research in an area that is currently severely understudied. The current findings are likely to guide future survey-based and intervention studies by stressing the importance of applying an ecological model for the prevention of betel nut use among USAPI adolescents. In particular, our findings suggest that a multi-component betel nut use prevention program that is primarily school-based but also involves families and a mass-media campaign may be able to reduce betel nut use prevalence among USAPI adolescents. Reduction in betel nut use prevalence may eventually result in reduced rates of head-and-neck cancers.

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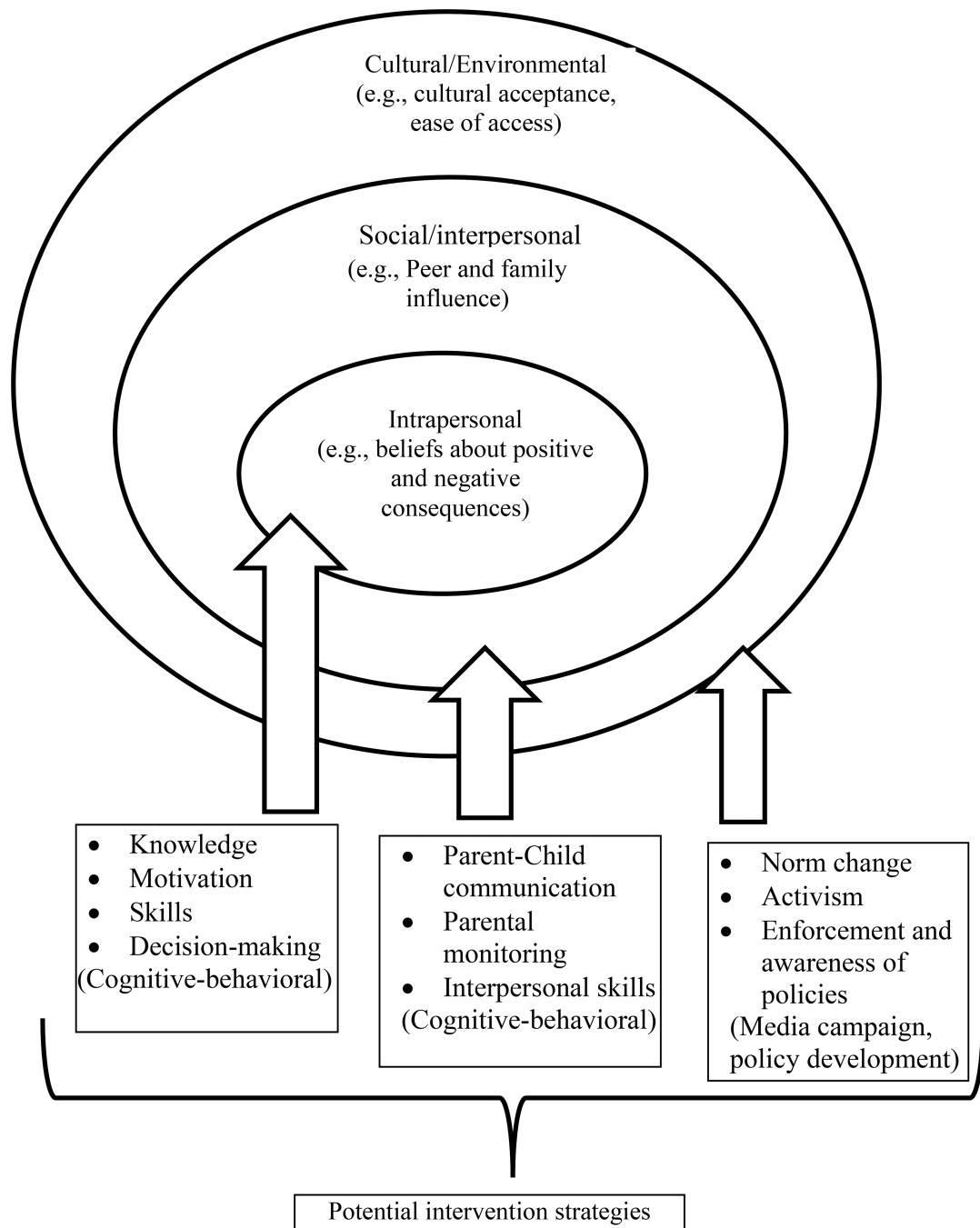


Figure 1.

Levels of influence on behavior. Block arrows show examples of intervention strategies for each level.

Table 1.

Adolescent users' betel nut use motives and experienced negative consequences

Motives/Positive consequences	Quotes
Good taste	<p>"It's just [tastes] like olive like a little" (17 year old Chuukese girl)</p> <p>"...I wanted to try it and I just got addicted to it... 'cause the juice the way it tastes...sweet" (11 year old Palauan boy)</p>
Relaxation	<p>"...to calm myself down from stress" (13 year old Palauan girl)</p> <p>"...cause most the people that chew, they cheerful and when they chew don't they argue, fight" (13 year old Palauan girl)</p> <p>"...to feel good" (17 year old Chuukese girl)</p>
Fun and boredom relief	<p>"Just chew it for fun" (14 year old Chuukese boy)</p> <p>"Well when it's boring and you're not doing anything else, it makes your mouth move...like exercise" (16 year old Chuukese girl)</p>
Negative consequences	Quotes
Bitter taste	<p>"I didn't like it, it's bitter" (12 year old Chamorro boy)</p> <p>"Well it taste that ugly taste but you still chew it and spit it" (16 year old Chuukese girl)</p>
Dizziness and headache	<p>"...it makes me dizzy" (11 year old Chuukese girl)</p> <p>"...it gives me headache and all that" (14 year old Chuukese boy)</p>
Hurts the mouth	<p>"...cause it can like cut your mouth 'cause you know the lime once you use it and put a lot on the betel nut the chew is gonna cut inside your mouth... and later you're not gonna be able to chew 'cause your mouth is aching" (11 year old Palauan boy)</p> <p>"It creates sores [in the mouth]" (13 year old Palauan girl)</p> <p>"It'll give you like I don't know blisters in your mouth" (16 year old Chuukese girl)</p> <p>"My mouth was burning" (17 year old Chuukese girl)</p>
Bad teeth	<p>"I think it makes you lose teeth." (18 year old Chuukese girl)</p> <p>"Uh because it could ruin your teeth" (15 year old Chamorro boy)</p>

Table 2.

Pro- and anti-betel nut use social norms

Pro-betel nut use social norms	Quotes
Parental/family permissiveness	<p>“Oh um I just always wanted to try it so like, my dad, he makes it for me.” (17 year old Chuukese girl)</p> <p>“I mean they’ve seen me try it but you know... they don’t say anything” (16 year old Chamorro girl)</p> <p>“My grandma is the one who let me try” (15 year old Chamorro boy)</p> <p>“Just wanted to try it cause I saw so many of my family using it.” (13 year old Chamorro girl)</p>
Cousins and sibling use	<p>“When I first got blisters I stopped, but then my cousins in there they chew and I see them they chew, and yeah they let me.” (16 year old Chuukese girl)</p> <p>“...my brothers always and when I see them chewing it its you know something that I want to try out” (13 year old Chamorro girl)</p>
Friend use	<p>“Friends chew... just to show off that they can chew but others can’t” (13 year old Palauan girl)</p> <p>“Cause one of my friend like dared me. They said like “I dare you to chew and if you don’t you’re not a part of our friends”. (14 year old Chuukese boy)</p>
Easy access	<p>“It was on the table and I thought it was something to snack on.” (14 year old Saipanese male)</p> <p>“[I got it] from my mom’s bag” (17 year old Chuukese girl)</p> <p>“Well it was around. It was growing in the backyard” (16 year old Chamorro girl)</p>
Cultural acceptance	<p>“There’s only one friend that uses betel nut. His older siblings that gives them. They’re from Yap. And their custom, they have chew for little kids, from first grade going up they can chew betel nut.” (14 year old Saipanese boy)</p> <p>“Um well most of my cousins are from Saipan and it’s a thing to do, so they kinda started chewing young and just started yeah.” (16 year old Chamorro girl)</p>
Anti-betel nut use social norms	
Parental control	<p>“They [parents] would get mad and be like “I don’t want you using that, don’t even try it anymore” (14 year old Saipanese boy)</p>
Teacher/school control	<p>“They’ll like suspend me if they see me using betel nut” (16 year old Chuukese girl)</p>