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Social Network Characteristics, Social Support, and Cigarette Smoking among Asian/Pacific Islander Young Adults

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Abstract

Cigarette smoking may be one of the factors contributing to the high levels of cancer-related mortality experienced by certain Asian/Pacific Islander (A/PI) subgroups (e.g., Native Hawaiian). Given the collectivist cultural orientation attributed to A/PI groups, social strategies are recommended for substance abuse or smoking cessation treatment among A/PI. However, research examining how social network characteristics and social support relate to smoking across A/PI subgroups has been lacking. This study investigated the associations between social network characteristics (e.g., size, composition), perceived social support, and recent cigarette use across Native Hawaiian, Filipino, and East Asian (e.g., Japanese, Chinese) young adults (18–35 year old). Cross-sectional, self-report data were collected from $N = 435$ participants ($M_{age} = 25.6$, $SD = 8.3$; 61% women). Ethnic differences were found in a number of pathways linking social network characteristics, perceived social support, and cigarette smoking. Larger network size was strongly associated with higher perceived social support and lower recent cigarette smoking among Native Hawaiians but not Filipinos or East Asians. Higher perceived social support was associated with lower recent smoking among East Asians and Filipinos but not Native Hawaiians. Implications are discussed with regard to smoking prevention and cessation among A/PI.

Keywords

Social networks; Social support; Cigarette smoking; Asian/Pacific Islander

Introduction

Cigarette smoking remains the leading preventable cause of mortality and morbidity in the U.S. (National Cancer Institute, 2015). National surveys often report Asian/Pacific Islander

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Conflict of Interest

The authors declare that they have no conflict of interest.

(A/PI) as the group least at risk for cigarette smoking, compared with other major ethnic categories in the U.S. (Centers for Disease Control & Prevention, 2014). A caveat attached to such data is the categorization of several A/PI subgroups into a single, aggregate group. A large proportion of this aggregate “Asian” or “Asian-American” group in national data tends to be composed of Chinese-, Japanese-, Korean-, and Vietnamese-descent individuals. A/PI subgroups such as Native Hawaiian/Pacific Islanders and Filipinos who are at high risk for cigarette smoking, and the mortality and morbidity associated with cigarette smoking (Mukherjea, Wackowski, Lee, & Delnevo, 2014) are often not adequately represented in these data. In Hawaii, Native Hawaiians show the highest rate of smoking prevalence (27% among adults aged 18 and above), followed by Filipinos (11.5% among adults) and Whites (12% among adults). Japanese-descent individuals show the lowest prevalence (9% among adults) (Hawaii Department of Health, 2010).

Thus, smoking prevention and cessation among Native Hawaiian/Pacific Islanders and Filipinos are of importance. Nationally, Pacific Islanders represent one of the fastest growing demographic groups (U.S. Census Bureau, 2012), while Filipinos have been one of the five largest groups of people immigrating into the U.S. every year since 1990 (Migration Policy Institute, 2010). Several previous studies have contended that culturally relevant smoking prevention and cessation interventions designed for A/PI should utilize strategies based on social network and social support theories (Burgess et al., 2014; Kim et al., 2015; Romero & Pulvers, 2013; Tsoh et al., 2015).

Culture and Asian/Pacific Islanders

One way to define culture is in terms of core societal values (Cooper & Denner, 1998). To use the commonly cited paradigm of collectivist-individualist cultural syndrome (Triandis, 1996), the core societal values of A/PIs are “collectivist” rather than “individualist.” People from collectivist cultures are *interdependent* members of their in-groups (e.g., family, ethnic unit), with attitudes and behaviors more likely to be shaped by in-group norms. Their social networks are more likely to be composed of family members or members of their community. Subsequently, they are more likely to rely on their family members and members of their community for social support (Goodwin, 2000; Pierce, Sarason, Sarason, Joseph, & Henderson, 1996). In contrast, people from individualist cultures are more likely to be *independent* and follow individual rather than in-group norms and goals.

The collectivist orientation of Japanese and Chinese cultures has been well-documented (e.g., Oyserman, Coon, & Kimmelmeier, 2002; Ralston, Holt, Terpstra, & Kai-Cheng, 1997; Sun, Horn, & Merritt, 2004). Family or *ohana* is likely to be the central source of influence on Native Hawaiians’ attitudes and lifestyle throughout lifespan (Andrade, & Bell, 2011). The Native Hawaiian *ohana* is usually multigenerational and extends beyond the nuclear family. It is composed of children/youth (*opio*), parents and relatives from parents’ generation (e.g., aunts and uncles; *makua*), and grandparents and relatives from grandparents’ generation (*kupuna*). The *ohana* has functioned as the most important source of support among Native Hawaiians through the changing social, political, and economic realities of the Hawaiian Islands. From ancient times up to as late as the early 20th century, the members of an *ohana* relied among each other for survival (e.g., food, security) and

conducted their day-to-day affairs based on a complex division of labor within the family. As more and more non-Polynesian outsiders migrated into the Hawaiian Islands and as the Islands increasingly fell into the dominance of the U.S., the family not only provided a strong material and emotional support system but also became a preserver of a unique cultural heritage in a multicultural environment. To the present day, most Native Hawaiian social activities take place in the context of the family, in which, members are economically and emotionally dependent.

Filipinos too share a core culture in which collectivism is strongly entrenched. Filipino emigration to the U.S. began in the early 20th century, when the Philippines became a colony of the U.S. For example, the first wave of Filipino migrants came to Hawaii in 1906 to work in the sugar plantations (Guerrero, Bayola, & Ona, 2011). The majority of these immigrants were from the Tagalog regions of the Philippines. It should be noted that Filipinos across the Philippines are not a homogenous group but embody several regional and subethnic differences. Nevertheless, the majority of Filipinos share collectivist values shaped by their Austronesian origins and the historical influences of the Southeast Asian (e.g., Chinese) and Spanish cultures, as well as, Roman Catholicism. The spirit of kinship and camaraderie dominant in the Filipino culture has been attributed to the Austronesian origins and the respect for family ties and family hierarchy to the Chinese and Roman Catholic influences (Guerrero et al., 2011). Among Filipinos in general, family is considered to be the strongest social unit and a source of identity and emotional and material support.

Culture and Social Networks

Clearly, the family appears to dominate the social networks of A/PI groups, more so for Native Hawaiians and Filipinos whose extended families seem more close-knit than those of East Asians (McDermott & Andrade, 2011; Min, 2006). This may be taken as an example of how culture influences individuals' social network characteristics. An individual's social network may be defined as the network of his or her relationships with others. As discussed in the next section, social network and social support are known to influence health risk behaviors, including tobacco smoking. But how is culture related to social networks?

Theories rooted in relational sociology have posited that social networks are a dynamic relational phenomenon embedded in larger contexts such as culture and environment (Emirbayer, 1997). Mische (2011) characterizes four approaches that link culture and social networks within the relational sociology framework. According to the first approach, social networks function as conduits of social influence. Attitudes, beliefs, and behaviors that are unique to a culture are transmitted among social network members through interpersonal influence. The second approach is based on the idea that culture can shape social network structure. Individuals with common cultural values, norms, and mores share affinities toward each other. Thus, the shared culture facilitates homophily, which may be defined as the tendency of like-minded individuals to aggregate together (McPherson, Smith-Lovin, & Cook, 2001). The third approach is to apply social network methods, such as of delineating inter-relationship structures and quality, to understand the inter-relationships among different domains of cultural beliefs, attitudes, and practices. The fourth approach is to conceptualize social networks as cultural processes that manifest through communicative interactions. In

this approach, social networks are understood as a dynamic process through which individuals actively form or break relationships depending on the cultural contexts of the interactions.

Social Networks, Social Support, and Cigarette Smoking

Social and interpersonal processes shape behaviors, including health behaviors such as cigarette smoking, above and beyond intrapersonal factors such as race, gender, or personality (Petraitis, Flay, & Miller, 1995). Individuals' attitudes and behaviors are often a function of the attitudes and behaviors of their social networks (Valente, 2010). Past research has shown that the greater the number of smokers in a person's social network, the more the person is likely to smoke (Roberts, Nargiso, Gaitonde, Stanton, & Colby, 2015; Rostila, Almquist, Ostberg, Edling, & Rydgren, 2013). Social networks are known to influence smoking initiation as well as cessation (Christakis & Fowler, 2008). Consistent with the concept of contagion effect in the theory of diffusion of innovation (Rogers, 2003), social networks may influence individuals to adopt new attitudes and behaviors that are prevalent in the networks. This may occur through social learning (Bandura, 1977): social networks represent a social environment in which people observe new behavior and model after that behavior.

Another way to look at social networks, in the context of health behaviors such as smoking especially, is as networks of individuals that make social support possible. Social networks and social support have been long studied in the context of health risk behavior etiology, prevention and treatment (e.g., Berkman & Glass, 2000; Cohen, 2004; Langlie, 1977; Valente, 2010). The theoretical framework linking social networks, social support, and health behavior has received a widespread empirical support (Heany & Israel, 2008). The foundations of this framework are provided by several psychological and sociological theories that stress the importance of social ties to human development and well-being, such as the attachment theory (Bowlby, 1978) and the exchange theory (Homans, 1961). The basic premise of the framework is that social network structures function to provide social support, which may impact health behavior or outcomes in more than one way (Heany & Israel, 2008). Social support may buffer the impact of stress on health or maladaptive health behavior (Cohen & Wills, 1985). Also, social support may be directly protective against maladaptive coping behaviors such as cigarette smoking (Wills & Cleary, 1996; Wills & Vaughn, 1989).

Assessing Social Network Characteristics

Social network characteristics can be empirically assessed in a variety of ways. Valente (2008) lists five types of social network data: data obtained through standard survey questions, ego-centric data, sequenced data, census data, and two-mode or joint data. Standard survey questions can be used to obtain rudimentary network type data based on a few questions designed to elicit, for example, the source of a particular information. The ego-centric method (Burt, 1984) involves asking a participant to generate a list of individuals close to him or her and then asking the participant substantive questions about each individual he or she identified. In the network thus generated, the participant is the ego and the individuals who he or she identifies are known as alters. The best example of the

sequenced data (Klovdahl, 1989) is the network data collected through snowball sampling, which involves asking participants to identify their network members and then interviewing each network member individually. The census method (Valente, 1995) involves collecting data from nearly all members of a pre-defined group (e.g., organizations, schools, geographical regions). The two-mode data is collected by recording how frequently individuals participate in the same event. For smaller-scale survey-based studies, the ego-centric method offers a good balance between simplicity of application and collection of relatively nuanced data. The two most common types of variables assessed by the ego-centric data include the size of the network and the quality of the relationships among network members. Traditionally, the relationship among network members has been assessed based on the following main criteria: nature of the relationship (e.g., family, friends), frequency of interaction (e.g., frequency of talking with each other), physical proximity (e.g., proximity of homes), and homophily (e.g., same-ethnicity) (Burt, 1984).

The Present Study

This study aimed to address current gaps in the literature concerning the relationships among social network variables, social support, and cigarette smoking across subgroups of A/PI young adults. The influence of social networks on health risk behaviors such as cigarette smoking suggests the possibility that social networks may be utilized to prevent or treat such behaviors. For example, changing the target risk behavior among “leaders” (i.e., influential network members) within a network may have preventive contagion effect on several other network members (Valente, 2010; Christakis & Fowler, 2008, 2013). This is an example of prevention or treatment effect through direct influence. Social networks may also positively impact health behaviors and outcomes by enhancing social support. Currently, it is not well-understood how social network characteristics and social support affect cigarette smoking across multiple groups of A/PI young adults. A/PI groups such as Native Hawaiian and Filipino tend to differ markedly from East Asians in their risk proneness. When social network-based smoking cessation interventions are suggested for A/PI, an assumption is tacitly made that because of the collectivist orientation of A/PI cultures such interventions should prove effective across all A/PI subgroups. No study to date has investigated whether key collectivist characteristics—for example, higher representation of family members in the network, higher representation of same-ethnicity individuals—are associated with lower likelihood of cigarette smoking across different A/PI subgroups.

This study employed an ego-centric method to assess social networks. Using multi-group path analysis, we tested the relationships between demographic variables (e.g., age, gender, ethnicity), social network characteristics, social support, and recent cigarette smoking across Native Hawaiian, Filipino, and East Asian young adults. The model that was tested was guided by the social networks- social support theoretical framework discussed above, in which, social support functions as a mediator linking network characteristics and cigarette smoking. Social network characteristics examined included network size and network composition (i.e., family members and same-ethnicity individuals in network), strength of association with network members (i.e., frequency of talking to individuals in network, length of having known network members, proximity of living), and number of cigarette smokers in network. In the analysis model, acculturation to the mainstream U.S. culture was

treated as a covariate. U.S. acculturation in minority ethnic groups has been associated with both cigarette smoking and social processes (e.g., An, Cochran, Mays, & McCarthy, 2008; Lim, Yi, & Zebrack, 2008). Young adult participants in the current study were community college (2-year college) students. Young adults (18–35 year old) show the highest prevalence of cigarette smoking in the United States (U.S. Department of Health and Human Services, 2012). Underutilized for research, community colleges provide access to traditional and nontraditional students, the majority of whom are future blue-collar workers and individuals from disadvantaged socio-economic backgrounds (Pokhrel, Little, & Herzog, 2014). Furthermore, compared with students attending 4-year colleges, community college students show higher prevalence of cigarette smoking (Pokhrel et al., 2014).

We hypothesized that (a) Compared with East Asians (e.g., Japanese, Chinese, Korean) Native Hawaiians and Filipinos will report larger network size, have more family and same-ethnicity members in network, have more close-living members in network, have more network members who they have known for a longer period of time and report talking more frequently with network members; (b) larger network size, having more family and same-ethnicity members in network, having more close-living members in network, and talking more frequently with network members will be associated with higher perceived social support; (c) higher perceived social support will be inversely associated with recent cigarette smoking; and (d) the associations between social network, social support, and cigarette smoking will be stronger for Native Hawaiians and Filipinos than East Asians.

Methods

Participants

This study is based on self-report data from $N = 435$ A/PI community or 2-year college students, who participated in a study on tobacco and other substance use conducted across three community colleges in Oahu, Hawaii. A/PI subgroups represented were Native Hawaiian ($n = 128$), Filipino ($n = 176$), and East Asian (mainly, Japanese and Chinese; $n = 131$) (more below on how ethnicities were categorized). Table 1 shows the demographic characteristics of the study participants. Participants were young adults of 18–35 years of age. Although young adulthood is usually defined as 18–29 years (Arnett, Zukauskienė, & Sugimura, 2014), to include a representative sample of community college students, who tend to be older (Pokhrel et al., 2014), we defined young adults as 18–35 years in this study. Lastly, as with other studies based on community college students (Berg et al., 2011; Chen, Miller, Grube, & Waiters, 2006), more females were represented in the current sample than males.

Procedures

Students were recruited from classrooms across the three community colleges and later invited via e-mail to participate in the study survey, which was administered online. Administration of the survey in the classroom was not feasible because of the length of the survey. However, recruiting participants from the classroom provided the opportunity to recruit across various academic disciplines and enhance the representativeness of the sample.

Classroom Recruitment—Instructors of 62 classes across the three community colleges were contacted by phone or e-mail seeking permission to recruit participants from their classes. Instructors from across the following academic areas were approached: social and behavioral sciences, humanities, math and natural sciences, and nursing and allied health sciences. These areas were selected because they offered maximum number of classes with enrollment sizes of 15 or greater. Relatively large enrollment sizes were important because visiting a large number of small classes would cost more resources. Of the 62 instructors contacted, 46 agreed to cooperate. Thus, two research staff visited 46 classes, of which 33% represented social/behavioral sciences or humanities, 33% represented math or natural science classes, and 34% represented nursing or allied health (e.g., medical technology, dental assisting) classes.

First, the research staff described the study to the students present in the classroom explaining that: (a) the study was about tobacco use; (b) participation in the study was voluntary; (c) everyone aged 18–35 years was invited to participate in the study regardless of gender or ethnicity; (d) the study involved providing contact information in the classroom and completing an online survey; and (e) a \$20 gift card would be provided to each participant who completed the online survey. Next, the informed consent protocol was described to the students who expressed interest in participating in the study. Students who provided written consent ($N = 673$) completed the information sheet in the classroom. The average consent rate across classrooms was 90%.

Online Data-Collection—Within 3 days of completing the classroom survey, participants were contacted via e-mail which invited them to participate in the online survey. The e-mail included a uniform resource locator, unique for each individual, which directed the participants to the survey questionnaire. SurveyMonkey was used to create and deliver the online survey. For each college, the online survey was kept active till the end of the 5th week after the last classroom visit. Non-respondents received e-mail reminders every third day beginning from the day of the first e-mail invitation. Participants who did not respond by the end of the third week after the last classroom visit also received a telephone reminder.

Of the 673 participants who were invited to participate in the online survey, 539 completed the online survey (online response rate was 80%), of whom $N = 435$ were A/PI. Participants who responded to online survey request did not differ from non-respondents in terms of ethnicity or substance use characteristics. However, non-respondents were significantly younger ($p < .05$; two-tailed) and tended to represent more males than females ($p < .05$; two-tailed).

Measures

Demographic Variables—Demographic variables measured included age, gender, annual household income, and ethnicity. Age, gender, and household income were assessed using single-item indicators. For income, participants were asked, “What is your annual household income?” Seven response options were provided (i.e., “\$0–\$9,999”, “\$10,000–\$19,999”, ..., “Over \$60,000”).

Ethnicity was assessed using an instrument that has been previously validated among adults in Hawaii (Kolonel et al., 2000). Participants were asked, “What is your ethnic or racial background?” and were asked to select “all that apply” from a list of ethnicities common in Hawaii and the U.S.: Black/African American, Chinese, Filipino, Native Hawaiian, Japanese (including Okinawan), Korean, Mexican or other Hispanic, White or Caucasian, or Other (space was provided with the “Other” option for participants to write in). In addition, participants were asked, “Are you full or part Native Hawaiian?” (Yes/No).

Participants who identified themselves as “Hawaiian” in response to the first ethnicity question and responded “Yes” to the second ethnicity question were classified as Native Hawaiian. The Native Hawaiian category also included a small proportion (10%) of other Pacific Islanders (e.g., Samoan, Tongan, Chuukese). Participants who identified themselves as Filipino only or as Filipino plus one or more of other ethnicities were categorized as Filipino. Self-identified Japanese, Chinese, and Korean were combined into a single category labeled “East Asian.” The East Asian category also included few participants who identified themselves Vietnamese ($n = 5$) and Laotian ($n = 3$). Self-identified Japanese, Chinese, and Korean were classified into one group because previous Hawaii-based studies show that these groups share similar low-risk profiles and are comparable on SES indicators (e.g., Baker, Hishinuma, Chang, & Nixon, 2010; Glanz, Maskarinec, & Carlin, 2005). Students identifying themselves as Japanese plus other ethnicities (e.g., White, Black, and/or Hispanic), Chinese plus other, and Korean plus other were also categorized as East Asian.

U.S. Acculturation—Acculturation to the mainstream U.S. culture was measured using an 8-item scale (Unger et al., 2002) previously validated among A/PIs (Unger et al., 2004). The eight items, which showed high reliability in the present sample (Cronbach’s $\alpha = .80$), assessed participants’ preference for peers, food, entertainment, etc., specific to the U.S. versus their country, culture, or ethnicity of origin. The lead-in sentence read “People have preferences regarding who they hang out with, what kind of music, TV shows, and food they like. Please select the response that best fits your preference.” A list was provided which included items such as “You are most comfortable being with people from...” and “The food you eat at home is from...” Participants were provided with the following response options: “The U.S.,” “Your country, culture or ethnic group(s) of origin,” “Both,” and “Neither.” The U.S. acculturation index was created by summing up “The U.S.” response across the items.

Social Networks—An ego-centric method adapted from Burt (1984) was used to assess social networks. The ego-centric method of social network assessment is usually the preferred method for a survey-based research design studying an “open” population (as opposed to a closed network where the boundaries are clear-cut such as a classroom or a platoon). This method asks participants to identify or recall their ‘alters’ or network members. A total of 11 questions were asked. The first was a free-recall name-generator question which asked participants to provide the first names or initials of up to five people they talk to about important matters. The remaining 10 questions asked participants for information on the alters. These included questions on relationships of the participant with his/her alters (e.g., family, friends), length of time of having known the alters, frequency of

talking to the alters (e.g., “daily,” “once a week”), alters’ gender and ethnicity, how close they lived to the participant (e.g., “Does he/she live within five miles of your home?”), and whether or not he or she smoked. Network size was determined based on the number of alters identified by the participant and ranged between 1 and 5.

Social Support—The social support measure (Procidano & Heller, 1983) assessed perceived social support from friends (10 items; Cronbach’s $\alpha = .90$) and from family (10 items; Cronbach’s $\alpha = .92$) in terms of the participant’s perceptions as to how much of his/her needs for support, information, and feedback are fulfilled by friends and family, respectively. Example items include “I rely on my friends/family for emotional support”; “Members of my family/my friends are good at helping me solve problems”; and “Members of my family/my friends are sensitive to my personal needs.” The measure has shown high reliability and validity across different populations (Procidano & Heller, 1983; Gloria & Kurpius, 2001). For the current study, the scales for social support from friends and family were combined into a single variable.

Cigarette Smoking—Recent cigarette use was measured in terms of past 30-day cigarette use. Participants rated frequency of cigarette use on an 11-point scale (0 times, 1–10 times, 11–20 times, 21–30 times, . . . , 91–100 times, over 100 times). This way of measuring cigarette smoking has been validated in previous research (Graham et al., 1984; Sussman, Sun, Rohrbach, & Spruijt-Metz, 2012). Self-report measures of substance use have found to be valid across different ethnic groups (Wills & Cleary, 1997).

Data Analysis

Descriptive analyses, including comparison of social network and social support variables across A/PI subgroups were performed using the SAS statistical program (Version 9.3). Analysis of Variance (ANOVA) was conducted to examine subgroup differences. Post-hoc pair-wise comparisons between subgroups were conducted using Tukey’s Studentized Range (HSD) test ($\alpha = .05$; two-tailed), which controls the Type I experiment-wise error rate.

Multi-group path analysis was conducted in *Mplus*. The base path analysis model included social network characteristics (e.g., size, composition), demographic variables (i.e., age, gender, annual household income) and acculturation as exogenous variables. Perceived social support was specified as a mediator variable. Lastly, past 30-day cigarette smoking was specified as the criterion variable. Covariance was specified between every pair of exogenous variables. The base model was fit across the three ethnic categories (i.e., East Asian, Filipino, Native Hawaiian) with a multi-group specification. Because the distribution for the cigarette use variable was highly skewed, the variable was log-transformed to reduce skewness. Some skewness still remained after the log transformation. Hence, the model was estimated using the MLR estimator option in *Mplus*, which is robust to multivariate non-normality (MLR; Muthen & Muthen, 1998–2015).

In the base model, direct paths were specified from all exogenous variables to social support and cigarette smoking, and a direct path was specified from social support to cigarette smoking. First, this configural model was fit simultaneously across the three groups freely estimating the path coefficients across the three ethnic groups. Next, the model was

estimated by constraining all path coefficients to be equal across the three groups. A nested model comparison was conducted by comparing the latter, nested model against the free, unconstrained model using the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2001). This test assessed if placing equality constraints across path coefficients significantly worsened the fit of the model. The overall model goodness-of-fit was determined based on chi-square statistic, comparative factor index (CFI), and Root Mean Square Error of Approximation (RMSEA).

Results

Ethnic Differences in Social Network Characteristics

Table 2 shows the differences in social network characteristics and social support. Native Hawaiians reported a larger network size than East Asians and more family members in their social networks than both East Asians and Filipinos. Both Filipinos and Native Hawaiians reported greater number of same-ethnicity members in their networks compared with East Asians. Native Hawaiians had known their network members for a longer length of time than East Asians and also included more smokers in their networks than East Asians. No differences were detected among Native Hawaiians, Filipinos, and East Asians in network gender composition, proximity of network members' residence, frequency of talking to network members, perceived social support, and levels of U.S. acculturation.

Path Analysis

Table 3 presents the zero-order correlations between key study variables. The fit statistics for the model in which paths were estimated freely across the ethnic groups were as follows: $\chi^2 = 65.41$, $df = 57$, $p = .20$; CFI = .94; RMSEA = .03, 90% CI [.01, .06]. For the model in which path coefficients were constrained to be equal across ethnicities (i.e., the nested model), the fit statistics were as follows: $\chi^2 = 106.0$, $df = 74$, $p = .008$; CFI = .78; RMSEA = .06, 90% CI [.03, .08]. The Satorra-Bentler scaled chi-square difference test indicated that placing the equality constraints significantly worsened the model fit ($\chi^2 = 68.5$, $df = 17$, $p < .0001$). Thus, paths were inferred to differ significantly across groups. Every path that was statistically significant for at least one ethnic group is shown in Fig. 1. Because there were obvious ethnic differences in magnitude of coefficients in paths that were significant for at least one group, the 1- df nested model comparisons for individual paths were not conducted. To examine how well the model fit across groups, we compared χ^2 contribution from each group. Across the three groups, the model appeared to fit best for East Asians ($\chi^2 = 16.45$, $df = 19$). The model appeared to fit better for Native Hawaiians ($\chi^2 = 22.82$, $df = 19$) than for Filipinos ($\chi^2 = 26.14$, $df = 19$).

As shown in Fig. 1, larger social network size was directly associated with higher social support and lower recent cigarette use among Native Hawaiians but not among East Asians or Filipinos. Having more same-ethnicity members in network was inversely associated with cigarette use among East Asians but not Filipinos or Native Hawaiians. However, having more same-ethnicity network members was not associated with social support in any group. Having more longer-known network members was directly associated with higher perceived social support among East Asians and Filipinos but not among Native Hawaiians. For East

Asians but not for Filipinos or Native Hawaiians, frequency of talking to network members was inversely associated with recent cigarette smoking. Interestingly, higher frequency of talking to network members was associated with lower perceived social support among Native Hawaiians. Across all ethnic groups, greater presence of smokers in network was associated with higher recent cigarette smoking. Higher perceived social support was associated with lower recent smoking among East Asians and Filipinos but not among Native Hawaiians. Older age was directly associated with higher smoking among Filipinos and Native Hawaiians but not East Asians. Higher income was inversely associated with smoking among East Asians, but not Filipinos or Native Hawaiians. U.S. acculturation was not associated with social support or cigarette smoking in any of the groups.

Discussion

This study generated significant new information and evidence on social processes related to cigarette smoking among diverse A/PI young adults. The current sample proportionately represented three A/PI subgroups which allowed comparative analysis of the data across the subgroups. To our knowledge, this is the first study to examine, in some detail, how social network characteristics are related to social support and cigarette smoking across different subgroups of A/PI young adults.

The support for hypotheses related to differences in social network characteristics and social support across Native Hawaiian, East Asian, and Filipino young adults was mixed. We found significant differences between Native Hawaiians and East Asians in the following network characteristics: network size, presence of family members and same-ethnicity individuals in one's network, and length of time of having known network members. However, Filipinos in the current sample were found to be more similar to East Asians in social network characteristics than we had expected. The only social network characteristic in which Filipinos clearly differed from East Asians was the mean level of presence of same-ethnicity individuals in network. We compared US acculturation across the three groups to find out whether similarities in acculturation explained the unexpected similarities between East Asians and Filipinos. Filipinos were found to show lower U.S. acculturation than East Asians but higher U.S. acculturation than Native Hawaiians; however, these differences were not statistically significant. In summary, comparison of average social network characteristics across East Asians, Filipinos, and Native Hawaiians indicated that collectivist orientation is likely to be more pronounced among Native Hawaiians than the other two subgroups.

Findings regarding the inter-group differences in the associations between social network characteristics, social support, and cigarette smoking were less straightforward and did not allow for a simple explanation based on the collectivist-individualist paradigm. Contrary to expected, the model fit better for East Asians than for Filipinos or Native Hawaiians. For Native Hawaiians, larger network size was protective against cigarette smoking and was associated with higher perceived social support. However, unlike for East Asians and Filipinos, higher perceived social support for Native Hawaiians was not associated with lower levels of cigarette smoking. In addition, having more family members or same-ethnicity individuals was not associated with perceived social support or cigarette smoking

among Native Hawaiians. In fact, for Native Hawaiians, talking more frequently with network members was inversely associated with perceived social support.

These findings related to Native Hawaiians raise interesting questions. Aside from network size, characteristics that are commonly associated with a collectivist culture—such as more family members, same-ethnicity individuals, or more members who one has known for a longer period of time in network—were not associated with higher perceived support or cigarette smoking. In addition, talking more frequently with network members, which may ordinarily signify higher network cohesiveness, was associated with lower perceived social support. On the hand, larger network size was strongly associated with higher perceived social support and lower cigarette smoking. How can these findings be explained?

One plausible explanation may be offered by the way of understanding what perceived social support may signify in different cultures and types of networks. In a social network such as that represented by Native Hawaiians, where family and relatives are more likely to be represented, the exchange of social support may be more implicit than explicit (Taylor, Welch, Kim, & Sherman, 2007). In a family-dense network, frequent talking may also mean arguing or disagreeing with each other more often. In addition, research has shown that individuals of cultures that show higher collectivism are less likely to be explicit about their social support needs (Kim, Sherman, & Taylor, 2008; Taylor et al., 2007). In such cultures, individuals may not consciously register the social support they are receiving or providing as social support. However, social support exchanged with network members outside one's family may register more as social support. This is because individuals may be more grateful for the support received from non-family network members as those members, unlike family members, are not ethically bound to provide social support. Hence the positive association between larger network size and higher perceived social support.

The fact that among Native Hawaiians in the current sample perceived social support was not associated with lower cigarette smoking but larger network size was associated with smoking may mean that social capital is a more important protective factor against smoking in this group than perceived social support. Social capital may be defined as resources that are embedded in individuals' social networks that the individuals can purposively use (Lin, 2001). While perceived social support partly depends on the exchange of emotional support, social capital refers mostly to network-specific benefits that flow among members through exchange of norms, information, skills, and other types of resources of instrumental value (Williams & Durrance, 2008). In historically disadvantaged groups with networks that are homogenous, composed mainly of family or same-ethnicity members, large network size may reflect a more open network that is open to influence (Valente, 2010). Perhaps, among Native Hawaiians, larger network size may mean increased exposure to tobacco use prevention or cessation messages, or resources that are protective against smoking.

The finding that Filipino young adults in the current sample had fewer family members or same-ethnicity individuals in their network may be related to the fact that Filipinos are non-indigenous and more recent immigrants to Hawaii and the U.S. compared with East Asians. It is possible that for many Filipinos, members of extended family are divided between the U.S. and the Philippines. For Filipinos, we found that having more long-known network

members was strongly associated with higher perceived support. In addition, higher perceived social support was protective against cigarette smoking. Filipino young adults' social networks may be culturally more diffused and social support among them may be more explicit.

The current findings related to East Asians may be interpreted to highlight how social networks function to provide social capital. In Hawaii, East Asians show higher socio-economic status as well as better health outcomes and lower prevalence of health risk behaviors (McDermott & Andrade, 2011). In the current sample, the average number of same-ethnicity network members was highest for East Asians. Further, we found that having more same-ethnicity members in network and talking more often with network members were directly associated with lower levels of cigarette smoking among East Asian young adults. These findings imply homophily as well as positive social influence at work against tobacco use. Thus, among East Asians, social network characteristics such as having more same-ethnicity members and talking more frequently with network members provide access to social capital that is protective against cigarette smoking.

In summary, this study provided increased understanding of the social processes associated with cigarette smoking across three groups of A/PI young adults: Native Hawaiian, Filipino, and East Asian. Inter-group differences highlighted that A/PI may differ in network characteristics and that network characteristics commonly associated with collectivism may not be protective against cigarette smoking across all groups. Ethnic groups richer in social capital may benefit from closed networks that emphasize homophily whereas disadvantaged groups may benefit from larger size networks, which presumably provide them access to protective resources.

Limitations

There are limitations to this study that need to be considered. First, although our sample included diverse groups of A/PI, the East Asian group combined Japanese, Chinese, and Korean based on risk profiles. Ideally, these groups should have been examined separately. However, the current sample did not include enough Japanese-, Chinese-, and Korean-descent young adults to meaningfully compare each of these groups separately with the rest. Second, the current social network data were collected using name-generator ego-centric method. Collecting data on alters first-hand from alters themselves would have been desirable. However, given budgetary constraints, that was not possible. But note that the information we collected from participants on alters was more or less objective and is likely to have been valid. Third, we used a single measure of social support. A parallel analysis with an alternative social support measure may have yielded different results, especially with regard to the relationships between social network characteristics and social support. Fourth, the current study was based on cross-sectional data; thus, although the path effects assume directionality of effects on theoretical grounds, they should not be mistaken as evidence for causation. Lastly, although the current study drew significantly on the individualist/collectivist paradigm, we did not assess collectivist/individualist orientation. A more nuanced assessment of culture-specific variables would have benefited the current investigation.

Implications for Future Research

Despite the limitations, the present study has significant implications for future research, both etiologic and interventional. Retesting the current hypotheses in a larger sample, using more sophisticated measures of social networks, using multiple measures of social support, and using a longitudinal design would validate the current findings and significantly advance the research on the socio-cultural determinants of A/PI young adults' smoking behavior. Additionally, this line of research would further ensure the relevance of applying social network and social support theories to smoking prevention and cessation interventions meant for vulnerable A/PI young adults. The current data indicate that smoking prevention or cessation programs designed for Native Hawaiians and Filipinos may benefit from utilizing social networks. However, the social networks may not need to be family-based.

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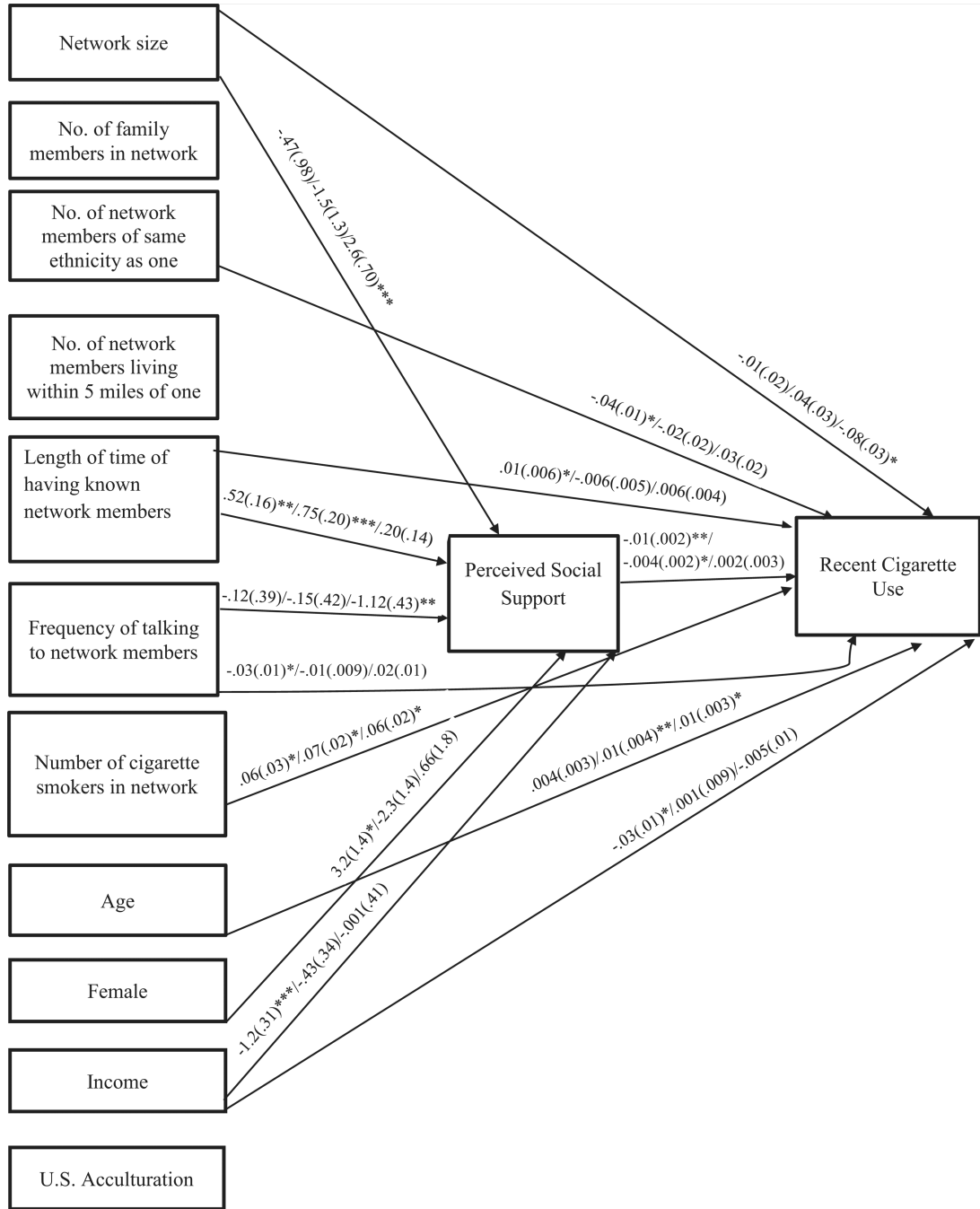


Fig. 1. Multi-group path model showing the associations among demographic characteristics, social network characteristics, social support and recent cigarette smoking across East Asian, Filipino, and Native Hawaiian groups. Single-headed arrows represent regression paths. For clarity of presentation, only statistically significant ($p < .05$; two-tailed) paths are shown. For each path shown, unstandardized path coefficient and corresponding standard error in parenthesis are provided for East Asians/Filipinos/Native Hawaiians. Covariances were

specified between all exogenous variables but covariance estimates are not presented for clarity. * $p < .05$, ** $p < .01$, *** $p < .001$

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Table 1Participant characteristics ($N = 435$)

	Mean (SD)	Frequency (%)
Age	25.6 (8.28)	
Gender		
Men		39.4%
Women		60.6%
Ethnicity		
Native Hawaiian		29.4%
Filipino		40.5%
East Asian		30.1%
Income		
\$0–\$19,999		31.6%
\$20,000–\$39,999		29.0%
\$40,000–\$59,999		17.0%
Over \$60,000		22.4%
U.S. Acculturation	2.58 (2.31)	
Social Support	50.2 (9.83)	
Lifetime cigarette use		50.6%
Past 30-day cigarette use		20.0%

SD, Standard Deviation.

Table 2

Social network and social characteristics across ethnic groups

Network characteristics	Range	Native Hawaiian (<i>n</i> = 128)	East Asian (<i>n</i> = 131)	Filipino (<i>n</i> = 176)
		Mean (SD)		
Size	0–5	4.55 (1.15) ^a	3.94 (1.80) ^b	4.36 (1.48) ^{ab}
Number of Family members in network	0–5	2.25 (1.42) ^a	1.46 (1.35) ^b	1.68 (1.36) ^b
Number of Females	0–5	2.87 (1.16) ^a	2.79 (1.26) ^a	2.91 (1.24) ^a
Number of network members living within 5 miles	0–5	2.50 (1.45) ^a	2.36 (1.35) ^a	2.49 (1.53) ^a
Number of same-ethnicity network members	0–5	3.34 (1.54) ^a	2.50 (1.55) ^b	3.67 (1.27) ^a
Number of smokers in network	0–5	1.13 (1.22) ^a	0.68 (0.94) ^b	0.81 (1.06) ^{ab}
Length of having known network members	5–30	23.7 (5.94) ^a	21.8 (6.09) ^b	23.1 (5.32) ^{ab}
Frequency of talking to network members	1–12	6.02 (2.00) ^a	6.20 (2.16) ^a	5.78 (2.00) ^a
Perceived social support	21–63	51.8 (9.99) ^a	49.6 (9.35) ^a	49.5 (9.99) ^a

SD, standard deviation.

Different letter subscripts across row (e.g., a, b, c) indicate a significant pair-wise difference at $\alpha = .05$ per Tukey's Studentized Range (HSD) Test which controls the Type I experiment-wise error rate in multiple comparisons.

Table 3

Zero-order correlations between main study variables

	Age	Sex	IncM	NH	F	Accult	Cig.	Soc. Supp.	SN Size	SN Family	SN Dist.	SN Eth.	SN Smok	SN Length	SN Talk
Age	1														
Sex	.11*	1													
IncM.	.02	-.01	1												
NH	.15**	.07	-.05	1											
F	-.19***	-.04	.04		1										
Accult.	-.11	-.08	.04	-.07	-.04	1									
Cig.	.18**	-.001	-.05	.04	.003	.01	1								
Soc. Supp.	.10*	.07	-.07	.10*	-.06	-.12*	-.09	1							
SN Size	-.02	.14**	.11*	.11*	.04	-.09	-.07	.31***	1						
SN Family	.11*	.04	.08	.22***	-.06	-.01	-.01	.23***	.39***	1					
SN Dist.	-.07	.05	.06	.02	.02	-.01	-.09	.05	.25***	.15**	1				
SN Eth.	-.18**	.04	.04	.05	.24***	-.09	-.03	.13**	.33***	.42***	.16**	1			
SN Smok.	-.10*	-.11*	-.06	.16**	-.05	-.06	.21***	-.02	.09	.02	-.02	.05	1		
SN Length	.14**	.07	.08	.08	.03	-.04	.001	.32***	.64***	.58***	.58***	.50***	.04	1	
SN Talk	.15**	.01	-.07	.01	-.08	.01	-.04	.04	.38***	-.04	-.04	-.01	.05	.27***	1

* $p < .05$,

** $p < .01$,

*** $p < .001$.

IncM., Income; NH, Native Hawaiian; F, Filipino; Accult, Acculturation; Cig, Cigarette; Soc. Supp, Social Support; SN Size, Social network size; SN Family, Number of family members in one's social network; SN Dist., Number of network members living within 5 miles of one; SN Eth., Number of network members of same-ethnicity as one; SN Smok., Number of cigarette smokers in network; SN Length, Length of time of having known network members; SN Talk, Frequency of talking to network members.