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## Association of cultural affinity and island food consumption in the Pacific Islander health study

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### ABSTRACT

**Objectives:** The dietary patterns of Pacific Islander Americans are partially influenced by a rich cultural heritage. There is little known about how cultural affinity affects the dietary choices of this small, but quickly growing population. This analysis attempts to understand how the association of cultural affinity on island foods consumption (IFC) varies by key demographic characteristics.

**Design:** A sample of 240 Samoan and Tongan adults in California from the Pacific Islander Health Study (PIHS) was used. Psychometric properties of a novel 11-item cultural affinity scale were assessed. Univariate and bivariate analyses of the cultural affinity scale were completed to understand the distribution of cultural affinity score. Separate multivariable Poisson regression was used to assess the effect of interactions between cultural affinity and five key demographic factors on IFC.

**Results:** Psychometric analysis of the PIHS cultural affinity scale revealed two unique factors. Significant interactions were found between cultural affinity and ethnicity and birthplace: the association between cultural affinity and IFC was larger among Samoans compared to Tongans and Samoan or Tongan birthplace was found to have a weaker association between cultural affinity and IFC. Interactions between cultural affinity and age, financial insecurity, and educational attainment were not significant.

**Conclusion:** Understanding how cultural affinity varies in its effect on IFC is a part of understanding overall dietary patterns in this population.

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Native Hawaiian/Pacific Islander; obesity; dietary patterns

## Introduction

Previous research has shown that culture, as defined by lifestyle, identity, or level of Western acculturation, has been a predictor of food choice among Pacific Islanders for several decades, whether this means consuming new, imported foods or savouring traditional foods within the diaspora (Cassels 2006; Clark 1980; Dancause et al. 2011; Englberger, Marks, and Fitzgerald 2003). For example, mutton flaps have become the

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guilty pleasure of Papua New Guineans and serve an important role in social exchange while a Native Hawaiian migrant living in Las Vegas describes poi – a Hawaiian staple made out of boiled and mashed taro root – as ‘like gold’ and its consumption mitigates homesickness (Errington and Gewertz 2008; Lassetter 2011). In a previous paper, the association between the self-reported consumption of both traditional and contemporary island foods (e.g. roasted pork, raw or cooked fish, breadfruit, taro canned corned beef, mutton flaps) during the previous week and several demographic, socioeconomic, and cultural variables was assessed among Pacific Islander adults residing in the continental U.S., and Pacific Islander cultural affinity stood out as a strong and significant predictor of increased island food consumption (Baumhofer et al. 2017). In this analysis, cultural affinity, which can be equated with Tajfel’s (1974) concept of ‘social identity’ – one’s emotional closeness to and in-group identification to a specific subculture – is further explored by examining the psychometric properties of the cultural affinity scale used in the Pacific Islander Health Study (PIHS). Second, this paper will assess the way in which the association between cultural affinity and island food consumption varies by level of other key covariates such as age, gender, ethnicity, education, and birth country.

Culture, its measurement, and its effect on health have been the subject of complicated and contested debate, a full account of which is far beyond the scope of this project (Kagawa-Singer et al. 2014). Nevertheless, its importance to health is undeniable and a brief introduction to the concept of culture can be introduced here. Social anthropologists Jean and John Comaroff (1991) write ‘culture [is] the space of signifying practice, the semantic ground on which human beings seek to construct and represent themselves and others – and, hence, society and history.’ In other words, culture is the process by which we create (and discard) symbols and engage in activities that represent us as belonging to one group or another. By using such a definition, food – island food – is not just fuel for the human body, it is a participant in the decisions individuals make to represent themselves and to solidify membership in social spaces (Appadurai 1988; Haden 2009). For example, in Samoan culture, food is viewed as a conduit for health and plays an important role in the material and social aspects of caregiving (Capstick et al. 2009; Pollock and Finau 1999). This concept is well-illustrated in a quote from an extended study on Samoan medical belief and practice:

“... people who eat well are less likely to get sick; people become sick when they do not have enough to eat; people who are ill need to be fed well if they are to recover; and the return of appetite is a sign of recovery” (Macpherson 1990, 188).

Although this paper does not fully explore the sociocultural reasons for island food consumption, for a Pacific Islander, a can of Spam® is not just a can of Spam®, but rather a cultural vehicle imbued with layers of meaning. Understanding this symbolism is important since these symbolic choices can have a direct and tangible effect on physical health (Capstick et al. 2009; Haden 2009; Hubbell, Luce, and McMullin 2005). A recent report on culture and health from the National Institutes of Health acknowledges culture as a complex, but powerful driver of health behaviours (Kagawa-Singer et al. 2014). Some studies have reduced cultural affinity or acculturation to a single question – often, which language is spoken at home. This approach misses the complexity and nuance inherent in the ways that culture drives behaviour. A comprehensive measure of culture that encompasses multiple dimensions is needed, especially when subscribing to a

definition such as the one previously described. This paper seeks to understand how the relationship between cultural affinity and island food consumption varies by key demographic covariates, which is an intermediate step on the theoretical pathway between food as a cultural representation and health outcomes. Central to this analysis is the 11-item, multi-factor cultural affinity scale developed specifically for use in the PIHS.

There is reason to expect that the relationship between island food consumption and cultural affinity will vary by some social variables such as birthplace, ethnicity, age, and educational attainment. One of the interactions considered in this paper is how the effect of cultural affinity on island food consumption may vary by birthplace. Pacific Islanders both within the United States and the greater Pacific region are experiencing a nutrition transition that ranges from traditional diets (largely based on fruits, vegetables, and lean proteins) to a diet inclusive of some imported goods (such as flour, sugar, and canned meats or fish) to a fully Western diet (Finau and Wainiqolo 2004; Gewertz and Errington 2010; Hughes and Lawrence 2005; Hughes and Marks 2009; Vainikolo, Vivili, and Guthrie 1993). This transition is occurring concurrently as Pacific Islanders are leaving rural homes for urban centres such as Los Angeles and Sydney and as the West infiltrates the Pacific in Honolulu, Auckland, and Suva (Errington and Gewertz 2008; Evans et al. 2001; Vainikolo, Vivili, and Guthrie 1993). Through the vehicle of migration, the effect of culture on food choices can vary greatly. The recent adoption of some imported foods that are now considered 'island foods' (e.g. Spam<sup>®</sup>, mutton flaps, turkey tails, canned corn beef) makes the relationship between food, culture, health, and identity – this foodscape – even more complicated (Adema 2007). In rural locales, island foods, whether they are imported or traditional, may be the only thing available and are eaten on a daily basis. Upon migration to the United States, these island foods may be sought out as a reminder of home, or simply the foods that are most familiar and most comforting to consume (Lassetter 2011; Vainikolo, Vivili, and Guthrie 1993). For individuals born in the United States, island foods might be a way to express their affiliation with their island culture rather than mainstream American culture. In other words, an increase in cultural affinity may be associated with a larger increase in island food consumption among those born in the United States who use food as an expression of culture and identity compared to the increase in island foods among those born in Tonga or Samoa who eat island foods out of habit regardless of change in cultural affinity. But could the opposite be true? Those born in the U.S. could lack a connection to island foods as well.

Beyond birthplace alone, ethnicity and the varied political relationships between the Kingdom of Tonga (Tonga), the Independent State of Samoa (Samoa), American Samoa, and the United States suggests that cultural affinity may have a differential effect on island food consumption for Tongans versus Samoans. An extensive body of previous research has shown that differential levels of modernization and exposure to Western culture (e.g. a stronger political affiliation with a Western power such as the United States or Great Britain) have influenced the dietary shifts among Pacific Islanders (Bindon and Baker 1985; Cassels 2006; Dancause et al. 2011; Denman and Dewey 1989; Evans et al. 2003; Finau, Prior, and Salmond 1986). The history and nature of the relationship between the United States and the three other island birthplaces represented in this analysis vary in important ways.

Occupied by the United States Navy since 1872, American Samoa became an unincorporated territory of the United States when control of the island state passed from the

Navy to the Department of the Interior in 1951. This action paved the way for the largest wave of migration from American Samoa to the United States (Ulijaszek 2005). American Samoans are not birthright U.S. citizens, but rather U.S. nationals, and are entitled to live and work in the United States without restriction, apply for a U.S. passport, and apply for citizenship via the process of naturalization, but cannot vote or hold elected office. Just 40 miles to the west, lies Samoa, which was controlled by Germany from 1900 to 1914 and then by New Zealand from 1914 to 1962 before gaining independence. Citizens of Samoa and Tonga do not have legal ties to the United States, but the geographic proximity of Samoa to American Samoa and deep familial ties between the two locales ensures at least some spill-over of the American diet and culture and has certainly contributed to migration from Samoa to the United States (Lewthwaite, Mainzer, and Holland 1973). Although a British protectorate until 1970, the Kingdom of Tonga stands alone as the only Pacific nation to never lose its independence to a colonizing power. The growth of a MIRAB (Migration, Remittances, and Bureaucracy) economy in Tonga in the 1970s made emigration to major Pacific Rim population centres in Australia, New Zealand, and the United States more culturally acceptable while chain-migration and religious ties drew Tongan immigrants even further into American cities such as Las Vegas and Salt Lake City (Cowling 2002). It has been argued that this relationship between increasing exposure to Western culture and increasing girth is influenced by the increasing availability of 'junk' foods (Bell et al. 1999; Snowdon et al. 2013). Food choice is influenced by several factors, including preference, cultural norms, emotional reinforcement, and availability, among others (Epstein et al. 2007). Therefore, if Western foods are ubiquitous in an individual's environment, it is hypothesized that the effect of cultural affinity on island food will be greater in such environments.

The strength of the effect of cultural affinity on island food consumption may also vary by age. Previous research shows that older individuals are more likely to eat a more traditional diet (Baumhofer et al. 2017; Bell et al. 1999). However, this association may be due to older individuals eating island foods out of habit regardless of their cultural affinity. Increased cultural affinity among younger individuals may have more of an effect on island food consumption since younger individuals may have had more exposure to other types of foods and be more inclined to have a wider variety of diet in the absence of a high level of Pacific cultural affinity. Younger individuals with a lower cultural affinity might be more attracted to Western foods. An analysis of a multi-ethnic population from the 2011 California Health Interview Survey examining racial and ethnic health disparities in diet and physical activity among middle-aged and elderly individuals hypothesized that the effects of acculturation would moderate the size of disparities between the two age groups examined (August and Sorkin 2011). The analysis concluded that there was, in fact, a wider variance of behaviours seen in the younger (and presumably more acculturated) participants compared to the elderly participants (August and Sorkin 2011). Given this evidence, it can be hypothesized that the effect of cultural affinity on island foods may become stronger as age increases, meaning that given the same level of island food consumption a younger individual would be expected to have a higher cultural affinity score compared to an older individual.

Another variable, which may have a moderating effect on the relationship between cultural affinity and island food consumption, is educational attainment. Participation in a Western-educational system can drive a cultural wedge between members of a minority

of immigrant community by exposing the Western-educated individual to social norms that may be discordant with their traditional culture, including dietary habits (Deyhle 1991; Deyhle and Swisher 1997; Fanon, Farrington, and Sartre 1963; Kaomea 2001; Said 1993; Sanchez and Stuckey 1999; Smith 1999). Maori activist and academic, Linda Tuhiwai Smith deftly describes this divide:

“... at the same time these same communities want their members to gain Western educations and high-level qualifications. But they do not want this to be achieved at the cost of destroying people’s indigenous identities, their languages, values and practices” (1999).

Although this quote describes an extreme example of community fears that follows some minority or Indigenous students to university, educational experience socializes these students into a community that most Pacific Islanders cannot call their own. Since educational systems in Samoa, American Samoa, and Tonga strongly follow either the British or American systems it can be assumed that a higher level of educational attainment, regardless of birthplace, is associated with an increased exposure to Western culture and diet. Prior work has shown that individuals with more than a high school education reported only 77% of the incidents of island foods consumed in the past week, compared to those who had less than a high school education (Baumhofer et al. 2017). While educational attainment may be inversely related to island food consumption, the ability of cultural affinity to influence this association may increase with education. Individuals with both high educational attainment and high cultural affinity may specifically seek out island foods as a means to remain grounded within cultural traditions or identity. This is in contrast to individuals with high educational attainment and low cultural affinity who may eat non-island foods as a matter of convenience or assimilation or individuals with low educational attainment who may eat island foods out of habit or preference regardless of cultural affinity. In other words, a high level of cultural affinity may have a stronger association with increased island food consumption in a person with high educational attainment compared to an individual with low educational attainment.

Lastly, there is a potential for financial insecurity to have a significant interaction with the association between cultural affinity and island food consumption. The consumption and rapidly growing popularity of fatty meats in the islands has been linked to macroeconomic forces (Cameron 1997; Errington and Gewertz 2008; Evans et al. 2002; Snowden et al. 2013; Snowden and Thow 2013). These forces have increased the availability of certain island foods (e.g. mutton flaps, tinned beef, tinned pork, instant noodles, and white rice), which more traditional foods have decreased in availability throughout the Pacific, especially in more urbanized areas (Hughes and Lawrence 2005; Hughes and Marks 2009). Their affordability and increased availability tends to encourage increased consumption even when traditional favourites are still preferred for taste and nutrition (Evans et al. 2002; Evans et al. 2003; Jones et al. 2011). However, in highly urban America, food choices may be more limited, especially under financial pressure (Buchthal 2014; Mhurchu et al. 2013; Rush et al. 2007; Young, Batch, and Svetkey 2008). If financial insecurity tends to limit food choice, it is expected that the strength of cultural affinity’s effect on the association between financial insecurity and island food consumption would strengthen as financial insecurity increases.

## Methods

This analysis uses a sample of 240 Samoan and Tongan adults living in California from the pilot PIHS. A stratified random sampling scheme was employed to select 300 households from 20 different community religious organizations. From these 300 households one adult and up to two adolescents (from 13 to 17 years of age) were randomly selected to participate in an interview. All responses from the final 240 households were collected in bilingual face-to-face interviews with study participants over a two-year period, beginning in June 2009. The sample analysed were, on average,  $39.74 \pm 1.51$  years of age, were 49.63% male, 60.01% reported being currently married or living with a partner, 45.45% have a high school diploma, and 36.66% have full-time employment (Baumhofer et al. 2017). The details of the methodology used in the PIHS are described elsewhere (Panapasa et al. 2012a, 2012b).

## Variables

*Island food consumption (IFC)* is operationalized as the self-reported number of times a participant has eaten 'island foods' during the previous 7 days. Participants were prompted with a list that includes cassava, taro, yams, corned beef, SPAM®, turkey tails, and seafood or meat cooked in coconut milk, but were also allowed to define 'island foods' in their own way. *Island foods* is a count variable that ranges from 0 to  $\geq 6$ .

*Ethnicity* is Samoan or Tongan. *Age* is calculated using the participant's birth year and date. *Gender* is reported by household member as male or female. *Marital status* is defined by three categories: 'married' includes participants who are currently living with their partners, with or without legal marriage, 'formerly married' includes participants who are separated from their spouse, divorced, or widowed, 'never married' includes participants who have never been married and are not currently living with a partner.

*Education* is defined by three categories: 'less than a high school diploma,' 'a high school diploma,' and 'more than a high school diploma.' *Employment status* is also defined by three categories which includes 'full-time work,' 'part-time work,' and 'not currently working/other.' *Financial insecurity* is operationalized as a continuous variable using a composite financial security score. Participants were asked if they ever needed to do any of the following seven things due to financial difficulties during the past year: liquidate assets, postpone medical care, borrow money, apply for government assistance, obtain a loan, or alter living arrangements. For each affirmative answer 1-point is added to the financial insecurity score such that higher scores indicate more financial insecurity.

*Birthplace* is self-reported by participants as United States, American Samoa, Samoa, and Tonga. *Pacific cultural affinity* is a continuous variable using a composite cultural identity score with a range of 11–44 that was designed specifically for the PIHS ( $\alpha = 0.85$ ). Participants were asked how often they participated in a series of 11 different Tongan or Samoan cultural activities including: speaking Samoan or Tongan language, listening to Samoan or Tongan music, cooking Samoan or Tongan food, spending time with Samoan or Tongan friends, time spent with Samoan or Tongan friends growing up, identifying oneself as a Samoan/Tongan American, identifying oneself as only Samoan or

Tongan, identifying oneself as only American, listening to Samoan or Tongan radio, watching Samoan or Tongan TV shows, and reading Samoan or Tongan news or other materials (see Appendix A). Each activity is given a numeric score based on their responses: very often – 1, fairly often – 2, not too often – 3, and never – 4. The exception is the question ‘How often do you identify yourself as only American?’ which was reverse coded. However, for this analysis, the items were reverse-coded from the original so that a higher score indicated a higher level of Pacific Island cultural affinity.

### **Analysis plan**

All statistical analyses were completed using STATA 12.0. A key variable in this analysis, cultural affinity, was developed specifically for use in the PIHS. Initially, univariate and bivariate statistics were assessed to understand the distribution of the cultural affinity score and its unadjusted relationships with other key covariates.

During the next step of the analysis the psychometric properties of the cultural affinity scale were evaluated. First, the Cronbach’s alpha of the entire scale was calculated. Exploratory factor analysis using varimax rotation and loadings of  $\geq 0.3$  was performed to confirm the existence of factors within the scale. In order to understand the importance of each item to the total scale the alpha for the mean, variance, and alpha of the scale if each item was deleted and the item-total correlations were calculated. Following the factor analysis, the cultural affinity scale was split into two subscales. The ‘Cultural affinity activity’ subscale includes items A-E, and G-H while the ‘Cultural affinity media’ subscale includes items I-K. The two subscales were used separately in the remainder of the analysis.

It was hypothesized that the effect of cultural affinity on IFC might vary by age, ethnicity, gender, education, or birth country. Using the following base model:

$$g\{E(y)\} = \beta_0 + \beta_1 \text{age} + \beta_2 \text{gender} + \beta_3 \text{ethnicity} + \beta_4 \text{marital status} \\ + \beta_5 \text{education} + \beta_6 \text{employment status} \\ + \beta_7 \text{financial} + \beta_8 \text{birthplace} + \beta_9 \text{cultural affinity activities} \\ + \beta_{10} \text{cultural affinity media} + \varepsilon,$$

where  $g = \ln\{E(y)\} = \ln\{E(\text{island foods consumption})\}$  and  $y \sim \text{Poisson}$ ,

the SVY command was used to apply population weights and correct for clustering within community religious organization. Five separate models were used to individually test for interactions between both of the cultural affinity subscales and age, ethnicity, gender, education, and birth country.

The final step of the analysis was to further examine the relationship between island food consumption and independent variables in the models where significant interactions were observed by performing a series of subgroup analyses. The effect of cultural affinity on IFC was separately determined in each of these subgroups while controlling for all other covariates in the models described above. All results were considered statistically significant at  $\alpha = 0.10$ . This alpha was chosen in order to increase sensitivity to detect trends within this small sample. Given that little is known about this population, the ability to identify potential trends during exploratory analysis is important.

## Results

### Descriptive statistics

The mean score for cultural affinity was  $33.09 \pm 0.28$  with a range of 21–44. Figure 1 shows that the distribution of cultural affinity scores is roughly normal, with 50% of the responses ranging between 30 and 36. The cultural affinity activity subscale has a mean of  $23.92 \pm 0.16$  out of a possible 28 points and the cultural affinity media subscale has a mean of  $6.03 \pm 0.22$  out of a possible 12 points. Bivariate associations shown in Table 1 indicate that the cultural affinity score is significantly and positively correlated with island food consumption, Samoan ethnicity, and age.

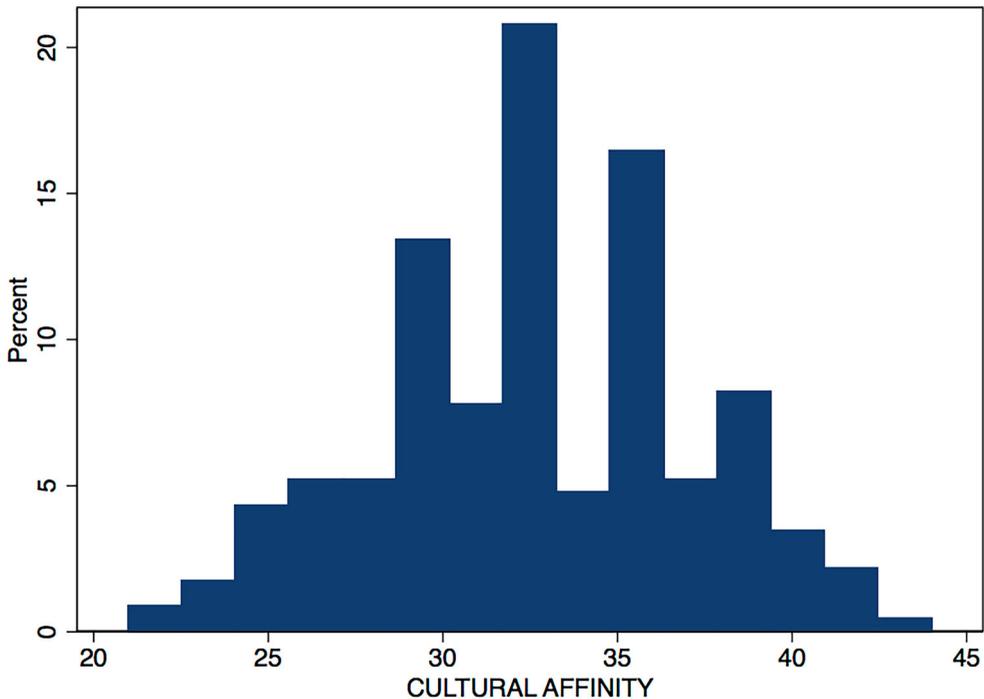


Figure 1. Frequency of cultural affinity score

Table 1. Correlations between cultural affinity score and key covariates.

R ( $p$ )	Culture	Island foods	Ethnicity	Age	Gender	Education	Birth country
Culture	1.00						
Island foods	<b>0.28</b> ( <b>&lt;0.01</b> )	1.00					
Ethnicity	<b>0.20</b> ( <b>&lt;0.01</b> )	<b>-0.21</b> ( <b>&lt;0.01</b> )	1.00				
Age	<b>0.16</b> ( <b>0.02</b> )	<b>0.19</b> ( <b>&lt;0.01</b> )	-0.16 (0.01)	1.00			
Gender	-0.05 (0.46)	0.04 (0.49)	0.07 (0.29)	-0.08 (0.25)	1.00		
Education	-0.10 (0.12)	<b>-0.15</b> ( <b>0.02</b> )	0.04 (0.52)	-0.16 (0.01)	-0.13 (0.05)	1.00	
Birth country	0.05 (0.45)	<b>0.26</b> ( <b>&lt;0.01</b> )	<b>-0.50</b> ( <b>&lt;0.01</b> )	<b>0.54</b> ( <b>&lt;0.01</b> )	-0.05 (0.43)	-0.08 (0.26)	1.00

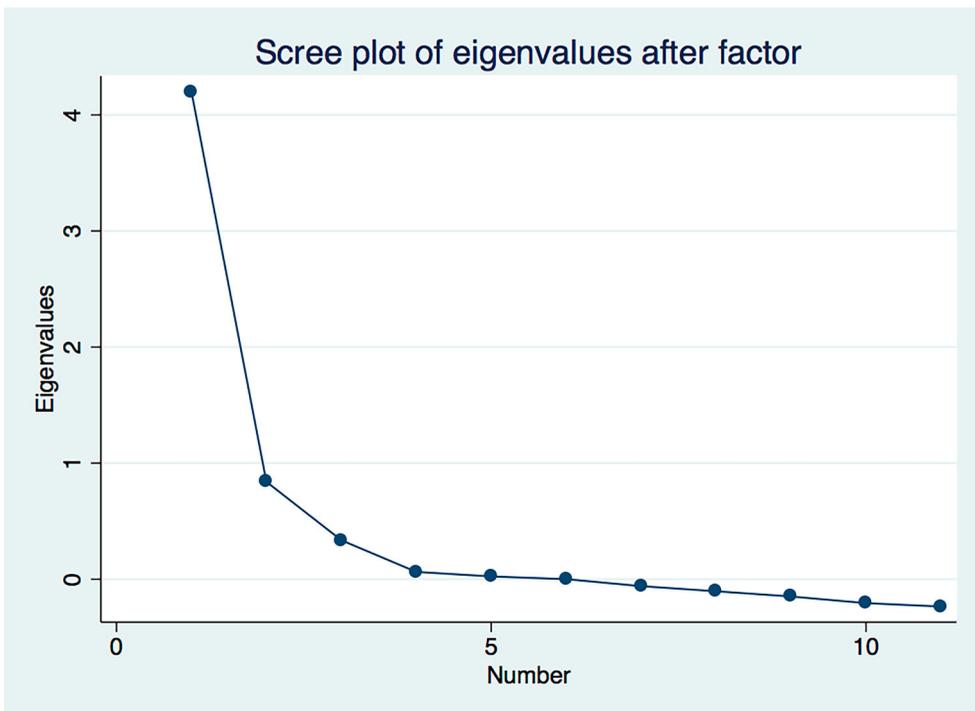
### Evaluation of psychometric properties

Table 2 shows a summary of the item-total statistics calculated. The entire scale had high internal consistency ( $\alpha = 0.85$ ) and removal of any one item did not increase the reliability enough to warrant dropping the item. Total-item correlations ranged from 0.06 (item H) to 0.66 (item K).

A screeplot (Figure 2) indicated one underlying factor. The factor pattern after varimax rotation (Table 3) indicates two factors with eigenvalues  $\geq 1$ . Accepting a loading of  $\geq 0.3$ , Table 3 shows that items A-E and G-H load on to the first factor comprised of cultural activities, items I-K load onto a second factor of media use, and only item F loads onto

**Table 2.** Item-total statistics of the cultural affinity scale.

Item	Scale mean if item deleted	Scale std. dev. if item deleted	Item-total correlation	Cronbach's alpha if item deleted
A	29.64	0.25	0.55	0.83
B	29.82	0.25	0.59	0.83
C	29.62	0.28	0.42	0.83
D	29.65	0.28	0.43	0.83
E	29.37	0.26	0.45	0.83
F	29.94	0.28	0.30	0.86
G	29.28	0.28	0.28	0.83
H	29.91	0.30	0.06	0.86
I	31.18	0.24	0.52	0.85
J	31.24	0.23	0.60	0.84
K	30.64	0.24	0.66	0.84



**Figure 2.** Scree plot of eigenvalues in the cultural affinity scale.

**Table 3.** Components of factors and factor loadings.

Item	Factor 1	Factor 2	Factor 3
A	<b>0.71</b>	0.38	0.03
B	<b>0.46</b>	0.43	0.33
C	<b>0.62</b>	0.22	0.24
D	<b>0.58</b>	0.15	0.38
E	<b>0.75</b>	0.21	0.12
F	0.14	0.23	<b>0.47</b>
G	<b>0.74</b>	0.17	0.11
H	<b>0.60</b>	-0.08	-0.15
I	0.12	<b>0.64</b>	0.19
J	0.23	<b>0.62</b>	0.07
K	0.37	<b>0.56</b>	0.04
Eigenvalue	<b>3.10</b>	<b>1.64</b>	0.63

a third factor. Following the factor analysis, two subscales were created. In addition to the results of the factor analysis, there was a theoretical basis for separating the two subscales based on the types of activities they described and also for potential correlations these activities may have with social or demographic characteristics such as age, birthplace, or education. The cultural affinity activity subscale had high internal consistency ( $\alpha = 0.85$ ), but the internal consistency of the cultural affinity media subscale was moderate ( $\alpha = 0.71$ ). The correlation between two subscales was 0.51.

### Multivariable analysis

Table 4 shows the incident rate ratios of IFC for the past week after adjustment for demographic, socioeconomic, and cultural variables in five different models – each with a different interaction term. The model in the second column showed a marginally significant interaction between the cultural affinity activity subscale and ethnicity ( $IRR = 1.08 \pm 0.04$ ;  $p = 0.067$ ). Increased cultural affinity in the form of Samoan media consumption was associated with more IFC in Samoans than the same level of Tongan media consumption in Tongans. The model in the fifth column of Table 4 indicates a significant interaction between the cultural affinity media subscale and birth country. Higher culturally specific media consumption was associated with a decrease in island food consumption among those born in Samoa ( $IRR = 0.90 \pm 0.004$ ;  $p = 0.052$ ) and Tonga ( $IRR = 0.90 \pm 0.04$ ;  $p = 0.0034$ ). However, there was no significant interaction found for those born in the United States or American Samoa. The cultural affinity media subscale did not have a varying effect on IFC by age, financial insecurity score, or educational attainment. There were also no significant interactions found between the cultural affinity activity subscale and any of the demographic factors tested.

### Discussion

Although culture is a complex concept, the cultural affinity scale used in the PIHS measures multiple aspects of culture relating to identity, language, media food, and social contacts adds a new level of richness to the survey measurement of Pacific Islander cultural affinity. Its moderate, but significant correlation with island food consumption is expected given that the more an individual identifies with a particular culture, the more its

**Table 4.** Incident rate ratios from poisson regression for island food consumption in past week and demographic covariates and cultural affinity activity and media subscale interactions.

Interaction variable:	Age	Ethnicity	Financial	Education		Birth country <sup>1</sup>	
	IRR (S.E.)	IRR (S.E.)	insecurity IRR (S.E.)	IRR (S.E.)		IRR (S.E.)	
Age	1.01 (0.01)	1.01 (0.01)	1.01 (0.01)	1.01 (0.01)		1.01 (0.01)	
Ethnicity (Samoan)	0.84 (0.14)	1.00 (0.17)	0.87 (0.14)	0.86 (0.13)		0.85 (0.15)	
Education <HS (Ref.)	–	–	–	–		–	
HS	0.87 (0.11)	0.91 (0.11)	0.91 (0.11)	0.78 (0.14)		0.93 (0.12)	
>HS	0.84 (0.13)	0.89 (0.13)	0.89 (0.13)	0.94 (0.18)		0.91 (0.14)	
Fin. Insecurity	<b>1.08<sup>+</sup> (0.04)</b>	1.07 (0.04)	1.05 (0.05)	1.06 (0.04)		<b>1.08<sup>+</sup> (0.05)</b>	
Birthplace US (Ref.)	–	–	–	–		–	
Samoa	0.86 (0.15)	0.83 (0.14)	0.86 (0.16)	0.81 (0.12)		1.13 (0.25)	
Am. Samoa	0.93 (0.16)	0.95 (0.17)	0.96 (0.17)	0.94 (0.18)		1.06 (0.24)	
Tonga	1.16 (0.18)	1.25 (0.18)	1.18 (0.19)	1.13 (0.20)		1.16 (0.15)	
Cultural Affinity Activity subscale	1.16 <sup>+</sup> (0.09)	<b>1.12<sup>**</sup> (0.02)</b>	1.06 (0.04)	1.08 (0.06)		<b>1.12<sup>+</sup> (0.06)</b>	
Cultural Affinity Media subscale	<b>1.12<sup>+</sup> (0.07)</b>	0.99 (0.03)	<b>1.07<sup>+</sup> (0.04)</b>	1.02 (0.05)		<b>1.09<sup>+</sup> (0.04)</b>	
Activity subscale Interaction	1.00 (0.002)	0.05 (0.04)	1.02 (0.01)	<HS (omitted)	S	0.91 (0.06)	
				HS	AS	0.90 (0.07)	
				>HS	T	1.00 (0.07)	
Media subscale Interaction	1.00 (0.001)	<b>1.08<sup>+</sup> (0.04)</b>	0.98 (0.01)	<HS (omitted)	S	<b>0.90<sup>+</sup> (0.04)</b>	
				HS	AS	1.03 (0.09)	
				>HS	T	<b>0.90* (0.04)</b>	
Constant	1.02 (0.55)	1.84 (0.46)	2.11 (0.60)	2.24 (0.53)		1.92 (0.52)	

\*\* $p < 0.001$ , \* $p < 0.05$ , <sup>+</sup> $p < 0.10$ ; all models adjusted for clustering by religious institution, gender, marital status, and employment status.

<sup>1</sup>U.S. omitted, S = Samoa, AS = American Samoa, T = Tonga.

foods they are likely to consume given adequate access. The lack of a significant correlation with birth country was surprising in that foreign-born migrants generally have a higher affinity for the home culture compared to native-born individuals (Birman and Trickett 2001). However, this could be explained by the relative recent nature of Samoan and Tongan migration to the United States. It is possible that many of the individuals born in the United States are children of immigrants themselves and grew up in more traditional household compared to third generation individuals of other immigrant groups.

The moderation analysis revealed two significant interactions between cultural affinity as defined by culturally specific media use with ethnicity and Samoan or Tongan birth. The interactions between cultural affinity and age, financial insecurity, and educational attainment were not significant. With the exception of age, the remaining four variables can be broadly split into two categories: financial insecurity score and educational attainment can represent socioeconomic status and ethnicity and birthplace represent identity and cultural orientation. In very broad strokes, the results of this portion of the analysis suggests that the effect of cultural affinity associated with IFCC varies more by subgroup in variables related to identity and culture than by subgroup in variables related to socioeconomic status.

The differential effect of cultural affinity on IFC by birthplace regardless of ethnicity suggests that there may be variation by political, geographic, and cultural nuance. Although Samoa, American Samoa, and Tonga are bounded by a close cultural and religious heritage, they are nonetheless separate and independent from one another (Hau'ofa 1994). Their disparate relationships with colonial powers have created more cultural

divergence in the past century than possibly ever before (Wendt 1982). In this analysis, there was a significant decrease in the effect of cultural affinity on island food consumption if an individual was born in Samoa or Tonga compared to the United States. There was no significant interaction among those born in American Samoa compared to United States birthplace. One possible explanation of this result is qualitative differences in migrants from American Samoa and immigrants born in Samoa or Tonga. As a United States territory, there is a long history of American Samoa migration and cultural exchange between American Samoa to the United States ranging from Americanization to biculturalism to multicultural, multinational identity in both home and diasporic Samoans (Hau'ofa 1994; Henderson 2010; Thomas 1981; Wendt 1982).

Multiple studies have shown a geographic association with dietary shifts within the Pacific with individuals living in rural areas adhering to a more traditional diet and those living in urban locales consuming more of a Western diet (Bindon and Baker 1985; Finau et al. 1986; Finau and Wainiqolo 2004; Tillotson et al. 1973). Cultural affinity may not have as large an effect on IFC among those born in Samoa or Tonga because those individuals may eat island foods out of habit or lifelong preference and therefore, more or less culturally-relevant media consumption may not have as strong of a moderating effect on island food consumption. For those born in the United States and American Samoa the consumption of island foods may serve a more symbolic purpose that is a synergistic part of an overall pattern of culturally-relevant information and food consumption: a representation of an island foodscape distinct from a growing 'McDonaldized' global diet and culture (Keesing 1989; Ritzer 2011, 9–14). Cooking, eating, and sharing food reinforces identity and cultural bonds between members of a group and ties individuals within the diaspora back to a distant homeland (Appadurai 1988; Bell and Valentine 1997; Lee 2007; Povey 2006).

A significant interaction between the cultural affinity media subscale, which measured consumption of culturally-relevant media, and Samoan or Tongan ethnicity was also found. Similar to the interaction found with birthplace, this result could potentially be explained by differences in the political relationship between Samoa, Tonga, American Samoa, and the United States, which in turn, influences sociodemographic, economic, and cultural differences between the two ethnic groups. In this study population, there were statistically significant differences between Samoans and Tongans in both employment and cultural affinity: Samoans have a higher cultural affinity score and a higher proportion of individuals reporting not working or doing non-standard work while Tongans had a higher proportion of individuals working part-time. There were no differences in age, educational attainment, financial insecurity, or full-time work. It is possible that this interaction could be explained by unmeasured differences in socioeconomic status or cultural capital such as preservation of *fa'a Sāmoa* – the 'Samoan way' – within the Samoan diaspora and a relatively high level of social support among migrant Samoans versus a high value placed on cosmopolitan goods and a desire to adopt a multicultural identity among second and third generation Tongans (Baldauf 1981; Besnier 2004; Hanna 1998; Lee 2006, 2007). When tested in Samoans and Tongans in separate subgroup analyses, there was a trend towards an increased influence of this subscale on IFC among Samoans compared to Tongans. However, this association did not reach significance in either group. This result could possibly be due to differences in sample size or variance between the two ethnic subgroups.

There are limitations to this study that should be addressed. First, the data used study was a pilot test of a larger, national survey of Pacific Islanders. Therefore, ethnic diversity within the sample is limited to Samoans and Tongans and participants were chosen as part of a complex sample drawn from Pacific Islander faith-based organizations in California, both of which may limit the generalizability of this pilot sample (Panapasa et al. 2012a). Second, the sample size is relatively small and cell sizes become increasingly narrow when looking at the intersections of multiple socio-demographic groups. Third, these data are cross-sectional in nature, which makes temporal ordering impossible and self-report data could introduce social desirability or recall bias. Fourth, the global nature of the island foods variable made nuanced interpretation impossible. The island foods variable used in this analysis did not differentiate between the type or nutritional quality of island foods consumed. For example, there are many types of island foods that vary greatly in availability and nutritional content. Coconut milk and canned pork products are lower in nutritional quality but are widely available in the continental United States. Fresh, high-quality produce or fish may be less available to the participants in this study who reside on the continental United States. Future research should focus on specific foods and explore how foods consumed by participants vary by nutritional quality. Lastly, although the cultural affinity scale used in this study captured multiple aspects of closeness to Samoan and Tongan culture but did not simultaneously measure affinity to American culture aside from a single item. For example, the three questions in the media subscale ask about consumption of Samoan or Tongan media, but not American radio, television, or news. Therefore, a bi-dimensional acculturation measure would better capture whether an individual aligns with traditional culture, American culture, is fully bi-cultural, or is marginalized from both cultures (Kaholokula et al. 2008; Lara et al. 2005).

Despite these limitations, there are multiple strengths to this analysis. This study uses a sample that captures multiple sub-groups of one of America's numerically small and under-studied racial groups (Panapasa 2009). There are no other known studies that have identified interactions between cultural affinity and sociodemographic characteristics that influence patterns of island food consumption among Pacific Islander Americans. A novel, multi-item scale was used to measure the complex construct of cultural affinity.

In conclusion, this analysis begins to answer the question of the extent to which cultural affinity may interact with age, educational attainment, and birthplace to influence IFC within two populations of Pacific Islander Americans in California. Results of regression models showed significant interaction effects between culture and age, educational attainment, and birthplace. These three significant interactions could be considered together as a larger sociocultural pattern. Globalization, Westernization, and migration generate identity change on both an individual and population level. The increasing importance of cultural affinity to IFC – especially if viewed within the context of a larger foodscape – to younger and more highly educated Pacific Islander Americans, speaks to an interesting trend. Those who are dually separated from their home cultures by both diasporic space and by educational attainment could be making more conscious decisions about the identity expressed through food.

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