WATERPIPE SMOKING AMONG ARAB AMERICAN WOMEN IN SAN DIEGO, CALIFORNIA

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by
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SAN DIEGO STATE UNIVERSITY

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Waterpipe Smoking among Arab American Women in San Diego, California

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DEDICATION

This Thesis is dedicated to my parents, Ayesha and Mohamad. I am blessed to have a mother that has turned her success in life into mine, and a father that provides nothing but limitless pride and support.

This thesis only constitutes a fraction of what I hope to achieve. The drive and conviction to do so is not possible without your prayer and support. May God give you health, wealth, and a long life with all your dreams fulfilled.
ABSTRACT OF THE THESIS

Waterpipe Smoking among Arab American Women in San Diego, California
by
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Master of Public Health
San Diego State University, 2010

Arab Americans are one of the country’s fastest growing immigrant populations. Arab American adult females emigrate from countries where smoking rates are two to three times higher than the United States national average smoking rate of 21.2%. Studies have shown that smoking rates in Arab Americans are among the highest in the United States. A popular form of tobacco use among Arab Americans, especially Arab American women, is waterpipe smoking. There is paucity of published research conducted on the health behaviors and tobacco use of Arab American women. The aim of this study is to determine predictors of waterpipe use level among Arab American women in San Diego, California. On the basis of previous studies with findings relevant to our research, we hypothesized that after controlling for demographic background factors, regular waterpipe smoking, versus occasional waterpipe smoking, is positively associated with smoking a waterpipe at home, smoking a waterpipe with one close friend, and initiating waterpipe smoking at an early age. Regular waterpipe smoking was defined as smoking a waterpipe at least once a month. This thesis conducts secondary analyses of existing data on 176 Arab American female waterpipe smokers to investigate contingencies theoretically responsible for their waterpipe smoking levels. Predictors were selected based on the Behavioral Ecological Model (BEM). Self-administered surveys were developed at the Center for Behavioral Epidemiology and Community Health (C-BEACH). The female participants of the study were between the ages of 18 to 80 years, with an average of 29 years of age (SD = 13). After controlling for demographic background factors, findings from the logistic regression analysis showed that regular waterpipe smoking was positively associated with smoking a waterpipe at home (P = .010), smoking a waterpipe with one close friend (P = .003), and initiating waterpipe smoking at an early age (P = .023). These predictors will help identify points of intervention to help design tailored health promotion, education, and prevention programs for waterpipe smoking among Arab American women.
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I graciously appreciate the continued support and dedication of my committee chairman, Dr. Melbourne F. Hovell. I especially would like to acknowledge his advice and guidance as my masters and thesis advisor. I would like to extend my thanks to committee members: Dr. Brian Finch, Dr. Ming Ji, and co-chair Dr. Nada Kassem. Their combined experience and insight have greatly impacted and influenced the writing of this thesis.

It is also a pleasure to pay tribute to my family. I am deeply thankful to have such wonderful brothers, Hussein and Asim. Their knowledge and intellect pushes me to learn more every day, but most of all their love gives me strength.
CHAPTER 1

INTRODUCTION

Tobacco use is one of the ten leading health indicators for the Healthy People 2010 agenda, and remains to be a major focus in the proposed Healthy People 2020 objectives (Office of Disease Prevention and Health Promotion, U.S Department of Health and Human Services, 2010). The World Health Organization (WHO) warns that if current smoking patterns continue, it will cause some 10 million deaths each year by the year 2020 (World Health Organization [WHO], 2010). Since 1964, tobacco use has been identified by numerous U.S. Surgeon Generals’ Reports as the leading source of preventable morbidity and premature death (Centers for Disease Control and Prevention [CDC], 1998; U. S. Department of Health and Human Services, 2004; U.S. Department of Health, Education, and Welfare, 1964). In the past several decades, attention was predominately focused on tobacco-related morbidity and mortality among White Americans in general. Much less attention was given to understanding tobacco use among other racial and ethnic groups living in the United States. It was not before 1998 that the first report was issued by the Surgeon General’s office that focused exclusively on tobacco use among other racial and ethnic groups (CDC, 1998). The latest report issued in 2004 noted differences in tobacco use among four major U.S. racial and ethnic minority groups: African Americans (22.8%), American Indians and Alaska Natives (39.9%), Asian Americans and Pacific Islanders (16.6%), and Hispanics (22.3%) (U.S. Department of Health and Human Services, 2004). Arab Americans, as an ethnic group, were not included in the 1998 nor the 2004 U.S. Surgeon General’s report.

Categorized by the U.S. Census Bureau (2003) as people with ancestries originating from Arabic-speaking countries or areas, Arab Americans are one of the country’s fastest growing immigrant populations (Hammad, Kysia, Maleh, Ghafoor, & Rabah-Hammad, 1998). Estimates of 3 to 4 million Americans are reported to have an Arabic origin (Arab American Institute, 2008; Kulwicki, 2000). According to the Arab American Institute (2008), 715,000 Arab American reside in California, and an estimate of 78,562 Arab Americans live in San Diego, California. In the U.S.A., no national tobacco use data are available for Arab
Americans. One study found that fifty two percent of Arab American adults who visited a local community health center reported using tobacco (Kulwicki & Dervartanian, 1996). Another study of Arab American adults in the United States found that 41% of men and 38% of women were smokers, a rate higher than the national average of 20.6% (CDC, 2009; Rice & Kulwicki, 1992).

Prevalence of tobacco use in some Arabic countries was recently reported to reach as high as 77% among men and 35% among women (WHO, 2006). Emigrating from countries where tobacco use rates are among the highest in the world, Arab Americans also come from countries where health promotion and tobacco cessation programs have been initiated in the past decade (WHO, 1999). Smoking is an acceptable social and cultural behavior in Arab countries (Shafey, 2007). Smoking inside the home is also considered to be within the range of normal behaviors (Al-Omari & Scheibmeir, 2009). Offering to smoke a cigarette to someone is considered being hospitable in Arab countries Kulwicki & Rice (2003) (as cited in Lewis, 1995). Another sign of hospitality in the Arab culture is offering to smoke or to share smoking a waterpipe (Yadav & Thakur, 2000). In a study conducted in Syria, waterpipe smokers reported that waterpipe smoking is a pleasant social experience embedded in cultural practice (Hammal, Mock, Ward, Eissenberg, & Maziak, 2008). The prevalence of waterpipe smoking in some Middle Eastern countries is as much as 25 percent of some populations (Chaaya, Awwad, Campbell, Sibai, & Kaddour, 2003; Tamim et al., 2003). Waterpipe is also known as “hookah, arghile, narghile, shisha, goza, and hubble-bubble” (Maziak, Ward, & Eissenberg, 2004).

A waterpipe consists of a head where tobacco is heated, a body that connects the head to the base, a water filled bowl, and a hose through which smoke is drawn (WHO, 2005). Because waterpipe tobacco is heated with charcoal, inhaled smoke is mixed with charcoal combustion products (Shihadeh, Azar, Antonios, & Haddad, 2004). With each inhalation, air is drawn from the heated tobacco and smoke is passed through the partially filled water bowl to finally reach the smoker through the hose mouthpiece (Knishkowy & Amitai, 2005). There has been a false perception that waterpipe smoking is safer than cigarette smoking, perhaps because the invention of waterpipe smoking involves the passage of smoke through water that is presumed to filter the smoke and remove toxic agents (Kandela, 2000; WHO, 2005). The popular belief that water filters the smoke from harmful substances, as well as the
intermittent pattern of smoking a waterpipe, may have resulted in underestimating the risk of
diseases and addiction related to tobacco use (Kandela, 2000). Maziak, Ward, and Eissenberg
(2004), reported that tar and heavy metals pass through water and remain in the inhaled
waterpipe smoke. Studies have shown that waterpipe smoke contains nicotine, carbon
monoxide, and carcinogens. These elements have been found associated with high levels of
nicotine metabolites in blood and with cancer, impaired lung function, pulmonary disease,
cardiocascular disease, and low birth weight (Knishkowy & Amitai, 2005; Maziak, Ward, &
Eissenberg, 2004; Shafagoj, Mohammed, & Hadidi, 2002; Shihadeh, 2003; Shihadeh &
Saleh, 2005). Waterpipe use is relatively new in the United States. Despite its wide and fast
spread, few data are available on its use and determining factors (Maziak, Rastam, et al.,
2004).

Gender was reported by researchers to be a significant predictor of smoking status in
Arab countries (Al-Omari & Scheibmeir, 2009), but studies show that gender patterns and
predictors of smoking differ between waterpipe smokers and cigarette smokers. While the
prevalence of cigarette smoking is predominantly higher among Arab males, waterpipe
smoking did not show significant prevalence differences between genders (El-Roueiheb et
al., 2008; Tamim, Akkary, El-Aein, El-Roueiheb, & El-Chemaly, 2006; Tamim et al., 2007;
WHO, 2010). Scientists attribute these observations to the increased use and popularity of
waterpipe smoking among Arab girls and women (Rice et al., 2006; WHO, 2010). Studies
also found that waterpipe smoking is socially more acceptable for Arab women than
cigarettes smoking (El-Roueiheb et al., 2008; Labib et al., 2007; Maziak, Rastam, et al.,
2004). While the Arab social culture opposes women cigarette smoking, but is tolerant of
men cigarette smoking, waterpipe smoking for women is positively perceived to be
“traditional, social, and attractive” (El-Roueiheb et al., 2008). This suggests that social
acceptability may play a role in maintaining a high rate of waterpipe smoking among Arab
women while bolstering its current popularity. Maziak (2008), predict that the widespread of
waterpipe use among Arab women may erase long-standing gender differences in tobacco
use in the future. The study also warns that the increased tobacco use by Arab women will
result in a dramatic increase in their risk of lung cancer, heart disease, and other tobacco
related illnesses. The few studies that explore the use of waterpipe among Arab women are
primarily focused on identifying patterns and predictors of waterpipe use among Arab
women who are pregnant (Chaaya et al., 2003; Chaaya, Jabbour, El-Roueiheb, & Chemaitelly, 2004; Yunis et al., 2007), emphasizing the harmful effects of waterpipe smoking on the fetus, but not on women’s health.

Currently, there are no representative samples of Arab immigrants from which reliable waterpipe use or determinants of use can be obtained (Al-Omari & Scheibmeir, 2009). Fewer data are available on the health behaviors and tobacco use of Arab American women. With the increase and popularity of waterpipe smoking among Arab women (Rice et al., 2006; WHO, 2010), and the anecdotal evidence that waterpipe use is spreading in California (Berestein, 2003) including the city of San Diego (McNicoll, 2002), this study aims to determine predictors of current waterpipe use level among Arab American women in San Diego, California.

**LITERATURE REVIEW**

There are several studies that examine the predictors of waterpipe use in the Middle Eastern region as well as several that study waterpipe use among Arab American youth (Baker & Rice, 2008; Kulwicki & Rice, 2003). For the purpose of an extensive literature review, published studies were searched for predictors of waterpipe use as well as cigarette smoking. In this thesis the following predictors were investigated: age at smoking initiation, the household environment, and normative influence.

In terms of demographic variables, a person’s age at which he or she starts smoking is a strong indicator of whether that person will develop a smoking habit (Kulwicki & Rice, 2003). Most teenagers become regular smokers when they initiate smoking at age 14 (Gilpin & Pierce, 1997). In the Middle East, most reports indicate that adolescents start smoking before age 14 (al-Faris, 1995; Saeed, Khoja, & Khan, 1996). In agreement, Kulwicki and Rice (2003) reported an average age of initiation for Middle Eastern adolescents of 13 years old. In a recent study by Weglicki, Templin, Rice, Jamil, and Hammad (2008), Arab American youth had lower percentage of ever smoking a cigarette (20%) when compared to non-Arab American youth (39%), but had a significantly higher percentage of ever using a waterpipe (38%) than non-Arab American (21%). Because of the increase in smoking among young girls compared to adult females in addition to other factors, the Global Youth Tobacco Survey (GYTS) indicated that the estimate of a doubling of deaths from smoking (from 5
million per year to approximately 10 million per year by 2020) might be an underestimate (CDC, 2008). In a study that compared “beginning” to “established” waterpipe users, women were noticed to initiate their waterpipe use later than men and were surrounded by social support and a tolerant attitude toward waterpipe use (Asfar, Ward, Eissenberg, & Maziak, 2005). Waterpipe smoking initiation in Arab American and non-Arab American youth may be due to a number of factors such as: waterpipe smoking proliferating in hookah bars and cafes throughout the U.S. (Noonan, 2010), and using tobacco to identify with a peer group of which youth want to belong (Sussman et al., 1990). Over time, these factors would reinforce waterpipe smoking. Starting to smoke waterpipe at an early age may be a marker for these factors. As such the younger the start, the longer history of cumulative reinforcement for waterpipe smoking, which would predict higher rates of current waterpipe smoking in adults.

The following studies suggest that one of the key predictors for smoking is having smokers in the household. All Arab American adolescent smokers who participated in a study by Kulwicki and Rice (2003) had at least one smoker in the household. Participants in the study also reported that they often had difficulty being around smokers at home when attempting to abstain from smoking. Data from Maziak, Fouad, et al. (2004) clearly showed that more frequent waterpipe users tend to smoke individually at home, while less frequent waterpipe users tend to smoke socially outdoors. A convenient sample of current waterpipe smokers from Richmond and Memphis reported that waterpipe use occurred primarily at home either the respondent’s home or someone else’s (Ward et al., 2007). A recent study by Weglicki et al. (2008) found that if one or more family members smoked waterpipes in the home, youth were 6.3 times more likely to be current water-pipe smokers.

Social factors specific to waterpipe use such as number of friends who use a waterpipe and family attitude towards waterpipe use may influence a person’s waterpipe use and cessation (Maziak, Fouad, et al., 2004). Participants in a Kulwicki and Rice (2003) study identified hanging around friends who smoked as one of the strongest barriers to smoking cessation. In this study, all participants reported that about five of their closest friends smoked and that smoking helped them make friends. Family and group norms are generally held closely by Arabs (Kulwicki, & Dervartanian, 1996) and social network and the need for affiliation are an integral part of daily life for Arabs (Meles, 1981). Waterpipe use is believed to promote social gatherings within the Arab culture (Kandela, 1997). A survey by
Labib et al. (2007) for Arab female waterpipe users showed 97% had some or all of their friends as current smokers and 61% were encouraged to start smoking waterpipe by a female friend. Asfar et al. (2005) found that more than half of waterpipe users initiated use with one friend and continue to use waterpipe with one friend. These studies show how smoking waterpipe with one close friend can serve as a marker for complex and profound social reinforcements. Numerous studies have provided substantial evidence that social and cultural factors have different effects on tobacco use among diverse ethnic and racial groups. The above findings highlighted the effects of social and cultural models and reinforcing factors in Arab American women tobacco and waterpipe use.

**PROPOSED HYPOTHESIS**

The aim of this study is to determine whether specific social contingencies are predictors of (possible determinants) of level (e.g. regular or occasional) waterpipe use among Arab American women in San Diego, California. On the basis of previous studies with findings relevant to our research, we hypothesize that after controlling for demographic background factors, regular waterpipe smoking, versus occasional waterpipe smoking, is positively associated with smoking a waterpipe at home, smoking a waterpipe with one close friend, and initiating waterpipe smoking at an early age. Regular waterpipe smoking was defined as smoking a waterpipe at least once a month.
CHAPTER 2

METHODS

Secondary analyses were conducted on data from the *Al-Wikaya* Study, a cross-sectional survey of waterpipe smokers. Between January 2006 and June 2008, data was collected from approximately 450 Arab American males and females residing in San Diego, California. This thesis focuses on examining predictors of waterpipe use among 176 Arab American female participants. Inclusion criteria for the study were being eighteen years old and older, current waterpipe user, residing in San Diego, and having an ancestry that originated from an Arabic-speaking country.

In order to conduct secondary data analyses, a modification of the originally approved waterpipe study was submitted to the San Diego State University Internal Review Board (IRB) Committee on Protection of Human Subjects. Once approval was obtained, study staff removed participants’ identifying information and assigned random identification codes before the dataset was made available for secondary data analyses.

Recruitment efforts included distributing flyers and screening forms at colleges, churches, mosques, and Middle Eastern restaurants and stores. Research assistants were trained to approach and screen potential study participants. Most of the research assistants were fluent in the English and the Arabic languages. All recruitment materials, screen and consent forms, and questionnaire were written in both languages. The research assistants explained the purpose, requirements of the study and the consent form to the recruited participants, and asked for signature. Once informed consent was obtained, the research assistants proceeded to explain the protocol for completing a self-administered in-depth waterpipe use questionnaire. Upon completion and submission of the questionnaire, the research assistant provided participants an incentive (e.g. international calling cards, movie gift cards, Starbucks gift cards or $20 cash).
THEORETICAL FRAMEWORK

Since Arab Americans emigrate from countries where tobacco use rates are among the highest in the world (WHO, 1999), it is important to understand the factors that reinforce and aid in maintaining tobacco use behavior among this group (Jha & Chaloupka, 2000). The Behavioral Ecological Model (BEM) served as conceptual basis for presumed causal influences and selection of possible predictors of waterpipe smoking, which emphasizes social contingencies as determinants of lifestyle practices. From this foundation, the BEM extends the selectionist and environmental operant models of behavior to a hierarchical model of environmental factors that interact to cause behavior in individuals and populations (Hovell, Wahlgren, & Adams, 2009). So in order to predict behavior, studying the broadest possible scale of social and cultural variables affecting a person’s environment is required. In terms of behavior modification, the BEM grants that social and cultural factors may be more important than the individual personality or cognitive variables in changing health behavior (Hovell et al., 2004). For the purpose of drawing a theoretical framework for research concerning policy and clinical efforts to restrict smoking and/or secondhand smoke exposure (SHSe), a review by Hovell and Hughes (2009) puts forward the BEM and empirical evidence that suggests social/cultural contingencies of reinforcement should be emphasized. In doing so, it is proposed that vulnerable populations will be protected from Industry-produced SHSe and may yield more and longer lasting cessation of smoking. Studies have demonstrated the BEM’s framework effectiveness in advancing health behavior research in various health issues, such as promoting physical activity (Hofstetter et al., 2008), tobacco use and cessation (Martinez-Donate et al., 2007), combating childhood obesity (Dresler-Hawke & Veer, 2006), Alcohol and Illicit drug use (Bousman et al., 2005), and promoting safe sex (Martinez-Donate, Blumberg, et al., 2004; Martinez-Donate, Hovell, et al., 2004).

No studies have been conducted using the BEM to investigate waterpipe smoking levels among Arab American women. However, Dr. Nada Kassem, the Principal Investigator of the Al-Wikaya Study, developed the study questionnaire with inclusion of concepts from the BEM. The waterpipe use questionnaire was pre-tested, pilot tested, and then self-administered. The questionnaire included questions on acculturation, waterpipe smoking habits, beliefs and attitudes about waterpipe smoking, cigarette smoking, ETS exposure to waterpipe smoking, waterpipe use home policies, general health, and demographics.
In order to explain waterpipe smoking behavior among Arab American women, contingencies operating at the individual, local, community, and social/cultural levels of the BEM should be examined. According to the BEM, the consequence under investigation is the level of current waterpipe smoking among Arab American women residing in San Diego, California. This consequence is determined and controlled by a hierarchy of contingencies of reinforcement. Guided by the BEM framework, predictors were grouped as follows: demographic background, distal contingencies, and proximal contingencies. A model of predictors of current waterpipe use level was designed based on the grouped predictors as displayed in a flowchart diagram (Figure 1).

Smoking waterpipe at home and smoking waterpipe with one close friend were hypothesized to be the proximal contingencies and the main predictors of the consequence. It is also hypothesized in the theoretical model that a distal contingency would be early initiation of waterpipe smoking. The distal contingency would serve as a predictor of the consequence, and would also act as a mediator for the proximal contingencies in the model. The demographic variables: age, education, marital status, and employment status were set to be the markers of the background variables. Background variables might interact with other contingencies in the model. All of the variables measured in this study were obtained through self-report, therefore making them under-specified.
MEASURES

In order to produce results comparable to previous studies and for accurate interpretation of results, most of the questions chosen from the Al-Wikaya study were dichotomized.

DEPENDENT VARIABLE

To predict current waterpipe smoking level, participants were asked about the frequency of waterpipe smoking using the following item: “Do you currently smoke a waterpipe daily, weekly, monthly, or occasionally?” responses of monthly or more frequent waterpipe smoking defined participants as “regular waterpipe smokers” (Jackson & Aveyard, 2008; Maziak, Eissenberg, & Ward, 2005; Maziak, Ward, Afifi Soweid, & Eissenberg, 2005; Smith, Curbow, & Stillman, 2007) and coded 1. An “occasionally” response option represented participants as “occasional waterpipe smokers” and it was coded 0 (reference category.)

Socio-Demographic Characteristics

Participants were asked about their age, education, marital status, employment status, region born, and annual household income. Age was used in its continuous form. However, because of skewness of the age variable distribution, the median was reported in the descriptive results. Educational level, marital status, employment status, region born, and annual household income were asked in multiple choice questions based on the current status at the time of survey. When asked about the highest level of education achieved, answers were recoded into “No college degree” and “College degree or higher”. Marital status was determined by the question “Do you have a spouse?” Employment had eight possible response options, these options were collapsed into “Employed” and “Not employed”. When participants specified which country they were born in, these answers were recoded into “born in the Middle East” and “born in the western region”. Annual household income was recoded into “under $30,000” and “over $30,000”.

Waterpipe Smoking Behavior

Regular waterpipe smoking predictor variables included: age when first started to smoke waterpipe, smoke waterpipe inside home, and smoke waterpipe with one close friend.
Smoking waterpipe inside home and smoking with one close friend were assessed by a yes and no question, with yes coded 1 and no coded 0. Age when first started smoking waterpipe was categorized into “18 years old or younger” and “older than 18 years of age”.

**Statistical Analysis**

All data analyses were conducted using SPSS version 16.0 (SPSS, Inc., 2008). Preliminary analyses included the inspection of frequencies for independent and background variables. Variables without variance were removed from further analysis. In the bivariate analysis, chi-square tests were used to compare each independent variable to current waterpipe smoking level. Because age was entered as a continuous variable, an independent-sample *t* test was used to indicate the mean difference in the bivariate analysis results. Variables with a significance of *P* < .10 were considered as candidate variables in the logistic regression (Elliott & Woodward, 2007).

Logistic regression analysis comparing each independent and background variable with the dependent variable was conducted. To detect multicollinearity, an examination of Tolerance and Variance Inflation Factor (VIF) was conducted for each independent variable. Age was found to be strongly associated with age at first use of waterpipe (*P* < .001), and was not included in the logistic regression model. A binomial logistic regression model was constructed entering variables that were hypothesized as predictors in the theoretical model. Hosmer and Lemeshow Goodness-of-Fit test was used to determine whether the model had a good fit.
CHAPTER 3

RESULTS

DESCRIPTIVE STATISTICS

The total number of female participants in Al-Wikaya study is 176 current waterpipe smokers. From this total sample, 104 women (59.1%) reported they were regular waterpipe smokers, and 72 women (40.9%) reported they were occasional waterpipe smokers (see Table 1).

Ages of participants ranged from 18 to 80 years old. The mean age for the total population was 29 years old, with a standard deviation of 13 years and a median of 24 years. About two thirds (63.6%) of the women in the sample had an educational level less than a college degree. Similarly, 62.4% reported that they do not have a spouse. Seventy two percent reported that they were employed, and about seventy percent (70.5%) had an annual household income of thirty thousand dollars or above. Approximately, half of the participants (55.6%) were born in the Middle East, with the remaining were born in the western region.

The percentage of women who started smoking waterpipe at or before the age of 18 years old was 47.6%. Forty two percent of the total sample smoked waterpipe inside their home, while about fifty six percent (55.8%) smoked waterpipe with one close friend.

BIVARIATE ANALYSIS

Bivariate relationships between current waterpipe smoking status and selected participants’ characteristics are shown in Table 2. Age, education, marital status, and employment status were all found to be significantly related (P < .10) (Elliot & Woodward, 2007) to waterpipe smoking level. Regular waterpipe smokers were more likely to have a younger mean age than occasional waterpipe smokers, had no college degree, did not have a spouse, and were employed. Additionally, current waterpipe smoking level was significantly associated with smoking waterpipe inside the home, smoking waterpipe with one close friend, and age at first use of waterpipe. Those who started to smoke waterpipe at or before
<table>
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<tr>
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<tr>
<td>Education</td>
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<tr>
<td>College Degree</td>
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<td>No College Degree</td>
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<td>(63.6)</td>
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<tr>
<td>Do you currently have a spouse?</td>
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<td>Yes</td>
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<tr>
<td>Under $30.000</td>
<td>33</td>
<td>(29.5)</td>
</tr>
<tr>
<td>Age at First Use of Waterpipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\leq$ 18 years old</td>
<td>80</td>
<td>(47.6)</td>
</tr>
<tr>
<td>$&gt;18$ years old</td>
<td>88</td>
<td>(52.4)</td>
</tr>
<tr>
<td>Smoke Waterpipe inside Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>71</td>
<td>(42.0)</td>
</tr>
<tr>
<td>No</td>
<td>98</td>
<td>(58.0)</td>
</tr>
<tr>
<td>Smoke Waterpipe with One Close Friend</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96</td>
<td>(55.8)</td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>(44.2)</td>
</tr>
</tbody>
</table>

*Due to missing values, some variables do not total 176.
Table 2. Bivariate Analysis of Arab American Women’s Current Waterpipe Smoking Status by Selected Characteristics (N=176)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Regular Waterpipe Smoker</th>
<th>Occasional Waterpipe Smoker</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>104 (59.1)</td>
<td>72 (40.9)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>102 (59.6)</td>
<td>69 (40.4)</td>
<td>.025(^b)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>27 (13)</td>
<td>32 (14)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Degree</td>
<td>25 (26.3)</td>
<td>35 (50.0)</td>
<td>.002</td>
</tr>
<tr>
<td>No College Degree</td>
<td>70 (73.7)</td>
<td>35 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Currently have a spouse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30 (29.4)</td>
<td>35 (49.3)</td>
<td>.008</td>
</tr>
<tr>
<td>No</td>
<td>72 (70.6)</td>
<td>36 (50.7)</td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>77 (79.4)</td>
<td>44 (62.0)</td>
<td>.013</td>
</tr>
<tr>
<td>Not Employed</td>
<td>20 (20.6)</td>
<td>27 (38.0)</td>
<td></td>
</tr>
<tr>
<td>Region Born</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East</td>
<td>50 (51.0)</td>
<td>44 (62.0)</td>
<td>.157</td>
</tr>
<tr>
<td>Western Region</td>
<td>48 (49.0)</td>
<td>27 (38.0)</td>
<td></td>
</tr>
<tr>
<td>Annual Household Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over $30.000</td>
<td>45 (73.7)</td>
<td>34 (66.7)</td>
<td>.411</td>
</tr>
<tr>
<td>Under $30.000</td>
<td>16 (26.2)</td>
<td>17 (33.3)</td>
<td></td>
</tr>
<tr>
<td>Age at First Use of Waterpipe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \leq 18 ) years old</td>
<td>57 (57.6)</td>
<td>23 (33.3)</td>
<td>.002</td>
</tr>
<tr>
<td>&gt;18 years old</td>
<td>42 (42.4)</td>
<td>46 (66.7)</td>
<td></td>
</tr>
<tr>
<td>Smoke Waterpipe inside Home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>52 (52.5)</td>
<td>19 (27.1)</td>
<td>.001</td>
</tr>
<tr>
<td>No</td>
<td>47 (47.5)</td>
<td>51 (72.9)</td>
<td></td>
</tr>
</tbody>
</table>

(table continues)
Table 2. (Continued)

| Characteristics                          | Regular Waterpipe Smoker n (%) | Occasional Waterpipe Smoker n (%) | P  
|------------------------------------------|---------------------------------|-----------------------------------|-----
| Smoke Waterpipe with One Close Friend    | 69 (68.3)                      | 27 (38.0)                        | <.001
| Yes                                      | 32 (31.7)                      | 44 (62.0)                        |     

a Chi-Square Test  

b Independent-Samples t-test

the age of 18, smoked waterpipe inside their homes, and smoked waterpipe with one close friend were more likely to be regular waterpipe smokers.

LOGISTIC REGRESSION

Table 3 shows the multivariable logistic regression for predictors of regular waterpipe smoking. Demographic variables as well as distal and proximal contingencies were entered in the logistic regression analysis. Independent variables were considered significant predictors at P < .10 (Elliot & Woodward, 2007). After adjusting for all other variables in the model, smoking waterpipe at home, and smoking waterpipe with one close friend were significant indicators of regular waterpipe smoking among female Arab American waterpipe smokers. Other significant predictors in the model were having an educational level less than a college degree, and starting to smoke waterpipe at the age of 18 or younger.

Participants who reported smoking waterpipe with one close friend were 3.26 times more likely to be regular waterpipe smokers than those who reported not smoking waterpipe with one close friend, (95% confidence interval [CI]: 1.49– 7.13). Analysis also showed that those who reported smoking waterpipe inside their home were approximately 3 times more likely to be regular waterpipe smokers than those who reported not smoking waterpipe inside their home, (95% confidence interval [CI]: 1.29 – 6.58). Those who started smoking waterpipe after the age of 18 years had .39 of the odds of being a regular waterpipe smoker compared to those who started smoking waterpipe at age 18 or younger (95% confidence interval [CI]: .17 – .88). Having a college degree had about .34 of the odds of being a regular
Table 3. Binary Logistic Regression to Predict Current Waterpipe Smoking Status among Arab American Women in San Diego, CA. (N =151)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Odds Ratio (95.0% CI)</th>
<th>P – value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Degree</td>
<td>.34 (.16 – .75)</td>
<td>.008</td>
</tr>
<tr>
<td>No College Degree</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Currently have a spouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>.53 (.22– 1.29)</td>
<td>.162</td>
</tr>
<tr>
<td>No</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>1.31 (.49– 3.49)</td>
<td>.584</td>
</tr>
<tr>
<td>Not Employed</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Age at First Use of Waterpipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years old</td>
<td>.39 (.17– .88)</td>
<td>.023</td>
</tr>
<tr>
<td>≤ 18 years old</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Smoke Waterpipe inside Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2.91 (1.29 – 6.58)</td>
<td>.010</td>
</tr>
<tr>
<td>No</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Smoke Waterpipe with One Close Friend</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3.26 (1.49– 7.13)</td>
<td>.003</td>
</tr>
<tr>
<td>No</td>
<td>-----</td>
<td></td>
</tr>
</tbody>
</table>

Because of automatic list wise deletion, only 151 cases from the original total of 176 were entered in the logistic regression model. The Nagelkerke R Square is .34. Hosmer and Lemeshow test (P = .938) showed that the model was a good fit.

waterpipe smoker compared to those having no college degree (95% confidence interval [CI]: .16 – .75).
CHAPTER 4

DISCUSSION

This thesis, using Al-Wikaya data, analyzed the current waterpipe smoking habits of Arab American women residing in San Diego, CA. Al-Wikaya study is the first to utilize the behavioral Ecological Model (BEM) framework to predict waterpipe smoking behavior among female Arab American waterpipe smokers. To the best of our knowledge, it is also the first study that aims to understand the contingencies of reinforcement of waterpipe smoking in the social environment among Arab American women. In agreement with a recent study by Al-Omari and Scheibmeir (2009), there is limited published research on Arab Americans’ smoking behavior. This study will inform science by providing in-depth and unique data for this understudied population, and will also aid in planning tailored health promotion interventions in the United States and abroad.

Results of this study were consistent with the literature (Jamil et al., 2009); in that being Arab and having less education explained current level of waterpipe smoking among occasional to more frequent smokers. We found that women without a college degree are more likely to be regular waterpipe smokers if they started smoking waterpipe at a younger age, had one close friend to smoke with, and smoke waterpipe at home. Moreover, our study produced similar results to Ward et al. (2007) where correlates of higher frequency of waterpipe use included younger age at first use, ownership of a waterpipe, and use occurring primarily with friends.

According to the BEM, demographic characteristics are markers of a certain culture defined as metacontingencies. In our study, waterpipe smoking with one friend is one metacontingency that is representative of social contingencies. This finding implies that an Arab American female with friends that smoke waterpipe will more likely be a regular waterpipe smoker. Israel et al. (2003) indicated that smoking was an indispensable social activity in the Arab population, especially inside their circle of friends.

The CDC (2001) reported that most current smokers start smoking before the age of 18 years. Therefore, this study investigated early initiation of waterpipe smoking and its
association with current waterpipe smoking levels. Descriptive statistics and logistic regression showed that regular waterpipe smokers started smoking waterpipe at a younger age than occasional waterpipe smokers. Rice, Templin, and Kulwicki (2003) conducted four pilot studies comparing the average age of smoking initiation between Arab American and American adolescents. The authors found that Arab American adolescents started smoking at age 12 years, an age that is younger than the smoking initiation age of 14 years among American adolescents. Rice et. al. (2003) also stated that these findings were similar to studies in Middle East, in that Arab adolescents started smoking at a young age. Furthermore, Haddad and Malak (2002) reported that initiation of tobacco use was more common among Arab youths. The authors also reported that previous reports from Arab countries have shown that children start smoking at an early age. Our results may indicate that an early age of waterpipe smoking is a marker of regular waterpipe smoking in the Arab American communities.

Available literature stated that educational levels in the Arab American population was negatively associated with smoking waterpipes in the United States (Chaaya et al., 2004; Eissenberg, Ward, Smith-Simone, & Maziak, 2008; Rice et al., 2006; Smith-Simone, Maziak, Ward, & Eissenberg, 2008). This finding is supported by our study results in that having college degree was negatively associated with regular waterpipe smoking. Lack of college education may increase a person’s likelihood to smoke waterpipe.

According to the BEM, having a waterpipe at home serves as both a prompt and a reinforcer to the waterpipe owner to smoke it. The ability to smoke waterpipe at home is an important element in the environmental context of smoking behavior. Arab Americans describing their use of waterpipe to be at home was considered as a unique type of smoking in a study by Kulwicki and Rice (2003). Another study that focused on the Arab-speaking population in Australia by Carroll, Poder, and Perusco (2008), reported that the most popular place to smoke waterpipe for current waterpipe smokers was at home. A more recent study by Roskin and Aveyard (2009), found those who smoked waterpipe most days, smoked waterpipe at home. In accordance with these findings, our study found that regular waterpipe smoking behavior was reported to take place more likely at home. While universal smoking risk factors are investigated in this study, such as smoking at an early age, smoking at home, and smoking with one close friend, future studies on the effects of culture specific factors on
waterpipe smoking behavior among Arab American women are needed. Learning the differential effects of these factors would help in designing effective and more appropriate smoking prevention programs that can target a specific gender and ethnic group.

**LIMITATIONS**

The secondary data analyses for this study were derived from a cross-sectional and self-reported survey design. One of the inclusion criteria for the survey was to recruit only current waterpipe smokers, as non waterpipe smokers were excluded from the study. This meant that the outcome variable of interest, current waterpipe smoking status, did not offer a reference category where waterpipe smoking as a health risk behavior is absent. The lack of one end of the spectrum in the target behavior would make it difficult to compare risk factors among current waterpipe smokers with risk factors among those who do not smoke. To better understand the determinants of waterpipe smoking and to identify at-risk groups, future study designs should collect and provide data on non-waterpipe smokers in addition to current waterpipe smokers. By comparing current waterpipe smokers’ behavior to non-waterpipe smokers the discrimination in the study would be more complete, and therefore should strengthen associations.

The survey used convenience sampling, which is likely to introduce a bias when trying to generalize outside of the study population. The total sample for the study was not randomly selected, and consisted of Arab American volunteers living in only one large Southern California County. While associations presented in this study may be generalizable to Arab American women living in the United States at large, prevalence rates may not be determined. This is due to non-random sampling and a relatively small sample size.

Although the paper-based survey instrument consisted of questions with skip patterns, many participants in the study found that the questionnaire was long and time consuming. This resulted in missing data in many variables of interest. Due to statistical power requirements, the relatively small sample size may have made it difficult to detect significant associations. Despite these biases, we found that several of the BEM variables predicted regular waterpipe smoking among Arab American women. It is believed that with a larger sample size, a longitudinal study design, and the inclusion of non-waterpipe smokers, more evidence would be provided to support the usefulness of the BEM.
IMPLICATIONS

Based on the BEM, an individual’s behavior is the product of a hierarchy of contingencies of reinforcement, from proximal to distal. This means that the more proximal the contingency, the stronger the contingency is in reinforcing a behavior (Glenn, 1988). Contingencies that were found to be proximal to initial and current waterpipe smoking take place in a social context, (Ward et al., 2007). When contingencies function at a group level, members of the group provide models of behaviors among the group members, and reinforce one another (Hovell, Wahlgren, & Gehrman, 2002). For example, accepting an offer to smoke a waterpipe and later offering to return the gesture promotes and reinforces waterpipe smoking. This behavior is especially evident in Middle Eastern cultures, where sharing and or offering to share the waterpipe to others is considered being hospitable (Yadav & Thakur, 2000), and is found to be a pleasant social experience embedded in cultural practice (Hammal et al., 2008). In addition to these social contingencies, a physical contingency to smoke waterpipe can be the relief from nicotine cravings. According to Hovell and Hughes (2009), the interaction of social and physical contingencies would support waterpipe smoking and the recruitment of new waterpipe smokers. Theoretically, the recruitment of new waterpipe smokers occurs when individuals who have been exposed to waterpipe smoking in a friend’s home or waterpipe lounge for example, start smoking waterpipe in other settings. The BEM describes this process as the recruitment of new members to the waterpipe smoking “culture” (Hovell et al., 2009). Hovell et al. (2009) also propose that this type of behavioral evolution is predicted by the BEM and should be studied using both observational and experimental procedures.

In Middle Eastern developing countries, women clearly have different smoking patterns than men. In general, the Arab culture is less positive about women smoking relative to men smoking, and cigarette smoking relative to waterpipe smoking (Maziak, Rastam, et al., 2004). When correlates of smoking behavior among Muslim Arab-American adolescents were examined by Islam and Johnson (2003), culturally based gender-specific norms were significantly associated with increased susceptibility to smoking for males but not females. Islam and Johnson (2003) concluded that social influences-based smoking prevention programs should be modified to address culturally based gender norms. In accordance with the BEM, Arab women have different individual and group contingencies of reinforcement.
history than those of men. In this case, gender is considered an important marker for measuring a specific culture, which encompasses the exclusive contingencies of its members. The power of subculture contingencies and the importance of engineering gender-specific contingencies to protect women or other “high risk” immigrants from the tobacco industry are demonstrated in a study by Hofstetter et al. (2004). The study shows how the effect of acculturation in California and the substantial gender equality that comes with it interact with the previous Korean contingencies that suppressed female smoking. It was reported that because of acculturation, smoking prevalence among Korean women went from 7% in Korea to 17% in California (Song et al., 2004). Unfortunately, the degree of acculturation of Arab American women was not investigated in the present study. Future research needs to focus on studying the effect of acculturation on waterpipe use among Arab Americans and other ethnic groups. This would enable future studies to compare cultural influences between multiple cultures and generations.

According to the BEM, as the frequency of encountering a specific culture increase, the probability of an individual adopting a behavior consistent with that culture also increases (Hovell et al., 2002). Anti-tobacco campaigns need to address the cultural influences on Arab Americans’ waterpipe smoking behavior. In order to reduce a behavior that is influenced by culture, culture engineering is suggested. Engineering smoking culture has successfully reduced smoking in California through governmental policies and laws (Pierce et al., 1994). Also, a reduction in smoking was observed in a small group of China-to-U.S. immigrants, who reported a smoking reduction after immigration because of policies, rules, and “no smoking signs” (Tu, Walsh, Tseng & Thompson, 2000). In a study of correlates of home smoking bans among Mexican-Americans, Martinez-Donate et al. (2007) confirmed that the BEM framework provides a strong foundation for engineering change in health-related behaviors at the individual and population levels.

The BEM framework denotes that proximal contingencies have stronger influence on modifying behaviors than distal contingencies (Glenn, 1988). Due to missing data or lack of variance, our study had few usable variables to represent distal and proximal contingencies. The BEM also emphasizes social contingencies. In our literature review, social contingencies such as waterpipe popularity and social acceptability were found to be valid determinants for waterpipe smoking behavior among Arab American women. Measures for these social
processes in our data were insufficient, and therefore were not investigated. Not using such social determinants would limit our ability to fully utilize the BEM framework, which makes our model under-specified. Future studies should include richer variables, such as acculturation, mass media exposure, public policies, and societal belief, to provide a more comprehensive model to be tested. Studying both genders within the Arab American population would also aid in detecting predictors of waterpipe smoking on a larger scale.

Although our measures might be described as limited when used in the BEM theoretical context, they are considered and used as “markers” for social contingencies within the BEM framework. These markers serve as proxies for social contingencies. For example, smoking waterpipe at home is a marker of other social contingencies such as family acceptability to smoke waterpipe at home, the popularity of entertaining with waterpipes at home, and having friends that relate to the Arabic background by smoking waterpipe at home. Markers also reflect possible modeling and imitating behavior, so smoking at home can be a consequence of imitating parents that used to smoke at home or watching Arabic TV that promotes smoking waterpipe at home. Despite the fact that our measures are theoretically limited and under specified, this study is one of the first to explore waterpipe smoking patterns of Arab American women, and shows promise for future studies that should employ more specific measures of contingencies to precisely predict and theoretically determine behavior.

Findings from this study may help guide future studies in developing interventions to reduce the rate of waterpipe smoking and initiation (Maziak, Fouad, et al., 2004). A health promotion framework guided by the Behavioral Ecological Model (BEM) would provide a conceptual strategy to waterpipe smoking awareness programs and subsequent anti-smoking strategies.
REFERENCES


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