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Examining the Relationship Between Cigarette Smoking and Depression Among Asian American Adults

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EXAMINING THE RELATIONSHIP BETWEEN CIGARETTE SMOKING AND DEPRESSION AMONG ASIAN AMERICAN ADULTS

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ABSTRACT

Does having smoked cigarettes have any relationship to depression? This study explores the relationship between cigarette smoking and depressive frequency within the Asian American adult population. I hypothesized that Asian American adults who have ever smoked a cigarette would report more depression compared to Asian American adults who have never smoked cigarettes. To test this hypothesis, I analyzed data from the 2021 National Health Interview Survey (NHIS) using a subset of 1704 Asian American adults aged 18 to 85+. I controlled for native-born status, social/emotional support, relationship status, education, age, and gender. Controlling for the other variables, Asian American adults who have ever smoked a cigarette reported greater depressive frequency than those who have never smoked a cigarette. Additionally, multiple regression results showed that being in a relationship (married or living with a partner together as an unmarried couple) along with one's level of social/emotional support had the largest effects on depressive frequency in the Asian American adult population followed by smoking status, gender, and native-born status.

INTRODUCTION

Asian Americans are distinctively the first U.S. racial/ethnic population to experience cancer as the leading cause of death, with lung cancer specifically as the leading type of cancer death (Lee et al. 2021). Heart disease and stroke, both of which can be linked to smoking, trail behind lung cancer (CDC 2022). Research shows that smoking cigarettes exposes the body to a variety of toxic substances that injure the lining of the lungs and airways, causing inflammation and the growth of cancerous cells (CDC 2022). In addition, these substances lead to blood vessel narrowing and blockages, which decrease blood flow and raise the risk of heart disease and strokes (CDC 2022). Aside from its physical effects, cigarette smoking negatively affects mental health, as it particularly leads to stress and anxiety (Thapa et al. 2020; Kim et al. 2007).

Today, Asian Americans have a record twenty-two million individuals with roots in more than twenty countries (CDC 2022). With about two-thirds of their population consisting of refugees and first-generation immigrants, Asian Americans are a diverse diaspora with ethnic groups differing in terms of education, income, and degree of acculturation, all of which can influence smoking habits (Suinn 2010; Tang, Shimizu, & Chen 2005). In particular, implementing effective interventions to prevent or reduce smoking among Asian Americans is more difficult because of these diverse population characteristics and cultural norms that influence smoking tendencies (Tang, Shimizu, & Chen 2005).

For over 25 years, only 0.17% of National Institutes of Health (NIH) expenditures were allocated to research projects including Asian American, Native Hawaiian, and Pacific Islander populations (Đoàn et al. 2019). Although Asian Americans are now the fastest-growing racial group in the United States, they continue to be one of the least studied groups. Even when they are studied, research results are sometimes used to justify that interventions are unwarranted. For

example, tobacco usage rates among Asian Americans are lower compared to other racial/ethnic groups (CDC 2022), causing people to believe that targeted health promotion interventions are unnecessary.

Unfortunately, smoking is not a new threat to public health. It has been an ongoing public health crisis for decades. Due to the high population growth and smoking rates in their countries of origin, Asian Americans continue to be targeted by tobacco companies, further exacerbating one of the world's most significant public health threats (CDC 2022). In 2022, smoking among Asian Americans has been estimated to cost the United States economy $6.5 billion annually (CDC 2022). With the lack of research done on smoking and depression in the general Asian American population, research on smoking and depression in this population is warranted. Identifying and educating vulnerable populations about risks associated with smoking is of utmost importance for the health of our society. Before we can deliver anti-smoking education in a targeted and effective manner, we must conduct more research on smoking and depression among the Asian American population. Based on theory, I expect that those who have previously smoked cigarettes or currently smoke cigarettes will report having higher levels of depression than those who have never smoked cigarettes.

THEORETICAL FRAMEWORK

Depression and Smoking

Depression is a chronic mental health condition that contributes to the global burden of disease. It is characterized by constant melancholy, hopelessness, and a lack of interest or pleasure in formerly enjoyable activities (CDC 2022). Although the exact causes of depression are not clearly understood, a series of complex interactions between social, psychological, and biological factors have been identified as contributing to its onset (CDC 2022). Social factors

include social isolation, lack of social support, relationship problems, stressful life events (eg., loss of a loved one), poverty, and discrimination (CDC 2022). Psychological factors include negative thinking patterns, low self-esteem, and a history of trauma and abuse while biological factors include chemical imbalances in the brain, genetic factors, hormonal imbalances, inflammation, and immune system dysfunction (CDC 2022).

Cigarette smoking and depression have a complex relationship. Several proposed theoretical frameworks seek to explain their interaction, including the Smoking-Depression Hypothesis, the Self-Medication Hypothesis, the Bidirectional Hypothesis, and the Spurious Hypothesis.

Smoking-Depression Hypothesis

The Smoking-Depression Hypothesis proposes that smoking may lead to depression through its effects on an individual's neurocircuitry (Fluharty et al. 2017). Cigarette smoke contains more than 4,000 chemicals, including nicotine and carbon monoxide. When smoking a cigarette, nicotine triggers reward circuits mainly in the midbrain and changes in the density of nerve tissue, which increases one’s susceptibility to environmental stressors (Fluharty et al. 2017). Research on animals has demonstrated that nicotine can impact the hypothalamic-pituitary-adrenal system, a region of the brain (Markou et al. 2016). This may alter the way brain chemicals function and increase the production of cortisol, increasing the risk of sadness and anxiety in that animal (Markou et al. 2016). These abnormalities disappear when the animal is not exposed to nicotine, which raises the possibility that nicotine exposure may be producing these effects (Markou et al. 2016).

Self-Medication Hypothesis

According to the Self-Medication Hypothesis, smoking can help people alleviate their depressive symptoms, which leads to nicotine being used as a form of self-medication (Khantzian 1997). While smoking can enhance pleasure and reward through increased levels of dopamine and other neurotransmitter levels in the brain, the relief it provides is temporary (Khantzian 1997). This can result in the nicotine being used as a long term coping-mechanism to help regulate mood.

Bidirectional Hypothesis

The Bidirectional Hypothesis proposes that the relationship between smoking and depression may be bidirectional, meaning that both smoking and mental health problems can influence each other over time (Fluharty et al. 2017). According to several studies, people may begin smoking as a coping mechanism for anxious or depressive symptoms (Fluharty et al. 2017, Markou et al. 2016, Thapa et al. 2020). While smoking may initially provide relief and a temporary uplift in mood, it may worsen the signs of depression and anxiety over time (Fluharty et al. 2017).

Spurious Hypothesis

According to the Spurious Hypothesis, smoking and depression may not have a causal relationship, meaning that smoking may not directly cause depression nor does depression directly cause smoking (Fluharty et al. 2017). Instead, the link may be the result of confounding or shared risk factors, such as genetics, health behaviors, and socioeconomic status (Fluharty et al. 2017). For example, some studies suggest that there may be a genetic predisposition for both smoking and depression (Loukola et al. 2014) while other studies suggest that health behaviors such as inactivity and poor diets may contribute to smoking and depression (Fluharty et al. 2017).

LITERATURE REVIEW

Defining Asian Americans

Constituting who is Asian American is a complex, multi-faceted question. In the 1980s, the United States Census Bureau decided that racial identity is a personal matter to be decided by each individual, which led to most social scientists avoiding the labeling of who is Asian versus who is Asian American (DeRousse-Wu and Liebler 2012). There are many United States-born Asian Americans who habitually call themselves "Asian" instead of "Asian American" when asked about their identity, which could be a result of a strong connection to their Asian heritage. Although individuals are allowed to self-identify their racial identity, operationalizing this concept can still be challenging. For the purpose of this study, I have called everyone in my sample (non-naturalized Asian immigrants, naturalized Asian Americans, and United States-born Asian Americans) Asian American, whether or not they have United States citizenship, because they are living in the United States and they had indicated that they were Asian-only.

Asian Americans, Smoking, and Depression

In 2021, approximately 10.5% of Asian American adults smoked cigarettes, with smoking prevalence varying by subgroup (CDC 2022). When analyzing Asian American smoking rates, it is important to keep in mind that approximately 71% of Asian American adults were born outside of the United States (Budiman 2021). Many of these adults immigrated from countries with much higher smoking rates, such as China and India. The diverse cultural factors that these Asian American adults bring with them impact smoking behaviors, such as attitudes regarding smoking as a social norm, the belief that smoking relieves stress, and the accessibility and availability of cigarettes within ethnic enclaves (Tucker et al. 2022). Additional factors

impacting smoking prevalence include acculturation, stress, and discrimination experiences (Kim et al. 2015).

The relationship between cigarette smoking and depressive outcomes in the United States adult population has been studied by numerous researchers. Past results show that current smokers had higher rates of depression compared to former smokers, and former smokers had higher rates of depression compared to never smokers (Bakhshaie et al. 2015, Lugar et al. 2014, Wiesbeck 2008). The negative impacts of smoking on health outcomes have been well documented among smokers in the general population, but there is a lack of research conducted about the relationship between cigarette smoking and depressive frequency in the general Asian American adult population. Specifically, few researchers have raised awareness in studies related to smoking and mental health profiles in Asian Americans apart from studies conducted on specific Asian American subgroups (Tucker et al. 2022; Li et al. 2019; Weinberger et al. 2019; Luk and Tsoh 2010). A recent 2019 study conducted on older Chinese American men in the greater Chicago area found that compared to current smokers and those who have never smoked, former smokers were more likely to have depression (Li et al. 2019). Another 2010 study conducted in San Francisco demonstrated substantial gender differences in smoking prevalence, with Chinese female smokers reporting higher depression levels than Chinese male smokers (Luk and Tsoh 2010). Previous research on Asian American subgroups has identified risk factors associated with smoking rates such as gender and age (Verplaetse et al. 2016; Luk and Tsoh 2010; Zang and Wang 2008; Kim et al. 2007), level of acculturation/years resided in the United States (Suinn 2010; Zang and Wang 2008), and symptoms of anxiety and depression (Thapa et al. 2020; McClave et al. 2009; Kim and Chen 2007). Aside from these studies conducted on specific Asian American subgroups, research has shown that Asian American health has received

less attention compared to other ethnic and gender groups, which could be attributed to their reputation for being a socially adept population that does not need much assistance (Đoàn et al. 2019).

Native-Born Status

Research about the effects of one's native-born status on smoking and depression in Asian American subgroups indicates that the relationship is complex and can differ depending on personal and environmental factors. Studies have shown that immigrants may experience low levels of acculturation stress and high levels of social support when immigrating into an ethnic enclave, revealing that being an immigrant may be a protective factor against smoking and depression (Kim et al. 2015). Other studies have shown that being an immigrant may increase the likelihood of smoking and depression, especially if they encounter prejudice or a lack of social support in their new country (Kramer et al. 2002). Therefore, being born in the United States or immigrating from another country may have both favorable and unfavorable effects on smoking and depression, depending on factors including acculturation, prejudice, and social support (Kim et al. 2015, Kramer et al. 2002). Taking native-born status into consideration is important for this study because the majority of adults included in this statistical analysis were born outside of the United States, indicating that different levels of acculturation and perceived discrimination may affect their relationship with smoking and depression.

Support

Research suggests that social and emotional support may have a protective effect against smoking and depression in the Asian American population. Studies have shown that higher levels of social support may not only improve one's mental health and reduce smoking, but also lessen the effects of other types of social stress (Juang and Alvarez 2010; Pokhrel et al. 2016). In

a study conducted on Vietnamese-American adults, social support was found to be negatively correlated with smoking and depressive symptoms (Tong et al. 2010). Similarly, another study found that depression among Chinese-American immigrants was negatively correlated with perceived social support (Chen et al. 2014). These findings indicate that social and emotional support may be essential factors to address the prevention and treatment of smoking and depression in Asian American adults.

Relationship

Studies have shown that married Asian men and women had significantly lower odds of smoking and depressive symptoms (Li et al. 2019; Tsai et al. 2008; Zhang and Wang 2008), but there is a lack of research on how various types of relationships (eg., cohabiting) affect smoking behavior and depression besides just marital status in the Asian American population. This suggests that more research is needed to understand the impact of relationship statuses on smoking and depression.

Education

Level of educational attainment, one of the most frequently used covariates in Asian American studies, is consistently seen to have a negative relationship with smoking status and depression (Li and Hummer 2015; Luk and Tsoh 2010; Zhang and Wang 2008). The more education that one has, the less likely they were to smoke or report depressive symptoms regardless of their gender (Li and Hummer 2015; Luk and Tsoh 2010; Zhang and Wang 2008). Specifically, those with a college degree or higher were less likely to smoke than those with less than a high school education (Ra et al. 2022). However, it is interesting to note that the relationship between education level and depression for Asian Americans can vary based on the subgroup and place where the education was obtained (Misra et al. 2020; Li and Hummer 2015).

For instance, one study revealed that higher levels of education were linked to decreased levels of depression among Asian Americans who attended schools in the United States (Li and Hummer 2015). However, this study found no discernible link between education level and depression in Asian Americans who attended school outside of the United States (Li and Hummer 2015). This is important to note since the vast majority of Asian American adults included in this study were not born in the United States.

Age and Gender

Previous results have shown that smoking prevalence varies by gender, with Asian American men being more likely to smoke than women regardless of country of origin (Kim et al. 2007). There have been inconsistent findings about the relationship between depression and gender. Some studies find that there are no male-female differences in depression (Kim et al. 2007; Yeung et al. 2004) while other studies found depressive symptoms to be higher among Asian women than men (Cheng et al. 2015; Luk and Tsoh 2008). Age was another inconsistent factor among studies, with some reporting that older Asian Americans were more likely to smoke (Zang and Wang 2008) while others report that younger Asian Americans were more likely to smoke (Chae et al. 2006). Lastly, studies found no age group differences with depression (Kim et al. 2015, Zang and Wang 2008).

METHODS

Data

I analyzed data from the 2021 National Health Interview Survey (NHIS). The National Health Interview Survey is an annual, cross-sectional survey intended to provide nationally representative estimates on a wide range of health status and utilization measures among residents of households and noninstitutional group quarters. The National Health Interview

Survey uses a geographically clustered sampling technique, which involves selecting a sample of households from different geographical areas or clusters, and then selecting individuals within those households to participate in the survey. The National Health Interview Survey dataset included responses from adults aged 18 to 85+. For 2021, the total adult sample was 29,482 and the adult response rate was 50.9%.

I created a subset of Asian American adults aged 18 to 85+ by selecting individuals who identified as "Asian only" from the larger sample (n=29,482), which reduced the sample size to the 1,704 respondents who self-identified as "Asian only." This subset included non-naturalized Asian immigrants, naturalized Asian Americans, and United States-born Asian Americans. Individuals who did not identify as "Asian only" were excluded from this study.

Variables

The dependent variable, depressive frequency, was measured by asking respondents the following question, "How often do you feel depressed?" The response set options were coded as never (0), a few times a year (1), monthly (2), weekly (3), and daily (4).

The independent variable for this study was cigarette smoking status, a dummy variable that I recoded from the original smoking status variable, which asked participants, "Have you ever smoked a cigarette?" The response options were "current every day smoker", "current some day smoker," "former smoker," "never smoker," "smoker-current status unknown," and "unknown if ever smoked." The recoded response options were No (0) and Yes (1). Response option "never smoker" was recoded to No (0), indicating that the respondent had never smoked a cigarette. Response options "every day smoker," "current some day smoker," "former smoker," and "smoker-current status unknown" were recoded to Yes (1), indicating that the respondent had smoked a cigarette. The response option "unknown if ever smoked" was omitted from this

analysis. This recode was made due to low frequency in response choices “every day smoker” (3.8%) and “current some day smoker” (1.4%) in the original smoking status variable.

I controlled for native-born status, social/emotional support, relationship status, education, age, and gender in this analysis. To control for native-born status, respondents were asked if they had been born in the United States or a United States territory. The response options were No (0) and Yes (1).

To control for one’s level of social and emotional support, respondents were asked the question, “How often do you get the social and emotional support you need?” Response options were never (0), rarely (1), sometimes (2), usually (3), and always (4).

To control for a respondent’s relationship status, I recoded the original marital status variable into a dummy variable. The NHIS asked respondents, “Are you now married, living with a partner together as an unmarried couple, or neither?” Response options were “married”, “living with a partner together as an unmarried couple”, and “neither.” The recoded response options were No (0) and Yes (1). Response option “neither” was recoded to No (0), indicating that the respondent is not in a relationship. Response options “married” and “living with a partner together as an unmarried couple” were recoded to Yes (1), indicating that the respondent is in a relationship.

To control for a respondent’s education, I recoded a nominal level education variable into an interval level education variable to approximate the number of years of school completed. The NHIS asked respondents, “What is your highest level of attained education?” Response options were “never attended/kindergarten only”, “grade 1-11”, “12th grade, no diploma”, “GED or equivalent”, “high school graduate”, “some college, no degree”, “associate degree: occupational, technical, or vocational program”, “associate degree: academic program”, “bachelor's degree”,

"master's degree", and "professional school or doctoral degree." The recoded response options were zero years (0), six years (6), eleven years (11), twelve years (12), fourteen years (14), sixteen years (16), eighteen years (18), and twenty years (20). Response option "never attended/kindergarten only" was recoded to zero years (0), "grade 1-11" was recoded to a midpoint of six years (6), "12th grade, no diploma" was recoded to eleven years (11), "GED or equivalent" and "high school graduate" was recoded to twelve years (12), "some college, no degree", "associate degree: occupational, technical, or vocational program" and "associate degree: academic program" was recoded to fourteen years (14), "bachelor's degree" was recoded to sixteen years (16), master's degree was recoded to eighteen years (18), and "professional school or doctoral degree" was recoded to twenty years (20).

The age question asked the individual's age in years since their last birthday. Age was a continuous variable ranging from 18 to 85+.

To control for the respondent's gender, I recoded the original gender variable to create a dummy variable with females coded as 0 and males coded as 1.

Missing data and response options "refused," "don't know," and "not ascertained" were omitted from this analysis.

FINDINGS

Univariate Findings

Table 1 provided means and standard deviations for all variables. The dependent variable, depressive frequency, showed that the Asian American sample reported rarely having depressive symptoms with the mean falling between never and a few times per year. The standard deviation for depressive frequency was 0.88, which indicated that most respondents fell between never having depressive symptoms and having depressive symptoms less than once a

month. The results for the independent variable, smoking status, indicated that a relatively small proportion of Asian American adults have smoked cigarettes with a mean of 19% and a standard deviation of 0.39. The results for native-born status showed that 20% of sampled Asian American adults were born in the United States and 80% were immigrants, with a standard deviation of 0.40. In 2021, 71% of Asian American adults were born outside of the United States, meaning that this sample size was skewed in favor of Asian American immigrants. Additionally, 74% of the sample had citizenship status while 26% did not, showing that many of the sampled immigrants are now citizens of the United States. The sample usually received social and emotional support ($\bar{x}$ =3.04) with a standard deviation of 1.26. Additionally, 65% of respondents reported being in a relationship (married or living with a partner together as an unmarried couple) with a standard deviation of 0.47. The respondents were fairly well educated, with the mean level of education years attained being 15.19. This falls between respondents having some college (no degree) or an associate degree to having a bachelor's degree with a standard deviation of 3.3 education years. The average age was about 47 years old with a 16.59 standard deviation. Lastly, 45% of respondents identified as men.

Bivariate Findings

Correlation coefficients were run between all pairs of variables to examine the relationships between independent, dependent, and control variables. ***Table 2*** showed the correlation coefficients among all of the variables. The bivariate correlation between depression and smoking was statistically significant at the .01 level. They had a positive but very weak relationship, which indicated that those who have ever smoked a cigarette reported higher levels of depressive frequency (r = .069, p = .005). Social/emotional support (r = -.099, p = .000), relationship status (r = -.130, p = .001), and being native-born (r = .099, p = .000) also had

statistically significant relationships with depressive frequency at the .001 level. Increasing levels of social/emotional support and being in a relationship (married or living with a partner together as an unmarried couple) were associated with lower levels of depressive frequency. Being native-born was the only control variable associated with higher levels of depressive frequency.

The independent variable, smoking status, had statistically significant relationships at the .001 level with education years ($r = -.106$, $p = .000$), age ($r = .117$, $p = .000$), and men ($r = .286$, $p = .000$). Additionally, smoking status had a statistically significant relationship at the .01 level with social/emotional support ($r = -.064$, $p = .008$). Increasing education years and levels of social/emotional support were associated with a lower likelihood of having ever smoked a cigarette while increasing age and being a male were associated with higher likelihoods of having ever smoked.

The control variable, native-born, had statistically significant relationships with age ($r = -.224$, $p = .000$) and relationship status ($r = -.231$, $p = .000$) at the .001 level. Additionally, being native-born had a statistically significant relationship at the .01 level with social/emotional support ($r = .079$, $p = .001$). Increasing levels of social/emotional support were associated with a higher likelihood of being native-born while being in a relationship (married or living with a partner together as an unmarried couple) and increasing age were associated with a lower likelihood of being native-born.

The control variable, social/emotional support, had a statistically significant relationship with education years ($r = .157$, $p = .000$) at the .001 level, indicating that those with more education years were associated with higher levels of social/emotional support. Additionally, relationship status ($r= .063$, $p = .009$) and age ($r= -.063$, $p = .009$) had statistically significant

relationships with social/emotional support at the .01 level. Those in a relationship (married or living with a partner together as an unmarried couple) were associated with receiving greater levels of social/emotional support while increasing age was associated with lower levels of social/emotional support.

The relationship variable had a statistically significant relationship at the .001 level with education years ($r = .088$, $p = .001$) and age ($r = .122$, $p = .001$). As education years and age increased, the likelihood of being in a relationship increased.

The control variable, education, had a statistically significant relationship at the .001 level with both age ($r = -.187$, $p = .000$) and men ($r = .084$, $p = .000$). Increasing age was associated with lower education years while being a male was associated with higher education years.

Multivariate Findings

As displayed in ***Table 3***, the regression equation showed that 4.2% of the variance in depressive frequency could be explained by all other variables ($R^2 = .042$). This regression equation was statistically significant at the .001 level with an F-value of 11.77.

The standardized coefficients (β) indicated that being in a relationship ($\beta = -.107$, $p > .001$), which included being married or living with a partner together as an unmarried couple, had the largest effect on depressive frequency. Level of social/emotional support had the second largest effect on depressive frequency ($\beta = -.105$, $p > .001$), followed by having ever smoked a cigarette ($\beta = .098$, $p = .001$), being a male ($\beta = -.098$, $p > .001$), and being native-born ($\beta = .073$, $p > .01$).

The unstandardized coefficients (b's) indicated the average unit change in depressive frequency while controlling for the other variables. Ever smoking cigarettes, social/emotional

support, being in a relationship (married or living with a partner together as an unmarried couple), being native-born, and being a male were the only significant predictors of depressive frequency. The unstandardized coefficient revealed that respondents who ever smoked cigarettes reported about a two-tenths (b = .219) of a point higher level of depressive frequency on a four-point scale compared to those that have never smoked a cigarette. Respondents who were born in the United States or a United States territory reported about a one-sixth (b = .160) of a point higher level of depressive frequency on a four-point scale compared to respondents who were not native-born. For every one-unit increase in the scale that measured how often respondents received social and emotional support, their depressive frequency score decreased by about seven hundredths (b = -.074) of a point on a four-point scale. For relationship status, respondents who were married or living with a partner as an unmarried couple reported about two-tenths (b = -.198) of a point lower level of depressive frequency on a four-point scale compared to respondents who were not married or living with a partner as an unmarried couple. Lastly, male respondents reported about one-seventh (b = -.174) of a point lower level of depressive frequency on a four-point scale compared to female respondents.

DISCUSSION

I conducted this study to examine the relationship between cigarette smoking and depression in the Asian American adult population. The bivariate and multivariate analyses supported the hypothesis that those who have ever smoked a cigarette have greater depressive frequency than those who have never smoked a cigarette. The multivariate regression analysis showed a stronger relationship between smoking and depressive frequency ($p < .001$) than the bivariate correlation analysis ($p < .01$), indicating that the relationship between smoking and depressive frequency may have been confounded by other variables in the multivariate

regression model such as native-born status, social and emotional support, relationship status, and gender. Further analyses would be necessary to understand the nature of these effects fully. The findings of the relationship between smoking and depression coincide with previous studies conducted on the general United States adult population, which showed that current smokers had higher rates of depression compared to former smokers, and former smokers had higher rates of depression compared to never smokers (Bakhshaie et al. 2015, Lugar et al. 2014, Wiesbeck 2008). It is difficult to compare results to past studies conducted on Asian American subgroups that reported mixed findings between depressive frequency among current, former, and never smokers. Previous studies conducted on Chinese Americans found that both Chinese-American women and men who are current smokers are more likely to report elevated depression compared to those that have never smoked. (Li et al. 2019, Luk and Tsoh 2008). However, these studies showed that Chinese-American women and men that had never smoked reported elevated depression compared to former smokers (Li et al. 2019, Luk and Tsoh 2008).

Results showed a stronger relationship between depression and native-born status in the bivariate correlation analysis ($p < .001$) compared to the multivariate regression analysis ($p < .01$), suggesting that the relationship may be confounded by other variables in the regression model. Being native-born was positively correlated with increased depression. These results align with previous studies revealing that being an immigrant may be protective against depression due to low levels of acculturation stress and high levels of social support when immigrating into an ethnic enclave (Kim et al. 2015). However, these results differ from studies that have shown that being an immigrant may increase the likelihood of smoking and depression, especially if one encounters prejudice or a lack of social support in their new country (Kramer et al. 2002). It may be inferred that the immigrant sample successfully integrated into society and

developed strong coping mechanisms that reduce depression. On the other hand, native-born Asian Americans may have faced different stressors that contributed to higher depression rates. It was surprising to see no relationship between native-born status and smoking status considering the likelihood that Asian immigrants may have been born in a country with a higher smoking rate compared to the United States. It is possible that a large percentage of the immigrant sample moved to the United States at an early age and did not grow up with their birth country's smoking habits. Another possibility is that the social class of those who immigrated was less likely to smoke in their country of origin.

Results from the bivariate and multivariate analysis show that both social/emotional support and relationship status had a significant relationship with depression ($p < .001$). Social/emotional support results were consistent with previous findings which indicated that higher levels of social support improve one's mental health and reduce smoking (Juang and Alvarez 2010; Pokhrel et al. 2016). In this study, relationship status was negatively correlated with depression frequency and had no relationship with smoking. Although there is a lack of research on how various types of relationships (eg., cohabiting) affect smoking behavior and depression in the Asian American population, these results coincide with previous studies suggesting that married Asian men and women had significantly lower odds of depression (Li et al. 2019; Tsai et al. 2008; Zhang and Wang 2008). However, they do not coincide with results showing that married Asian men and women had a significantly negative relationship with smoking (Li et al. 2019; Tsai et al. 2008; Zhang and Wang 2008). Results indicated that social/emotional support may have a protective effect against depressive symptoms and smoking behaviors in the Asian American adult sample. Additionally, results showed that being in a

relationship may have a protective effect against depressive symptoms, but not smoking behaviors in the sampled Asian American population.

In this study, both education and age had no relationship with depression in the bivariate correlation or multivariate regression. The results for age were consistent with past studies that found no age group differences with depression (Kim et al. 2015, Zang and Wang 2008). Education had no relationship with depression, which differed from previous studies conducted on Asian American subgroups that consistently showed a negative relationship between education and depression (Li and Hummer 2015; Luk and Tsoh 2010; Zhang and Wang 2008). However, education results may be linked to studies that found no discernible link between education level and depression in Asian Americans who attended school outside of the United States (Li and Hummer 2015). Education and age were shown to have a negative relationship with smoking, which coincides with previous research (Li and Hummer 2015; Luk and Tsoh 2010; Zhang and Wang).

Results showed that gender had a significant relationship with depression in the multivariate regression but not in the bivariate correlation, indicating that gender significantly affected depressive frequency when the other factors were controlled. A possible explanation for this is that men may experience unique stressors or coping techniques that aren't accounted for by the other variables in the model. Men had a significant positive correlation with smoking in the bivariate analysis, indicating that men were more likely to smoke compared to women. These findings are consistent with previous literature showing that smoking prevalence varies by gender, with Asian American men being more likely to smoke than women regardless of country of origin (Kim et al. 2007).

Results from the bivariate correlation analysis coincide with studies that found no male-female differences for depression (Kim et al. 2007; Yeung et al. 2004). Results from the multivariate regression are consistent with studies that found depressive symptoms to be higher among Asian women than men (Cheng et al. 2015; Luk and Tsoh 2008).

Although the exact causes of depression are not clearly understood, research has revealed that a series of complex interactions between social, psychological, and biological factors have been identified as contributing to its onset (CDC 2022). While there was a lack of psychological and biological variables related to depression in this study, social factors such as social/emotional support and relationship status were included. Results showed that they had a significant relationship with depression, indicating that social factors matter. Social/emotional support and relationship status (being married or living with a partner together as an unmarried couple) are important factors to address when studying depression.

Since this analysis was not designed to test causal relationships, the results of this study do not provide clear evidence for the Smoking-Depression Hypothesis, Self-Medication Hypothesis, Bidirectional Hypothesis, or Spurious Hypothesis. The bivariate correlation and multivariate regression between smoking and depression was statistically significant ($p < .001$), indicating a positive but very weak relationship. However, the direction of this relationship is unclear and could be interpreted as supporting either the Smoking-Depression Hypothesis, Self-Medication Hypothesis, or Bidirectional Hypothesis. Additionally, because this study cannot indicate a causal relationship, the Spurious Hypothesis, which proposes that there may not be a causal relationship between smoking and depression, cannot be fully ruled out. Further research is needed to investigate the nature of the relationship between smoking and depression in this sample of Asian American adults.

CONCLUSION

This study explored whether smoking status affected how often an individual feels depressed. Using a sample of 1704 Asian American adults aged 18 to 85+, this study analyzed data from the 2021 National Health Interview Survey to investigate whether Asian American adults who have ever smoked cigarettes reported feeling depressed more often than Asian American adults who have never smoked cigarettes. I hypothesized that Asian American adults who have never smoked cigarettes would report feeling depressed less often. Native-born status, social/emotional support, relationship status, education, age, and gender were controlled for. The bivariate and multivariate analyses provided evidence supporting the hypothesis that there is a statistically significant relationship between smoking status and depressive frequency, with those who have ever smoked a cigarette reported more frequent depression than those who have never smoked a cigarette. These findings about the relationship between smoking and depression coincide with previous studies conducted on the general United States adult population (Bakhshaie et al. 2015, Lugar et al. 2014, Wiesbeck 2008), but are hard to compare to past studies conducted on Asian American subgroups that reported mixed findings between depression frequency among current, former, and never smokers (Li et al. 2019, Luk and Tsoh 2008). Additionally, the multivariate regression analysis shows a stronger relationship between smoking and depressive frequency ($p < .001$) than the bivariate correlation analysis ($p < .01$), indicating that the relationship between smoking and depressive frequency may have been confounded by variables such as native-born status, social and emotional support, relationship status, and gender. While this study provided evidence that presented a statistically significant relationship between smoking and depression, the direction of this relationship is unclear and

results be interpreted as supporting either the Smoking-Depression Hypothesis, Self-Medication Hypothesis, Bidirectional Hypothesis, or Spurious Hypothesis.

Although there was a statistically significant relationship between smoking and depression, it is essential to note that social factors such as social/emotional support and relationship status (being married or living with a partner together as an unmarried couple) had larger effects on depression in the Asian American sample. Social factors are important and should be taken into account when researching depression.

Building upon these results in future studies can potentially raise awareness about the importance of implementing interventions for Asian American adults, especially women, to help combat depression. A potential intervention may include targeted educational campaigns about cigarette smoking and depression along with support groups that help raise levels of social/emotional support in the Asian American population.

LIMITATIONS

While the results of this study show that the relationship between smoking status and depressive frequency is statistically significant, there are limitations. Firstly, the study lacked longitudinal data, which prevents the identification of the direction of any causal relationship between smoking and depression. While the study revealed a correlation between smoking and depression, it was unable to determine whether smoking cigarettes caused more frequent depression, whether people who experience more frequent depression were more likely to smoke, or whether the relationship is bidirectional or even spurious.

Secondly, the geographically clustered sampling technique used by the National Health Interview Survey may have drawbacks. It is possible that certain Asian American subgroups may

have been underrepresented in the sampled regions or clusters, meaning that the sample may not be representative of the Asian-American adult population.

Additionally, while this study included social factors linked to depression, it lacked psychological and biological control factors related to depression. Another limitation of this study is that we couldn't examine differences among different Asian subgroups. The study lacked access to restricted variables, such as Asian subgroups as well as income, limiting the ability to control for Asian groups with various socioeconomic backgrounds. This analysis also excluded Asian Americans who did not identify as "Asian only." Since 28% of the Asian American population identifies as multiracial (CDC 2022), results may not be representative of the entire Asian American adult population. Additionally, the sample size was skewed in favor of Asian American immigrants, with 80% of respondents being foreign-born. In 2021, 71% of Asian American adults were born outside of the United States (Pew Research Center 2021), so immigrants were overrepresented in the sample.

Another limitation is that the National Health Interview Survey provides self-reported data in this study, which means that reporting bias and social desirability bias could have affected the results. For example, immigrant respondents might pay little attention to mental health issues or feel as though they don't have societal permission to report poor mental health, which would lead to inaccurately reported cigarette smoking statuses and depressed symptoms, impacting the validity of the results.

FUTURE RESEARCH

Research could be conducted to learn more about cigarette smoking and depression in the general Asian American population. Future research would benefit from using a longitudinal design to determine whether the relationship between smoking and depression is causal,

bidirectional, or spurious. Longitudinal studies may also help identify potential risk factors and protective factors for smoking and depression. Additionally, it would be beneficial to conduct studies that examine differences among different Asian subgroups. These studies could include additional control variables related to psychological and biological factors linked to depression. Variables may include health behaviors, personality traits, genetics, hormones, brain structure, coping strategies, and socioeconomic status, which can help researchers better understand the relationship between smoking and depression and develop more preventative measures to improve mental health outcomes for Asian Americans. Overall, there has been a lack of research about these topics pertaining to Asian Americans while researchers have seemed to shift their focus to the impact of the Covid-19 pandemic on the Asian American community. Researchers should continue to assess the ongoing impact of smoking on depression in the Asian American community to help combat this ongoing public health crisis.

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Table 1. Question, Metric, Mean, and Standard Deviation for Variables (N=1704)

Variable Names	**Question**	**Metric**	**Mean**	**Standard Deviation**
FREQDEP	"How often do you feel depressed?"	0-Never 1-A few times a year 2-Monthly 3-Weekly 4-Daily	0.57	0.89
EVERSMOKED	"Have you ever smoked cigarettes?"	0-No 1-Yes	0.19	0.39
NATUSBORN	"Were you born in the United States or a United States territory?"	0-No 1-Yes	0.20	0.40
SUPPORT	"How often do you receive social/emotional support?"	0-Never 1-Rarely 2-Sometimes 3-Usually 4-Always	3.04	1.26
RELATIONSHIP	"What is your current relationship status?"	0-Not in a relationship 1-In a relationship	0.65	0.48
EDUYEARS	"How many years of education have you received?"	0-Zero years 6-Six years 11-Eleven years 12-Twelve years 14-Fourteen years 16-Sixteen years 18-Eighteen years 20-Twenty years	15.19	3.30
AGE	"What is your age?"	18 to 84 years old 85+ years old	46.83	16.60
MEN	"What gender do you identify as?"	0-Women 1-Men	0.45	0.49

Table 2. Bivariate Correlation (N=1704)

	Ever Smoked	Native Born	Support	In a Relationship	Education	Age	Men
Depression Frequency	.069*	.099**	-.099**	-.130**	-.003	.060	-.054
Ever Smoked		.032	-.064*	.016	-.106**	.117**	.286**
Native Born			.079*	-.231**	.028	-.224**	.047
Support				.063*	.157**	-.063*	-.050
In a Relationship					.088**	.122**	-.018
Education						-.187**	.084**
Age							-.053
Men							

*p < .01, **p < .001

Table 3. Regression of Depressive Frequency on All Variables

Variable	*b*	β
Ever Smoked	.219	.098**
Native Born	.160	.073*
Social/Emotional Support	-.074	-.105**
In a Relationship	-.198	-.107**
Education	.008	.031
Age	-.003	-.048
Men	-.174	-.098**
Constant	.928	

R^2=.042; F(7, 1696) = 11.77; p < .001

*p < .01, **p < .001