Factors Associated with Smoking among Rhode Island Adults Age 60 and Over: A Needs Assessment

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Introduction

Tobacco is derived from the dried leaves of tobacco plants. It contains nicotine, a toxic substance found in cigarettes and cigars that is highly addictive. Nicotine is a stimulant, meaning it excites the central nervous system, increasing heart rate and alertness. When someone smokes, they burn the tobacco leaves and inhale the smoke into their lungs so it may enter the bloodstream and give off the stimulating effects. A person may smoke cigarettes; dried tobacco leaves rolled in paper, cigars; dried tobacco leaves rolled in a tobacco leaf, or a pipe; a reusable device that dried tobacco can be packed into. As of 2018, 13.7% of American adults (34.7 million people) were current smokers (Health Effects, 2020).

According to the Center for Disease Control and Prevention, smoking is the leading cause of preventable death in the United States, resulting in nearly 20% of deaths per year. Smoking contributes to one's risk of mortality in numerous ways. First, smoking tobacco results in damage to blood vessels causing the vessels to narrow. Narrowing of blood vessels makes it more difficult for the heart to work properly, meaning the heart must work harder and beat faster. This may lead to an increase in blood pressure as well as increased risk of clots which subsequently results in a 200 to 400% increase in risk of developing coronary heart disease and stroke, two of the leading causes of death in the United States. Additionally, smoking can damage the airways and alveoli, or the small air sacs found in the lungs. This damage can cause lung disease, lung cancer, COPD, or asthma attacks in individuals with asthma. Smoking tobacco is attributed to approximately 90% of all lung cancer deaths and 80% of all COPD deaths in the United States (Health Effects, 2020).

Not only can smoking cause damage to the heart and lungs, but its affects reach nearly all parts of the body. Cancer is another leading cause of death in the U.S., second only to heart

disease, and smoking tobacco will increase one's risk for developing a variety of cancers. These cancers can affect a range of areas on the body, including the bladder, blood (acute myeloid leukemia), cervix, colon and rectom (colorectal), esophagus, and liver, to name a few. It is estimated that smoking tobacco contributes to approximately 33% of all cancer deaths in the United States. Other than cancer, more acute effects of tobacco smoking on the body include decreased fertility in both men and women, osteoporosis, tooth loss, cataracts, inflammation, decreased immune function, rheumatoid arthritis, and a 30 to 40% increase in risk of developing type 2 diabetes mellitus. Combined, smoking not only causes severely diminished physical health, but also increased healthcare cost and lost productivity. It has been shown that quitting smoking can have beneficial effects on health, with risk of cardiovascular disease, stroke, and cancer of the mouth, throat, esophagus and bladder declining significantly in just one to five years after quitting, which can add years to the lifespan (Health Effects, 2020).

Older adults are at a higher risk of developing chronic disease. Smoking can accelerate the aging process and lead to premature death. Due to older adults already being at a higher risk of developing chronic diseases like cancer, smoking adds another element of mortality in living a long healthy life (Nicita, 2008). For the older adult age group, it has been shown that smoking in combination with heart disease and diabetes, can lead to an increase in mortality rate. In one study conducted to analyze the relationship between older adults and smoking, the researchers gathered participants into three categories: those who have never smoked, those who smoked and quit, and those who currently smoke. It was found that those who smoked more cigarettes in their life than others had lower longevity rates (Tafaro, 2004). 3.5 million people over the age of 65 have smoked in the US. Although there have been successful efforts through marketing to reduce the prevalence of smoking in older age groups, it is still an active behavior that this demographic

partakes in (Bratzler, 2002). According to the Center for Disease Control and Prevention, 8.5 % of all older adults smoke cigarettes, despite this behavioral choice being a significant risk factor for the two leading causes of death, heart disease and cancer (FastStats, 2020).

The purpose of this study is to compare a variety of variables to smoking status via statistical tests in order to assess their relationship. The analysis of these tests will provide data that determines statistical significance and the interpretation will give an understanding of what that means for older adults who smoke.

Methods

Data Source

The data analyzed for this report is from the 2019 Behavior Risk Factor Surveillance. System (BRFSS). The BRFSS data are collected by the Center of Disease Control and Prevention with assistance from the Rhode Island Department of Health. BRFSS data is collected through telephone surveys in which participants are randomly selected and asked about "health-related risk behaviors, chronic health conditions and the use of preventative services" (BRFSS, 2020). At a state level, Rhode Island tailors the survey to meet specific state needs, in order to properly provide funding where it is needed. In this needs assessment, the population that is being reviewed is limited to adults over the age of 60 who live in Rhode Island.

Research Questions

Five research questions related to smoking were implemented and are as follows. Question 1, is there a difference in smoking status across gender? Question 2, is there an association between smoking status and weight status? Question 3, is there an association between smoking status and alcohol use? Question 4, is there an association between smoking

status and meeting daily sleep recommendations? Question 5, is there an association between smoking status and perceived health status?

Measures

Smoking status: This variable was based on the question, "Do you now smoke cigarettes everyday, some days, or not at all?" This question produced a categorical variable which, in order to simplify the measure, was re-coded into two categories instead of three. To do so, if individuals answered that they smoked everyday or some days, they were re-coded to "current smokers." Individuals who answered not at all were "not current smokers."

Gender: All respondents reported their gender (male_or_female) when asked "are you male or female?".

Weight Status: Participants reported their height and weight, which was used to calculate Body Mass Index (BMI). Computed BMI was then used to assess weight status which was categorized as either normal, overweight, or obese.

Underweight: Under 18.5

Normal Weight: 18.5 to 25

Overweight: 25-30

Obese: over 30

Indivduals categorized as overweight and obese were grouped into one category and normal weight and underweight were grouped into another category of being not overweight/obese.

Alcohol Use: Participants were asked how many drinks they had per day, on average, in the past 30 days, to assess alcohol use. Those who averaged zero drinks per day were categorized

as nondrinkers, one drink per day as occasional drinkers, and two or more drinks per day as heavy drinkers.

Sleep Recommendation: The determination of whether or not individuals met sleep recommendations was made by the question "how many hours per night do you sleep?" Responses to this question were continuous, then regrouped into categorical variables for easier analysis. Individuals who responded that they got one to six hours of sleep per night did not meet sleep recommendations, seven to nine hours met recommendations, and more than nine hours exceeded hours of sleep recommendations set forth by the CDC.

General Health: The question "in general would you say your health is excellent, very good, good, fair, or poor?" was used to assess perceived health status. The response options were excellent, very good, good, fair, and poor. For analysis, excellent, very good and good were grouped together as "good health." Fair and poor were grouped together as "bad health."

Race and Ethnicity: participants were asked, "what is your race/ethnicity?" The response options were: white, black or African American, American Indian or Alaska Native, Asian, Pacific Islander, Latino/a or Spanish Origin, and other.

Income level: Participants were asked to report their income. The measure used was computed income level and the response options were grouped: less than $25,000, $25,000 to less than $75,000, $75,000 or more, and do not know/refused to answer.

IMB® SSPS Statistics version 26 was used for data analysis. A chi-squared test was performed for the variables smoking, weight status, drinking, sleep and perceived health, obtained from the research questions, to determine significance between smoking and the other variables. Tests were considered significant based on a p-value of 0.05. Frequencies were also found using SPSS and computed into bar graphs using Google Sheets.

Results

All participants were 60 years of age or older . The population was primarily white (90.3%) and about half (43.4%) had graduated college **(n = 2773)** (see Table 1)

Table 1: Demographics of Participants (n = 2773)

Variable:	**Response Option:**	**n =**	**Percentage:**
Age	60+ years of age	2773	100%
Gender	Male	1190	42.2%
	Female	1632	57.5%
Race/Ethnicity	White	2549	90.3%
	Black or African American	62	2.2%
	American Indian or Alaska Native	36	1.3%
	Asian	18	0.6%
	Pacific Islander	88	3.1%
	Latino/a or Spanish Origin	70	2.5%
	Other	70	2.5%
Income Level	Less than $25,000	573	20.3%
	$25,000 to less than $75,000	889	31.5%
	$75,000 or more	698	24.7%
	Don’t know/not sure/refused	663	23.5%
Education Level	Graduated High School or Less	873	30.7%

	Some College or Technical School.	706	25.0%
	Graduated from College	1225	43.4%
Current Smoker Status	Smoker	250	8.9%
	Non Smoker	2523	89.4%
	Refused	50	1.8%

Research Question 1: Is there a relationship between smoking status and gender?

The research question was, is there is a difference in smoking status by gender. The independent variable was gender and the dependent variable was smoking status. The hypothesis was that males would be more likely to be a current smoker than females. In one study that was conducted to analyze the role gender has on smoking interventions, it was found that ads for promoting smoking tend to be more targeted at men. For women, however, smoking was portrayed in the media as being unattractive or not "lady like." The conclusion from this study, addresses gender gaps and the need to create gender equality when talking about smoking (Bottorff, et al., 2014). The information from this study supported the initial hypothesis that men would have a higher rate of smoking status than women.

In total, 9.00% (n=250) of the sample were current smokers. As seen in Figure 1, there was a 0.20% difference in current smokers, with 9.10% of females and 8.90% of males currently smoking.

A chi-squared analysis was conducted to examine the association between gender and smoking status. Those surveyed (n=2823), 97% (n=2763) provided both gender and smoking status. The chi test determined that there was no association between gender and smoking status.

$X^2(1, N=2763) = 0.233 = 0.841$.

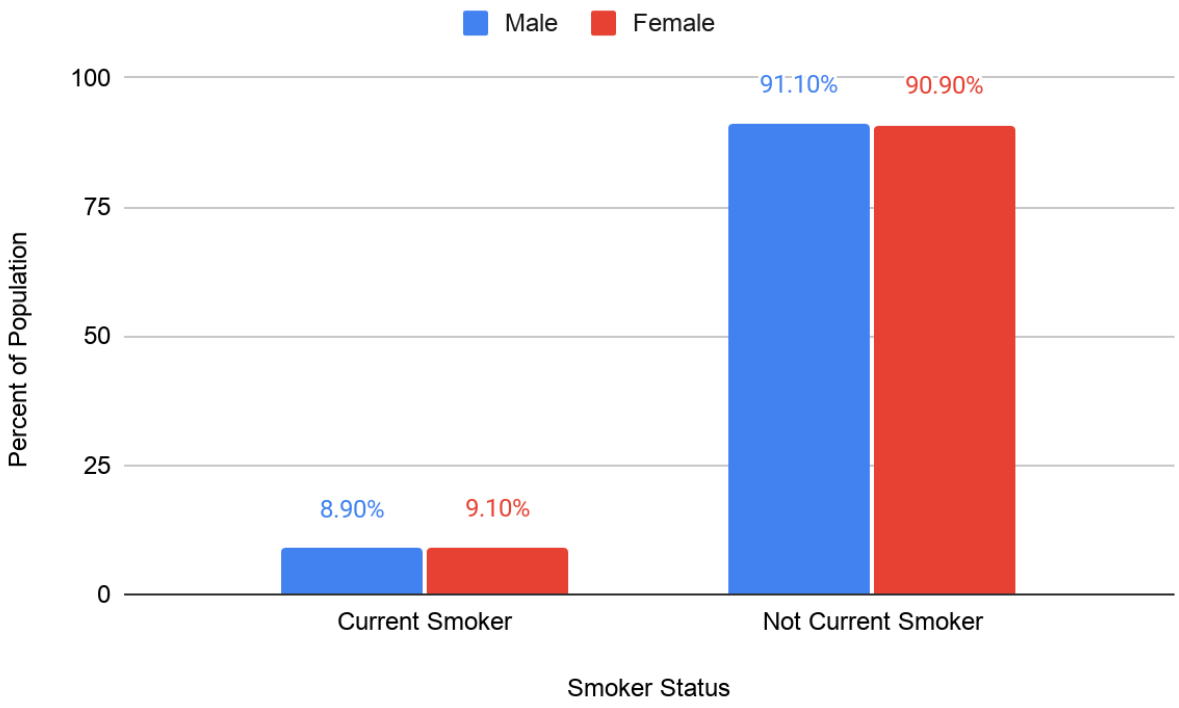

Figure 1: *Smoking Status by Gender (n =2763).*

Research Question 2: Is there a relationship between smoking status and weight status?

According to the Center of Disease Control, the obesity rate for those over 60 is 42.8% (Product-data briefs, 2020). In the US, obesity has been a health condition that has become increasingly prevalent. Obesity is a high risk factor for type 2 diabetes, heart disease, high blood pressure, stroke, some cancers as well as other diseases (Product-data briefs, 2020). As previously mentioned, older adults are already at a higher risk of developing chronic diseases, and smoking is a high risk factor for some of the health concerns that are linked to obesity. In

older adults particularly, obesity was also shown to decrease quality of life and slow down cognitive ability (Roderka, Puri, Batsis, 2020).

A chi square analysis was conducted using the 2019 BRFSS data to evaluate if there was a relationship between smoking status and weight status . The hypothesis was that rent smokers were more likely to have obesity or be overweight. The dependent variable was smoking status, and the independent variable was weight status. Out of the population that responded, (N=2542), the chi square test determined that 33.20% were overweight or obese and 66.80% were not. While the obesity/overweight percent for smokers was higher than that of the total tested population, with a rate of 54%. The chi square analysis determined there was an association between weight status and smoking status, $X^2(1, n=2542) = 19.12$, p=0.000, with current smokers being more likely to be overweight/obese than not.

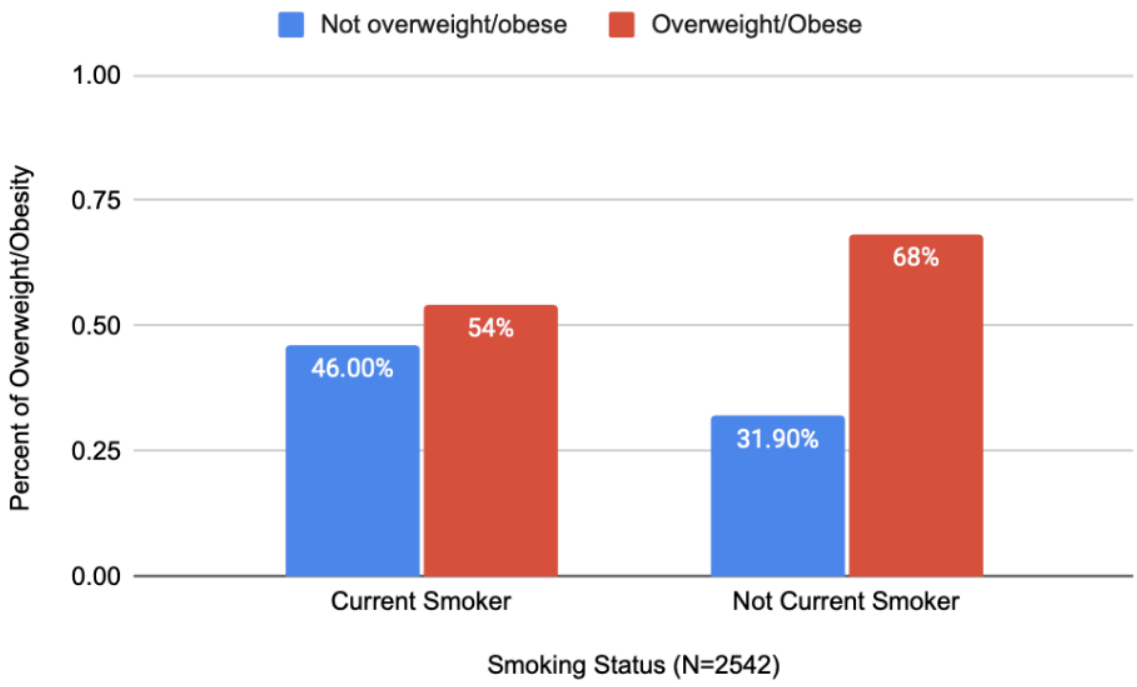

Figure 2*: Smoking Status by Weight Status (n=2542).*

Research Question 3: Is there a relationship between smoking and drinking status?

The goal of this comparison was to see if there was an association between smoking and drinking. Studies have shown that these two behaviors tend to be linked. Specifically that drinking triggers smoking (Shiftman, 1994). Those studies focused more on situational behaviors rather than habits, which is what is being compared here. This test aimed to confirm these statements and possibly expand on them as well. The hypothesis was that there would be a strong association between these two variables meaning if you were a smoker you were also likely to be a drinker. It was assumed that these two variables would be correlated because smoking and drinking tend to give your body the same responses, some people would describe the response as pleasurable, euphoric, relieving, etc. Therefore, it would seem likely that if an individual engaged in the use of one kind of substance, there was a high chance they would also engage in use another.

Of the participants who completed the BRFSS survey (N=2823), 51.8% (n= 1461) answered both questions used in this comparison. As shown in Figure 3, 91.9% (n=1344) of people reported that they did not currently smoke, and 59.2% (n=866) reported they drank 0 drinks a day on average in the past 30 days. This shows that a large majority do not smoke and they do not drink, that means the correlation between the variables is strong and the hypothesis seems to be correct.Only 8% (n=117) said they were a current smoker and 40.7% (n=595) reported they were an “occasional drinker”, that they drank 1 drink a day on average in the past 30 days. No one reported that they were a “heavy drinker”, that they drank 2 or more drinks a day on average in the past 30 days. A chi-squared test was used to compare smoker status and

drinker status. The test concluded that there was a significant association between the variables. Where, $X^2(1, N=1461) = 33.16, p = 0.000$.

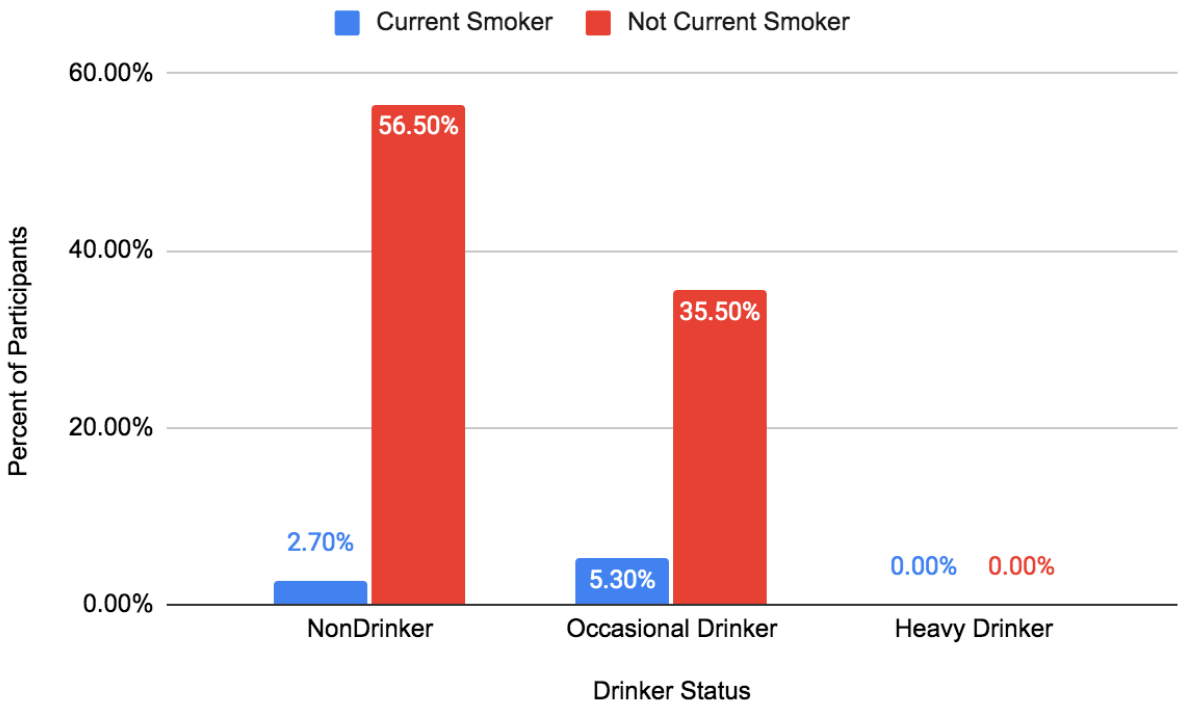

Figure 3: *Smoking Status by Drinking Status (n=1461).*

Research Question 4: Is there a relationship between smoking status and meeting daily sleep recommendations?

This research question aimed to establish an association between smoking and whether or not individuals met daily sleep recommendations. The Center for Disease Control and Prevention states that individuals aged 60 and over require 7 to 9 hours of sleep per night. The hypothesis for this study stated that if someone was a current smoker they would be less likely to meet daily recommendations than those who were not current smokers. This hypothesis was based on three

main factors, including the stimulating effects of nicotine, nightly withdrawal symptoms, and increased prevalence of sleep breathing disorders in smokers compared to nonsmokers (Wetter, 1994). The independent variable in this analysis was smoking status and the dependent variable was whether or not individuals would meet daily sleep recommendations.

Of the total BRFSS participants surveyed (n=2823), 96.60% (n=2726) reported both smoking status and number of hours of sleep per night. 65.70% of all participants (n=1790) met daily sleep recommendations. Smokers fell below the population average with 53.70% (n=131) of smokers meeting daily recommendations compared to 66.80% (n=1659) of nonsmokers meeting daily recommendations. A chi-squared test was performed to assess the association between meeting sleep recommendations and smoking status. Results of the chi-squared test show that there is a significant difference in meeting sleep recommendations when comparing smokers and non smokers. $X^2(2, N=2726) = 17.29, p=0.000$.

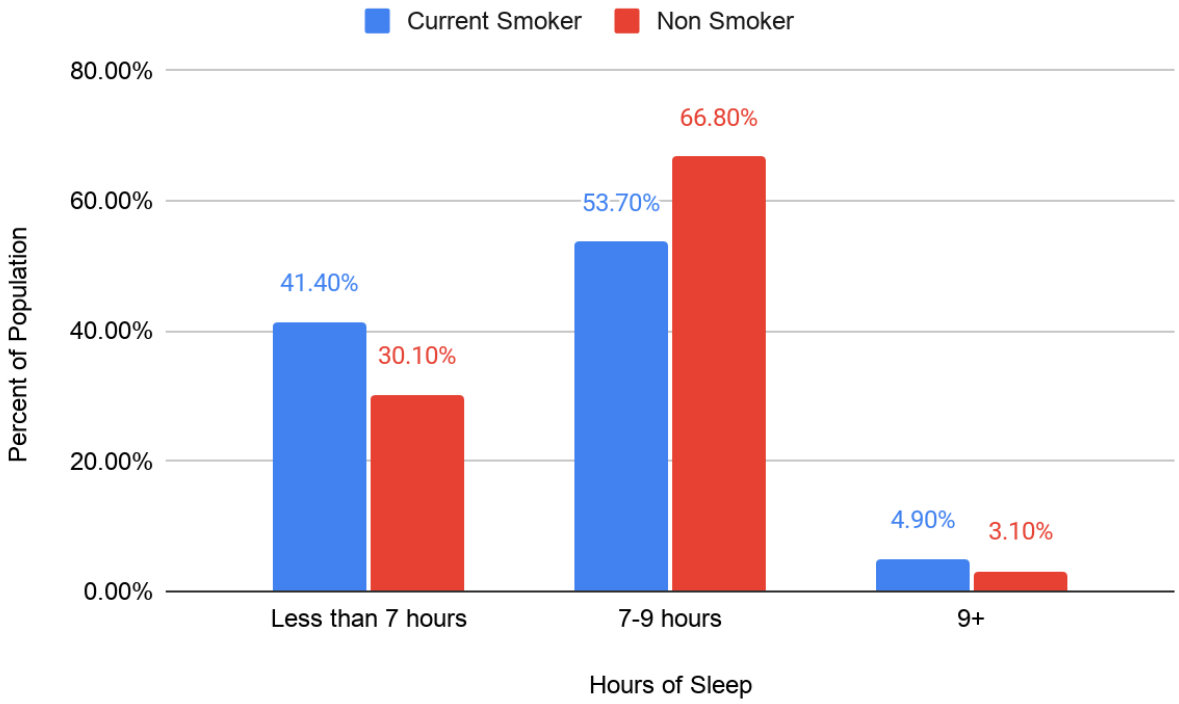

Figure 4*: Smoking and Meeting Daily Sleep Recommendations (n=2726).*

Research Question 5: Is there a relationship between smoking status and perceived health status?

The purpose of this research question was to determine if any relationship is present between smoking status and perceived general health status in older adults. Smoking has been linked to many negative health outcomes such as elevated blood pressure, increased chance of developing lung cancer, increased risk for cardiovascular disease and additional negative health effects (CDC, Health Effects of Cigarette smoking). The Hypothesis was that smokers would report lower perceived health than non-smokers, as the survey question used for the analysis was based on the participants' own perspective. This comparison was meant to investigate whether smokers perceive themselves in poorer or greater general health than non smokers. The independent variable was perceived general health and the independent variable was smoker status.

A chi square test was used to determine that there is significant evidence that smoking affects perceived general health $X^2(1, N=2763) = 38.87$, p= 0.000. The majority of non-smokers (n= 2050, 81.52%) and smokers (n = 161, 64.92%) indicated having good health. Conversely, the minority of each group reported having fair or poor health with non-smokers reporting a lower proportion (n = 465, 18.49%) than those who smoke (n = 87, 35.08%).

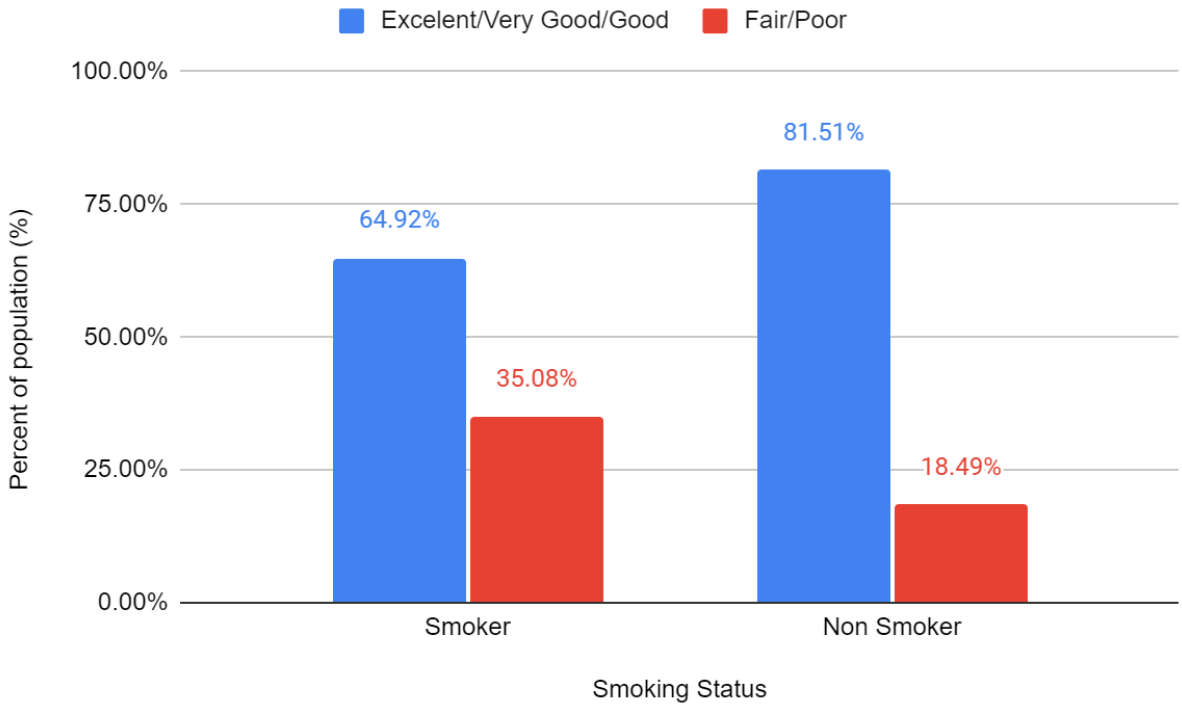

Figure 5: *Smoking Status by Perceived General Health (n = 2763).*

Conclusions and Future Directions

The results from the analysis conducted showed that there was a significant association between current smoking status and weight status, drinking status, sleep recommendations, and perceived general health.

There was no significant association between current smoker status and gender with this data. For women, smoking can have an affect on their reproductive system, by causing irregular periods, low estrogen levels and trouble getting pregnant. They are also more likely than men to develop COPD earlier and life, which results in women having a higher death rate of this disease. Smoking can also affect risk of heart disease and other associated illnesses. Female smokers were noted to have higher rates of heart disease over the age of 35, when compared to their male

counterparts (Smoking's Impact, 2020). When acknowledging smoking and gender, it is important in the future to implement tactics and strategies that aim at targeting women smokers, due to their higher risk of multiple different diseases associated with smoking.

A significant association analyzed from this data test was weight status and current smoking status, with 54% of current smokers categorized as overweight or obese (n= 2542). Obesity in older adults can lead to problems in physical functioning, as well as declines in different systems of the body. In one study specific to older adults, it was found that a higher BMI was a risk factor for having type 2 diabetes, and can ultimately lead to a negative effect on volumes of brain regions associated with cognitive ability (West, 2020). Smoking and obesity both increase a person's risk for developing different types of heart disease, lung disease, some cancers and impaired brain functioning. Programs that target smokers who are categorized as overweight and obese need to be specially trained in working with this population, in order to implement strategies that decrease the risk of developing diseases that could increase mortality rates. These programs would likely be successful if they were to stack weight loss and quitting smoking.

According to one review that looked at multiple health behavior change interventions, or interventions that target more than one behavior, physical activity can be seen "to reduce tobacco-related cravings, negative affect, and withdrawal symptoms" (Prochaska, 2013) making it a useful tool in both promoting weight loss and abstinence from smoking.

A significant association was found between smoking status and drinking status. Of the 59.20% (n= 866) of participants who reported they did not drink, or drank 0 drinks a day on average in the past 30 days, 56.50% (n=826) also reported that they were not a current smoker. Of the 40.80% (n=595) of the participants who reported occasional drinking, 5.30% (n=77)

reported that they were also a current smoker. These results gave a lot of information regarding those who did not engage in smoking and drinking, and very little about those who did. Smoking can increase the risk of cardiovascular disease, lung disease, worsened asthma, a variety of cancers (lung, blood, esophageal, bladder, etc.), stillbirth, decreased oral health, cataracts, among many other things (Health Effects, 2020).

Studies have shown that alcohol can also have negative impacts on overall health. Increased alcohol consumption has been linked to increased HDL cholesterol which can lead to heart disease, hypertension, cirrhosis of the liver which may lead to liver cancer, and an increased risk for diabetes (Grønbæk, 2009). The strong association between these two variables may be explained by the awareness of the negative health outcomes that are associated with the substance use behaviors. Those who are aware of the risks are less likely to engage in those behaviors (smoking and drinking). Future research should focus on the association between those who do engage in drinking and smoking, instead of this general way of assessing the association. By focusing the research, the conclusions could provide a more descriptive analysis and interpretation of the two variables and how they interact when people engage in them, instead of when they don't. This would give more insight into if drinking increases your likelihood of smoking instead of what this data showed which was more that not drinking increases your likelihood of not smoking.

Meeting sleep recommendations was also found to have a significant relationship with current smoking status. Smokers were below the population average of meeting sleep recommendations from this data, with only 53.70% of smokers responding that they receive 7-9 hours of sleep per night (N= 2726). This is consistent with current findings that cigarette smokers report higher levels of poor sleep due to nicotine dependence, withdrawals, and cravings

(Purani, 2018). Getting an adequate amount of sleep is important because it improves cognitive function and prevents increases in cortisol, a stress hormone (Harvard Health Publishing, 2020). Considering many smokers report using smoking as a way to cope with stress (Jarvis, 2004), lack of sleep and subsequent increased stress may increase the amount that someone smokes. Therefore, sleep must be addressed as an important factor in health and addressing the association between poor sleep habits and smoking is critical to improving the health of the given population. Meeting sleep recommendations will work to improve the cognitive abilities of smokers and their behavioral choices. It will also decrease cortisol levels which have been associated with increased risk of cardiovascular disease. Due to current smokers showing a higher rate of poor sleep quality (under 7 hours), interventions must be implemented to combat this health issue. Interventions may be conducted at the individual and policy level.

Individual interventions would include smoking cessation programs which offer alternative activities such as group exercise classes or card game clubs. They may also provide smokers with alternative coping strategies for stress, such as five to ten minute meditation or walk rather than a five to ten minute smoke break. Policy level interventions may include mass media anti-smoking campaigns specifically oriented towards older adults, as well as strict, smoke-free initiatives in and around restaurants, stores, libraries, and outdoor green spaces.

The analysis of perceived general health and smoking status provided evidence of a significant relationship between the two variables. 35.08% of those who smoke reported being in fair or poor health while only 18.49% of non-smokers reported having fair or poor health. This trend suggests that smoking leads to poorer health status as might be expected. Many smoking related health conditions are caused by chronic exposure to the toxins within cigarette smoke (Das, 2003). As people age, continued long term smoking would be expected to carry more

health consequences and reduce life expectancy (Bratzler, 2002). Therefore, it is reasonable to suspect this disparity in health status amongst smokers to be more exaggerated and significant in older adults than it may be in younger adults who have had less life span to be exposed to the toxins in cigarette smoke. Despite the chronic effects of cigarette smoking on health across the lifespan, even older adults can benefit from quitting. According to the National Institute on Aging, blood pressure will drop to normal levels, risk of heart attack, stroke, and cancer will decrease, and nerve endings will begin to regenerate after older adults quit smoking (Quitting Smoking, 2019). Future research could be conducted to examine smoking and perceived health status across the lifespan, as well as the significance of health benefits of quitting specific to older adults.

A major strength of this survey is the use of randomization of participants. By using randomization, the data works to eliminate selection bias, such as certain: income levels, education levels or gender. Another strength of this study was the large sample size used. The large sample size provided more reliable trends that can be generalized with greater accuracy to the whole population.

One of the limitations of this analysis on the association between smoking and other factors, is that the data was self reported. This type of data can have recall bias, in which a participant does not fully remember the information that they are reporting on. In some cases, participants forget how frequently they perform a certain behavior. A second limitation to this analysis was the use of secondary data. The BRFSS survey had their own proposed questions, and were not specifically designed for this assessment. Another limitation was that there were three possible measures in the BRFSS data that related to smoking. In order to create a cohesive measure of smoking status, the results of (71- have you smoked 100 cigarettes) was omitted

entirely. This could have limited our analysis because it disregarded those who have smoked over 100 cigarettes and those participants could have contributed to the results and the factors associated with current smoking status. Given the data provided, it is important for the future that more research is conducted to fully understand the relationship that smoking has on the older adult population.

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