UNIVERSITY OF CALIFORNIA SAN DIEGO

Effect of Participant Demographics and Antibody Knowledge on COVID-19 Risk Perception

A Thesis submitted in partial satisfaction of the requirements for the degree Masters

of

Public Health

by

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ABSTRACT OF THE THESIS

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by

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Master of Public Health

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Professor Marni Jacobs, Chair

Data from the UCSD ZAP COVID study was analyzed to determine an association between participant demographics and risk perception, as well as the effect of antibody knowledge on risk perception. It was hypothesized that medical comorbidities and tobacco use would influence baseline risk perception, and that a change in risk perception would be affected by participants' antibody results. Participants (n=2727) were recruited from UCSD and provided saliva samples for antibody testing. Participants were surveyed on baseline characteristics, risk perception, and masking/social distancing behavior. Participants completed follow-up surveys at 30 and 90 days. After analyzing the study data in RStudio, it was found that people with medical comorbidities had higher baseline risk perceptions, and obesity (based on BMI) was the most significant comorbidity. Knowledge of antibody levels had a significant effect on change in risk perception, as participants with 80% or higher immunity had a decrease in risk perception, while participants with less than 80% immunity tended to increase their risk perception.

Introduction

Research has found that age, tobacco use, and a variety of medical comorbidities can lead to increased risk of serious COVID-19 infection, and individuals falling into these categories may be more inclined to engage in more protective health behaviors to reduce exposure to COVID-19.

Health Belief Model

The Health Belief Model (HBM) is an individual-level theory that attempts to explain the factors that predict engagement in protective health behaviors using the following six concepts: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Hong, lecture slide). Given the recent global pandemic caused by SARS-CoV-2, it seems valuable to discuss these key concepts within the context of COVID-19. Perceived susceptibility is an individual's belief of likelihood of contracting COVID-19. Perceived severity is an individual's perception of the adverse effects of contracting COVID-19, which may include thoughts about symptoms, potential for hospitalization, long-term effects, and mortality. Perceived benefits entail the positive aspects and personal benefits of engaging in each health behavior. In the context of COVID-19, protective health behaviors include social distancing and mask use, with the benefits of both including reduced risk of contracting the infection and passing the infection to others. Perceived barriers are the obstacles a person must overcome to engage in a health behavior. Barriers also include negative aspects of health behavior. People may view masking as an inconvenience, finding them uncomfortable to wear or finding it harder to breathe while wearing a mask. Barriers to social distancing include feelings of isolation, being unable to socialize with friends, family, or significant others, and boredom. Cues to action are the internal and external factors that inspire adoption of a health behavior. This could include messaging about the benefits of masking and distancing and medical or celebrity figures urging

individuals to engage in these behaviors. Internal cues to action may include beliefs of personal benefit or feelings of obligation. Self-efficacy is a person's belief that they can engage in a given health behavior. If an individual has respiratory problems that make it difficult to breathe through a mask, they may have lower self-efficacy about their ability to engage in masking behavior. Or if someone is an essential worker, it may be more difficult to distance from others.

This project focused primarily on perceived susceptibility, severity, and benefits of engaging in protective COVID-19 health behaviors. In the current state of COVID-19, vaccination is a primary factor that influences individuals' perception of susceptibility. Perceived severity is driven mainly by individuals' perception of their physical health, age, tobacco use, and medical comorbidities, with older age and medical comorbidities frequently noted as increasing perceived severity.

Factors Increasing Severity

Several known risk factors can influence the severity of COVID-19 infection, including age, tobacco use, hypertension, diabetes, kidney disease, obesity, heart disease, chronic obstructive pulmonary disease (COPD) and others. In 2017, chronic lower respiratory disease was the fourth leading cause of death,[2] and smoking is the most commonly associated risk factor for respiratory diseases.[5] In the context of the Health Belief Model (HBM), smoking is considered a voluntary risk, to which individuals can choose exposure.[6] The voluntary aspect of this risk factor decreases an individual's perception of severity. In a study of smoking and nonsmoking participants in Ohio, it was found that 75% of all participants believed that smoking would increase the risk of COVID-19 infection. In conjunction with the HBM, a lower percentage of smokers (69%) than nonsmokers (77%) thought smoking would increase risk.[7] Majority (93%) of all participants believed that smoking would increase the risk of more severe

COVID-19 infection, again with lower rates of smokers (85%) than nonsmokers (95%) holding this belief.[7] Results from this study provide evidence that indicates that smokers have a lower risk perception of COVID-19 than nonsmokers, evidenced by increased risk-taking behavior through tobacco use.

Medical comorbidities remain strong predictors of increased risk perception of COVID-19 due to overwhelming evidence of increased severity of COVID-19 infection in patients with comorbidities. [4,8–12] In San Diego County, the most common medical comorbidities are obesity (24.1%), diabetes (9.9%), heart disease (5.3%), COPD (5.1%), and kidney disease (2.7%).[4] A study by Nandy et al., posited that medical comorbidities significantly increased the risk of serious events during COVID-19 infection, and increased the need for extreme treatment measures like ICU admission and mechanical intubation/ventilation.[8] The article defined "serious events" as novel pneumonia, Acute Respiratory Distress Syndrome (ARDS), mechanical ventilation, and death.[8] Factors contributing to serious events in COVID-19 infection were hypertension, diabetes mellitus, cardiovascular disease, COPD, and chronic kidney disease. People with hypertension had 2.95 higher odds of serious events compared to those without hypertension.[8] 51% of moderate/severe ICU patients had hypertension, compared to 68% of critical ICU patients. Patients with diabetes mellitus were at 3.07 higher odds of serious events compared to those without diabetes, and diabetic patients saw a higher risk of mortality than non-diabetic patients.[8] Patients with CVD had 4.58 higher odds of serious events than those without CVD and patients with COPD saw further increases in odds of serious events, with 6.65 higher odds.[8]

Autoimmune disease and immunosuppression can also increase risk of adverse events in patients with COVID-19. Additionally, COVID-19 infection has been shown to mimic the

effects of immunosuppression by increasing the production and release of pro-inflammatory cytokines and chemokines, which can result in severe organ damage.[11] COVID-19 infection also decreases patients' number of T cells, decreases white blood cell count, and can cause cytokine storm syndrome.[11] Kidney transplant patients and patients on dialysis have weakened immune systems due to immunosuppressive medications. In a study of COVID-19 in kidney transplant patients, 34% of patients were admitted to the ICU, and 19.7% required ventilation.[12] Among kidney transplant cases, 21% died after COVID-19 infection, and the average age of mortality was 61, compared to an average age of 51 in patients who survived.[12] This speaks to age as an increased risk factor for mortality in COVID-19, as well as emphasizes the increased risk of being immunocompromised and contracting COVID-19. It can be hypothesized that people with autoimmune diseases or people who are immunocompromised for any reason would have a higher risk perception of COVID-19 and would engage in more protective health behaviors like masking and distancing. Outside of medical comorbidities, increased age remains the strongest risk factor for severe COVID-19 infection. (6) In comparison to the 18-25 age group, risk of death was 25x higher in those 50-64, 60x higher in 65-74, 140x higher in 75-84 and 340x higher in people 85 and older.[4]

Vaccination Attitudes

As vaccinations became more readily available to the public, there was a fear that vaccination would lead to increased risk-taking behaviors and decreased adherence to protective public health protocols that recommended masking in public places and physically distancing from others. However, a United States survey on changing attitudes during the initial stages of vaccine dissemination in December of 2020 found that unvaccinated respondents were less likely to engage in masking and distancing behaviors than vaccinated respondents.[13] At that time, 99%

of vaccinated respondents reported masking in public places, compared to only 87% of unvaccinated respondents. Unvaccinated respondents also reported feeling less likely to contract COVID-19 and predicting lower severity of infection. It should be noted that in December of 2020, vaccines were primarily available to people who were at a higher risk of adverse events from COVID-19, including older adults and people with medical comorbidities. Accordingly, this study also looked at health behavior and risk perception in March 2021, finding that risk perception and engaging in riskier health behavior was more similar between vaccinated and unvaccinated respondents.[13]

The circumstances surrounding vaccine eligibility in December 2020 could have affected health behavior, as those who perceive higher risk are more likely to engage in more protective health behaviors than those who perceive lower risk. A study by Boekel et al., looked at vaccination attitudes in patients with autoimmune diseases. The study found that 61% of participants with an autoimmune disease expressed willingness to receive a vaccine compared to 65% of controls. Primary causes for hesitancy in the patient group were fears that a vaccine would negatively affect their autoimmune disease or increase their likelihood of adverse events. Participants also expressed hesitancy due to the lack of vaccine research and long-term testing.[9] However, it was found that having a physician recommend vaccination increased vaccine willingness by 20%.[9]

Methods

Data for the present study came from health and risk behavior surveys conducted as part of the Neutralizing Antibody Project for COVID-19 (ZAP) conducted at the University of California, San Diego (UCSD). All students and employees aged 18 and older were eligible to participate. Participants were recruited via emails and fliers around the undergraduate and medical school campuses as well as the hospital system. Emails had a link to sign up for the study, and participants were prompted to make an appointment and provide consent via the electronic medical record system (MyChart).

The primary aim of the ZAP study is to evaluate antibody levels to SARS-CoV-2 in the university population and assess how antibody levels correspond to risk of contracting COVID-19. As part of the study, participants are asked to provide information on medical comorbidities, and to answer questions regarding perceived COVID-19 risk and masking behavior. Data on risk perception and masking behavior was collected at baseline, and 30 and 90 days after baseline. Follow up surveys were sent out through MyChart. Antibody levels to SARS-CoV-2 were measured via finger prick blood draw and are reported as estimated percent of viral neutralization. Individual antibody results are also posted to the participant's MyChart accounts, with instructions that the results are for research purposes only. Participant data for the present analysis was collected from January 2022 through December of 2022. Participants who completed either follow-up survey after December of 2022 were not included in the present analysis. All participant survey and medical data was de-identified prior to analysis.

Demographic and Medical Comorbidities

Participant reported tobacco use was captured using the options, "Current smoker (>1 pack/day)", "Occasional smoker (<1 pack/day)," "Former smoker," "Passive smoker (frequent exposure to tobacco smoke)," and "Never smoker." For analysis, participants who responded that

they were a current, occasional, or passive smoker were combined into the "Current smoker" category.

Most recent Body Mass Index (BMI) was extracted from the medical record. Participant BMI was classified into underweight (<18.5), normal (18.5 to <25), overweight (25.0 to <30), obese (30.0 <40), and extremely obese (40 or higher), based on CDC metrics[14].

Participants reported being afflicted with a wide range of medical comorbidities, and many reported more than one comorbidity. In order to capture the general scope of risk perception based on medical comorbidities, participants were analyzed based on whether they had reported any comorbidities or none.

When surveyed about perceived risk of COVID-19, participants provided responses on a Likert scale from 0 to 6, with 0 being "Very Low Risk", and 6 being "Very High Risk." For the purposes of analysis, responses indicating very low risk, low risk, or somewhat low risk were combined into one category denoting "Low Risk" and the same was done for the high risk responses.

Statistical Analysis

Data analysis was conducted using RStudio software, version 2022.12.0+353. Categorical variables were analyzed using Cross Tables; significance was determined via p-values from Chi-squared tests or Fisher tests as appropriate. A two-sided p-value <0.05 was considered significant for all analyses. In Table 4, significance was determined by using a Cochran-Mantel-Haenszel (CMH) test, to assess the association between the antibody and risk change variables, by controlling for a third (demographic) variable.

Results

Participant Characteristics and Risk Perception

Data from 2727 participants who were surveyed at baseline, 30-day follow-up, and 90-day follow up are included in this study. Response times for the final follow-up survey ranged from 90 days to 326 days, so responses provided after 130 days were removed from analysis. The average response time for the 90-day follow-up was 99 days, with a minimum response time of 90 days, a maximum response time of 130 days, and a standard deviation of 6.6 days. There was an approximately 50% attrition rate from baseline to final follow-up. The average age of the study population was 38 and ranged from 18 to 80 years old. The study population was predominately White (55.21%), and included 25.67% Asian, 9.80% mixed race, 2.48% Black or African American, 1.08% Native Hawaiian or Other Pacific Islander, and 0.62% American Indian or Alaskan Native participants. Additionally, 17.54% of participants identified as Hispanic, Latino/a or being of Spanish origin. The study population was 67.87% female. An additional 0.90% of participants identified as genderqueer (being neither exclusively male nor female), non-binary, or transgender.

COVID-19 Risk Perception

When analyzing baseline risk perception by age, it was found that the 65 and older group's risk perception was skewed toward lower risk, while the younger than 65 group had a relatively normally distributed risk perception (Figure 1). Over half (58.7%, n=27) of the participants 65 and older reported perceiving COVID-19 low risk at baseline, compared to 38.3% (n=837) of participants under 65. When surveyed at the final follow-up, 45.2% of participants 65 and older reported low risk, and 31.0% of participants younger than 65 reported

low risk. There was no significant increase in the number of high risk responses for either group, however the "moderate risk" responses increased for both age groups.

Current and past tobacco use was relatively uncommon in the study population, with only 9.63% (n=237) of participants reporting current use, and 3.33% (n=82) reporting former use. The remaining 87.03% (n=2141) of participants reported no current or past use of tobacco. Baseline risk perception between current, former, and non-tobacco users was relatively similar. Among participants who reported current tobacco use, 35.4% indicated low risk perception, compared to 39.7% among those who had never used tobacco, and 42.9% among former tobacco users.

643 participants reported having a medical comorbidity, and among reported comorbidities, asthma was the most prevalent. At baseline, 24.0% of participants with one or more comorbidity indicated high risk perception, compared to only 17.5% of participants with no comorbidities. Having one or more medical comorbidity had a significant effect on baseline risk perception ($p=.002573$)

The reported BMIs for the study population ranged from 15.2 to 57.58, with an average BMI of 25.80. BMI data was not available for 296 participants. Participant BMI was distributed as follows: 2.35% (n=57) were underweight, 50.05% (n=1214) were in the normal range, 30.23% (n=733) were overweight, 10.64% (n=258) were obese, and 6.72% (n=163) fell in the extremely obese category. Looking at Figure 5, people in the higher BMI categories reported significantly higher risk perceptions than people in the underweight and normal BMI categories. At baseline, more participants in the Underweight and Normal BMI categories had lower risk perception, with 56.2% of Underweight BMI participants reporting low risk, and 43.7% of Normal BMI participants indicating low risk. Additionally, these two BMI categories had the lowest rates of high risk perception, with only 12.5% of people in the underweight category

reporting high risk, and 16.6% of the normal BMI group reporting high risk. Among participants in the Obese BMI category, 24.2% indicating high risk perception, which was largest percentage of high risk among all BMI groups. BMI had a significant effect on baseline risk perception, as indicated by a p-value of 2.791e-07. However, when assessed at the final follow-up, participant BMI no longer had significance in terms of risk perception (p=0.974).

Antibody Results

Among participants who completed the final follow-up survey, 64.82% (n=774) reported receiving their antibody results, and 35.18% (n=420) did not. Of those who received their results, 8.9% (n=88) reported decreased risk, 69.7% (n=693) reported no change, and 21.4% (n=213) reported increased risk. When comparing the change in risk perception based on antibody levels (Table 4), it was found that having higher immunity levels resulted in decreased risk perception (p=9.222e-11). Among participants with less than 80% immunity to COVID-19, only 4.5% reported a decrease in risk perception, compared to 36.5% who reported an increase in risk perception. When demographic variables, sex, age, BMI, medical comorbidities, and smoking status are controlled for, the association between antibody percentage and risk change remains significant, with p-values of 1.155e-09, 4.056e-09, 5.477e-10, 1.187e-09, and 1.252e-09, respectively.

Discussion

Some limitations to this study were that the participants were recruited only from UC San Diego, so they are not easily generalizable to a larger population.

All survey data was self-reported by participants and is subject to response biases. Social desirability bias may have been at play when participants were responding to questions about smoking behavior, resulting in underreporting of current tobacco use. Using Likert scales with a "moderate" option invites participants to remain neutral and causes responses to cluster around the neutral option.

The results of this study point to a significant association between receiving antibody results and risk perception, as participants with 80% or higher immunity had a decrease in their perceived risk of covid-19. That said, many other variables factor in to perceived risk. People with medical comorbidities and higher BMI reported higher risk perceptions than people without comorbidities and with normal BMIs. These results are congruent with the HBM, as medical comorbidities and BMI are factors that would increase severity of Covid-19 and should therefore contribute to increased perception of risk. The opposite is true for antibody levels, as higher antibody levels would decrease susceptibility, and should result in a decrease in risk perception.

Looking at risk perception based on age, it was interesting to see that participants aged 65 and older had lower average risk perceptions at baseline, when compared to the younger age group. This data did not take into account medical comorbidities for either group, and compared solely based on age. However, with old age (65 and older) putting people at higher risk for more severe complications from COVID-19, it was assumed that participants in this age demographic would have higher risk perceptions than the younger age group, but this was not the case. It should be noted that UC San Diego's vaccination and masking policy may have helped reduce

perceptions of risk in both populations, and helped older participants feel safer regarding COVID-19.

Knowledge of antibody results seemed to have a large effect on participants' change in risk perception. Figure 7 shows the breakdown of risk perception change in participants who received their antibody results. Approximately 80% of participants who indicated a decrease in risk perception had higher levels of antibodies. Additionally, approximately 60% of participants who indicated an increase in risk perception had lower levels of antibodies. It is likely that there would have been larger differences in these percentages, had participants received their antibody results within a few days of submitting their samples. However, participants received their antibody results approximately 90 days after the samples were collected, at which point the results may have been perceived as no longer being an accurate representation of participants' current antibody levels. The delay in results was due to concern from the university that participants would receive their results and then stop engaging in protective health behaviors if they perceived their risk to be lower. Despite the delay in releasing results, antibody percentages had a significant effect on risk change, and this effect remained significant after controlling for demographic factors.

BMI and medical comorbidities seemed to be most associated with initial baseline risk perception in study participants. These two variables support the HBM concept that an increase in perceived severity will result in an increase in perceived risk. People with underlying medical comorbidities (including obesity) tend to have poorer outcomes from COVID-19 than people of a normal weight, with no underlying comorbidities, which provides some explanation for the higher risk perceptions in these groups. Similarly, participants whose antibody levels were above 80% had significant decreases in risk perception. This trend is supported by the HBM's concept

of perceived susceptibility. Participants with higher antibody levels perceived themselves to be less susceptible to COVID-19, and therefore reported lower risk.

Tables and Figures

Table 1. Participant Characteristics by Baseline Risk Perception

	Low Risk	**Moderate Risk**	**High Risk**	p-value
Total	39.0% (n=878)	41.9% (n=942)	19.15% (n=431)	
Sex				0.1454
Female	37.4%(n=580)	43.0%(n=667)	19.6%(n=304)	
Male	42.6%(n=295)	39.4%(n=273)	18.0%(n=125)	
Age				0.01918
Under 65	38.3%(n=837)	42.3%(n=924)	19.4%(n=425)	
65 and Older	58.7%(n=27)	28.3%(n=13)	13.0%(n=6)	
BMI				2.791e-07
Underweight	56.2% (n=27)	31.2% (n=15)	12.5%(n=6)	
Normal	43.7%(n=441)	39.7%(n=401)	16.6% (n=167)	
Overweight	37.2% (n=226)	39.2% (n=238)	23.6% (n=143)	
Obese	30.7% (n=66)	45.1% (n=97)	24.2% (n=52)	
Extremely Obese	22.8% (n=31)	55.1% (n=75)	22.1% (n=30)	
Smoking Status				0.7407
Nonsmoker	39.7% (n=745)	41.2% (n=773)	19.1% (n=359)	
Current smoker	35.4% (n=74)	43.1% (n=90)	21.5% (n=45)	
Former smoker	42.9%(n=30)	38.6% (n=27)	18.6% (n=70	
Medical Comorbidity				.002573
No comorbidity	39.8% (n=668)	42.7% (n=716)	17.5% (n=293)	
One or more medical comorbidity	36.6% (n=210)	39.4% (n=226)	24.0% (n=138)	

Table 2. Participant Characteristics by Final Follow up Risk Perception

	Low Risk	**Moderate Risk**	**High Risk**	**p-value**
Total	31.7%(n=368)	49.7%(n=577)	18.6%(n=216)	
Sex				0.3178
Female	30.1%(n=234)	40.7%(n=394)	19.2%(n=149)	
Male	35.5%(n=120)	47.0%(n=159)	17.5%(n=59)	
Age				0.1417
Under 65	31.0%(n=330)	50.2%(n=535)	18.9%(n=201)	
65 and Older	45.2%(n=19)	38.1%(n=16)	16.7%(n=7)	
BMI				0.974
Underweight	40.9%(n=9)	40.9%(n=9)	18.2%(n=4)	
Normal	33.0%(n=179)	48.3%(n=262)	18.8%(n=102)	
Overweight	31.0%(n=100)	50.2%(n=162)	18.9%(n=61)	
Obese	30.3%(n=36)	50.4%(n=60)	19.3%(n=23)	
Extremely Obese	30.6%(n=22)	54.2%(n=39)	15.3%(n=11)	
Smoking Status				0.8668
Nonsmoker	31.9%(n=300)	49.1%(n=461)	19.0%(n=178)	
Current smoker	33.6%(n=36)	50.5%(n=54)	15.9%(n=17)	
Former Smoker	26.7%(n=8)	56.7%(n=17)	16.7%(n=5)	
Medical Comorbidity				0.3797
No comorbidities	31.6%(n=257)	50.7%(n=412)	17.7%(n=144)	
One or more comorbidities	32.1%(n=98)	46.9%(n=143)	21.0%(n=64)	

Table 3. Change in Risk Perception Based on Antibody Results ("Did receiving the results of your antibody test change your risk perception?")

	Lower Risk	No Change	Higher Risk	p-value
Total				
Antibodies				9.222e-11**
Less than 80%	4.5%(n=16)	59.1%(n=212)	36.5%(n=131)	
80% or Higher	16.2%(n=67)	64.4%(n=266)	19.4%(n=80)	
Sex				0.6587
Female	10.0%(n=52)	62.4%(n=325)	27.6%(n=144)	
Male	13.0%(n=28)	60.6%(n=131)	26.4%(n=57)	
Age				0.1994
Under 65	10.6%(n=75)	61.5%(n=436)	27.9%(n=198)	
65 and older	12.0%(n=3)	76.0%(n=19)	12.0%(n=3)	
BMI				0.1749
Underweight	5.9%(n=1)	64.7%(n=11)	29.4%(n=5)	
Normal	10.7%(n=39)	58.4%(n=213)	31.0%(n=113)	
Overweight	9.6%(n=20)	63.5%(n=132)	26.9%(n=56)	
Obese	10.6%(n=7)	66.7%(n=44)	22.7%(n=15)	
Extremely Obese	20.8%(n=11)	64.2%(n=34)	15.1%(n=8)	
Medical Comorbidity				0.1467
No comorbidities	9.6%(n=53)	63.5%(n=350)	26.9%(n=148)	
One or more Comorbidity	14.4%(n=27)	57.4%(n=108)	28.2%(n=53)	
Smoking Status				0.9755
Nonsmoker	10.9%(n=68)	61.7%(n=385)	27.4%(n=171)	
Current Smoker	9.5%(n=7)	64.9%(n=48)	25.7%(n=74)	
Former Smoker	13.3%(n=2)	60.0%(n=9)	26.7%(n=15)	

Table 4. Change in Risk Perception for Higher Versus Lower Antibody Levels, Controlling for Demographic Variables

	Less than 80% Antibodies		**80% or Higher Antibodies**		p-value
	Lower	Higher	Lower	Higher	
Antibodies					9.222e-11
	4.5%(n=16)	36.5%(n=131)	16.2%(n=67)	19.4%(n=80)	
Sex					1.155e-09
Female	12.7%(n=27)	25.0%(n=53)	7.3%(n=19)	29.5%(n=77)	
Male	14.2%(n=14)	33.3%(n=33)	10.5%(n=10)	18.9%(n=18)	
Age					4.056e-09
Under 65	12.5%(n=37)	28.8%(n=85)	8.1%(n=28)	27.0%(n=93)	
65 and Older	18.2%(n=2)	9.1%(n=1)	7.7%(n=1)	15.4%(n=2)	
BMI					5.477e-10
Underweight	20.0%(n=1)	20.0%(n=1)	0.0%(n=0)	33.3%(n=4)	
Normal	12.5%(n=19)	28.9%(n=44)	9.1%(n=16)	30.7%(n=54)	
Overweight	12.3%(n=13)	38.3%(n=30)	8.0%(n=7)	25.0%(n=22)	
Obese	4.2%(n=1)	37.5%(n=9)	10.5%(n=4)	15.8%(n=6)	
Extremely obese	25.0%(n=5)	20.0%(n=4)	11.5%(n=3)	15.4%(n=4)	
Medical Comorbidity					1.187e-09
None	12.6% (n=29)	27.0%(n=62)	6.8%(n=18)	25.9%(n=69)	
One or more	14.8%(n=12)	29.6%(n=24)	12.0%(n=11)	28.3%(n=26)	
Smoking Status					1.252e-09
Nonsmoker	13.2%(n=35)	28.9%(n=77)	8.0%(n=24)	25.7%(n=77)	
Current Smoker	8.3%(n=2)	16.7%(n=4)	9.5%(n=4)	33.3%(n=14)	
Former Smoker	25.0%(n=2)	25.0%(n=2)	0.0%(n=0)	16.7%(n=1)	

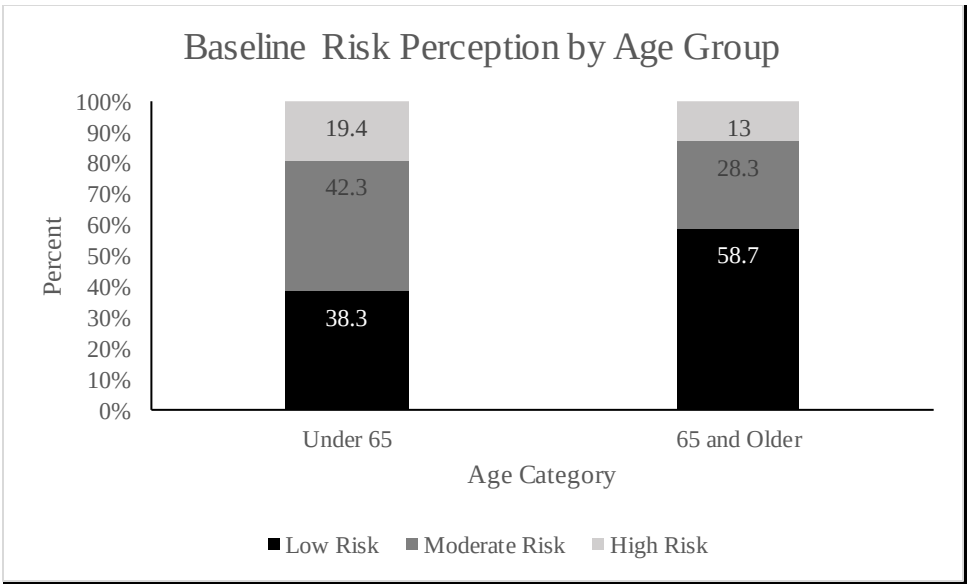

Figure 1. Baseline Risk Perception by Age Group

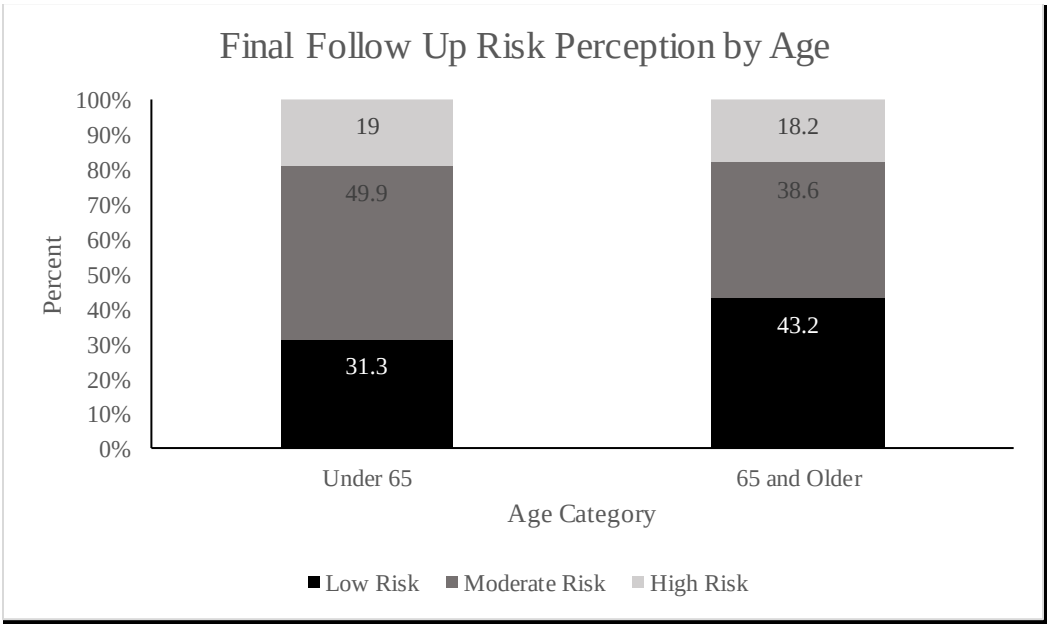

Figure 2. Final Follow Up Risk Perception by Age

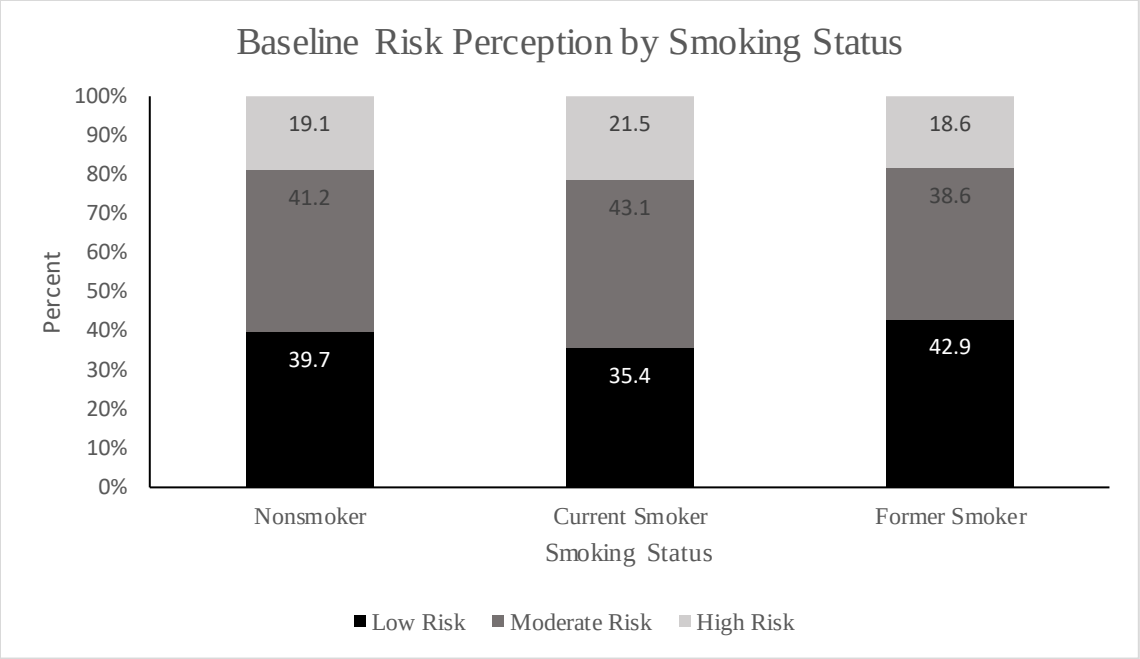

Figure 3. Baseline Risk Perception by Smoking Status

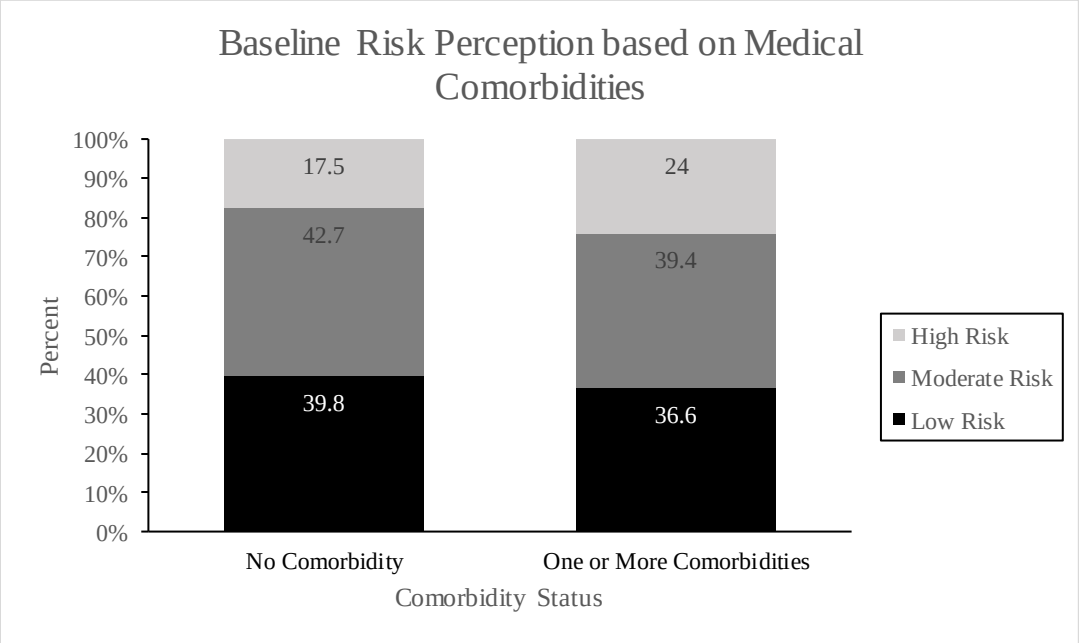

Figure 4. Baseline Risk Perception based on Medical Comorbidities

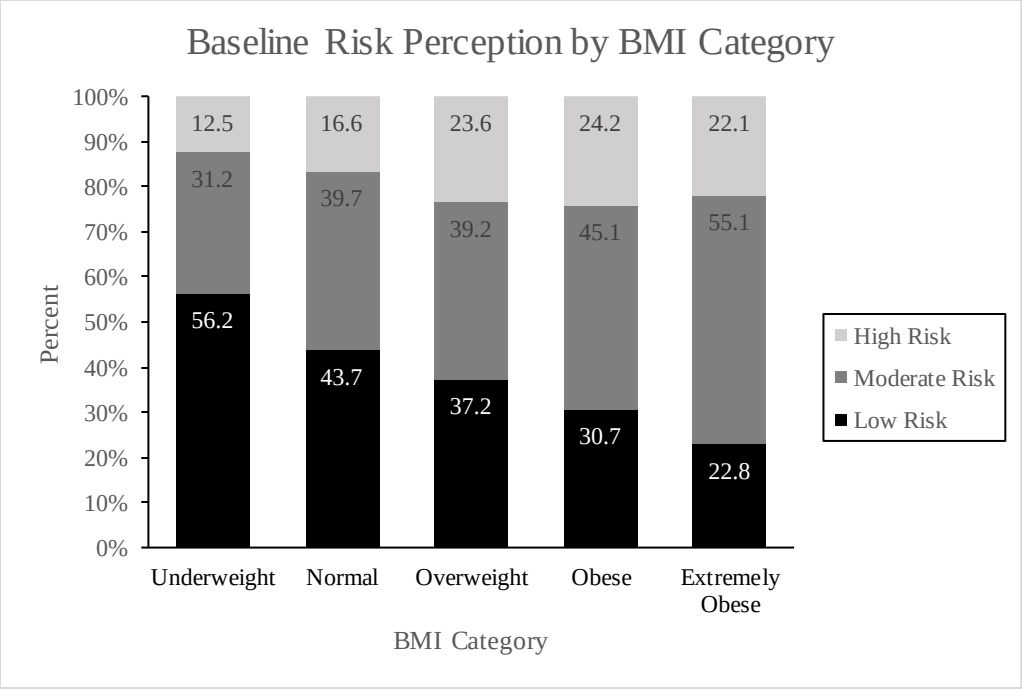

Figure . Baseline Risk Perception by BMI Category

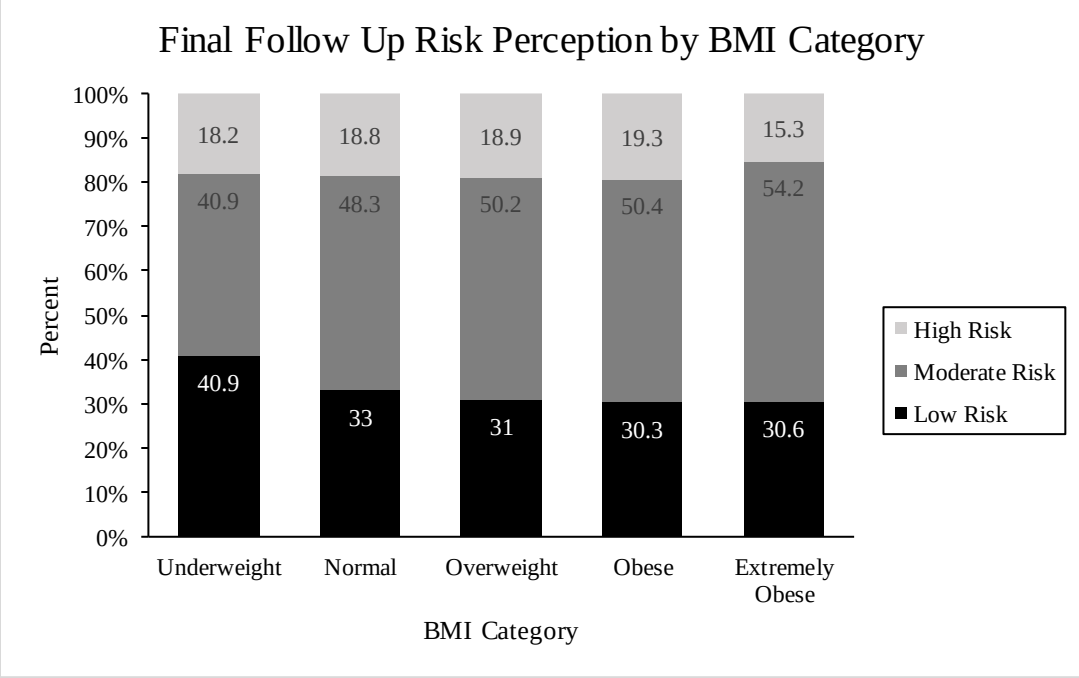

Figure 5. Final Follow Up Risk Perception by BMI Category

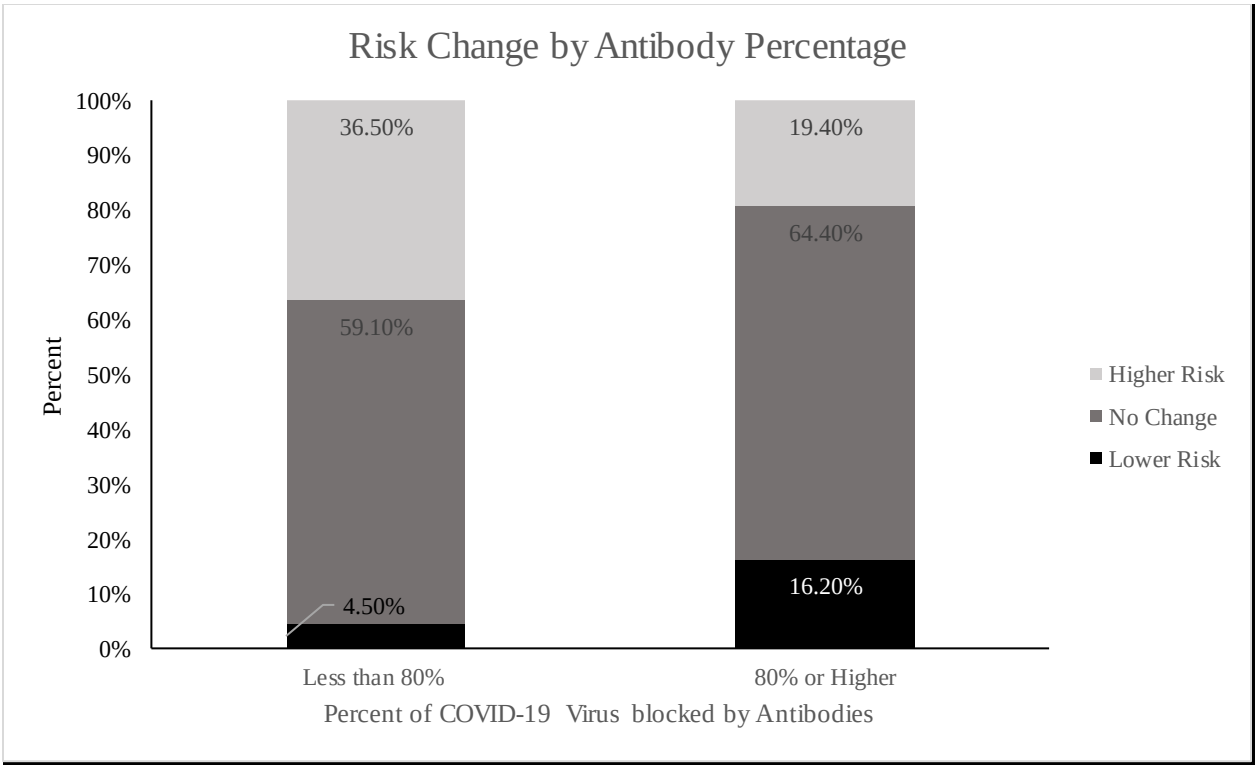

Figure 6. Risk Change by Antibody Percentage

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