

A DIFFERENT KIND OF SHOT –
THE COVID-19 VACCINATION BEHAVIOR OF COLLEGE STUDENTS

by

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DEDICATION

To Jerry – I could not have accomplished this without you!

To Maria – I wish you could have been here!

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ABSTRACT

COVID-19 and its mitigation through social distancing, masking, and preventative vaccination have impacted societies worldwide, leading to controversy regarding public health policy. This dissertation investigates the determinants of the vaccination behavior of 18-24-year-old college students in four-year public institutions in the United States, specifically concerning coronavirus. Of interest are reasons “why” or “why not” students would opt for or against the COVID-19 shot. Findings could aid in messaging public policy targeted toward a desired audience. Concepts related to policy, public health, beliefs, and their effects on the willingness to receive the coronavirus shot are explored. Prospect Theory – decision-making under risk and uncertainty – serves as the theoretical framework, including the theory’s key components of probability and severity. Existing data sets collected by the American College Health Association – the National College Health Assessment – for the survey periods Fall 2020, Spring 2021, and Fall 2021 – are utilized. The final data set comprises 62,267 cases, analyzed with binary nominal logistic regression. Of note is the unexpected finding that COVID-19 vaccination uptake outpaced flu and HPV shots by 20%. In addition, other findings did not align with previous research: male students, students with caregiver responsibilities, and those in relationships are less likely to participate in preventative health behaviors. Prior works also outlined that the risk component of Prospect Theory should be operationalized based on probability when applied to the health domain.

For this analysis, risk encompasses both severity (as the coronavirus disease may vary from person to person) and probability (the likelihood of infection with the disease). The odds ratio analysis finds that probability has a far more significant effect on the student's willingness to receive the vaccine than the element of severity. As a result of the analysis producing unexpected and expected findings, future research should include components that address political ideology and the politicization of the COVID-19 disease. In addition, targeted surveys could further explore the severity and probability elements in more detail.

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CHAPTER 1: INTRODUCTION

In late 2019, the first reports of respiratory illness presenting with fever, malaise including cough, sore throat, and difficulty breathing, emerged from Wuhan, China (Liu et al., 2020). Classified in March 2020 by the World Health Organization (WHO) as COVID-19, the virus was characterized as a pandemic (Liu et al., 2020; WHO, 2020). The coronavirus continues to cause death and severe illness, comparable to the 1918 Spanish Flu (estimated deaths 50M), 1957 Asian Flu (estimated deaths 1.5M), 1968 Hong Kong Flu (estimated deaths 1M), and the 2009 Pandemic Flu (estimated deaths 300K) have caused in the past (Liu et al., 2020).

The Centers for Disease Control and Prevention (CDC) reported an estimated total of American cases of 45,149,234 and 730,368 deaths on their October 22, 2021, COVID Data Tracker Weekly Review. October 22, 2021 data also showed 189,924,447 administered vaccines, resulting in 57.2% of a fully vaccinated U.S. population (CDC, 2021b). Updated CDC figures showed 101,094,670 U.S. cases and 1,091,184 total reported deaths as of January 4, 2023. 69.1% or 229,300,000 of the U.S. population have been vaccinated, and 48,200,000 individuals (15.4%) have received booster shots (CDC, 2023a). The WHO reported total worldwide cases as 663,248,631 and 6,709,387 deaths (WHO, n.d.-a.) as of January 19, 2023. The WHO Coronavirus (COVID-19) Dashboard also listed the worldwide total of fully vaccinated individuals as 5,035,835,135 (WHO, n.d.-a.) Pandemics impact individuals and communities in multiple ways. From a health perspective, people and the health infrastructures that serve them are affected from those

with immediate infection, those who require long term treatment, and those who are not able to access treatment for ongoing or emergency care because COVID-19 strains the health system (Bruce et al., 2022; Chen et al., 2020; Maital & Barzani, 2020). The economic impact of a pandemic is also complex and destructive. Supply chain interruptions affect economies. Consequently, manufacturers are not producing goods, and consumers are not purchasing items. Thus, a chain reaction occurs: supply interruptions result in lowered demand and spending. Subsequently, gross domestic product is reduced, unemployment rises, and price corrections attempt to recover revenue losses. In particular, already vulnerable populations such as economically disadvantaged families may suffer from the impacts of the pandemic at a greater rate, experiencing financial constraints at times leading to food insecurity (Bruce et al., 2022; Chen et al., 2020; Maital & Barzani, 2020). In addition, non-Caucasian individuals may have also experienced higher proportions of financial vulnerability when compared to their Caucasian counterparts (Bruce et al., 2022). Finally, social wellness is affected in the short and long term and links to both physical and mental health and economic recovery. Ideally, individuals of all ages must feel confident and safe when re-entering the marketplace and re-starting their pre-pandemic life and activities. When individuals are concerned about being exposed to the virus and exposing others, they may not participate in public life (Bruce et al., 2022; Chen et al., 2020; Maital & Barzani, 2020).

As the COVID-19 pandemic continues to impact global communities and health systems, policymakers and public health officials have strongly encouraged citizens to participate in preventative health measures such as masking and vaccinating. Participating in such measures improves community health and the economic outlook,

sense of security, and general well-being of communities (Chen et al., 2020; Maital & Barzani, 2020).

Access to and utilization of health care resources may be impacted by individuals' behavior because of their beliefs and values; according to research, greater demand on the system may reduce the availability of health care resources to others (Ostrom et al., 1999; Palumbo, 2017). Individual behaviors may affect communities at large, at times depleting resources through overuse and emphasizing individual rights over the well-being of the community. The continued influx of COVID-19 patients put tremendous strain on the nation's hospitals, as outlined by the U.S. Department of Health and Human Services' Office of Inspector General 2021 National Pulse Survey (U.S. HHS, 2021) – staffing and equipment shortages have impacted care providers and patients alike, simultaneously affecting equal access to care for individuals of diverse socio-economic backgrounds. For example, access to vaccination may be insufficient in rural communities. In addition, vaccine hesitancy and access to inoculation, availability, and misinformation may cause delays in large-scale vaccination efforts. Interruptions in community vaccination could prolong the circulation of the coronavirus. However, the personal choice to forgo vaccination may impact health care provision for all. Further, as the CDC reported on October 22, 2021, hospitalizations and deaths were more prevalent among unvaccinated than vaccinated individuals, and even if break-through infections of the vaccinated occurred, these were less severe (CDC, 2021b).

Early recognition and acceptance of participation in public health endeavors are vital to ensure good public health outcomes. Instilling positive health behaviors in young populations provides a foundation for the individuals' continued participation in the

health system (Flanagan & Levine, 2010). Young adults' socialization into higher education may provide students with tools to consume various data that aid in decision-making, critical thinking, and the consideration of their contributions' impact on their communities. The citizen role in health systems would allow for both burden- and benefit-sharing as individuals would fund the public health system through redistributive (welfare and social) and regulatory (tax) policies (Lowi, 1972). Such health systems are funded through the participants' monetary contributions and their participation in health behaviors (Palumbo, 2017). Individual daily health behaviors may support or undermine society's health. One could argue that diseases may not be combatted when citizen participation in preventative health measures is lacking.

It is important to note that participation in health measures is subject to many factors (Cairney, 2019; Stone, 1997; Weible et al., 2020). Cognitive biases may impact young adults as a result of their upbringing, which subsequently could influence their risk perception – experiences shape behaviors. Policy implementation efforts may encounter difficulties and even fail when people's value systems may be disregarded, putting community health and wellness at risk. To improve policy implementation, scholars suggest that it is crucial to target policy tools and incentives to align with the cognitive capacities of individuals as well as with their ideologies, perception, and subsequent mitigation of risk (Cairney, 2019; Stone, 1997; Weible et al., 2020).

For example, a 2016 survey of 18-24-year-old undergraduate students conducted by the National Foundation for Infectious Diseases (NFID) illustrated that despite recognizing the importance of flu vaccinations (70%) as a preventative health measure, fewer students (46%) opted for the vaccination. As established by NFID (2016), reasons

for not receiving flu vaccinations included a sense of personal invincibility (36%) and disbelief in science (30%). Additionally, parents, guardians, and other relatives had approximately 50% weight in the student's decision-making process (NFID, 2016). Recent work by Marcell and Spurlock (2020) supports NFID's findings regarding general vaccination hesitancy: the authors reiterated NFID's concerns about misinformation among the young student body (mean age 20.3 years), such as vaccines causing side effects and people contracting the illness as the result of the vaccine. Furthermore, decision-making occurred based on information provided by the social network of students. Although Marcell and Spurlock's 2020 small study was limited to students at a historically black college and university, it highlighted concerns regarding vaccination uptake: as flu vaccination participation had already been lacking, inadequate COVID-19 vaccination rates similar to reduced influenza vaccinations could have potentially adverse consequences.

It also appears that young adults' awareness of their contributions to the health community may be missing. Recently completed research by Utych and Fowler (2020) found that appealing to younger adults about the risks that COVID-19 poses to older persons has no significant impact on the young adults' behaviors such as hand washing and covering the mouth when coughing, other than providing information. In fact, messaging that older individuals are more susceptible and symptomatic may result in younger people behaving as if COVID-19 is inconsequential for younger individuals and subsequently they may become asymptomatic spreaders of the illness. Messaging increased the awareness of the seriousness of the disease; however, this did not result in any behavioral changes. Findings revealed that when messaging is constructed and

targeted towards the protection of older individuals, the opposite effect might take place. Younger individuals seem to be caring less about their fellow senior citizens, as their willingness to participate in hygiene measures was reduced. Outlining the threat that COVID-19 also poses to younger persons resulted in an increased risk perception only if the geographical areas showed higher infection rates. So, as Utych and Fowler (2020) found, younger individuals' health behaviors and risk perception may result in their non-participation in preventive health measures.

Individual and subsequent communal health behaviors such as preventative health measures are subject to personal perceptions of risk. Prospect Theory – decision-making under risk – addresses individuals' decision-making in the context of personal health choices and the potential impact of such individual behaviors on public health policy-making. Prospect Theory, first developed by Kahneman and Tversky (1979), illustrates how the assessment of losses and gains varies depending on the perception of the significance of losses or gains and the associated reference points. This dissertation aims to extend theory building by applying Prospect Theory to public health policy and student health behaviors, to analyze individual's decision-making processes within the Prospect Theory framework, and to inform the targeted messaging associated with policy tools.

It should be noted that this manuscript also addresses the role of ideology as a vital consideration in public and private decision-making. However, health behaviors such as vaccinating may be complex in the first instance, and even more complicated when interfacing with policy-making and political behavior. To start this discussion, the analytical focus is placed on other causes such as demographic factors, general health and other vaccination behaviors, socio-economic status, and risk perception.

For the scope of this work, the concepts of health behaviors and health literacy are of particular interest. The intersection of these concepts addresses individual health behaviors that ultimately may result in health issues affecting society. Health-related concerns in civil societies also encompass the burdens and benefits imposed by society; in other words, civic orientation is concerned with how public health policies interact with society's needs and the subsequent policy outcomes (Sørensen et al., 2012). Consequently, this research explores the health behaviors of young adults and their subsequent impacts on community health:

What determinants are associated with college students' decisions to vaccinate against the COVID-19 virus?

From an applied perspective, findings may aid in developing health education and policy tools to further young adults' understanding of societal health and the importance of their contribution to society's overarching well-being. In addition, this work may be generalizable to other policy contexts, such as education or social welfare, as citizen participation in public programs is generally subject to the individual's opinion about program and policy impacts related to their beliefs. For example, despite meeting program requirements and needing support, individuals eligible for unemployment benefits may not seek service due to their principles rooted in self-sufficiency and independence.

This dissertation is organized into six chapters, including this introduction in Chapter 1. Chapter 2 provides a literature review addressing ideologies and values related to policy-making, health, and concepts such as health literacy, health behaviors, and the interaction between health and young adults. After introducing Prospect Theory –

decision-making under risk and uncertainty – as a theoretical framework in Chapter 3, the description of data and empirical strategies will follow in Chapter 4. That chapter outlines the research methodology employed to obtain secondary data about college students' health behaviors. Chapter 5 details the statistical methods used to analyze the data, the analytic results and discusses both expected and unanticipated findings. Finally, Chapter 6 concludes with an overall summary of this dissertation project, including a discussion of the empirical findings and their considerations for future research and practice.

CHAPTER 2: LITERATURE REVIEW

Chapter 2, the literature review, synthesizes relevant scholarly material. First, I offer a foundational layout of concepts such as policy-making, values, and ideologies and health policy. Then, I review literature on health literacy, health behaviors, factors impacting health behaviors, and the relationship of young adults with the concept of health. The concepts of health and values are multidimensional. Such multidimensionality is further extended to sub-concepts, creating the challenge of separating sub-concepts, for example, the cognitive biases of framing and loss aversion, for review and analysis.

Prior scholarship has addressed the impacts of student health behaviors. Cannonier et al. (2019) addressed how smoking affected academic performance. Other works investigated the relationship between smoking and media literacy (Primack et al., 2009), drug use, depression, and suicidality (Zullig & Divin, 2012), drug use and sexual orientation (Kerr et al., 2015), alcohol usage and weight management (Barry & Piazza-Gardner, 2012), stimulants and weight management (Jeffers et al., 2014), and sexual behaviors and their interaction with mental health (Hossain et al., 2014; Lytle et al., 2014; Matthews-Ewald et al., 2014).

However, while limited research has been conducted regarding vaccination behaviors of college students, some studies have been performed addressing human papillomavirus (HPV) vaccine uptakes among Hispanic students (Cohen & Legg, 2014), women (Lindley et al., 2013), women and men (Thompson et al., 2016), and HPV

vaccination uptake and protection when engaging in sexual behaviors (Vazquez-Otero et al., 2016).

A careful review of the published literature suggests that no analyses exist regarding vaccination health behaviors using institutional-level data. In addition, the nascent literature addressing health behaviors related to the COVID-19 virus benefits from attention to the subgroup of adults who are seeking education and credentialing through post-secondary institutions.

Policy-Making

Policy-making aims to arrive at solutions that improve conditions for society and citizens, level the playing field, and correct wrongs. However, solutions to societal problems – particularly wicked problems that might be difficult to solve as they often could consist of several issues interfacing with each other and could be difficult to untangle – are predominantly challenging to address. Additionally, there are often debates as to whether there is a policy problem to be solved in the first place as people with differing beliefs may not see the need for policy interventions (Stone, 1997).

Kingdon's Multiple Streams Framework (1995) has demonstrated how the convergence of the three streams (differentiated into problem, politics, and policy) allows issues to gain traction and to be placed on the political agenda. Additionally important are the timing and the involvement of policy actors. As a precursor to achieving desired policy outcomes, policies must delineate particular components that would result in said outcomes. In order to establish specific policy elements, analysis of the existing environment must occur. After policy intervention and implementation, policy outcomes might be assessed through formal policy evolution (Kingdon, 1995).

Indeed, feedback effects outlined in the Policy Feedback Theory (Mettler & SoRelle, 2018) and storytelling through the Narrative Policy Framework (Shanahan et al., 2018) may influence policy-making and political interactions. Shanahan et al.'s Narrative Policy Framework (2018) consists of the four essential considerations of policy setting, storied characters, interactions between the characters (plot), and the meaning of the interactions equating to the policy solution (moral of the story). First, policy setting refers to the context of the problem, such as regulative social policies. Second, the concept of characters discusses individuals affected by the policy or individuals who play some part. They may be portrayed, for example, as beneficiaries, supporters, opponents, experts, or policy entrepreneurs. Third, the plot thickens as characters and their individual stories interact and create relationship-specific stories. Finally, the moral of the story provides advice – the policy solution – to the policy actors (Shanahan et al., 2018). Narrative strategies include conflict expansion (Schattschneider, 1975; Shanahan et al., 2018) and causal mechanisms such as lacking initiative, at times aiding in assigning blame to citizens as being responsible for their situation.

Policy feedback is conceived as the process of policies influencing behavior and choices, and as the result of such behaviors and actions, subsequent policies are enacted or revised (Béland, 2010). Policymakers are advised to learn from the policy process to make adjustments for the next cycle and use knowledge resulting from policy implementation. To put it another way, one needs to learn from successes and failures. The demographic characteristics of individuals influence policy: the longer a policy has been in existence and the greater its scope (i.e. affecting many people), the more significant support it will receive. Policy legacies – programs that have been in existence

for decades – have generated interest groups in particular support of specific policies (Béland, 2010).

Conversely, policies may create interest groups in opposition to or favor of such policies (Béland, 2010). Then, once established, interest groups impact policy-making by providing their input, suggestions, and opinions about policy proposals, representing the interests of their members. Negative policy feedback can also lead to policy changes, as policy features and impacts are not maintainable over a period. At the same time, governments must address its changing population to account for its needs (Béland, 2010).

Policies may be symbolic and entrenched without accomplishing any outcomes (Larason & Ingram, 1997; Stone, 1997). Consequently, policies that are embedded in society may almost be impossible to modify or remove, regardless of whether the policy produces any benefits. Policies may be associated with the societal values of sub-populations and subsequently garner the acceptance of such policies by the target groups. Additionally, if policies are framed as supporting specific populations (particularly when perceived negatively), such policies then become the model policies for addressing such sub-groups (Larason & Ingram, 1997; Stone, 1997).

Policy design delivers messages to target groups about who they are, relates what social groups they belong to, with whom they identify, and what is expected of them (Larason & Ingram, 1997). The choice of policy design reflects attitudes and opinions prevalent throughout society when groups are labeled as deserving and promoted over other populations. Social construction uses imagery and stereotypes such as the categories of dependents or deviants in need of social welfare policy to justify the imposition of burdens or benefits, at times resulting in punishing citizens for their

situations. The concept of social construction also includes the categorizations of the advantaged and the contenders – individuals and groups of privilege and presumably higher social standing. Policy-making may justify rationales and assumptions and may also legitimize the policy design based on, for example, the target population (Larason & Ingram, 1997).

However, rationales and assumptions can be deceptive. For example, effectiveness may be touted as an essential rationale as policies are supposed to solve problems and achieve goals, but this begs the question of how and if societal – human – problems can be rationalized away. Other typical justifications of policy proposal and policy may be grounded in the desire for economic or scientific progress, the public interest, equality, or perceived fairness. However, policy justifications may conflict with each other (Larason & Ingram, 1997; Stone, 1997).

Personal decisions may conflict with public and policy decision-making. Such personal choices may subsequently result in broader consequences for others, as private and individual actions may cause impacts for society (Larason & Ingram, 1997; Stone, 1997). Public sector policy decision-making is frequently subject to various factors such as power and the salience of the issue. Lasswell and Kaplan (2014) noted that politics are grounded in personal values, motives, and associations. Values function as the underpinning of motivational behavior and relationships that translate into how power is exercised and how concerns and evaluations of specific issues are approached. Political power deals with allocating social values. In turn, values have a significant impact on political conflict and group formation. In addition, like-minded individuals may band together due to such shared principles. Such shared principles may then determine the

individuals' acceptance within their social groups and how other actors may be treated. Power itself addresses the generation of specific, future outcomes, getting people to do what one wants them to do. It is the ability to dominate people and behaviors through policy tools such as sanctions or incentives (Lasswell & Kaplan, 2014).

Additionally, as Downs (1972) pointed out, the salience of public policy issues goes through cycles as there is a somewhat short to medium issue attention span: the public and elected officials may get bored or saturated with the (wicked) problem and move on to other concerns. Nevertheless, not all social problems grab attention and cycle through the stages of the issue attention cycle. However, problems may have some features that will allow for the cycle, such as sufficient counts of people suffering from the problem; otherwise, if they do not directly suffer enough, they may not pay attention. In addition, when issues are addressed, policy proposals often include outlines addressing the financial impact of the policy solution – how much does it cost to solve the problem, who is paying for it, and how and when?

When policy decisions are made, there is the risk of whether citizens accept a policy and are willing to follow measures outlined in a policy. In addition, uncertainty about public policy outcomes such as prospective gains or losses must be considered: is the participation worth the risk or utility, considering the uncertainty of the reward? These questions are central to policy, decision-makers, and citizens and their perception of uncertainty, risk, and reward (Baekgaard, 2017; Tversky & Kahneman, 1989).

In summary, policy issues encompass various areas impacting society, such as but not limited to education, transportation, taxation, social welfare, and public health. One could certainly argue that health matters are private matters, and largely, these matters are

private concerns between individuals, their health care providers, and their health care insurers. However, most people do not live in a vacuum, free from interaction with others; individual, personal actions do affect others. Community health is the aggregate of individual health as communities are as healthy as their members are unhealthy. Public health policy may not only provide the guard rails for actions in the public sphere but policy may also serve as an educational tool to raise awareness of issues – at times not applicable to oneself – prevalent in communities. In other words, not every policy intervention may apply to all citizens but citizens should understand why health policy is implemented, even if it might cause disadvantages for some. Policy successes of public health policies may be dependent on citizens' buy-in and their individual decision-making. Regardless of whether compliance with policy tools is voluntary or mandatory, citizens may gauge their decision-making and compliance based on potential outlays and the consequences of following policy actions. Clearly, policy decision-making – health policy or otherwise – is also subject to the context in which such decisions are made.

Policy Responses to Disasters

Disasters often strike unexpectedly. Dewi and colleagues (2020) pointed out that responsiveness and increased capacity to address catastrophic events such as the COVID-19 pandemic, with the added difficulty of coordinating national and international policy responses, must be a consideration when preparing for adverse events. Disasters may be responded to from a precautionary or proportional management approach, resulting in trade-offs. The need for increased disaster response capacities may require governments to engage in preventive and focused emergency planning. Nonetheless, such planning may be limited in scope, resulting in insufficient responses to disasters. Dewi et al.'s

(2020) findings illustrated that 177 countries did not react at all or react sufficiently to COVID-19.

For example, according to Dewi et al. (2020), South Africa and Brazil ranked at the top of the preparedness scale but swift increases of Coronavirus infections in their respective countries outpaced the countries' planning. This reactionary behavior is explained by Disproportionate Policy Theory – the over- and under-reaction to policy. Policy responses to wicked problems may differ from policy action addressing disasters as officeholders have to consider their political time horizons and how their actions may influence future (re)elections. Such consideration may result in more measured, less aggressive policies (Jones & Baumgartner, 2005).

Further review of national disaster preparedness and response capacities by Kandel et al. (2020) revealed a great range of national capacities, with 91 out of 182 countries being ready to respond appropriately to a disaster. Kandel et al. (2020) analyzed prior year reporting in the areas of prevention, detection, responsiveness, state capacity, and operational readiness. Cross-national collaboration, coordination, and capacity building were needed to mitigate the spread of airborne pathogens. Nevertheless, these needs may be hamstrung by low national capacities. Increased and improved health provision at local levels was vital to increase prevention and detection, yet such basic provisions were lacking. In addition, an expansion of health services as a matter of policy should occur, including health prevention and community education to address hand and respiratory hygiene (Kandel et al., 2020).

Policymakers may have well-established plans and sufficient policies to mitigate disasters; however, if the disaster is disproportionately larger than the available resources,

the disaster will outpace the resources. COVID-19 infections requiring health care provisions have led to crisis standards of care (IDHW, 2021) and the possible rationing of resources. Raising public awareness, messaging, and issue framing may be vital tools to address disaster mitigation and the public's role in the process. Still, reasonable communication measures may be counterproductive, as Utych and Fowler (2020) outlined – individuals might not consider the implications of their behaviors on others.

Weible et al. (2020) viewed the policy response to COVID-19 through the lenses of emotions, narratives, and messaging, among other considerations. As emotions drove policy-making, policymakers tapped into citizens' concerns, regardless of the rationality of concerns, possibly fueling unreasonable behaviors. The emotional needs of society were used to drive policy, appealing to sentiments such as national pride to defeat the foreign virus. Such a tactic could surely result in frames negatively impacting minority members of society, exacerbating fear among the majority population and artificially triggering responses. Policy responses may affect citizens' lives on an individual level as, for example, lockdown policies could cause people to isolate and socially distance themselves, possibly resulting in mental health issues. Messaging and narratives may increase or reduce risk perception (Weible et al., 2020) but "Even though narratives and messaging are important, we still know little about how to construct and deliver them effectively to influence public behavior" (Weible et al., 2020, p. 14).

Consequently, an accurate understanding of risk is vital for policy response, communication, and avoiding spreading false information that would escalate disaster and provoke urgent action. At the same time, downplaying to lessen the sense of urgency and need for behavior modification may delay policy responses. In addition, timely and

accurate messaging is needed to ensure continued trust in policymakers while simultaneously aligning national and subnational governmental responses (Weible et al., 2020).

Health Policy

Public health achievements may result from policy change addressing problems that affect large numbers of citizens. Often policy tools such as capacity-building tools or incentive tools may be applied, but these policy tools may not be in alignment with preferred health behaviors and underlying motivational tactics. For example, policy tools may be grounded in the assumption that citizens and policymakers may not realize deficiencies in knowledge but that learning tools could decrease such deficiencies (Schneider & Ingram, 1990). As Schneider and Ingram (1990, p. 513) put it: “Public policy almost always attempts to get people to do things that they might not otherwise do; or it enables people to do things that they might not have done otherwise.” Policy tools encompassing authoritative tools such as vaccine mandates (Jacobson v. Massachusetts, 1905) have been deployed, emphasizing individuals’ responsibilities to society. Other policy tools consist of capacity-building tools providing education and resources (Cairney, 2019; Kingdon, 1995; Schneider, 2000). In the context of the COVID-19 vaccine, capacity-building tools would entail educating the public about the science behind the COVID-19 vaccine and how to obtain the shot. In addition, providing incentives as a capacity-building tool would allow cash rewards for receiving a dose of the vaccine. In summary, the concept of public policy is comprised of laws, regulations, policies, and (un)funded mandates. Health policy areas range from tobacco restrictions

and public school health to workplace protection, disease prevention, and access to health infrastructure.

Health policy-making is not solely based on scientific evidence but also on values, competing information, and influences from policy actors outside the governmental realm (Cairney, 2019; Kingdon, 1995; Schneider, 2000). It stands to reason that health policies' successes depend on policy tools put forth to accomplish the desired outcomes and impacts on society. If determinants of health behaviors are subject to specific factors, should health policy then not address these factors and apply appropriate policy tools?

People may refuse to comply with policies to increase community health, defined as the "health status of a defined group of people and the actions to promote, protect, and preserve their health" (McKenzie et al., 2008, p. 7). However, according to Goodman et al. (2014), community health's overall constructs and definitions are lacking. Goodman and colleagues (2014) question the inclusiveness of populations supposed to be encompassed in the definition. Therefore, attempts to combat chronic illness through health prevention may fail (McKenzie et al., 2008). In other words, if the definition is lacking, populations may be missed, and intersectionality may not be considered. Thus, policy tools may not generate the desired results.

McKenzie et al. (2008) outlined activities such as capacity-building, providing health education, and promotional campaigns as tools to improve community health behaviors. However, despite appealing to citizens' concern for the welfare of others, these health promotion tools may not have produced the desired results of increasing vaccination rates. Other examples include the initial framing of mask wearing to appeal

to the sense of community concern as an unsuitable policy tool to achieve mass masking participation (CDC, 2021a; Godoy, 2020; Hilburn, 2021).

Utych (2021) pointed out that states in the Union have diverse approaches to fighting COVID-19, providing recommendations without enforcement and consequences. Institutions of higher education policies exemplified in this manuscript mirror these approaches: health policies of select universities do require vaccinations but allow for exemptions. However, obtaining exemptions may be somewhat cumbersome (e.g., doctor visits to obtain medical exemptions, meeting with religious leaders, and the provisions of notarized documents), possibly making getting the shot more convenient than obtaining an exemption.

Framing of information resulted in different behaviors – Liberals were not positively affected by promotional (focusing on advantageous results) or preventional messaging (avoiding negative outcomes) related to masking. Nevertheless, promotional messaging decreased the likelihood of Republicans recognizing the benefit of masking, masking's impact on disease spread, and the willingness of Republicans to wear masks. This messaging resulted in reduced compliance (Utych, 2021). Messaging of prevention mechanisms played a role in subsequent participant composition. Messaging and framing both affected compliance with regulations (Hameleers, 2021) as the framing of mask wearing had different impacts on the public.

Evidence-based policy is grounded in the policy process, content, and outcomes. Brownson et al. (2009) outlined significant implementation barriers that may result in ineffective public health policy. Appropriations may reflect the lack of policy foci such as prevention, meaning that preventative health measures may be underfunded. Health-

opposing yet influential industries may impact the policy process. Also, health practitioners may have lacked technical skills about policy-making. However, of particular interest is that policy-making may often be subjected to stereotyping and may be grounded in ideologies and beliefs that may not address the actual needs of 21st-century society (Brownson et al., 2009).

Beliefs and Biases

Different realities and problems exist for different people, subject to their beliefs and expectations (Béland, 2010; Campbell, 2012; Mettler & SoRelle, 2018; Stone, 1997). Salient policy issues may not be recognized as advocacy for these issues may be absent, and as problems may be specific to particular populations, the problem's urgency might not be recognized. As individuals may not experience explicit problems, it may not be their concern and as a result, empathy is missing. Values and elements of social construction determine problems and their agenda-worthiness, ultimately resulting in concrete social policy. Social policies may be controversial because their regulatory and redistributive features directly influence ordinary citizens and possibly impose burdens in supporting the community. Policies targeted to specific categories of individuals may make it challenging to extend said policy benefits to other populations. Citizens are impacted by policy not only from afar but also because of their direct interactions with the bureaucracy as service recipients. These citizens may be judged based on their social construction and value – they may receive specific messages based on their status. Naming conventions of policies may also determine the response and future treatments; key terms such as patriotism, liberty, and security may be used in symbolic policies and

may become ideological tools (Béland, 2010; Campbell, 2012; Mettler & SoRelle, 2018; Stone, 1997).

Not only may the mobilization of interest groups occur because of policy-making, but there might also be an increase in the participation of individuals. Direct policy impact – an observable tie between policy and its consequences on citizens – increases one's participation. However, citizen participation presupposes that citizens may know how policy modification affects them personally. Unfortunately, people may only participate if the policy directly affects their lives; otherwise, they may be disinterested in advocating for their fellow citizens (Campbell, 2012).

As policy and benefit provisions may often be challenging to understand and include numerous provisions and stipulations, questions arise as to how one investigates issues and processes information about their health concerns. Such knowledge may then be used to mobilize for or against the policy. Critical health literacy may be a crucial consideration, as one must understand how health information, scientific data, discoveries in health sciences, and medicine determine one's health behavior. One may contemplate that young adults may recognize the need to participate in the health system when health is viewed through the lens of collective action and common-pool resources (Fleary et al., 2018). However, if individuals were to better comprehend such knowledge in the first place, would they be amiable to forgo their ideologies and engage in health behaviors that result in the subjective betterment of communities?

In summary, health policy-making may interface with individual biases, health literacy, and health behaviors. Health policy-making may also be impacted by issue framing and subsequent policy solutions. Nevertheless, when a deadly disease is being

framed, even by policymakers, as a simple inconvenience, individuals may react accordingly and exercise insufficient caution. If health policy aims to improve citizens' lives, it may behoove policymakers to ensure that correct policy concerns are addressed by appropriately using policy tools to support targeted implementation, including clear measurement criteria. It is reasonable to expect that problems of a rather complex nature involving scientific knowledge should be conveyed in a relatable and understandable manner. Policy-making interfaces with critical and community health literacy, both at the citizen level and the level of the policymaker. It is indeed a concern if policy proposals are disregarded by policymakers and not accepted by citizens if such regulation is not understood due to a lack of health literacy. As the fight against COVID-19 is underway, alternative treatments such as ivermectin, supported by U.S. senators (Cillizza, 2021), have caused a run for the drug generally used to treat roundworm found in equines. The spreading of inaccurate information by policy makers influences outcomes (Weible et al., 2020).

Ideologies, Societal Values, and Health as a Value

The debate about the concept of public values may beg the question of whether health should be considered a public value. Such an argument may be subject to the ideological underpinnings of a given society. Wade's timely work (2022) – leaning on Bozeman (2009) – posited whether health care would be considered a public value by U.S. citizens. Wade (2022) utilized other values as predictive tools to establish the value concept and public values dissonance in his work. Public values dissonances explained why individual rights would be held in high regard, but similar services or access for all citizens would be undesirable. Wade (2022) found that individuals who supported gun

ownership as a public value did not support health care as a public value. On the other hand, supporters of values such as the right to abortion, diversity, protective health measures, and access to health care were found to back health care as a public value. Wade (2022) pointed out that public values might be consensual or contested – and that citizens may be willing to abandon contested values rather than consensual values. However, he found that individuals were unwilling to sacrifice the contested value of health care as a public value. Instead, study participants would sacrifice the bedrock values of religious freedom, liberty, or civil rights. Appreciating a contested value such as health led Wade (2022) to contemplate that public values dissonance (Festinger, 1962 as cited by Wade, 2022) may be at play – individuals may recognize health as a value for themselves but not others. In the United States, the prevalent notion has been that health has been an individual value, not to be addressed through societal responsibilities (Plough, 2015). Wade’s (2022) findings may lead one to believe that health as a value and health care are desired values and rights. However, individuals may not openly admit to the desirability of health as a societal value out of concern of going against society’s prevalent norms. In his work, Plough (2015) pointed out that the recipients’ changing demographics may drive the inclusion of health as a value.

Public values dissonance may lead citizens to argue that society should not be responsible for communal health. Nevertheless, once individuals lose access to health services or fall ill, they may recognize the importance of health as a value and the subsequent accessibility to services and treatment. Health may become a societal value when there is the communities’ need for its provision. Bozeman (2009) defined public values in relation to citizens’ obligations and privileges, to the community, the

government, and each other. Yet, these values are subject to cultural norms, societal beliefs, and change. Ingrained, informal values direct norms. Public values may evolve or devolve, may create controversies as to whether the values should be considered public values and may be in conflict with other values (Bozeman & Sarewitz, 2011). Public values, lacking a universal definition, could be considered an ideal (Fesler, 1990 as cited by Bozeman, 2009). Bozeman and Sarewitz (2011) pointed out that public laws or policies could lay the base for such public values – but that would still raise the question of how public values would be created. However, Bozeman (2009) did address the relationship between public values and public policy, ultimately pondering that policy without its grounding in values is mere “government mechanics” (p. 369).

Nevertheless, individuals may not admit to whether they subscribe to particular public values. Public values are social values as they often influence the community; simultaneously, social problems cannot be reduced and solved by economic concepts (Fukumoto & Bozeman, 2019). Bozeman (2009) addressed the premise of public values merely being the sum of private values resulting in the rejection of this suggestion and stated, “In pursuing public values, some private values are *necessarily* sacrificed” (p.372). He then provided the example of taxation as a public value as means for the redistribution of resources and the funding of public programs: redistributive tax policy would generally not be considered a favored program.

Lasswell and Kaplan (2014) noted that political power deals with the allocation of public values, and that politics is grounded in personal values, motives, and associations. Values function as the underpinning of motivational behavior and relationships that translate into how power is exercised and how concerns and evaluations of specific issues

are approached. Values have a significant impact on political conflict and group formation. Like-minded individuals will band together because of such shared principles and determine their acceptance within their social groups, how they are regarded and treated by other actors. Power itself addresses the generation of specific, future outcomes – getting people to do what one wants them to do using policy tools such as sanctions or incentives.

Public values encompass citizens' rights and their responsibilities to their communities but also their level of involvement in participatory democracy. When citizens participate, they might express their sentiments about values important to them and their communities, policy-making, and policy outcomes. Participation may also include various forms of interaction with the governmental and policy process, aside from the obvious civic duty of voting (Nabatchi, 2010). It makes sense that the concept of participation could be extended to accepting policy tools and participating in subjective measures to achieve outcomes benefiting communities at large.

Values as Societal Concepts

The construct of values is a mixed bag of definitions as scholars and nonexperts may interpret values as they see fit, defining the meaning of such value in specific settings and contexts. The definition of values is further complicated by using alternative terminology such as attitudes, motivations, or traditions (Jones et al., 2016; Rohan, 2000). Schwartz (2012), a visionary in values theory and research, situated the construct of values in the context of human existence: values create coping mechanisms to aid with social interaction. He listed the underlying motivation and requirement as the "... needs of individuals as biological organisms, requisites of coordinated social interaction, and

survival and welfare needs of groups” (p.4) and defined values as “...socially desirable concepts used to represent these goals mentally and the vocabulary used to express them in social interaction,” (p.4). Schwartz (2012) aligned values to beliefs and feelings but also to goals that generate action; he found that values might compete with one another and generate a possible trade-off depending on the situation.

Similarly to Schwartz, Rohan (2000) grounded her synthesis of value constructs in prior early value theory (e.g., Rokeach, Kluckhohn). For example, it was presumed that specific values were prevalent in individuals based on shared human features, with one dominant value. Of interest is the concept of values serving as a measure of judgment, as Rohan (2000) contemplated. Values were applied to specific purposes in concert with their priorities: people adopt values that would ensure their survival in particular environments, maintain standards of morality and socially accepted behaviors, and ensure optimal outcomes in their lives. One could argue that individuals might adopt pro-vaccinations stances or express their opposition to the shot merely to fit in and avoid exclusion. Additionally, values may be delineated based on the context – personal values (one’s priority), social values (the perceptions of others), and ideological values (related to values put forth by groups) (Rohan, 2000). Eccles (2009) further elaborated on this value-setting process through the creation of different selves which associate with diverse values settings as individual values may differ from communal values. One may have individual values that conflict with community values. Restated, individuals behave differently and exhibit diverse personas depending on the context and their environment. Schwartz (2011) utilized prior works to address how values are communicated among populations, concluding that communities share values.

Health as a Value versus the Value of Health

Health may be viewed as “a state of complete emotional, social, and physical well-being” (WHO, 2014, as cited in Plough, 2015, p. 1), illustrating that health is an all-encompassing, multifaceted, and complex construct. The concepts of “health” and “health values” may be ambiguous and vast as the terminology may mean different things to different individuals; therefore, “health” may be challenging to operationalize while finding common ground with others. As Chandra et al. (2016) outlined, conversations about the value of health have focused on the value related to monetary impacts, funding, and subsequent cost of health care and service provision. On the contrary, health as a value may be grounded in the belief of its ideological importance to society’s collective health and equitable access to health care. Wade (2022) pointed out that the United States outspent every Organization for Economic Development member country but ranked in the bottom third regarding national health coverage and access to care. Deluga et al.’s (2018) research addressed the importance of health as a personal value among several other valued individual qualities such as a sense of humor, liveliness, or mental acuity, to name a few. To ground their research, Deluga et al. (2018, p. 65) relied on a more comprehensive definition of health as a value:

According to WHO’s Health for All strategy, health is a value that enables humans or societies to satisfy their needs and aspirations, and to protect and shape the local environment. Health is also a resource for the society, one that ensures its social and economic development while helping achieve a better quality of life [4, 5]. Health is one of the essential values that ranks high in individual and

societal hierarchy of values [6]. It is an important decision-making element, which influence the choice of behaviors that shape the individual's lifestyle [7, 8].

Of note is the inclusion of health being an essential value in the individual and societal hierarchy of values, promoting the universal view of health worldwide, as posited by the WHO. In the United States, the prevalent view of health as an individual construct has been shifting. As Plough (2015) pointed out, changing demographics influence the public's view of health as a value and health care and societal responsibilities for communal health. Changing perceptions of health as a value and communal health may be promoted by the Affordable Care Act, which endorses the view of health as a value that should be accessible to everyone, not only the select few.

Promotion of health as a value will need to occur at the local level, but at the same time must have willing and motivated participants, even when formal guidance is lacking. In addition, medical provider and recipient mindsets will have to change and move from a problem-oriented approach to a more holistic one (Mason et al., 2019). It makes sense that society's values need to be in alignment for health to achieve the status of a public value. Consensus might not be attained if factions consider health a private matter, not affecting society and disregarding the public interest resulting from comprehensive public health policies. Attempting to shift mindsets may require effort, particularly when addressing societies with rather individualistic motives and opinions conflicting with public health interests. At the micro-level, adjustments that promote one's view will need to occur: plainly stated, people may need to change their opinion regarding the importance of health. Subsequent changes can then transfer to the meso- and macro-level (Mason et al., 2019).

Civic Orientation to Create Health as a Value

The Culture of Health Action Framework created by the Robert Wood Johnson Foundation (Chandra et al., 2016; Plough, 2015; Mason et al., 2019) identified four action areas. Among the four action areas, “making health a shared value” is a crucial component of the framework. Considering health as a shared value leans on community building and the concern for others, the continued feedback loop of caring and being cared for with the underpinning of a social contract. This thought presumes that health is an individual value in the first place, to be emphasized as a vital factor for communities. It stands to reason that even if health existed as an individual value, promoting its importance for the community would need to result in mind shifts (Plough, 2015). The framework attempts to provide further insight into why or why not health is a shared value: social concerns, social connections, and individual values may drive the acceptance of health as a shared value (Plough, 2015).

Chandra et al. (2016) illustrated by using previous scholarship addressing environmentalism and the civil rights movements how issues that may have been perceived to be affecting only subgroups of the population affect society as a whole. If health, as a shared societal value, were in the public interest, then policy would necessarily promote and establish such in the community. To instill the concept of health as a value, the authors called on the drivers of civic engagement, mindset and expectations, and community sense. The mindset and expectations relating to the construction of health as a value touched on the very core of how health is viewed and achieved – health should be regarded as a right, equitably accessible to everyone, not dependent on economic status. Community building may build mutual connections that

might promote collective action and shared concerns for others' well-being. Such mutual connections would then promote collective action and shared concerns for others' well-being. Civic engagement – the driver that puts beliefs and values into action – could produce tangible outcomes. Subscribing to health as a value and desiring equitable access to health care could then become a reality.

Individual Health Values

Work by Lewicka et al. (2013) provided more insight into the concept of health as an individual value. First, the researchers created their survey instrument – the List of Health Criteria – distributed among nursing and midwifery students in Poland. Then, based on the survey instrument, participants were asked questions relating to positive and holistic – mental and physical – health behaviors. It was also presumed that individuals who considered health as a value might lead a healthy life. Next, Lewicka et al. (2013) established that health is a notion subject to individuals assessing the concept; its definition is driven by personal and situational circumstance, individually socially constructed. Thus, no standard definition may be available, but it has become evident that health encompasses more than medical constructs. The authors further differentiated the concept of health based on six dimensions (historical, intercultural, socio-structural, interpersonal, theoretical and pragmatic, and situational), concluding that the concept of health is multidimensional. It then stands to reason that health as a value is also multidimensional as, for example, one may view themselves through interpersonal (others of similar status) and situational (suffering from an illness) lenses. In other words, in a comparative situation, one may place more or less importance on health for oneself and the importance of health for others.

In the context of the study setting, health as a value was considered of great importance, seeing that older adults, in general, and people with familial obligations put greater emphasis on health than a younger nursing student population. Notably, health as a value was subjective and dependent on the context in which the value was evaluated: Deluga et al.'s 2018 study was performed among nursing professionals. Such a study setting may have introduced bias, as the significance of health was the underpinning of the profession. Another potential bias in this study was the high percentage of female nurses; however, this was not surprising given that the nursing profession is gender dominant.

Individual social values may determine social behaviors and the subsequent importance of economic outcomes compared with community health considerations affecting society. Social values may be subject to trade-off preferences and be dependent on framing, as trade-offs may be portrayed as positive, or as unfavorable. Thus, framing could impact perceived trade-offs and outcomes, which affects choices and subsequent actions. As Carrieri et al. (2021) outlined, framing as a tool in a pandemic may produce interesting findings: such tools can be used to manipulate citizen health behaviors to achieve greater compliance, aiding in combating the virus. Carrieri et al.'s (2021) research in the higher education setting revealed that the field of college study influenced preferences because of framing: science majors' emphases were on health considerations. Economic, engineering, and social sciences majors, as well as students raised with financial hardship, put greater weight on monetary concerns. Compassionate individuals were more likely to support health-focused policies. Attributes such as student attitudes, educational focus, and socio-economic background influenced the trade-off preference of

whether individuals favored health or economic trade-offs. Additionally, compliance behaviors such as maintaining personal hygiene, social distancing, and isolation in the event of illness correlated with health-economy trade-offs: individuals preferring health-centered policies rather than policies focused on monetary concerns tended to support health behaviors.

Community Health Values

According to Wise et al. (2020), measures to combat COVID-19 were dependent on the public's participation in protective measures and their perception of the severity of the diseases' impact. Policy interventions such as lock-downs may result in trade-offs exchanging economic declines for improved health conditions. Nevertheless, one cannot precisely determine the counterfactual – the impact on the economy if lock-downs would not have been imposed. In order to save lives, policy intervention may come at a literal cost of a suffering economy. Societal preferences may also present themselves in policy goals. Equity, equality, efficiency, welfare, security, and liberty are generally common problems affecting the citizenry in its entirety. These common problems may differ regarding their impact on individuals. As Stone noted in *The Policy Paradox* (1997), in the polis – the “political community” – information is ambiguous, incomplete, strategically, and deliberately shaded to support aforementioned goals and values. In the “market model” as the social exchange system pursuing the individual's welfare, people presumably may maximize their subjective self-interest and welfare through the application of economic rationales (Stone, 1997). To act economically, it is asserted that conditions are perfect: information about goods and prices are accurate and available to everyone at no cost. Monopolies do not exist or may have social consequences such as

limiting access to services. Values significantly influence political conflict and power and determine relationships and group formation between bureaucrats, politicians, and the public. As the underpinning of motivational behaviors and relationships, ideals translate into how power is exercised. Like-minded individuals may band together and dominate people and behaviors. Power provides for the production of specific, future outcomes, impacting the distribution of services (Jørgensen & Bozeman, 2007; Larason & Ingram, 1997, Stone, 1997).

Policy problem-solving approaches based on concepts such as rational analytic models versus polis models may result in different implementation approaches. Implementation decision points (Pressman & Wildavsky, 1984) may also be subject to values and policy goals. Implementation may be the result of ideology, values, and biased trade-offs leading to the contemplation of whether implementing a goal may be advantageous for one group but subjectively detrimental for others. Framing or anchoring of implementation decision points to outline prospective outcomes and satisficing options skillfully is also a tool to sell and influence policy (Jørgensen & Bozeman, 2007; Lasswell & Kaplan, 2014).

Recent work by Motta and Goren (2020) leaned on Schwartz's (2012) Human Values Theory. The theory assumes that concern for others and placing their needs before oneself may result in pro-social behavior. Self-transcendence (the concern for in-groups and out-groups) and self-enhancement (the betterment of oneself with a focus on pro-individual values), were measured while controlling for political ideology and partisan identification. Republicans were found to be less likely to comply with preventative and protective measures such as masking and social distancing which was regarded as

prosocial health behavior (Motta & Goren, 2020). Findings revealed that older and college-educated individuals living in locations with high COVID counts were more likely to engage in pro-social health behaviors. Negative views of technical and scientific experts also promoted misinformation about the COVID-19 virus. However, partisan ideologies did not seem to influence pro-social health behaviors (Motta & Goren, 2020).

Ideologies

Ideological values set forth by groups may relate to values such as liberty, freedom, choice, self-reliance, and security. As Stone (1997) outlined, policy-making and policies are controversial as society's needs, demands, and values must be considered. Problems in the political community may often be significant policy problems, affecting everyone and not only impacting limited numbers of individuals. Such problems and their potential ripple effects may have unintended consequences. Needs and solutions are never entirely congruent and may not even align at all. At best, one may agree on fundamental values and problems, but goals and solutions vary.

As a policy goal, welfare may be difficult to establish and measure, as its solution may be subject to personal circumstances and needs (Stone, 1997). In other words, welfare goals such as public health care provision, education, affordable housing, and food security may be driven by society and the government's culture. Nevertheless, how are the needs of citizens taken into consideration? In particular, individuals may desire security to ensure protection against unforeseen events such as accidents and illnesses. These events, in turn, affect personal welfare and security when citizens wonder if they can afford medications to treat medical conditions. Additionally, welfare in the form of health care access may be provided; however, quantity and quality may be limited and

subject to social and economic status and access to services. Society's health woes may not be solely solved by the marketplace, which is often subject to profit motives. As a result, individuals may be priced out of the market and service receipt, thus ultimately forgoing the needed care (Stone, 1997). This contemplation leads then to the question of whether health is considered a public value or even a human right (Adhanom Ghebreyesus, 2017; Gerisch, 2017) not provided for by a market-based system denying care because of costs. If it might appear that the position of some elected officials is that individuals would not perish because of lacking access to health care, it might give the impression that the community's health is not considered a priority of policymakers (Hemmer, 2012; Watson, 2017).

Roberts and Utych (2021) researched – in the context of partisan membership and citizen behaviors – whether political membership influenced social distancing and staying-at-home behaviors during the COVID-19 pandemic. They found that the median age of county residents may have mattered as younger residents (under 30 years) may have complied less with protective health measures. However, partisanship may have also influenced younger residents' behavior: younger Democrats may behave differently than younger Republicans based on the COVID-19 threat level in that county. Nevertheless, when citizens were older, partisanship mattered less – older Republicans were more likely to comply with social distancing than younger Democrats. Partisanship effects were reduced in counties home to older citizens but not for counties with more infections. Young persons, regardless of partisanship, may have conceived the virus as non-threatening.

Clearly, the scope of this work could be extended to include the works of Druckman et al. (2021) addressing policy-making and affective polarization or political leadership and its result of COVID-19 response policies (Adolph et al., 2021). Roberts and Utych (2021) also provided insight into ideological underpinnings whereas Wolaver and Doces (2021) connected specific personality traits with political behavior. Values and ideologies drive individual and community behaviors. Nevertheless, such actions are not only subject to concerns such as liberty, independence, and self-reliance. Knowledge and understanding of the concepts related to health as a whole and the impact of health as a holistic issue interface with each other.

Health Literacy

Health literacy addresses individuals' capacities to understand and evaluate health concepts and concerns for oneself and others, community health included (Berkman et al., 2010; Nutbeam et al., 2018; Sørensen et al., 2012). It also encompasses the individual's ability to navigate complex health systems and the three domains of health: healthcare, disease prevention, and health promotion. The concept does not only address the verbatim meaning of literacy – understanding medical terminology – but the general comprehension of processes such as treatments, procedures and compliance with health instructions, e.g., medication management. Definitions of health literacy may be vast but generally relate to one's capacity to understand health issues and the health literacy's impact on the person. The concept also entails the level of one's ability to function successfully within the healthcare system, the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed

to make appropriate health decisions (Berkman et al., 2010; Nutbeam et al., 2018; Sørensen et al., 2012).

Health literacy can be influenced by cultural knowledge, educational attainment, and comprehension, both oral and written. In addition, personal, cognitive, and social skills may determine the ability of individuals to gain access to, understand, and use health information to promote and maintain good health. These skills may produce improved knowledge and understanding of health determinants and changed attitudes and motivations. Relevant skills that drive health literacy may be distinguished between functional, interactive, and critical health literacy skills indicating three levels of difficulty (Berkman et al., 2010; Nutbeam et al., 2018; Sørensen et al., 2012). Functional abilities address skills related to obtaining basic information. Interactive skills allow the individual to interpret and apply health information to various settings and changing circumstances. Finally, critical literacy skills let the individual evaluate and apply a great variety of resources to improve health conditions (Berkman et al., 2010; Nutbeam et al., 2018; Sørensen et al., 2012).

Nutbeam et al. (2018) offered the concepts of interactive and critical health literacy as health promotion tools. That is, as individuals obtain knowledge of health concepts and further their decision-making and self-efficacy abilities, their health behaviors may adjust, and their health literacy may improve. Health literacy may be viewed as a dynamic concept, subject to improvement through information, communication, and education, ultimately resulting in better-informed individuals (Baker, 2006; Bröder et al., 2017; Nutbeam et al., 2018). An individual's health literacy may vary depending upon the medical problem being treated, the health care provider,

and the system providing the care. However, health literacy may be subject to the informative environment where these actions occur (Baker, 2006; Bröder et al., 2017; Nutbeam et al., 2018). Specifically, media portrayal of communicable diseases and associated cures, for example, may affect the health literacy of citizens (Abel & McQueen, 2020).

Improving health literacy may improve health outcomes (Nutbeam et al., 2018), such as reducing the severity of diseases, hospitalization, and urgent care visits. In addition, understanding health concepts and their implications for one's health may help guide individuals' behavior. Improving health literacy can occur through various venues such as educational programs targeted towards specific age groups, particular educational formats like online courses, in public venues, or educational settings (schools). In addition, health literacy interventions may be targeted towards the specific needs of populations in particular settings, e.g., lower economic status (Nutbeam et al., 2018).

Continued scientific progress and development of cutting-edge medical treatments of illness may support the concept of health literacy being a dynamic state. After all, as society, technology, and medicine evolve, emerging treatment options may be presented to a public with limited medical knowledge. Therefore, to stay apprised and become an advocate for one's medical procedures, scholars recommend the individual be an active participant with the capacity to understand treatment options presented to them, ask questions, and be informed about available options (Baker, 2006; Bröder et al., 2017; Nutbeam et al., 2018).

As outlined above, despite the definitions of health literacy being vast, health literacy is a vital skill that may determine personal health behaviors. Notably, in the

information overload age, constantly changing news, information, and data at one's fingertips may make it challenging to distill accurate material. However, misinterpretation or disregard of evidence may have dire outcomes – in the context of a pandemic, this could translate into health behaviors resulting in life or death consequences for individuals and their communities.

Health Behaviors

Health behaviors may be a function of health literacy. Short and Mollborn (2015) describe the concept of health behaviors as “actions taken by individuals that affect health or mortality” (p.2), further delineated into health promotion or detracting, and distinguished into specific actions. For example, in this context, smoking would be considered a behavior that detracts from health. In contrast, physical activity would generally be viewed as a health promotive behavior. At the same time, behaviors are not static, may change over time, and vary based on demographics. Thus, health behaviors apply to individuals engaging in the specific action and to subgroups or entire populations (Short and Mollborn, 2015).

Definition and Categories

The commonly agreed-upon definition of health behaviors in terms of behaviors promoting or detracting health has been used for decades. As an umbrella term, it has further been differentiated into health-protective behaviors (Lonnquist et al., 1992; Norman, 1995; Weiss and Larsen, 1990). Health protective behavior (HPB) relates to actions aiming to improve, maintain, and protect one's health, regardless of whether individuals are suffering from illness or whether the actions are effective and result in desired outcomes. For example, an individual may engage in daily consumption of

supplements without evidence that such supplements produce the desired outcome. Cutler and Lleras-Muney (2010) distinguished eight groups of health behaviors: “smoking, diet/exercise, alcohol use, illegal drugs, automobile safety, household safety, preventive care, and care for people with chronic diseases” (p. 2). Protective behaviors can also be associated with risk levels: direct and indirect risk alludes to the fact that direct risk results from active engagement in unhealthy behaviors such as drug use. On the contrary, indirect risk results from not following recommended health-protective behaviors such as living a sedentary lifestyle (Cutler and Lleras-Muney, 2010).

Framing of Health Behaviors by Policy Makers

Cutler and Lleras-Muney (2010) contended that the perception of health behaviors might result from framing the benefits or lack thereof by policy opponents. The authors illustrated this by the example of seat-belting as a costless health behavior that did not incur any expenses, and had a participation rate of 69% at the time the study was performed: nevertheless, opponents of mandatory seat-belt legislation claimed seat belts could hurt drivers when in accidents. Non-college-educated individuals questioned the usefulness of seat-belting at a higher rate (55% with less than a high-school diploma) than college graduates (17%). In fact, Cutler and Lleras-Muney (2010) pointed out that educational attainment is a significant indicator of protective health behaviors and how health education is consumed: 49% of college graduates referenced printed materials compared to individuals without a college education (18%). In the same vein, to downplay smoking as negative health behavior, the tobacco lobby “sought to portray the issue of smoking and cancer as an unresolved debate, rather than a scientific fact” (Cutler and Lleras-Muney, 2010, p. 9).

Similarly, vaccination opponents warned that medical interventions might result in side effects (CDC, 2023b). As the CDC had outlined, adverse events such as anaphylaxis (severe allergic reactions), blood clots, and inflammation of the heart muscle and the lining outside the heart (myocarditis and pericarditis) can occur. CDC accounted for 18,977 deaths for the vaccination period from December 2020 through January 2023. At the same time, 668,000,000 doses were administered, resulting in a death rate of 0.0028%, yet, as pointed out by the CDC, adverse reactions, including death, “do not necessarily mean that a vaccine caused a health problem” (CDC, 2023b). In March of 2023, vaccination rates in the United States rose to 672,076,105, with a death count of 1,117,856 (CDC, 2023c). However, individuals and groups opposed to the COVID-19 vaccine may argue that these deaths prove the vaccine’s dangers.

Health Behaviors and Health Locus of Control

Locus of control influences the health decision-making process in addition to other causes such as cognitive biases: it is a construct significantly influencing health behaviors. “Health Locus of Control (HLC),” first developed as a bi-product of Social Learning Theory, posits that behaviors are chosen because of the anticipated outcomes – individuals perceived that they have a certain level of control over the situation (Weiss and Larsen, 1990). On the contrary, external events, uncontrollable by individuals, may lead to the impression that people were powerless in addressing factors affecting their lives. As further research and analysis revealed, internal and external locus of control exists on a continuum. Since the health locus of control scale was initially developed, subsequent dimension modifications were put forth: internality, powerful others, and chance. Later, additional dimensions and distinctions were included – “self-control over

health, provider control over health, chance health outcomes, and general health threat” (Weiss & Larsen, 1990, p. 123). After all, when individuals feel powerless, they may relinquish their efforts. The lack of agency or presumed lack thereof may prevent individuals from acting on their behalf to improve their personal situation – consequently forgoing preventative health measures. In addition, feelings of powerlessness and lack of control may result from particular, external events, such as substance abuse addiction.

Demographic Determinants of Health Behaviors

Health behaviors are subject to diverse factors, such as education, gender, and age. Cutler and Lleras-Muney (2010) found that educational levels impacted various health behaviors as college graduates were more likely to abstain from smoking, were less likely to be obese, often were not heavy drinkers (but drinkers nonetheless), were more likely to have tried illegal substances, but were better at controlling their habits. Cutler and Lleras-Muney (2010) also pointed out that educational attainment positively affected income and subsequently allowed for improved health outcomes: individuals may have the resources to spend on health care. Finally, Barari and colleagues (2020) surveyed protective health behaviors and compliance with COVID-19 mandates in Italy and found that compliance and coping with restrictions depended on the respective demographic groups. While there was general compliance among the Italian subjects, women, the elderly, and healthier individuals were more amenable to quarantine restrictions. Younger adults (30 years or younger) were less compliant, leaving the house for non-essential reasons (e.g., socializing, or being tired of being confined). Health-compromised individuals were also not as compliant, possibly due to their need for continued medical treatment (Barari et al., 2020).

Cutler and Lleras-Muney (2010) established that an individual's level of education was an essential factor of health behaviors: better-educated individuals were more likely to engage in positive health behaviors such as non-smoking and positive dietary and exercise habits. Not surprisingly, education was also a factor in disease prevention and health promotion as educated individuals participated at higher rates in preventative screenings, vaccination uptakes, and various cancer screening. Of interest was the lack of uptake of no-cost care provision as Cutler and Lleras-Muney (2010) pointed out that even if care was free, care services were underutilized.

Cutler and Lleras-Muney's (2010) findings pose the following contemplation – one can argue that non-smoking and alcohol abstinence are also costless health behaviors. On the other hand, engaging in the adverse health behaviors of smoking and (excessive) drinking incurs expenditures. Nevertheless, people still smoke and drink, most likely due to the behaviors' addictive nature, social pressures, and conventions. Cutler and Lleras-Muney (2010) found that medical care might be provided at no charge, but still be underutilized. This lack of health care uptake may then lead to the question of why educated individuals do not participate in free or low-cost care. Is the lack of participation grounded in values, beliefs, self-efficacy, or ability to control procedures and outcomes?

Social Attributes of Health Behaviors

The acts of seeking and accessing information, conveying messages, and applying such information to address health concerns fall into the category of behavioral attributes (Bröder et al., 2017). Of particular interest is the attribute of citizenship, also included in this grouping. The attribute of citizenship addresses one's sense of responsibility for the

community, recognizing that individual health actions affect others. Additionally, individuals equipped with holistic health literacy skills may behave in an environmentally conscious manner and may be open-minded to new ways of thinking; these persons may accept and recognize how the well-rounded approach benefits society (Bröder et al., 2017). Finally, the third category of attributes encompasses affective characteristics and processes directed to accomplish specific outcomes – that is to say, how emotions, individual personality, mental state of mind, may result in particular behaviors. Although these attributes center on the “self,” awareness, reflection, control, efficacy, regulation, interest, and motivation are vital as these attributes guide the desire to stay involved in health matters (Bröder et al., 2017).

In summary, critical knowledge about disease prevention and wellness promotion may aid individuals in improving health protective behaviors. Policymakers have proposed and implemented health policies based on potential outcomes and losses, relying on certain presumptions related to individual health behaviors: people desire to protect themselves from a deadly virus, albeit the perceived probability of death is subjective. However, actions resulting from individual desires, and beliefs raise concerns as individuals’ behaviors may not solely affect their health and subsequent economic situation but also influence others. It may also be feasible to maintain the position that despite being knowledgeable in health matters, individuals may not be able to maintain subjectively positive health protective behaviors due to exogenous circumstances. For example, people may lack the financial or temporal resources to engage in healthy behaviors. Lacking or available resources then may impact one’s health behavior,

resulting in actions such as accessing preventative health care measures (e.g. annual physicals) or skipping preventative dental exams.

Health and Young Adults

As Bröder et al. (2017) and Fleary et al. (2018) summarized, demographics, environmental and societal upbringing, individual characteristics, learning environments, socio-economic status, health education, and health promotion may influence the health literacy of young people. These factors subsequently may result in interactions between health literacy and health outcomes. Health advocacy and social mobilization through lobbying and political activism may result in more significant individual benefits such as empowerment, increased knowledge, and improved capacity on the aggregate community level.

Influences on Young Adults

Initial health literacy may be instilled into young adults by their family environment and other forms of socialization such as peers and the educational environment, supporting positive or negative health behaviors. According to Bröder et al. (2017, p. 19), subsequent health literacy may be improved through “efforts to mobilize people’s collective energy, resources, skills, toward the improved of health and advocacy for health, e.g., in the form of lobbying activities and political activism.” Young adults who have autonomy in their health decision-making should comprehend health education material presented in an educational setting, form opinions, and develop skills while experiencing emotional and physical growth (Bröder et al., 2017). At the same time, young individuals may be subject to peer influences and pressure, resulting in coerced health behaviors. These coerced behaviors could both result in subjectively negative or

positive health behaviors. However, young adults may often obtain and model their health behaviors from their environments, including parental guidance, peer systems, and social media. These informational and behavioral environments may also be subjective to individualistic ideologies and values that may subsequently conflict with community health considerations (Bröder et al., 2017).

Attributes of health literacy are comprised of cognitive, behavioral (operational), and affective dimensions. Cognitive attributes consist of knowledge that aids in comprehending health concepts, service provision, and health care choices. In addition, individuals must be able to understand and grasp the various forms of information presented to them and subsequently glean and critically assess such data (Bröder et al., 2017). Underpinning the attributes are basic health-related skills, particularly reading and writing to complete forms or understand written health information. Young individuals must understand the information presented to them, distinguish between valid or bogus information, and should critically apply such evidence to their specific circumstances while simultaneously considering broader, societal implications and acting upon it.

Health Behaviors of College Students

Health behaviors in the college setting are multifaceted and, for example, may include sleep hygiene, diet and exercise, alcohol consumption, drug use, and nicotine use. Reuter and Forster (2021) recently published a small study addressing various health behaviors of 600 undergraduate students. The authors established ties between health behaviors and academic performance measured by GPA. Despite a weak association between negative health behaviors (sleep deprivation, legal and illegal drug use, unhealthy food and drink consumption, and work hours) and GPA, positive health

behaviors were reflected in a higher GPA (sleep behavior of eight hours, properly eating breakfast every day, and physical activity resulting at a GPA of about 3.5) (Reuter & Forster, 2021).

Lonnquist et al. (1992) situated a two-year study about health behaviors in the college setting, in particular, to shed light on whether determinants of HPBs differed based on gender. Findings showed that gender was a significant factor in HPBs, particularly when interacting with time. In other words, while females initially showed more significant HPB levels, measurements taken later showed that levels increased even more from 4.44 points to 6.87 points. On the contrary, the opposite effect occurred for the males. Lonnquist et al.'s (1992) study also revealed that both for females and males, peer practices had a significant impact on health behavior. However, health as a value was also a vital factor for females but not for male students. Thus, the question resulting from this study was why females display a higher level of HPBs. Lonnquist et al. (1992) reiterated the notion that this behavior may be a result of "the primary motivation may be enhancement of physical appearance" (p. 79)¹. Fortunately, the authors acknowledged that the desire for subjective beauty might result in destructive health behaviors.

Thompson et al. (2016) investigated the HPV vaccination behavior of college students. They found that young women had greater participation rates than young men, but young men were catching up to female students more. HPV vaccination uptake of female students increased from 44.70% in 2009 to 68.90% in 2013; participation among male students rose from 17.5% in 2009 to 42.90% in 2013. Thompson and colleagues (2016) also found that vaccination rates and rates of increases varied among sex and age

¹ In retrospect, this statement may be questionable. Desires to improve health or appearance may be grounded in motivations other than improving one's appearance.

group, most likely as a function of the HPV vaccination program: the recommendation outlined that young males up to the age of 21 should receive the shot (18-21 age group) and up to age 26 for high-risk groups. On the other hand, women were advised to receive the shot up to the age of 26. Relationship status also mattered as higher participation rates were found in male students who were not in a relationship. On the contrary, female students in monogamous relationships did not see the need for vaccination. Thompson et al. (2016) acknowledged that further research would need to provide more insight into the findings related explicitly to relationship status.

Naturally, recent research addressed college students' willingness to obtain the COVID-19 vaccination. Brunson et al. (2021) surveyed 18-23-year-old college students (mean age 20.30) in Texas and found that 40.90% of the 614 survey participants planned to get the shot once made available. Of interest was their particular finding that female students were less likely to have received the vaccination than male students. Also, Republicans did not express the same level of willingness to participate in this preventative health behavior. Brunson et al.'s (2021) odds ratio analysis further showed that not receiving the flu shot (OR=2.62) increased the hesitancy to receive the COVID-19 shot.

As Marcell and Spurlock (2020) and NFID (2016) outlined earlier, when researching the flu vaccination behavior of young college students, students' behaviors may be influenced by peer groups of their campus communities, engaging in educational, extra-curricular, and social-reactional activities. Therefore, when individuals congregate in large numbers, caution should be exercised to avoid the community spread of infectious diseases such as COVID-19. Despite compelling encouragement from

organizational leadership in IHEs such as Boise State University, health measures like masking have been disregarded (Almeido, 2021; Hunter, 2021; Richert, 2021). In addition, institutional vaccination mandates were also not implemented in Idaho's IHEs, Boise State University, Idaho State University, and the University of Idaho. However, vaccination uptakes were strongly encouraged by Idaho State University and the University of Idaho via cash incentives (Idaho State University, n.d.; University of Idaho, 2021). In addition, Boise State University offered prize rewards drawings for individuals receiving immunizations (Boise State News, 2021). The American College Health Association's (ACHA) Pulse Survey, with a response rate of 42.67% (411 replies from 963 campuses), reported that 56.7% of the solicited institutions described a vaccination requirement for students and recommended for students to be vaccinated beginning the fall semester 2021 (ACHA, 2021a). Yet, institutions that have enacted vaccination mandates have experienced opposition (Burt, 2021; Sullivan, 2021). However, vaccination mandates are not new requirements as outlined by ACHA News. Surveys detailed that IHEs have been requiring students to be vaccinated against measles and other infectious diseases (ACHA, 2021b).

Some IHEs have implemented COVID-19 vaccine requirements by the end of the Spring 2022 semester (University of Cincinnati, n.d.), or mandating vaccinations by November 2021 (University of Oregon, 2021; University of Toledo, 2021). Medical and religious vaccination exemptions validated by medical professional and religious counsel are available, in combination with the requirement of frequent testing (University of Cincinnati, n.d.; University of Oregon, 2021) and masking (University of Toledo, 2021). Non-compliance with health policies may then result in disciplinary action, including

expulsion from the institutions (University of Cincinnati, n.d.), and enforcement of corrective actions as put forth by the U.S. government (University of Toledo, 2021).

Nevertheless, despite using policy tools such as educational campaigns, offering cash incentives, and door prizes at events, individuals may be reluctant, for various reasons, to participate in disease prevention efforts put forth by institutions of higher education. Reasons for non-participation may be multifold, ranging from an increased sense of security and the perception of a low probability of contracting the virus or its subjectively low severity, the sentiment that vaccinations may not be safe, a general contention that health is a personal matter or possible disregard of how individual health behaviors affect others.

Health Civic Engagement of Young Adults

Although health behaviors are personal choices, these personal behaviors may translate into cooperative behaviors when taken together. Ballard et al. (2019) posited that civic engagement might encompass diverse aspects, such as beliefs and behaviors that affect society. Ballard and colleagues (2019) illustrated how the benefits of engaging in civic activities positively influenced the development of young adults, resulting in improved health behaviors. However, civic engagement is thought to be on the decline due to the lack of parental involvement and guidance (Smith, 1999) and lack of economic resources (Flanagan & Levine, 2010). In other words, parents may not have the means to engage with their adolescents and young adult children to instill concepts of social capital (the interpersonal connections and resources), and a desire to then become involved with their communities. Higher education institutions may then play a vital role in offering

diverse perspectives on issues students may not have been exposed to in their previous home and community life.

As Flanagan and Levine (2010) outlined, civic engagement of young adults may be influenced by educational institutions as the student body transitions from adolescence into adulthood. College attendance may foster the college experience related to civic commitment: institutions often engage their students in civic and social causes and volunteering while attempting to prepare them for community-building and increase their awareness of civic concerns (Smith, 1999). However, as Smith (1999) pointed out, civic engagement could become more complex as college students temporarily live on and away from campus. In addition, as young individuals mature, their civic orientation and exposure to values and ideologies within their formative environments may determine their health values and behaviors. Health is a critical and dynamic concept; thus, it makes sense that a comprehensive education in health concepts, health behaviors, and potential outcomes resulting from such behaviors of young adults should be a cornerstone of programs offered by IHEs. Such programming may promote health civic engagement, furthering the recognition of health as a shared value. Following this review of works providing information of concepts essential to policy-making and health behaviors, is the introduction of Prospect Theory as theoretical framework, a discussion of the theory's applicability, and the operationalization of risk in the context of the COVID-19 pandemic.

CHAPTER 3: THE THEORETICAL FRAMEWORK

Chapter 3 introduces the reader to the theoretical framework of Prospect Theory. This theory has been applied to various domains such as education, economy, transportation, and healthcare. Since its inception in 1979, Prospect Theory has been further developed, but its usefulness has also been questioned. This chapter begins with a general overview of the theory, then elaborates on components interacting with Prospect Theory, and includes recent works addressing the application of the theory to the health domain and the COVID-19 pandemic.

The Theoretical Framework of Prospect Theory

In 1979, Kahneman and Tversky introduced Prospect Theory, which describes the actual behavior of individuals when faced with economic decision-making (decision-making under risk), rather than the ideal-type assumption of the Expected Utility Theory (EUT), which considers the optimization of decision-making under risk. Prospect Theory is grounded in the premise that individuals are biased in their decision-making and may exhibit a more significant or lower decision risk tolerance concerning a given outcome (Baekgaard, 2017; Kahneman & Tversky, 1979). Rational theories do not consider psychological factors such as cognitive biases and heuristics in decision-making processes (Morrison & Clark, 2016). Rational Expectations Theory (RET) posits that if choices are identical, either choice should not matter (Morrison & Clark, 2016). However, in reality, attachments to and emotions for choices form, resulting in an endowment effect – valuing items that one owns more than identical items not in

their possession. In turn, the endowment effect negates the indifference proposed by EUT and RET – utility or gains are not necessary, but rather what people stand to realize in comparison to what they have. The utility depends on prior experiences, which are used as a reference point – the baseline. The reference point is person-dependent and subject to change under any given circumstances (Morrison & Clark, 2016). Tversky and Kahneman (1981) illustrated biased decision-making patterns in their Asian Disease study², suggesting a lethal disease scenario killing 600 individuals. The researchers presented gain and loss frames (lives saved compared to lives lost) in conjunction with the adoption of four potential choices of probability. When framed as a loss (lives lost), participants became risk-seeking in comparison to gain framing (lives saved) where individuals became risk-averse. Yet, across the four different program options, the outcome of survivors equated to 400 people. “Choices involving gains are often risk averse and choices involving losses are often risk taking” (Tversky & Kahneman, 1981, p. 453).

Tversky and Kahneman (1981) acknowledged that people base their decisions on individual preferences depending on the framing of the decision but also the reference point. In other words, if the problem is presented differently, the outcome (decision) may vary. Additionally, individuals may often be unaware of alternatives and how such alternatives may influence the selection process. In 1992, Tversky and Kahneman expanded on the theory, resulting in Cumulative Prospect Theory. The modified theory accounted for a decision-making pattern as a function of risk and loss aversion, risk asymmetry (as anticipated losses make risks more tolerable), and the likelihood of risk

² In retrospect, naming the study “Asian Disease Study” was an unfortunate choice of words, not only in the context of COVID-19 but in general. It may create a negative connotation with specific demographics.

occurrence within the monetary domain when engaged in gambling. Specifically, behaviors were driven by probabilities: in the context of the high probabilities, individuals were risk-seeking when they were likely to experience losses, but when they expected gains, they preferred less risky actions. On the contrary, when considering low probabilities of occurrence, individuals were more willing to experience unlikely gains (risk-seeking). However, they were risk-averse when faced with the probability of unlikely losses (Tversky & Kahneman, 1992).

Table 1 Risk Attitudes

Occurrence	Low Probability	High Probability
Gains	Risk-Seeking	Risk Aversion
Losses	Risk Aversion	Risk-Seeking

Table created by McCann, A., (2022), based on Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297-323.

As outlined by the authors, framing effects occurred as individuals weighted outcomes against reference points, which served “as a boundary that distinguishes gains from losses” (Tversky & Kahneman, 1992, p. 303). The perception of the likelihood of occurrence existed on the spectrum of certainty and impossibility (Tversky & Kahneman, 1992). In the authors’ experiment, which consisted of four risk attitude patterns, a small group of participants was asked to report their preference of the probability of winning money – for example, would they prefer lower odds of winning a higher amount or higher odds of winning a lower amount? Once the subjects’ preference was recorded, the value pairs were adjusted to reflect different odds, and the selection process was repeated. As Tversky and Kahneman (1992) concluded, individuals employed heuristics (mental

shortcuts) as part of their decision-making process, at times absent of rationality and possibly absent of the capacity of making rational choices.

Prospect Theory's Application to Other Contexts

Prospect Theory has been applied to various fields such as, but not limited to, education, economics, policy, and health. Coffey et al. (2020) analyzed student's willingness to give up time to achieve higher GPAs, using Prospect Theory to assess gains (improved GPA) versus losses (time relinquished to studying). Risk asymmetry was present, as students would give up more leisure time (4.6 times) to avoid losing one point compared to increasing their GPA by one point. There were certainly tradeoffs as the objectives of better grades and more leisure time may not be achievable simultaneously, in particular when the final GPA score may not have mattered a great deal. Additionally, the reference point of previous student performance carried some weight: higher-achieving students placed greater values on higher GPAs, whereas lower-performing students valued free time more. High performers also exhibited a greater willingness to pay (i.e., spending time studying) even if the gains were marginal. On the contrary, lower-performing students would relinquish GPA points to have more free time. Of note was the finding that the loss aversion ratio was at 4.6; as pointed out by Coffey and colleagues (2020), it was higher than the ratio found in other studies. They contended that GPA determinations are lifetime events, determining future outcomes and earnings. In addition, it is a non-repeatable event, and do-overs cannot be reasonably expected (Coffey et al., 2020). Similarly, engaging in health behaviors such as elective surgeries, medication consumption, or inoculations could be viewed as lifetime and non-repeatable events. After all, one does not routinely undergo surgeries, and medical procedures

generally cannot be undone; once individuals have been vaccinated, they will have to deal with potential side effects.

Other applications of Prospect Theory were conducted in the area of air transportation, as outlined by Walmsley and Gilbey (2020). The study posed several scenarios pertaining to pilots' behavior when faced with route travel choices in combination with weather events. As a reward for flight performance, pilots would receive premiums. However, they would have to consider adverse weather in order to reap the gains. The authors confirmed the presumptions of Prospect Theory as risk adversity was paired with the high likelihood of financial gains. When expecting losses, riskier and unknown routes were taken into consideration. Walmsley and Gilbey (2020) pointed out that pilots are – generally speaking – risk-averse as a condition of their profession. However, risk tolerance or adversity exists on a continuum, and decision-making may be influenced by potential prospects such as monetary and time gains. Interestingly, time and monetary gains resulted in the pilots' more significant risk adversity behavior. Nevertheless, in the loss domain, pilots were risk-averse when facing time loss but risk-seeking when facing monetary losses.

Prospect Theory Interfacing with Psychological Forces

Citizens' decision-making processes are subjected to psychological forces, but bureaucrats may also behave irrationally (Burden et al., 2012; Moynihan et al., 2015; Simon, 1955). As a result, citizens and bureaucrats alike may not make logical and controlled policy decisions. Thus, in addition to the constraints of Prospect Theory – the asymmetric assessment of gains and losses – policymakers and policy implementers are advised to consider citizens' capacity. Cognitive limitations and rationality assumptions

may determine policy outcomes (Burden et al., 2012; Moynihan et al., 2015; Simon, 1955). Even well-thought-out policies and administrative processes aiming to solve public issues and improve citizens' lives may not produce desired outcomes if such policies and policy tools are not designed in concert with citizens' psychology (Christensen et al., 2020).

Loss Aversion

In his 2004 work, Jervis pondered the implications of individuals' unwillingness to lose and the subsequent actions associated with loss aversion as an inherent part of human behavior. According to Jervis (2004), Prospect Theory cannot explain human behavior, but behaviors such as loss aversion could be explained by making certain assumptions and the individuals' proclivity of accepting preferences and values as a given. In other words, once societies accept widely shared values and preferences, these values and preferences become the status quo – the favored societal standard. Jervis (2004) states, "...that losses inflict psychological harm to a greater degree than gains gratify, which means that people are more willing to run risks to avoid or recoup losses than to make gains" (p. 165). The desire to avoid losses may be used as a reason to explain unintelligible, daily behaviors to redeem potential losses by engaging in risky actions without their awareness of the loss aversion behavior.

Indeed, this may result in desperate actions to recover losses due to an unwillingness to lose: not heeding warnings. These aggressive actions to achieve damage control may cause tremendous suffering. Jervis (2004) proposed that things end when they go wrong in social life, as people generally do not throw effort at lost causes. However, neither do they constantly chase after better things. Loss aversion may be

impacted by the endowment effect, the morality of gains and losses (sacrifice to save), the concept of change, the likelihood of occurrence, and reference points (Jervis, 2004).

Campos-Vazquez and Cuiilty (2014) reviewed how risk aversion interacted with age and found that age may possibly be reducing risk aversion in the monetary domain: older individuals were risk-seeking in the loss domain and risk-averse in the gain domain. The researchers' suggestion that the life experience of older individuals may aid in judging risky opportunities for their potential gains (winnings), but also to allow for concessions such as small, acceptable monetary losses, is reasonable. However, Campos-Vazquez and Cuiilty's (2014) finding may also be a function of the domain, as it does seem peculiar that the elderly would be less risk-averse when dealing with potential COVID-19 infections if these findings were applied to the health domain.

Reference Points

Reference points – the basis for evaluation – are arbitrary and subjective, yet they serve as a basis for the endowment effect, and morality of gains and losses (Jervis, 2004). Reference points provide meaning to what gains and losses are and against which action and utility are being judged; they will shift depending on the person. The reference point may not be the status quo – what we currently have – but also what is desired (Jervis, 2004). Schwartz et al. (2008) elaborated on reference points in conjunction with Prospect Theory in their theoretical model in the health domain. People did not perceive potential screening exams requiring preparation as helpful when considering future disease detection benefits. In particular, when individuals exercised the “editing operation” (as means to justify their decision), their reference points may have shifted, subsequently modifying the perceived utility of the action (Schwartz et al., 2008). Editing occurs when

individuals employ heuristics to simplify decision-making. Editing, of course, is situational and subjective (Tversky & Kahneman, 1992).

In addition, individuals may consider their current health status as a reference point related to future health: self-assessed healthy individuals may reluctantly undergo preventative screenings to discover underlying diseases that need to be treated. The precautionary screening test would then shift individuals' reference points from the status quo of health and perceived lower utility to a perceived higher utility: the previously thought to-be-unpleasant and undesired test for healthy individuals now becomes less of a nuisance exercise as it may potentially be life-saving (Schwartz et al., 2008). The adverse outcomes of screening tests (losses such as treatment side effects, time outlays, missed work, or social time) may outweigh the potential gains (protection from disease in the case of vaccinations or early detection of curable diseases).

However, when people believe that they may be invincible, due to cognitive biases such as framing, and forgo preventative behaviors, the otherwise considered gain may now become a loss; getting a vaccination now moves into the risk domain. The value function of the message (gains versus losses) in relation to the reference point (currently healthy status quo versus health after treatment) and framing determines the decision-making. In addition, individual behaviors may pose a greater risk to others; for example, receiving the COVID-19 vaccine may be considered risky behavior for some individuals but individuals not receiving the vaccine may pose more significant risks for others.

Prospect Theory considers decision-making under risk, based on manipulating reference points and framing choices: yet the net outcome is identical, as illustrated by the counts of lives lost and saved in the Asian Disease Experiment (Tversky &

Kahneman, 1992). Other reference points of importance are the aspiration level – not meeting self-imposed goals are considered losses and may result in diminished happiness – and competitiveness (compared to what others have and as a motivator for what one can achieve). Reference points change, but it may take time to normalize losses. If losses were regulated quickly (resulting in an adjusted status quo), risk-seeking to avoid losses would not occur. On the contrary, gains are normalized more quickly as they do not produce lasting impressions and a prolonged, improved sense of well-being. Getting used to improved circumstances does not take long (Jervis, 2004; Tversky & Kahneman, 1992).

Probabilities

Decision-making under risk also considers the likelihood of occurrence, the Certainty Effect (Jervis, 2004; Tversky & Kahneman). People may place great significance on small chances that may result in positive outcomes and on the most negligible chances of improvement when faced with losses. This hope may lead to risk aversion in high probability gain domains and risk-seeking in high probability loss domains (Jervis, 2004; Tversky & Kahneman, 1992). One could argue that optimism bias may also be at play, affecting risk perception. Wise et al. found in their 2020 work that younger adults underestimated their risk of contracting the COVID-19 virus and the severity of the infection, despite being aware of the highly infectious nature of the virus. Optimism bias was present, as younger adults concluded that others would be more likely to contract the disease than they would. The opposite concept applied to higher risk perception, leading individuals to believe they would be more susceptible to virus infection. As a result, these individuals would be more likely to receive the COVID-19

vaccination. The level of protective behavior was driven by the likelihood of contracting the virus and individual risk perception. Risk perception is fluid and can increase and subsequently reduce optimism bias. The research established that individuals initially found their risk to be lower than their fellow citizens (Wise et al., 2020). However, levels of perceived risk rose throughout Wise et al.'s 2020 study, and at the same time, protective behavior increased. Regardless, the study found small and disengaged groups – oblivious – and generally not interested in information and health-protective behaviors. The virus and its impacts were irrelevant to them, and they did not bother to obtain health information. Age (median age of 30 years) or education levels did not appear to be factors of optimism bias but rather generally not feeling impacted by the pandemic.

Human Emotions

Nevertheless, not only cognitive biases drive decision-making. Human emotions are vital factors and, sufficiently primed, set the stage for subsequent behaviors. Campos-Vazquez and Cuijly's (2014) supporting literature outlined that emotions drive people's attitudes towards risk. In Campos-Vazquez and Cuijly's (2014) experimental design among college students in Mexico, the researchers set the stage by proposing hypothetical scenarios – framing treatments concerned with drug violence and a financial crisis – eliciting emotions such as sadness, anger, and fear. After the participants were exposed to the framing treatment, they were instructed to choose lotteries and lottery payoff schemes. Campos-Vazquez and Cuijly (2014) showed that emotional framing treatments generated specific pairings of emotional and decision-making under risk: sad individuals were more risk-averse in the gain domain (faced with probable gains) and more risk-seeking in the loss domain to avoid damages. Angry people were less loss

averse and less sensitive to losses. It appeared that individuals were supporting losing options out of spite. Anger was also more impactful in the loss domain than sadness at a rate of about 50%. However, results for the impact of fear on risk aversion did not produce conclusive findings. Lerner et al. (2013) also found that negative emotions influenced time discounting – their study illustrated that emotions affected decision-making processes. Subjects were primed to experience certain emotions before choosing between immediate or time-delayed monetary rewards. For example, sadness caused impatience, which led to receiving smaller rewards but immediate rewards versus bigger payoffs later.

Cognitive Biases

Decision-making occurs using heuristics resulting in an approximation of the resolution process (Battaglio et al., 2019; Cairney, 2019). Heuristics include anchoring (reaction to information in comparison to reference point), proportion dominance (motivation to act increases when recipients are part of a small reference group), and the status quo (as inertia is a viable option when faced with numerous options). Furthermore, asymmetric dominance (the presentation of a third option causes a higher uptake of the dominating choice) and framing (information presented in a specific manner of prospective gains or losses) are considered heuristic shortcuts. However, these shortcuts may not always result in optimal outcomes for citizens (Bellé et al., 2018; Erlandsson et al., 2014; Kahneman and Tversky, 1979). Policy-making is subject framing: presenting diverse policy options may influence the policy of choice (Bellé et al., 2018) as gambles are preferred over prospective policy losses and the safe choice over a prospective policy

gain. Other findings illustrated that anchoring – relying on initial comparative data – influenced bureaucratic response time standards (Bellé et al., 2018).

It stands to reason that framing potential policy solutions, with either positive or negative outcomes, impacts decision-making and policy implementation. If a policy is framed to have a positive outcome, it may shift the perception of risk for policymakers and citizens: policies with sure outcomes are preferred when outcomes are positively framed. One may not want to gamble away a sure thing. If there is a concern that the policy may fail, policymakers may be more likely to gamble on the outcome.

Prospect Theory and Framing

Framing, the tailored presentation of information to elicit certain behaviors, interacts heavily with the views of Prospect Theory. Most recently, Case et al. (2021) researched if specific health behaviors depended on expert or novice advice and if gain-loss framing moderated the uptake of such recommendations. Personal health behaviors were presented as a tool to combat the effects of the pandemic. The experiment included a setup that addressed framing based on a gain-loss perspective: social distancing increased health and safety measures versus a loss frame of poor hygiene causing the virus to spread. Case et al. (2021) questioned whether individuals would find expert advice persuasive or have adverse reactions to experts. In addition, Case and colleagues (2021) were interested if disregard for expert knowledge was particularly prevalent in Republican circles. The underlying premise of their theory was that behaviors might be shaped by expert communication and subsequent recommendation. Nevertheless, such expert knowledge may be subjected to mistrust by the public. Expert opinion may not count as citizens may not rely on medical expertise but political cues supporting one's

dearly held political identity. The findings showed that neither partisanship nor expert message framing swayed the participants' response to COVID-19 questions posed in the survey. However, ideology (the opinions and norms of a group), age, and media consumption suggest that those factors drive responses to COVID-19 (Case et al., 2021).

Hameleers' work (2021) also addressed the outcomes of framing interventions as a tool to fight the coronavirus pandemic. When presented with loss frames (the lives lost to COVID-19), people showed slightly greater support for risky alternatives when compared to gain frames supporting risk-averse interventions. Despite these findings, Hameleers (2021) suggested that for intervention and health promotion, policy and media coverage should focus on gain frames (the lives that could be saved because of prevention) rather than loss frames, as the slightest spin of information could have consequences on treatment options. Loss frames and the associated emotional fallout of fear and helplessness may elicit more substantial support for governmental interventions and mandates. However, emotions did not seem to be affected by gain frames. Hameleers (2021) concluded,

...compliance with risk-averse interventions may be most successful when governmental communication emphasizes the gains that can be achieved when performing pro-social behavior, while at the same time emphasize efficacy beliefs (i.e., performing this behavior can successfully secure the gains promoted) (p. 496)

Other work also related to the impacts of the COVID-19 pandemic was executed by Wolaver and Doces (2021). First, they connected Prospect Theory's framing bias with partisan membership, seeking to answer the question of whether risk preferences were

dependent on partisan membership and subject to gain or loss frames: are risk-averse responses to infectious disease (e.g., masking, vaccinating, social distancing) depending on framing and political membership? Wolaver and Doces' (2021) analysis showed that partisanship did not bear risk preferences, producing similar responses to gain and loss frames across party lines but with one exception: Republicans responding to the loss frame showed higher levels of risk aversion than Democrats did. However, elderly partisans were more responsive to positive framing than younger citizens were, but elderly Democrats were still more responsive than Republicans were.

Socio-economic demographics influenced Wolaver and Doces' (2021) analysis, as the higher income and more educated population were also more responsive to risk framing. It stands to reason that because that population was less exposed as a function of their employment (e.g., opportunities to work from home); potential exposures were a more significant concern for them. On the contrary, individuals in lower socio-economic brackets may have become desensitized at a greater rate due to exposure to the virus because of the virtue of their jobs.

Motta and colleagues (2021) outlined that individual and collective health frames and messaging positively affected people who agreed with vaccine policy. Nevertheless, skeptics needed to be convinced and receive the message that COVID-19 vaccinations were safe. Messaging to get vaccinations should resonate with the daily concerns of average Americans as their personal and community health worries and economic impacts are affected by community health. Individuals with personal risk factors like pre-existing conditions, particular demographics like the elderly, and occupational groups facing high-risk exposures should be more receptive to health communication

encouraging vaccination uptake. Motta et al. (2021) found that messages targeting personal and community health concerns improved vaccination attitudes and intentions to vaccinate, but there was no effect for framing addressing economic concerns. Economic impacts did not increase vaccination uptakes. In addition, the research did not find partisan differences. Of interest were also the findings that COVID-19 vaccination opponents differed from vaccination opponents in general: these individuals usually distrusted vaccination science, but COVID-19 vaccination objectors were not opposed to receiving other protective shots (Motta et al., 2021). In addition, there was a preference for U.S.-developed and manufactured vaccinations as people did not want non-U.S. vaccinations with side effects. However, people did not seem to have preferences for one-dose vaccinations, quickly developed vaccinations, or inoculation based on mRNA technology (Motta, 2021).

Cultural contexts may matter also. Chen et al. (2021) studied how such environments and message framing influenced the vaccination behavior of the Chinese – what was the likelihood of Chinese individuals receiving the vaccine because of message framing? The study found a greater willingness of individuals to vaccinate, most likely due to cultural differences, such as China being a collective community. Age was also correlated with vaccination behaviors. Older people were being vaccinated at higher rates, possibly due to ageism. Chen et al. (2021) reasoned that the elderly would want to receive the vaccination to avoid burdening society. In addition, the perception that COVID did not affect young people caused a false sense of security among younger populations compared to senior citizens. Chen and colleagues (2021) used the vaccine's effectiveness as the uncertainty component of the experiment. Gain-framing focused on

positive, intended outcomes when complying with a recommendation, and loss-framing related to undesired, detrimental results when not behaving in the recommended manner. Findings could not support Prospect Theory's assumptions, where gain-framing would be more convincing in the context of certain outcomes, and loss-framing would be more useful when dealing with uncertain results. The usefulness of Prospect Theory may depend on context, the severity, and the reality of the situation; that is to say, behaviors may differ when moving from an experimental simulation to a real-world setting (Chen et al., 2021).

In their work, Chen et al. (2021) addressed the concept of collective communities and the individual's impact on others, further explored by Gantiva et al. (2021). Gantiva et al.'s (2021) experiment on message framing in the health domain was executed in a college setting. It consisted of four loss- and four gain-framed messages addressing public health recommendations and their respective economic or health consequences. Gantiva et al. (2021) pointed out that cultural differences influence the risk perception of the pandemic and its messaging, the pandemic's impacts, and the impacts of countermeasures such as lockdowns affecting the economy, making the overall situation worse. Injunctive norms – how others feel about behaviors – and socially approved behaviors resulted in a potential discrepancy between the impact message framing has on oneself versus others. Individuals thought that economic messaging was more influential on others. In the context of self-isolation and its impact on health and the economy, the participants did not believe that there were different responses regarding the framing: people would respond to positive health messaging in the same manner as they would respond to negative economic messaging. However, they thought they were more

influenced by health messaging and would be indifferent to gain-loss framing in the economic context compared to others. In addition to studying gain and loss framing, the researchers were interested in the framing influence on others through the lens of economic impact. The content of messages – health versus economy – was an essential interaction in gain and loss framing. The experimental combination of loss-framed health messaging and gain-framed economics produced weaker messaging. Finally, it stands to point out that gain framing in the health domain may encourage preventative health behaviors. However, such gain framing may be negated when considering a possibly lower risk perception of younger individuals, in turn leading to reduced health prevention behaviors (Gantiva et al., 2021). A synopsis of the findings of Prospect Theory can be found in Appendix A, Overview of Prospect Theory’s Findings.

Prospect Theory’s Application to and Suitability for the Health Domain

Recent work by Attema et al. (2013, 2016) questioned Prospect Theory’s applicability and transferability to the health domain. The original context of Prospect Theory – monetary losses and gains – differs from losses and gains in the health domain. The critical difference between the two domains is time. In the monetary domain, decisions regarding finances occur at a single point in time. On the other hand, one generally deals with life expectancy or quality of life in the health domain. In addition, in the health domain, the discounting of imminent events may occur as future considerations and outcomes might be of lesser importance at present. Reference points are also of importance. A reference point for monetary concerns may be established relatively quickly: the status quo is zero, lacking financial means. However, establishing a reference point for health may prove difficult (Attema et al., 2013, 2016). Nevertheless,

establishing a reference point is vital to determining the usefulness or utility of gains and losses. Attema et al. (2013) found a more significant loss aversion in the health domain when compared to the monetary domain, leading to the conclusion that the domain determines risk aversion or risk-seeking: “The most notable finding of our study is the absence of risk-seeking behavior in the loss domain,” (p. 1065), resulting in risk aversion in the loss domain. Attema et al. (2016) further specified risk aversion: in the health domain, more risk aversion occurred when outcomes were framed as losses, but in the monetary domain, more risk-seeking was evident when outcomes were framed as losses. On the contrary, in the health domain, more risk-seeking ensued when outcomes were framed as gains, and in the monetary domain, more risk aversion was apparent when outcomes were framed as gains.

Table 2 Framing Of Risks in Domain

Domain	Gain	Loss
Monetary	Risk Aversion	Risk-Seeking
Health	Risk-Seeking	Risk Aversion

Table created by McCann, A., (2022), based on Attema, A. E., Brouwer, W. B., l’Haridon, O., & Pinto, J. L. (2016). An elicitation of utility for quality of life under prospect theory. *Journal of Health Economics*, 48, 121-134.

Attema et al. (2013, 2016) were not alone in questioning Prospect Theory’s applicability to the health domain. O’Keefe (2012) pointed out that the persuasive appeal of messaging – gain-loss framed appeals outlining positive behavioral aspects in contrast to the adverse outcomes of not following the recommended action – was driven by loss aversion because of the Endowment Effect and the desire to maintain the status quo. Negativity bias –the more significant and longer-lasting sensitivity to negative

information – additionally affected messaging. Therefore, loss-framed messages were more productive in achieving the desired results. Messaging in the health domain supposedly addressed detection and prevention behavior. Prospect Theory assumes that detection behaviors are encouraged by loss framing and prevention behaviors by gain framing, driven by the individuals' risk perception. Nevertheless, the plausibility of this assumption was not supported by the meta-analysis conducted by O'Keefe (2012), as the research did not produce sufficient evidence to support the claim. O'Keefe (2012) found no distinction between message framing and concluded that conditions drove the appeal of framing. Depending on the circumstances and conditions, gain framing may work better than loss framing and vice versa.

O'Keefe (2012) and Harrington and Kerr (2017) recognized that Prospect Theory uses uncertainty to conceptualize risk. Nevertheless, how risk is framed – uncertainty versus severity – impacted health decision-making as the risk was framed as severity in the health domain. Harrington and Kerr (2017) established, contrary to their belief that gain frames should be used for illness prevention behaviors (avoidance) which are low risk, and loss frames to be used for promotion behaviors (detection) which are high risk and, at times illness-confirming, that the outcomes drive the decision-making behavior. In combination with deadly outcomes within the gain-frame, certainty over uncertain outcomes was preferred; participants were risk-averse. Conversely, fewer participants chose certainty over uncertain outcomes in loss-frames with deadly outcomes; they were risk-averse but not statistically significant. Easily curable conditions presented in a loss frame produced an almost even choice split, with no preference between options. Harrington and Kerr (2017) found that

When outcomes were presented as gains, participants preferred certainty regardless of consequence severity. When outcomes were presented as losses, participants had no clear preferences regardless of consequence severity. These results suggest that consequence severity does not play much of a role in decision making within the risky choice framework. (p.138)

Axioms of Prospect Theory may need to be adjusted to the health context to better inform about the probabilities of health outcomes and to address the likelihood of risks occurring. Health decision-making does not involve choosing program options but whether the executed behaviors follow health guidelines (Harrington & Kerr, 2017). O'Keefe (2012) clarified the possible failures of Prospect Theory when applied to the health domain, perhaps as a result of experimental designs and chosen language in such designs using positive language in a negatively framed scenario: the concept of risk can have the meaning of dangerousness and the meaning of uncertainty. Within the original context of Prospect Theory, risk equates to uncertainty and the absence of risk to the certainty of outcomes. However, outcomes of prevention and detection behaviors may be uncertain, as behaviors ultimately may not matter regarding prevention or detection (Harrington & Kerr, 2017; O'Keefe, 2012). Prospect Theory offers two choices differing in risk but not the relative and perceived riskiness of two behaviors; there is a focus on the riskiness of one behavior. However, behavioral alternatives in the health domain may or may not differ in riskiness (Harrington & Kerr, 2017; O'Keefe, 2012). For example, to receive a COVID-19 vaccination and still contract the disease or not to receive the shot and still not suffer from the illness. More importantly, the performance of subjectively healthy versus unhealthy behaviors may not have the same outcomes as the results of the

Prospect Theory experiment, as either experimental option saved the same number of lives.

Attema et al. (2016) also pointed out that individuals may be subject to differing perceptions of outcomes based on the respective domain. When experiencing a small financial loss in addition to an already large financial loss, that small loss is insignificant. However, the identical small loss has greater weight when the initial loss is also minor. In the health domain, which often deals with quality of life concerns, smaller losses may have significantly more impacts when they reduce an already diminished reference point. Common sense and reasoning supported Attema et al.'s (2016) finding – individuals with diminished quality of life experiencing a percentage reduction calculated on varied baselines may experience a 10% reduction in capacities quite differently. Such a 10% decrease could mean diminished self-sufficiency, for example, independently executing daily hygiene functions such as teeth brushing to needing help with tasks. A summary of the interaction of Prospect Theory with COVID-19 Research can be found in Appendix B, Prospect Theory's Framing Element Interfacing with COVID-19 Research.

As the literature on health behaviors, health literacy, and health values outlines, the behavior of individuals is complex, situational, and possibly perceived as irrational. Health behaviors may result in consequences as these behaviors or their absence may affect one's and others' health. With each action or non-action – yet still, an action – subsequent outcomes may vary. For example, following standard health practices to prevent any contagious disease may pose a risk, but such a risk may be subject to the individual's perception of risky behavior. As outlined in the literature review, actions may cause reference points to shift: previously considered low-probability and high-

severity behaviors may be perceived differently after such reference point adjustment. For example, receiving a vaccination may provide protection but could also result in experiencing side effects.

The theoretical framework of Prospect Theory, widely used in multiple domains and offering valuable insights, is certainly context-dependent. Scholarly research completed in similar settings resulted in diverse findings. The remainder of this dissertation explores the role of the common denominators that drive research findings on health behaviors (such as demographic markers, relationship and caregiver status, habitual health behaviors, and perceptions of risk probability and risk severity) that may associate with students' willingness to receive the COVID-19 vaccination.

Hypotheses

This project draws upon existing research regarding health behaviors and demographic characteristics to consider 18-to-24-year-old United States college students' COVID-19 vaccination behavior. Integrating prospect theory and perception of risk with existing scholarship on health behaviors may provide insights to guide policy responses to COVID-19. In addition, findings from this project may add to existing published literature addressing health behaviors of college students. Personal surroundings and demographics may influence health behaviors and socio-economic status: individual circumstances influence behaviors. General health behaviors are suggestive of future health behaviors, and prospect theory suggests that perception of risk associates with policy compliance. In the following hypotheses, *COVID-19 Vaccination* is the dependent variable. A positive behavior would include receipt of a COVID vaccine, while a negative behavior would be forgoing the vaccine.

Demographic Characteristics

Given general student health behaviors, such as vaccination receipt, it is reasonable to expect lower COVID-19 vaccination rates among young male college students (Lonnquist et al., 1992; Weiss et al., 1990). However, recent survey research by Brunson et al. (2021) also established that female college students were less likely to receive the COVID-19 shot than male students when the researchers inquired in the Fall of 2020 about the young women's willingness in the Fall of 2020 to get the vaccination in the upcoming months.

Uttych and Fowler (2020) established that younger individuals were not concerned about preventive health behaviors protecting vulnerable populations. Contrarily, Wise et al. (2020) posited that optimism bias was not a factor in their study of a group with a median age of 30 years. For this project, it is possible that such bias – that older individuals would contract the virus before young adults succumb to the disease – is more prevalent in a younger age group. By limiting the data set to a younger population, I controlled for age for the population of 18-24-year-old college students. Students older than 24 years were excluded from the analysis, as the purpose of my work was to establish connections between the behaviors of young adults and other factors that may lead to their decision-making. Students attending private institutions were also excluded from the analysis due to the private colleges' differences in funding and governing mechanisms.

Research to date indicates that positive health behaviors such as non-smoking, smoking cessation, diet and exercise management, and seat-belt use are associated with specific demographic characteristics such as age, biological sex, relationship status, and

caregiver status. In other words, older individuals and women are more likely to exhibit positive health behaviors in general. So too, will people in relationships and those with caregiving responsibilities be more likely to exhibit positive health behaviors (Deluga et al., 2018; Lau et al., 1986; Lewicka et al., 2013). Conversely, Thompson et al. (2016) found that male students who were not in relationships were more likely to receive the HPV vaccination series; female students who were partnered up felt they could forgo the shot. However, HPV as a sexually transmitted disease would only infect individuals in very close contact; therefore, it would make sense that individuals in monogamous relationships would experience a greater sense of security and protection from infection.

Concerning COVID-19, Wolaver and Doces (2021) suggest that individuals of higher socio-economic status may be more receptive to the COVID-19 vaccination, especially students who were not exposed to the virus compared to groups of lower socio-economic standing. For students, socio-economic status may be indicated by food security, parents' educational attainment (first-generation college student), and accessibility to health insurance. Socio-economic status (SES) is often described as an individual's or a collective's position in society and their access to resources. Generally speaking, the better their social standing, the better their access to resources such as education and health care services (Saegert et al., 2007). Various measures of SES combined in diverse groupings offer different dimensions, highlighting facets of inequality. SES may be comprised of multiple measures such as, but not limited to, income, intergenerational wealth, education, geographical location, occupation, and their intersectionality with demographic factors such as age, race, ethnicity, or gender identity. Income, wealth, and education are moderately correlated as income or wealth allows

access to education (Saegert et al., 2007). Food insecurity serves as a proxy for SES. It is reasonable to assume that students experiencing food insecurity may not have personal or family resources supporting the individuals. Lee et al.'s recent work (2021) outlined the bidirectional connection between food insecurity and housing stability as lacking finances may result not only in insufficient access to nutrition but also in unstable living conditions. Seivwright et al. (2020) linked food insecurity with individual health conditions, education level, employment status, community connection, and household composition. Their assessment showed that students experiencing food insecurity were more likely to defer college attendance and were suffering from poorer health.

Literature additionally outlined that individuals of lower socio-economic status may be desensitized against COVID-19 (Wolaver & Doces, 2021) as these individuals, due to the nature of their employment, could not work from home, or else maintain greater social distance. In other words, individuals may have been forced to expose themselves to the virus as otherwise they would not have been able to earn a living. Bruce et al. (2022) also illustrated the greater vulnerability of economically disadvantaged households, often having difficulties obtaining food. On the contrary, Motta et al. (2021) found that economic considerations did not affect COVID-19 vaccination uptakes.

Finally, common sense would imply that receiving medical care at no cost – the COVID-19 vaccination – should not negatively influence students' willingness to obtain the free COVID-19 shot. Health insurance coverage may provide easier access to obtaining the COVID-19 vaccination, although obtaining the vaccination is free of charge for uninsured individuals (U.S. HHS, 2022). In other words, health insurance coverage

should be irrelevant. However, Cutler and Lleras-Muney (2010) pointed out that health care provided free of charge may not be used.

H-1.1: Male students are less likely to receive the COVID-19 vaccination.

H-1.2: Students in a relationship are more likely to receive the COVID-19 vaccination.

H-1.3: Students with caregiver responsibilities are more likely to receive the COVID-19 vaccination.

H-1.4: Higher student socio-economic status may associate with receiving the COVID-19 vaccination.

H-1.5: The availability of health insurance coverage should not affect the willingness to receive the COVID-19 vaccination.

Health Behaviors

Additionally, it makes sense that students who exhibit general positive protective and active health behaviors such as diet, exercise, preventative medical screenings, and sleep hygiene might demonstrate a willingness to receive the COVID-19 Vaccination. Prior research addressing the health behaviors of young adults and general health behaviors outlined that females in a college setting (Lonnquist et al., 1992) exhibited more significant levels of protective health behaviors. In addition, Reuter and Forster (2021) found links between positive health behaviors on students' GPA as well as the impact of negative health behaviors on academic performance.

Positive health behaviors such as non-smoking, seat-belt, diet, and exercise management are surely associated with age, gender, relationship, and parenting status

(Lonnquist et al., 1992; Norman, 1995; Short and Mollborn, 2015; Weiss and Larsen, 1990).

It then makes sense that individuals engaging in these behaviors that generally promote health would be more accepting of receiving the COVID-19 vaccination.

Nevertheless, as pointed out in Chapter 1 – the introduction – Marcell and Spurlock (2020) established that vaccine hesitancy among a young student body (mean age 20.3 years) existed, and this

finding was supported by earlier work conducted by NFID (2016). Research by Brunson et al. (2021) established that students who did not receive the flu vaccine in 2020 were less likely to receive the coronavirus shot when compared with students vaccinated against the flu.

For the purpose of this project, general health behaviors as independent variables would include preventative medical screening, flu vaccination receipt, and HPV vaccination receipt. So, this study considers that students who engage in the aforementioned positive health behaviors might be more receptive to other health behaviors such as obtaining a COVID-19 vaccine.

H-2.1: Students who receive preventative medical screening are more likely to receive the COVID-19 vaccination.

H-2.2: Students who receive Flu vaccinations are more likely to receive the COVID-19 vaccination.

H-2.3: Students who receive HPV vaccinations are more likely to receive the COVID-19 vaccination.

Risk Severity and Risk Probability

Prospect Theory posits that decision-making is a function of risk and loss aversion, resulting in risk asymmetry as anticipated losses make risks more tolerable. The likelihood of risk occurrence is also a consideration. Consequently, if the outcome is uncertain or the cost of behavior is too high, individuals would rather gamble with the potential unknown yet severe outcome (Baekgaard, 2017; Tversky & Kahneman, 1992). Additionally, when Prospect Theory is applied to the health domain, the severity of the potential losses may influence the decision-making process (Harrington and Kerr, 2017; O'Keefe, 2012). Students' general perception of the severity of COVID-19 and the probability of contracting the disease must be considered.

Presumably, then, using the logic of prospect theory, low severity, and risk probability perception indicate low concerns for COVID-19, resulting in the willingness to accept riskier outcomes (contracting and suffering from COVID-19) as the cost for promoting positive health behaviors (COVID-19 vaccination) is too high (vaccination and its possible negative symptoms). This also suggests that higher levels of concern about contracting the virus and higher concerns about the severity of the illness may associate positively with the willingness to receive the shot. As Harrington and Kerr (2017) suggest, the perceived likelihood of contracting COVID-19 may have a more significant effect than severity as the certainty of contracting the virus as a function of exposure is more assured. It may be more difficult to predict the severity of the disease than the probability of contraction upon exposure.

Eventually contracting the coronavirus may be highly probable but could result in an asymptomatic presentation or subjectively mild cases of the illness, meaning the

individuals have little or no symptoms. Contrarily, the infection could result in severe disease when it was not very likely to contract the virus. Health behaviors allow particular risks to be associated with severity and probability levels. Variables chosen for the analysis addressed the component of risk associated with the behavioral action; risk should be simultaneously viewed through the lens of severity and probability. I further elaborate on severity and probability variables in the forthcoming sections of this work.

H-3: A student's perceived high (low) risk severity and high (low) risk probability is positively (negatively) associated with receiving the COVID-19 vaccination.

CHAPTER 4: ANALYTICAL DESIGN

Chapter 4 outlines the quantitative research design, data sources, and variables used in preparation for the subsequent data analysis in Chapter 5. Guided by the research question, my dissertation utilized secondary data – the National College Health Assessment III (NCHA III) – collected by the American College Health Association (ACHA). Although secondary data may capture limited variables of interest, the significant secondary data set used in the analysis encompasses large student sample counts from institutions of higher education across the United States and can provide a robust analysis. The use of secondary data also allowed for Boise State University’s Institutional Review Board’s Exempt Review Protocol.

Quantitative Analytic Approach

The genesis of this dissertation project was sparked when witnessing a young adult’s approach toward protective health behaviors – the COVID-19 vaccine. The individual’s attitude and subsequent outcomes resulting from their behavior raised the question of why specific subpopulations may or may not participate in community health measures. After formulating the guiding question, *What determinants are associated with college students’ decisions to vaccinate against the COVID-19 virus?* within an *a priori* framework, a literature review established the foundation and definition of concepts fundamental to health policy and health behaviors.

Prospect Theory – decision-making under risk subject to messaging and framing – was chosen as the analytical framework. While Prospect Theory is often executed in

experimental settings, the theory is useful in this study given its utility in considering that *choice* behaviors were studied (Attema et al., 2013, 2016; Harrington & Kerr, 2017; O’Keefe, 2012; Wise et al., 2020). In addition, decision-making under risk has also been studied in the context of the COVID-19 pandemic, further supporting the applicability of Prospect Theory to various domains and conditions. Decision-making under risk, the principle of the theory, suggests individuals conceive of risk in terms of either severity or probability, when applied to different domains. Prior research (O’Keefe, 2012; Harrington & Kerr, 2017) suggested that the operationalization of risk in the health domain should be based on probability rather than severity. While this is true, in the context of the COVID-19 public health scenario, risk should encompass both severity and probability in conjunction with public interests and communal health benefits.

Philosophical debates exist about the best research methods and approaches (Babbie, 2013; Gliner et al., 2017; Tracy, 2019). Qualitative (or constructivist) approaches generally adhere to looser guidelines, but guidelines nonetheless. Qualitative research and data may be subject to interpretation by researchers addressing subjective perceptions of the study participant and the researcher through interviews, focus groups, and lived experiences.

The execution of constructivist research is commonly more feasible on a smaller scale. On the other hand, quantitative analysis, also called (post) positivism, focuses on utilizing data sets, often large-scale information (Babbie, 2013; Gliner et al., 2017; Tracy, 2019). Quantitative data lends itself to statistical analysis to reveal relationships between variables. However, the quantitative analysis does not provide the reasoning behind answers captured in surveys (Stockemer, 2019) as the individual stories of people

impacted by the COVID-19 pandemic and influenced by the subsequent public health policy-making are not heard. Qualitative methods can then provide greater insight into motives and behaviors (Babbie, 2013; Tracy, 2019). When discussing research approaches, Gliner et al. (2017) pointed out that "...the approach is based really on the research question" (p. 64). Nevertheless, Gliner et al. (2017) further elaborated that research is a complex adventure and may not be limited to single research questions, hypotheses, and analytical approaches.

Data about emotions, attitudes, and perceptions – undoubtedly subjective based on the study participants' experiences – are qualitative data. Nevertheless, these data can be transformed into quantitative measures (Gliner et al., 2017). This process certainly applied to surveys, which, for example, inquired about students' perceptions of the risk of contracting COVID-19. Secondary data sets that include large samples from institutions of higher education across the United States allowed for a robust analysis, using existing data points that meshed with the research question and hypotheses. A useful contribution of this approach is that, to my knowledge, research applying Prospect Theory and its associated concepts to large data sets has not been executed yet.

At the time this data set was collected, the COVID-19 virus continued to circulate and mutate throughout the globe and community health policies focused on social distancing. Consequently, participant recruitment could have posed a challenge. Response rates for the three NCHA III survey periods used in this analysis barely varied from 14% (Fall 2020) and 13% (Spring 2021 and Fall 2021). The average NCHA III response rate is 19-20%, ranging from 10% to 35% (ACHA, 2020). ACHA acknowledged declining response rates and offered guidance to improve such rates,

proposing 20% response rates as their benchmark (ACHA, n.d.-d.). Expected response rates drive sample size: when lower response rates are anticipated, sample sizes should then be increased. For example, for a student count of between 3,000 and 9,999 students, ACHA recommended a complete sample of 700 students based on the total organizational student count (ACHA, 2020).

Porter (2013) emphasized that student participation in surveys is generally low. However, Fosnacht et al. (2017) pointed out that despite declining participation rates and the prevalent notion that high response rates would equate to unbiased estimates (forgoing non-response bias), such an assumption may be unfounded. Fosnacht et al. (2017) found that reliability and unbiased estimates were achievable if there were sufficient counts of responses, such as 50 to 75 students in smaller IHEs or 500 students in larger colleges. Even if the response rate could be considered low – 5% to 10% – it was not the rate that mattered, but the response counts. Fosnacht et al.'s (2017) study did not find evidence that higher response rates significantly increased unbiased results. Indeed, the response rates for the above survey periods are below average or barely within the suggested ranges. However, the response rates translate into student response counts in the thousands; for example, the Fall 2021 survey generated 33,204 total student responses.

Data were analyzed with binary logistic regression. This statistical method examines relationships between one or more independent variables on a dichotomous dependent variable (Babbie, 2013; Berman & Wang, 2016; Gliner et al., 2017). One assumption of binary logistic regression is its dichotomy resulting in two outcomes. Binary logistic regression leads to odds ratio analysis – how likely it is that an event does

or does not occur – as there are only two values the dependent variable can take on (Berman & Wang, 2016).

National College Health Assessment III Survey Data Set

The data set included U.S. institutions of higher education that participated in the Fall 2020, Spring 2021, and Fall 2021 surveys inquiring about the health behaviors of college students. The institutions were limited to public colleges and universities and their 18-24-year-old undergraduate students. Colleges and universities included in this study were members of the American College Health Association, and their students completed the National College Health Assessment.

ACHA, established in 1920, has collaborated with more than 800 higher education institutions to support student wellness (ACHA, n.d.-a). ACHA administers the National College Health Assessment (NCHA) that aids universities and colleges in obtaining data pertaining to student health behaviors (ACHA, n.d.-b). NCHA surveys have been administered since Fall 2000 (ACHA, n.d.-c.) among their member institutions, often in predetermined participation cycles. The NCHA III tool provided insight into student health behaviors such as substance use and abuse, mental and physical health, including the prevalence of specific health conditions. The survey also collected demographic information. ACHA employed NCHA III biannually among its member institutions, and in 2019, the NCHA III core survey was released (ACHA, n.d.-b.).

Beginning in the Fall 2020, ACHA added a supplement to the core survey, outlining inquiries related to the impact of COVID-19, the NCHA III COVID-19 Questions. Included in the survey were also questions related to the vaccination status of

students. The Fall 2020 and Spring 2021 surveys inquired about students' willingness to receive the COVID-19 vaccine when available, and the Fall 2021 survey followed up on whether students received the vaccine after it became available in 2021 (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022). The NCHA III surveys, precisely for Fall 2020, Spring 2021, and Fall 2021 reporting periods for the participating institutions, were utilized to obtain data addressing student health behaviors, demographics, and questions about the impact of COVID-19 and the COVID-19 vaccination status of college students.

Reliability and Validity

NCHA was first launched in 2000 and, since then, has been continuously updated to include emerging health behaviors. These survey revisions have caused ACHA to conduct consistency analyses between survey versions. Measurement validity and reliability – measuring what is intended to be measured and consistently measured (Berman and Wang, 2016) – was ensured by NCHA's reliability and validity analysis (ACHA, 2013). Data collected by the NCHA survey were also compared by ACHA to nationally representative data sets such as the 2008 Monitoring the Future (MTF) National Survey Results on Drug Use Data set, resulting in similar findings (Johnston et al., 2009 as cited by ACHA). In addition, data related to college binge drinking (Wechsler et al., 2000 as cited by ACHA, 2013) produced comparable results (ACHA, 2013).

Subset of NCHA III for this Study

Per Boise State University policy, I filed an Exempt Protocol Application with the Institutional Review Board (IRB) in April 2022. Upon approval in May 2022, using the

existing literature as guidelines, I requested specific variables of the primary Fall 2020, Spring 2021, and Fall 2021 NCHA III data set from ACHA³ (C. Kukich, personal communication, May 4, 2022). The NCHA III core survey (C. Kukich, personal communication, April 14, 2022) consists of variables related to student health behaviors, index variables, and several demographic data points. Twelve variables pertaining to COVID-19, general health behaviors, and demographic information, were specific to this analysis (ACHA, 2022).

For the purpose of this study, I selected 18-24-year-old undergraduate college students attending public higher education institutions.⁴ In the following paragraphs, I outlined the variables used for analysis. Appendix C, ACHA Survey Questions, shows a complete list of the variables extracted from the NCHA III Core Survey and the NCHA III COVID-19 Questions (C. Kukich, personal communication, April 14, 2022). After removing missing observations from all variables used for analysis, the final data set consisted of 62,267 cases.

As illustrated in Figure 1, Descriptive Statistics of the Sample, more women than men responded to the survey, respondents' mean age was 20.14, and most students ranged between freshmen and seniors, with a few 5th-year undergraduate seniors

³ ACHA provides access to survey data for research use through its data request process. However, “the opinions, findings, and conclusions presented/reported in this article/presentation are those of the author(s), and are in no way meant to represent the corporate opinions, views, or policies of the American College Health Association (ACHA). ACHA does not warrant nor assume any liability or responsibility for the accuracy, completeness, or usefulness of any information presented in this article/presentation” (C. Kukich, personal communication, July 12, 2022).

⁴ I extrapolated public 4-year institutions by filtering the data set in the statistics program SPSS. The variable *PUBPRIV* distinguished the educational institution into either *Public* or *Private*. Cases designated with the value of 2, indicating private institutions, were excluded from the analysis. Furthermore, I applied filters to limit the analysis to the appropriate age group (variable *N3Q69* ≤ 24), and the appropriate cohorts of the first year to fifth or more undergraduate (variable *N3Q72* ≤ 5). Filters to remove missing cases related to the variables *N3Q55A*, *VaxHPV*, *VaxFlu*, *RUSDAFI*, *COVID19ReInfectionFear*, *QCOVID13E*, *N3Q67A*, *N3Q76*, *N3Q85*, *ParentalEduAttainment*, *HealthInsuranceCoverage*, and *COVID19Vaccination* specified in the following sections were applied.

included. In terms of race/ethnicity, as noted in Table 3 Student Race, the majority of students included in the sample were White (62.10%), followed by Hispanic (21.00%) and Asian (16.20%)

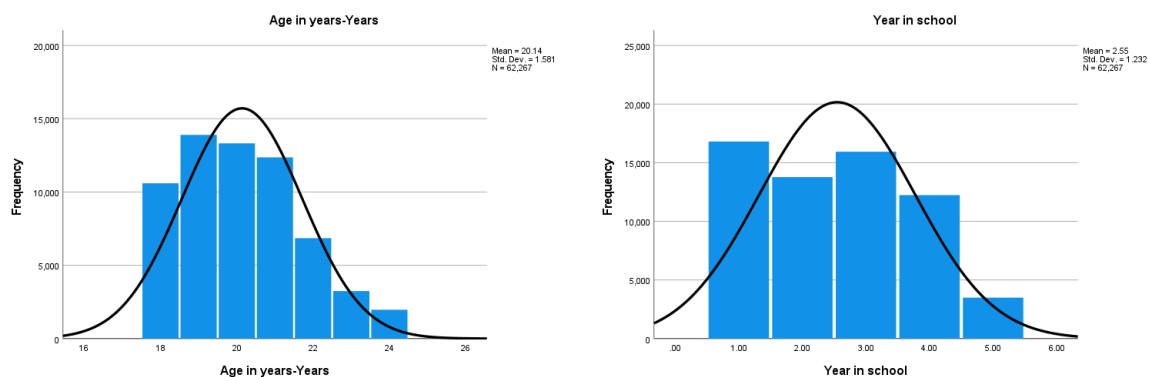


Figure 1 Descriptive Statistics of the Sample

students. The student count totaled 71,554 rather than the 62,267 cases produced by filtering and eliminating cases with missing observations. The increased count of 9,287 students resulted from the question phrasing: *N3Q75A How do you usually describe yourself? (Please select ALL that apply)* (NCHA III Codebook, C. Kukich, personal communication, April 14, 2022, p. 91). A visual inspection of the data set showed that some students selected at least two options, increasing the total student count regarding race classification over the final sample count of 62,267. Table 3 Student Race illustrates student self-reported grouping according to race/ethnicity.

Table 3 Student Race

Race	Count	Percent
White	38,666	62.10
Hispanic/ Latino/a/x	13,055	21.00
Asian/ Asian American	10,101	16.20
Biracial/ Multiracial	3,349	5.40
Race	Count	Percent
Black/ African American	2,898	4.70
American Indian/ Native Alaskan	1,311	2.10
Middle Eastern/North American/ Arab Origin	1,025	1.60
Another	605	1.00
Native Hawaiian/ Other Pacific Islander Native	544	0.90
Total Cases	71,554	100.00

Dependent Variable COVID-19 Vaccination

Students' COVID-19 vaccination status was selected as the dependent variable as this dissertation aims to establish whether there is a relationship between students' willingness to be vaccinated and factors influencing such a decision. The action of receiving the vaccine may depend on the individual's risk perception – severity and probability alike. Attema et al. (2013, 2016) found that risk-seeking behavior was not prevalent in the health loss domain, but risk-seeking actions increased when outcomes were presented as gains. Vaccination behavior may be subject to reference points – should a higher risk aversion be present if vaccinations are considered protective health behaviors? Conversely, non-vaccination increases risk unless reference points are shifted. The dependent variable *COVID-19 Vaccination* was constructed from responses asked in

the NCHA III COVID-19 Questions (C. Kukich, personal communication, April 14, 2022)⁵. In this data set, 19,493 or 31.30% of students were not vaccinated against COVID-19, and 42,774 or 68.70% of students received the shot (Appendix D, Table 6 Students' COVID-19 Vaccination Survey Period, and Table 7 Students' COVID-19 Vaccination Actual). The following comparative visualization indicates that vaccination behavior and the corresponding concern of infection show similar patterns between the biological sexes. As a whole, vaccinated students were generally more concerned about the corona-virus, ranging from 78.32% (*Extremely concerned*) to 70.41% (*Slightly concerned*). Similar percentages per concern category were present when reviewing concern levels based on biological sex. Surprisingly, vaccinated male students showed slightly higher rates of concern, e.g., male students being *extremely concerned* at 80.48%

⁵ This question was changed three times from *QCOVID19 Once a vaccine is developed for COVID-19, how likely are you to get vaccinated?* to *QCOVID19A Once a vaccine for COVID-19 is available to you, how likely are you to get vaccinated?* The final version was changed to *QCOVID19B How would you describe your COVID-19 vaccination status?* For the Fall 2020 and Spring 2021 survey periods, the response categories were identical: *Very likely to be vaccinated* (1), *Somewhat likely to be vaccinated* (2), *Somewhat unlikely to be vaccinated* (3), and *Very unlikely to be vaccinated* (4). The Spring 2021 version also allowed for the fifth response of *I've already been vaccinated for COVID-19* (5) (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 11). However, the answers to the Fall 2021 version of the survey questions were changed to *I have received all the injections required to be fully vaccinated against COVID-19* (1), *I have started the vaccination process, but need another shot* (2), *I will get vaccinated as soon as possible* (3), *I will only get vaccinated if required* (4), and *I will not get vaccinated* (5) (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 11). Substantial counts of missing values resulted from the participation frequency of IHEs and the structure of the survey. As IHEs did not participate in the survey every year, values were missing merely because the specific question was not available during the survey period in which the IHE contributed. In other words, IHEs may have answered the questions related to their students' vaccination status (QCOVID19, QCOVID19A, or QCOVID19B) in either the Fall 2020, Spring 2021, or Fall 2021 survey cycle. More detail is available in Appendix D, Table 6 Students' COVID-19 Vaccination for Survey Period Overview. Responses coded as *Very likely to be vaccinated* (1) and *I have received all the injections required to be fully vaccinated against COVID-19* (1) were recoded as *Yes* (11). In addition, the response for the Spring 2021 survey *I've already been vaccinated for COVID-19* (5) was also recoded to (11) as the Fall 2021 response *I will not get vaccinated* also uses (5) as a code. All responses other than *Very likely to be vaccinated* (1), *I've already been vaccinated* (5) and *I have received all the injections required to be fully vaccinated against COVID-19* (1) were recoded as *No* responses as the respective vaccination statuses could not be confirmed as *Yes*. I created the new variables *COVID19VaxDevelopFA2020*, *COVID19VaxDevelopSP2021*, and *COVID19VaxCreatedFA2021* that were then combined into the final variable *COVID-19 Vaccination*.

vs. female students being *extremely concerned* at 77.88% or being very concerned at 78.27% vs. 76.29%. Unvaccinated female students showed slightly more concern across the five categories, compared to unvaccinated males. *Not concerned at all* female students did not differ much regarding their vaccination status: 49.18% were unvaccinated compared to 50.82% vaccinated.

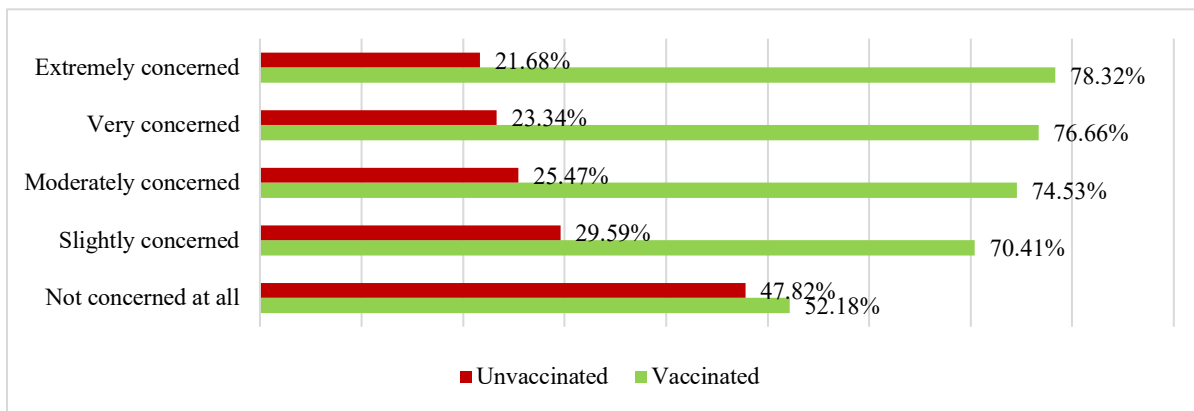


Figure 2 Comparisons of Concern Levels of COVID-19 Infection Between Vaccinated and Unvaccinated Students – Total Students

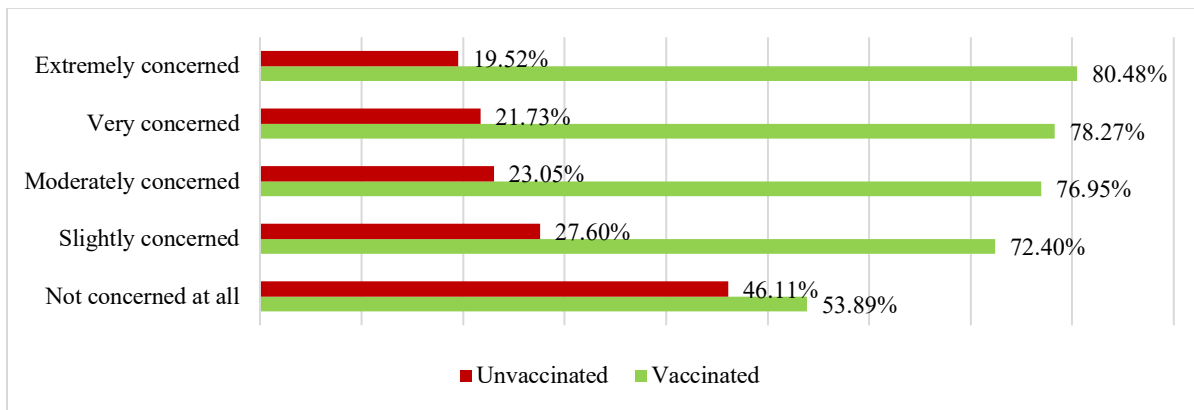


Figure 3 Comparisons of Concern Levels of COVID-19 Infection Between Vaccinated and Unvaccinated Students – Male Students

A greater percentage of vaccinated male students were *not concerned at all* (53.89%), compared to unvaccinated male students (46.11%). Data about the small group of intersex students showed patterns deviating from female and male students. Notable is

the lack of vaccinated students being *extremely concerned* about an infection. In general, approximately 20% of both female and male unvaccinated students expressed extremely high concerns about a coronavirus infection. However, one intersex students (100%) was *extremely concerned*. The level of concern between vaccinated and unvaccinated students is quite different from female and male student vaccination and concern patterns.

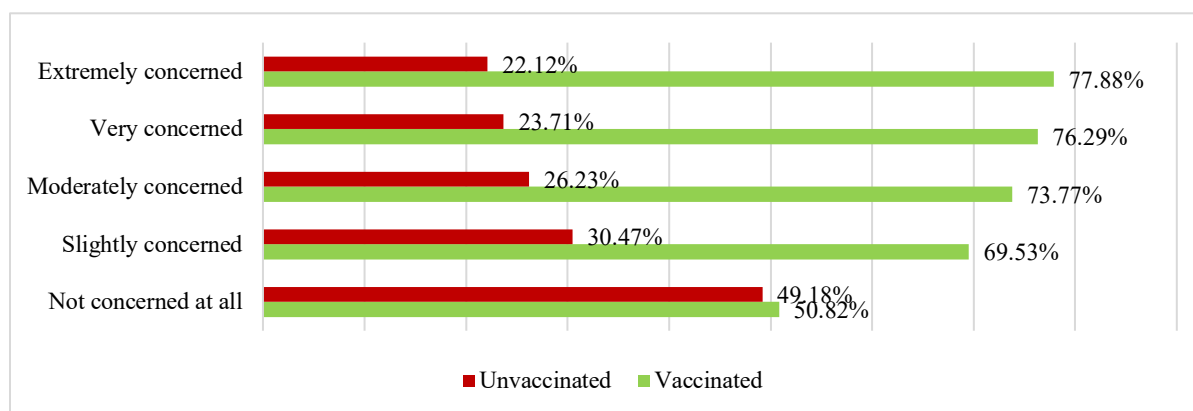


Figure 4 Comparisons of Concern Levels of COVID-19 Infection Between Vaccinated and Unvaccinated Students – Female Students

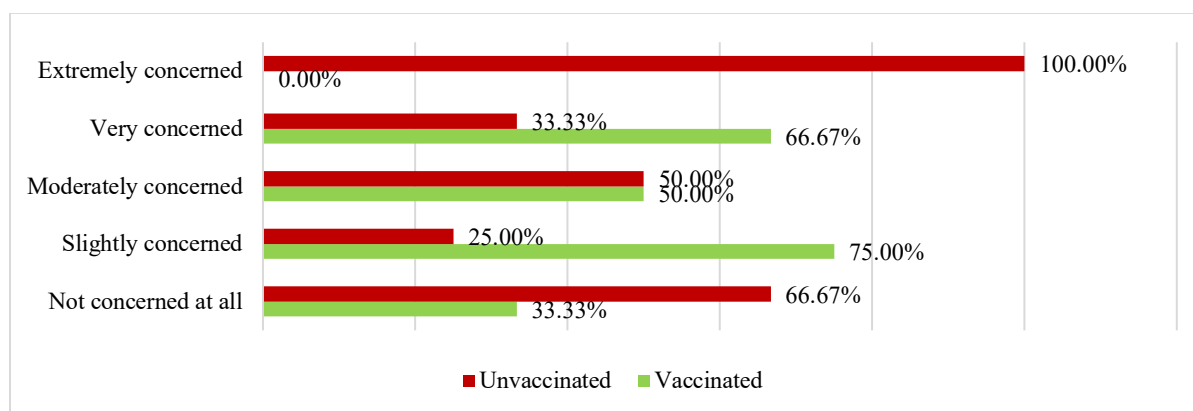


Figure 5 Comparisons of Concern Levels of COVID-19 Infection Between Vaccinated and Unvaccinated Students – Intersex Students

Figures 2 through 5, Comparison of Concerns of COVID-19 Infection Between Vaccinated and Unvaccinated Students, compares the five levels of concerns between the two groups. Vaccinated students in general expressed greater levels of concern about a

COVID-19 infection, when compared to their unvaccinated counterparts (Figure 6, Vaccinated Students' Fear of COVID-19 Infection). Only 18.24% were *not concerned at all*. However, a total of 53.56%, ranging from *extremely concerned* to *moderately concerned*, were worried about infection – did they receive the vaccine because they were worried, or are they worried despite having received the shot?

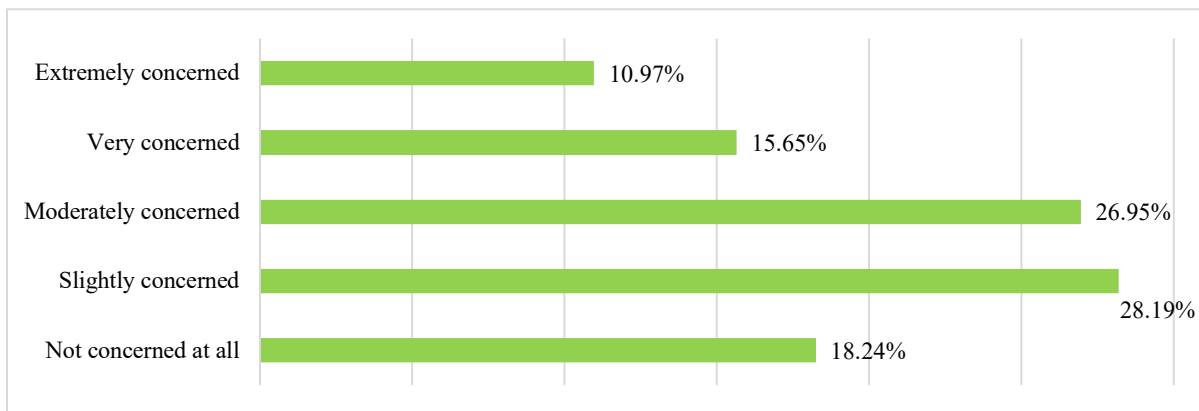


Figure 6 Vaccinated Students' Fear of COVID-19 Infection

Data listed in Figure 7, Unvaccinated Students' Fear of COVID-19 Infection, may make one ponder – 36.68% of unvaccinated students were *not concerned at all* about contracting the coronavirus, but the remainder of unvaccinated students had expressed varying levels of concern totaling 63.31% – why were these students not receiving the COVID-19 vaccination despite expressing their concerns about infection or reinfection?

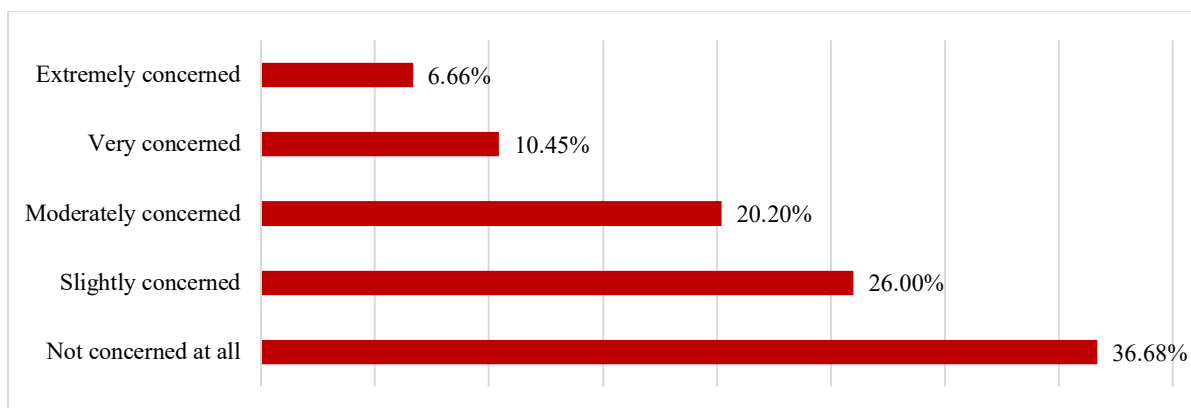


Figure 7 Unvaccinated Students' Fear of COVID-19 Infection

Independent Variables Biological Sex, Relationship Status, Caregiver Status, Socio-Economic Status (measured by Food Security and Parental Educational Attainment), and Health Insurance Coverage

Biological Sex

Biological sex may be a critical demographic variable. Women, often considered the biological sex displaying more positive health behaviors, were found in previous research to be more compliant and followed health policy restrictions (Barari et al., 2020). Similarly, Lewicka et al. (2013) and Lonnquist et al. (1992) showed that the importance of health and health protective behaviors were found in women at a greater rate. In this data set, 43,920 or 70.53% of students were female, 18,334 (29.44%) were male, and 13 (0.02%) students reported their biological sex as intersex (Appendix D, Table 8 Students' Biological Sex).

Caregiver and Relationship Status

As previously pointed out, personal surroundings matter, and personal circumstances may influence behaviors. Therefore, I expected individuals responsible for others or in relationships to receive the coronavirus vaccination at a higher rate than individuals not responsible for others or in relationships (Deluga et al., 2018; Lau et al.,

1986; Lewicka et al., 2013). This data set showed that 26,019 (41.80%) and 898 (1.40%) students were in a relationship and caregivers, respectively. In this data set, 36,248 (58.20%) students were single, and 61,369 (98.60%) were not caregivers (Appendix D, Table 9 Students' Relationship and Caregiver Status)⁶.

Socio-economic Status (SES) Measured by Food Security

USDA's RUSDAFI index (Food Security 6-item Short Scale) – utilized in NCHA III – served as a proxy for SES as a connection between food security and socio-economic status exists. NCHA III questions addressing food insecurity – cutting or skipping meals due to the lack of money, eating less because the student felt they should reduce their food intake, or if they experienced hunger due to the lack of financial resources – pointed towards socio-economic status. As a result of inadequate financial means or other resources, individuals may reduce food consumption. Survey questions posed on NCHA III aligned with USDA's definition of food security (USDA, n.d.-a.). USDA's precise definitions of food (in)security were distinguished into high food security (food is readily accessible), marginal food security (no adjustment to food intake but anxiety over access to food), low food security (no adjustment to food intake but the quality and diversity of food is lacking), and very low food security (insufficient and sporadic consumption).

Answers about food security were combined into USDA's RUSDAFI Short Scale Category Collapsed (USDA, n.d.-b.). Outlined in the NCHA III core survey, RUSDAFI ranges from (1) *Very low food security (5-6)*, (2) *Low food security (2-4)* to (3) *High or*

⁶ The three categories *Not in a relationship (1)*, *In In a relationship but not married/partnered (2)*, and *Married/partnered (3)* were recoded into *Not in a relationship (1)* and *In a relationship (2)* for the ease of analysis. Additionally, categorizing relationships into married or unmarried assigns a value to the relationship, which is irrelevant for analysis.

marginal food security (0-1) (NCHA III Codebook, C. Kukich, personal communication, April 14, 2022, p. 98). ACHA's scoring aligns with USDA's scoring method (USDA, 2012). For my regression analysis, I used RUSDFAI reporting the three categories of food insecurity, which resulted in the following distribution: 10,287 (16.50%) students experienced *very low food security*, and 14,666 (23.60%) students faced *low food security*. *High or marginal food security* was present for 37,314 (59.90%) of the student population (Appendix D, Table 10 SES Measured by Food Security).

SES Measured by Parental Educational Attainment

Cutler and Lleras-Muney (2010) found educational attainment to be an influence on health behaviors; the educational attainment of parents may provide additional insights into students' health behaviors. It would be plausible that students' enrollment in an institution of higher education would further affect their health behaviors. As educational attainment is correlated with health behaviors, I argued that college-educated parents may be modeling protective health behaviors to their young-adult children. College education also affected income: more significant resources may be available to spend on health care. First-generation student status might be a valuable variable as parental education affects the economic status of families (Bruce et al., 2022; Chen et al., 2020; Cutler & Lleras-Muney, 2010; Maital & Barzani, 2020).

In this data set, 24,357 (39.10%) of students' parents earned a post-secondary degree, and 17,315 (27.80%) earned an advanced post-secondary degree. Finally, 20,595, or 33.10% of parents had some college experience or finished high school. This last

group also includes the parental educational attainment as being unknown (Appendix D, Table 11 Parental Level of Education, and Table 12 Parents Educational Attainment)⁷.

SES Measured by Health Insurance Coverage

I also included the sourcing of the students' primary health insurance. Cutler and Lleras-Muney (2010) addressed the utilization of health care provision in their work to point out that at times even no-cost care was not utilized. Consequently, the availability of preventative health care through health insurance should not be a barrier to obtaining the coronavirus vaccination.

In this data set, 59,485 (95.50%) of students reported that they had health insurance coverage, and 1,946 (3.10%) reported they did not. 836 (1.30%) of students were unsure of their coverage status (Appendix D, Table 13 Students' Primary Source Health Insurance Coverage, and Table 14 Students' Health Insurance Coverage)⁸.

Independent Variables General Health Behavior Preventative Medical Screening, VaxFlu, and VaxHPV

Variables addressing general health behaviors were derived from selected questions addressing common health-related actions such as general vaccination uptake

⁷ I recoded the eight choices into three main groups to capture high-level educational attainment: *Did not finish high school (1), High school diploma or GED (2), Attended college but did not complete degree (3), and Don't know (8)* were recoded to *No HS/ HS/GED/ Some College/ Unknown*. *Associate's degree (AA, AS, etc.) or trade/technical training (4)* and *Bachelor's degree (BA, BS, etc.) (5)* were restructured to *Associate's/ Bachelor's/ Trade/Technical* and *Master's degree (MA, MS, MFA, MBA, MPP, MPA, MPH, etc.) (6)* and *Doctoral or professional degree (PhD, EdD, JD, MD, etc.) (7)* to *Master's/ Doctoral/ Professional*.

⁸ Question N3Q79 *What is your primary source of health insurance?* allows for several answers such as *I have a college/university Student Health Insurance Plan (1), I am covered by my parent/guardian's plan (2), I am covered by my employer-based plan (or my spouse/partner's employer-based plan) (3), I have Medicaid, Medicare, SCHIP, or VA/Tricare coverage (4), I bought a plan on my own (5), I don't have health insurance (6), I don't know if I have health insurance (7), and I have health insurance, but I don't know the primary source (8)*. Various answers were recoded to *Yes, No, and Unsure*. As the main concern for this variable was whether students had health insurance coverage, the source of such coverage was not of great interest.

and preventative medical screenings. These variables were selected, as the corresponding behaviors were commonly accepted health behaviors outlined in the research literature. General health behaviors and health protective behaviors were identified as actions that could influence one's health either directly or indirectly (Cutler & Lleras-Muney, 2010; Lonnquist et al., 1992; Norman, 1995; Weiss & Larsen, 1990). Cutler and Lleras-Muney (2010) outlined several categories of health behaviors, some of which were addressed in the NCHA III Core Survey (C. Kukich, personal communication, April 14, 2022). The survey also inquired about health behaviors such as medical preventative and protective behaviors, and vaccination behaviors identified in the literature. Preventative care, such as medical exams and vaccination, was called out by Cutler and Lleras-Muney (2010), particularly in connection with educational attainment as the driver of higher participation rates in screening exams and vaccination uptakes. Barari et al. (2020) also pointed out that the need for medical care may have promoted reduced compliance with health policy – individuals may have been unable to isolate themselves, as they were required to leave their homes to seek (routine) medical care.

Health safety behaviors were also particularly compelling from the perspective of Prospect Theory (Walmsley & Gilbey, 2020) as a connection to probability (e.g., the likelihood of infection with the coronavirus) and severity (the significance of harm of the injury caused by the infection) can be established. A complete list of the questions addressing general student health behaviors such as vaccination uptake and preventative medical screenings and more detail about the independent variables *Vax Flu*, *Vax HPV*, and *General Health Behaviors* is available in Appendix C, ACHA Survey Questions.

General Health Behavior Preventative Medical Screening

Question N3Q55A *Within the last 12 months, have you visited any medical provider (for example: a nurse practitioner, physician assistant, primary care doctor, or other type of medical doctor) for a check-up or any other medical reasons?* (NCHA III Core Survey, C. Kukich, personal communication, April 14, 2022, p. 47) provided a high-level indication of a health behavior and were easy-to-answer questions, showing the students' efforts of achieving preventative care. In this data set, 39,019 or 62.70% of students regularly visited a medical provider for preventative medical screening, but 23,248 or 37.70% students did not (Appendix D, Table 15 Students' Preventative Medical Screening).

General Health Behavior Flu and HPV Vaccinations

The NCHA III core survey also enquired about other student vaccination behaviors, namely flu, and HPV vaccination uptakes, captured by the questions N3Q61 *The Human Papillomavirus (HPV) vaccine (for example: Gardasil, Silgard, or Cervarix) is recommended, but usually not required, and is given in a series of 2 or 3 shots based on your age. Which of the following best describes your vaccination status for HPV?* (NCHA III Codebook, C. Kukich, personal communication, April 14, 2022, p. 50) and N3Q62 *Did you have a flu vaccine within the last 12 months?* (NCHA III Codebook, C. Kukich, personal communication, April 14, 2022, p. 51). These variables pertaining to general vaccination behaviors were chosen as they may provide insight into whether general vaccine hesitancy was present or if vaccine hesitancy was related to concerns surrounding COVID-19, as previously outlined in the literature review. Prior work (Motta et al., 2021) suggested the possibility of a distinction between general non-

vaccinators and COVID-19 non-vaccinators. Additionally, NFID (2016) and Marcell and Spurlock (2020) expressed concerns about whether flu vaccination uptake could indicate COVID-19 vaccination behavior.

In this data set, 30,859 (49.60%) and 31,632 (50.80%) students received the flu and HPV vaccination, respectively, while 31,408 (50.40%) did not receive the flu shot, and 30,635 (49.20%) did not obtain the HPV series (Appendix D, Table 16 Last 12 Month Flu Vaccine, Table 17 Students' HPV Vaccination Status, and Table 18 Flu And HPV Vaccination Uptake)⁹. It should be noted that only 18,629 students received both the Flu and HPV vaccination (Appendix D, Table 18 Combination Flu and HPV Uptake).

Independent Variables COVID-19 Risk Severity and COVID-19 Risk Probability

Multiple questions addressing COVID-19 behaviors were included in the NCHA III COVID-19 Questions. For example, the inquiries addressed the student's health status (*QCOVID1 Have you ever had COVID-19 (the novel coronavirus disease)?*) (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 1). The main independent variables *COVID-19 Risk Severity* and *COVID-19 Risk Probability* were derived from selecting a question addressing students' feelings about COVID-19 and students' behaviors dealing with the pandemic, excluding COVID-19 vaccination status.

⁹ *Vax Flu* and *Vax HPV* variables were derived from questions regarding the student's vaccination status, which could be answered with several responses. Questions related to the flu vaccination could be answered with *Yes* (2), *No* (1), or *I don't know* (3). HPV vaccines are given in a series; survey questions addressed the completion status (not received HPV vaccines (1), started the series (2), completed the series (3), did not complete (4)) (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022). All responses coded other than *Yes* for *N3Q61 Which of the following best describes your vaccination status for HPV?* or *N3Q62 Did you have a flu vaccine within the last 12 months?* were recoded as *No* responses as the respective vaccination status could not be confirmed as *Yes*.

As previously outlined in Chapter 3, scholars (Attema et al., 2013, 2016; Harrington & Kerr, 2017; O’Keefe, 2012) have questioned the operationalization of risk in the health domain. Prospect Theory assumed that gain frames were suitable for prevention behaviors (low risk) and loss frames for detection behaviors (high risk). However, it appeared that the reverse was true, as gain frames for risk-seeking behaviors and loss frames for risk aversive actions were more prevalent in the health domain. Harrington and Kerr (2017) further pointed out that severity might not be significant when making risky choices. Prospect Theory also operationalized risk as certainty, whereas risk should be operationalized as certainty and severity in the health domain. COVID-19 is a highly contagious disease that varies in presenting its symptoms and severity levels. That is to say, conceivably, it could be highly likely that one could contract the disease, but the likelihood of severity might vary. Consequently, in the context of decision-making under risk and concerning COVID-19, both severity and certainty variables should be considered in the multiple regression analysis.

COVID-19 Risk Probability

Jervis (2004) outlined that losses have a more significant psychological impact than gains; individuals may act subjectively irrationally to avoid risk and perceived losses. In addition, reference points affected risk perception (Jervis, 2004; Schwartz et al., 2008) as individuals may use mental shortcuts to justify and simplify their actions. As Wise et al. (2020) established, individuals’ optimism bias was prevalent, expecting not to succumb to COVID-19.

Survey question *QCOVID13 Over the past 30 days, on average, how much have you been concerned with the following?* addressed various perceptions regarding the risks

coronavirus infections may cause. This question did not change throughout the three survey periods. Participants expressed their levels of concern on a five-point Likert scale ranging from *Not concerned at all (1)*, *Slightly concerned (2)*, *Moderately concerned (3)*, *Very concerned (4)* to *Extremely concerned (5)* (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 7). Among the seven answer choices, students had the choice of answering, *That you will get COVID-19 (QCOVID13B)* or *That you will get*

*COVID-19 again (QCOVID13C)*¹⁰ (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 7). In this data set, 14,954 (24.00%) of students were *Not concerned at all*, 17,128 (27.50%) were *slightly concerned*, and 15,464 (24.80%) were *moderately concerned*. Only 8,279 (14.00%) of the student population reported their concern level as *very concerned*, and 5,992 (9.60%) were *extremely concerned* (Appendix D, Table 20 Students' Concern With Contracting COVID-19, and Table 21 COVID-19 ReInfection Fear).

COVID-19 Risk Severity

Concerns about the dangers resulting from an infection with the coronavirus were also included in *QCOVID13 Over the past 30 days, on average, how much have you been concerned with the following?* The answer *Someone you care about will die from COVID-19 (QCOVID13E)* addressed individuals' concerns of how the pandemic would affect the individuals themselves should they experience the worst outcome of a COVID-

¹⁰ Both choices capture students' concern of contracting the coronavirus. In order to capture both the fear of being infected and being infected again, I combined *QCOVID13B* and *QCOVID13C* into *COVID19ReInfectionFear*. More detail is available in Appendix D Table 20, Students' Concern with Contracting COVID-19. Similarly to other recoded and combined variables, larger counts of missing responses are due to the phrasing of the question and selection of the follow-up questions: if students had never been infected with COVID-19, they would not respond to a question regarding the reinfection with the virus.

19 infection – death – the loss of loved ones (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 8). In this data set, 11,679 (18.80%) of students were *not concerned at all*, 13,629 (21.90%) were *slightly concerned*, and 11,579 (18.60%) were *moderately concerned*. Finally, 10,888 (17.50%) of the student population reported their concern level as *very concerned*, and 14,492 (23.30%) were *extremely concerned* (Appendix D, Table 22 Students' Concern with Someone Dying from COVID-19). Descriptive statistics are presented in Table 4, Descriptive Statistics Independent Variables, including reference groups.

Table 4 Descriptive Statistics Independent Variables

Independent Variables	Mean	SD
Biological sex female	0.71	0.46
Biological sex male	0.29	0.46
Biological sex intersex	0.00	0.01
Not in a relationship	0.58	0.49
In a relationship	0.42	0.49
Not a parent or caregiver	0.99	0.12
A parent or caregiver	0.01	0.12
Participated in preventative medical screening	0.63	0.48
Did not participate in preventative medical screening	0.37	0.48
Have health insurance coverage	0.96	0.21
Unsure of health insurance coverage status	0.01	0.12
Do not have health insurance coverage	0.03	0.17
Vaccinated against Flu	0.50	0.50
Not vaccinated against Flu	0.50	0.50
Vaccinated against HPV	0.51	0.50
Not vaccinated against HPV	0.49	0.50
SES Very low food security	0.17	0.37
SES Low food security	0.24	0.42
SES High food security	0.60	0.49
SES No or some parental education	0.33	0.47
SES Post-secondary parental education	0.39	0.49
SES Advanced post-secondary parental education	0.28	0.45
Risk Severity not concerned at all	0.19	0.39
Risk Severity slightly concerned	0.22	0.41
Risk Severity moderately concerned	0.19	0.39
Risk Severity very concerned	0.17	0.38
Risk Severity extremely concerned	0.23	0.42
Risk Probability Re(infection) not concerned at all	0.24	0.43
Risk Probability Re(infection) slightly concerned	0.28	0.45
Risk Probability Re(infection) moderately concerned	0.25	0.43
Risk Probability Re(infection) very concerned	0.14	0.35
Risk Probability Re(infection) extremely concerned	0.10	0.29
Total cases		62,267

CHAPTER 5: ANALYSIS, FINDINGS, AND DISCUSSION

Filtering and recoding the extensive NCHA III survey of 143,066 cases for the survey periods Fall 2020, Spring 2021, and Fall 2021 reduced the data set to 62,267 cases. Chapter 4 outlined the recoding and filtering process to adjust the parameters and remove cases with missing values. Chapter 5 presents the data analysis and findings, starting with a review of binary logistic regression and odds ratio analysis, a demographic overview addressing coronavirus vaccination behavior, and the students' fear of infection.

Quantitative Analysis through Binary Logistic Regression and Odds Ratio Analysis

The quantitative section of the dissertation entailed a single logistic regression model to estimate the impacts of various student behaviors such as general health behaviors, demographics, and COVID-19-related behaviors on students' decision to vaccinate against the coronavirus. Specifically, I employed binary logistic regression as the dependent variable *COVID-19 Vaccination* is a dichotomous variable, allowing only for *yes* or *no* answers (Berman & Wang, 2012; Laerd, n.d.): students were vaccinated against COVID-19 (*yes*), or they were not (*no*).

The binary logistic regression equation reads as follows:

$$\log(P1/1-P1) = B_0 + B_1X_1 + \dots + B_KX_K$$

where $\log(P1/1-P1)$ are expressed as the odds where B_i is the regression coefficient and X_i is the predictor variable. This analysis method was also applicable for the independent variables taking on dichotomous or categorical characteristics: for

example, *yes* or *no* as an answer to the variable *VaxFlu* or multiple categorical choices for *SES Measured by Food Insecurity* ((1) *Very low food security* (5-6), (2) *Low food security* (2-4), or (3) *High or marginal food security* (0-1) (NCHA III Codebook, C. Kukich, personal communication, April 14, 2022). As indicated by the regression equation above, binary logistic regression uses probabilities and odds to predict outcomes and relationships between variables. As Cooper et al. (2016, p.66) outlined, “probability is the mathematical likelihood of something occurring” and is expressed as

$$P(A) = \frac{\text{number of ways the event can occur}}{\text{total number of possible outcomes.}}$$

Odds are then the ratio of the probability of an event occurring or not occurring and are expressed as

$$\text{Odds Ratio} = \frac{\text{Probability Event Occurs (p)}}{\text{Probability Event Does Not Occur (1-p)}}$$

Odds ratios are conditional as they relate to the independent variables being applied to the equations. In other words, the independent variable drives the odds. Berman and Wang (2012) further illustrated a comparative odds ratio analysis where two groups (including the reference group) were compared with each other. The statistical program SPSS calculates the odds ratio as part of the regression analysis and displays the outcome as $\text{Exp}(B)$ in comparison with the reference group.

The odds ratio refers to the likelihood of the occurrence or non-occurrence of an event. In this analysis, the event would be whether students received the COVID-19 vaccination compared to a predictor variable’s reference group. Of importance is the odds ratio of 1 – if the odds ratio is above 1, it is more likely that the event will occur. In

contrast, an odds ratio below 1 makes the event less likely to occur. However, odds ratios of exactly 1 indicate no difference when comparing the effect of the covariates (Babbie, 2013; Berman & Wang, 2012). This regression analysis dealt with both dichotomous independent variables (*biological sex, relationship status, parenting status, preventative medical screening, flu, and HPV vaccination*) and continuous independent variables (*SES Measured by Food Security, Parental Educational Attainment, Health Insurance Coverage, COVID-19 Risk Probability, and COVID-19 Risk Severity*). Therefore, the interpretation of the odds ratio for the continuous independent variables' effect on the dependent variable differed from the dichotomous independent variables' effect on the dependent variable.

It is important to emphasize that probability and odds ratios are not the same. Odds ratios compare occurrence with non-occurrence and probabilities compare the occurrence ratio to the whole and considers possible outcomes (Berman & Wang, 2012; Cooper et al. 2016):

$$\textit{Probability} = \textit{Favorable Outcome} / \textit{Total Outcome}$$

$$\textit{Odds} = \textit{Favorable Outcome} / \textit{Unfavorable Outcome}$$

For the scope of this study, odds ratio analysis was used as a comparison between two or more groups (e.g., female vs. male students or very low SES vs. low SES vs. high SES resulting in an odds calculation), including the reference group. All variables were tested in a single model in order to prevent omitted variable bias.

Findings and Discussion

The binary logistic regression and odds ratio analysis results are presented in Table 5, Binary Logistic Regression – Single Model, listing the coefficient and the odds

ratio $\text{Exp}(B)$. Several variables delivered results as hypothesized. Others, however, left room for discussion and consideration for future research and analysis. All variables were statistically significant predictors of the *COVID-19 vaccination* behavior, with the exceptions of *Biological Sex (Intersex)*, *SES Measured by Food Security (Low Food Security)*, *Health Insurance Coverage (No)*, and *Health Insurance Coverage (Unsure)*.

Table 5 Binary Logistic Regression – Single Model

Variable	B	.E.	xp(B)	E
Biological sex Female	***			
Biological sex Male	0.22***	.02	.24	1
Biological sex Intersex	-0.47	.59	.62	0
Relationship Status Not in a Relationship	0.15***	.02	.16	1
Parent-Caregiver No	0.64***	.07	.90	1
USDA Food Security Category Very Low Food Security	***			
USDA Food Security Category Low food security	0.02	.03	.02	1
USDA Food Security Category High or Marginal Food Security	0.14***	.03	.14	1
ParentalEduAttainment No HS/ HS/GED/ Some College/ Unknown	***			
ParentalEduAttainment Associate's/ Bachelor's/ Trade/Technical	0.22***	.02	.25	1
ParentalEduAttainment Master's/ Doctoral/ Professional	0.61***	.03	.84	1
HealthInsuranceCoverage Yes	*			
HealthInsuranceCoverage No	-0.02	.05	.98	0
HealthInsuranceCoverage Unsure	-0.17	.07	.84	0
Last 12 months: visited medical provider No	-0.18***	.02	.83	0
Variable	B	.E.	xp(B)	E
VaxFlu No	-0.75***	.02	.47	0

VaxHPV No	-0.43***			0
		.02	.65	
COVID-19ReInfectionFear Not concerned at all	***			
COVID-19ReInfectionFear Slightly concerned	0.72***			2
		.03	.05	
COVID-19ReInfectionFear Moderately concerned	0.95***			2
		.03	.58	
COVID-19ReInfectionFear Very concerned	1.08***			2
		.04	.94	
COVID-19ReInfectionFear Extremely concerned	1.22***			3
		.04	.38	
Over the past 30 days, on average, how much have you been concerned with the following?-Someone you care about will die from COVID-19 Not concerned at all	***			
... Slightly concerned	0.12***			1
		.03	.13	
...Moderately concerned	0.12***			1
		.03	.13	
... Very concerned	0.16***			1
		.03	.17	
... Extremely concerned	0.181***			1
		.03	.20	
Constant	-0.41***			0
		.08	.67	
Total Cases	62,267			

*p<0.1, **p<0.05, ***p<0.01

Variable(s) entered on step 1: *Biological sex, RelationshipStatus, Parent, USDA Food Security Category, ParentalEduAttainment, HealthInsuranceCoverage, Last 12 months: visited medical provider, VaxFlu, VaxHPV, COVID-19ReInfectionFear, Over the past 30 days, on average, how much have you been concerned with the following?-Someone you care about will die from COVID-19.*

Hypothesis Group 1 – Demographic Characteristics

For H-1.1, the statistically significant findings suggested that when comparing the COVID-19 vaccination behavior of male college students against the reference group of female students, male students were 1.24 times more likely to receive the shot. In other words, the chances that male students would be vaccinated increased by 24.10%. Contrary to the expected finding, that female students would be more likely to receive the

COVID-19 vaccination, the findings showed that H-1.1 could not be confirmed. Prior research had established that female students showed greater protective health behaviors than men (Deluga et al., 2018; Lonquist et al., 1992; Weiss et al., 1990). This finding, however, was in line with the result produced by Brunson et al. (2021), who established in their survey of 614 students that female students would be less willing to obtain the vaccination than male students.

H-1.2 posited that students in relationships would be more likely to exhibit positive COVID-19 vaccination behavior when compared to single students. Similarly, H-1.3 theorized that students with caregiver responsibilities would be more likely to receive the COVID-19 vaccination than students without caregiving responsibilities. However, the regression analysis for H-1.2 revealed that single people were 16.30% more likely to get the shot. The analysis of H-1.3 delivered similar, surprising results. Nevertheless, this hypothesis was also not confirmed. Individuals without caregiving responsibilities were 1.90 (or 90.30%) more likely to get the shot when compared to student parents and caregivers. The findings, both for H-1.2 and H-1.3, did not align with prior research about health behaviors in context with demographics and social interactions (Deluga et al., 2018; Lau, et al., 1986; Lewicka et al., 2013). Indeed, being a caregiver, in a relationship, or both may pose demands on one's time, keeping in mind that attending college simultaneously may also require a time commitment. Therefore, one could theorize that, despite the fact that many campuses provided the shots, individuals may not have had time to visit medical offices, especially if students' may have multiple, conflicting commitments.

H-1.4 produced statistically significant findings. When comparing the COVID-19 vaccination behavior of students experiencing high levels of food security with the reference group of students experiencing very low levels of food security, the odds ratio indicated that for every unit that was moved up on the predictor variable (*SES Measured by Food Security*), the odds of receiving a vaccination increased by 1.14. In other words, it was 14.40% more likely that students experiencing high food security would receive the COVID-19 shot than students experiencing very low food security. The result of this analysis confirmed the hypothesis, in line with Wolaver and Doces' (2021) finding that risk-framing pertaining to COVID-19 had a more significant effect on individuals and families of higher socio-economic standing. On the other hand, Motta et al. (2021) argued that occupations exposed to greater risk levels would be more receptive to messaging encouraging the shot. Therefore, it would also make sense that individuals deemed essential workers during the pandemic might have worked in professions associated with lower socio-economic standings to support themselves, such as sanitation services and retail. The question remains – why would students of lower socio-economic standing be less inclined to obtain the vaccine?

Statistically significant findings confirmed H-1.4 related to parental educational attainment. When comparing the COVID-19 vaccination behavior of students whose parents obtained a post-secondary degree with the reference group of students whose parents did not earn post-secondary degrees, the odds ratio indicated that for every unit that is moved up on the predictor variable (*Parental Educational Attainment*), the odds increased by 1.25. In other words, it was 24.50% more likely that students whose parents

earned a post-secondary receive the COVID-19 shot than students whose parents have not finished high school or had some college education.

These statistically significant findings for H-1.4 also applied to the next unit of the predictor variable (advanced post-secondary degrees such as Master's, Doctoral, and Professional degrees). When comparing the COVID-19 vaccination behavior of students whose parents obtained advanced post-secondary degrees with the reference group of students whose parents earned no post-secondary degrees, the odds ratio indicated that for every unit that is moved up on the predictor variable (*Parental Educational Attainment*), the odds increased by 1.84. That is to say, it was 84% more likely that students whose parents earned advanced post-secondary degrees received the COVID-19 shot than students whose parents have not finished high school or had some college education. These results established an association between parents' educational attainment and their children's willingness to receive the COVID-19 vaccination. It would then make sense that parents' role modeling would have a positive effect on their children, as indicated by previous literature: Cutler and Lleras-Muney (2010) established that educational attainment improved protective health behaviors. Better-educated individuals would also have the financial resources for health care provisions. Similarly, Motta and Goren (2020) found college-educated individuals were more inclined to engage in behaviors supporting community health.

The findings for H-1.5 were not statistically significant, therefore confirming H-1.5, which posited that the availability of health insurance coverage should not affect the willingness to receive the COVID-19 vaccination. Nevertheless, individuals without health insurance coverage or unsure of their coverage status were 1.80% and 15.90% less

likely to get for the coronavirus vaccination. Visiting medical professionals to obtain preventative screenings may not only address the immediate problem but may also aid in the improvement of health literacy (Baker, 2006; Bröder et al., 2017; Nutbeam et al., 2018), increasing advocacy for oneself. Although a statistically non-significant finding, one may wonder why medical care at no-cost is still underutilized. Cutler and Lleras-Muney (2010) found similar results in their study when addressing no-cost care provisions. Common sense may dictate that even with no-cost preventative care provision, other outlays such as time spent at the medical office, travel time, travel cost, and other expenses related to medical appointments may be a consideration. It would also make sense that individuals of lower economic standing may not have (some of) the resources listed above. As Bruce et al. (2022), Saegert et al. (2007), Lee et al. (2021), and Seivwright et al. (2020) established SES is multi-dimensional: the lack of resources in one dimension may influence others. However, college students should be able to obtain the shot on campus through their campus health departments. Therefore, such barriers may not be applicable in the context of this study.

Hypothesis Group 2 – Health Behaviors

Preventative medical screening (H-2.1) was also a statistically significant indicator of receiving the COVID-19 vaccination. Students who were not regularly receiving preventative medical screenings were 16.80% less likely to receive the coronavirus vaccination when compared to students participating in preventative care. The results of this analysis confirmed the hypothesis and affirmed previous scholarship (Lonnquist et al., 1992; Norman, 1995; Short & Mollborn, 2015; Weiss & Larsen, 1990). Bröder et al. (2017) pointed out that basic health-related skills, including comprehension

and application of medical information, are vital components of participatory health behaviors. Involvement in positive health behaviors (Flanagan & Levine, 2010) also may pave the way for the students' continued contribution to the health system, both through monetary contributions and personal, physical participation in medical care (Palumbo, 2017).

Hypotheses H-2.2 and H-2.3 posited that students receiving both flu and HPV vaccinations would be more likely to receive the COVID-19 shot, which was confirmed by the statistically significant results. Students who did not receive the flu or HPV vaccine were 52.70% and 34.60%, respectively, less likely to receive the COVID-19 shot. These conclusions also align with Brunson et al.'s 2021 findings, which established through their survey that the odds for students vaccinated against the flu were 2.61 times higher than for students not vaccinated against the flu. The results of this analysis were promising as Marcell and Spurlock (2020) and NFID (2016) pointed out that low flu vaccination rates in similar age groups might indicate low participation in COVID-19 vaccinations. However, students' COVID-19 vaccination uptake outpaced flu and HPV vaccinations, as shown below in Figure 8 Comparative Vaccination Uptake.

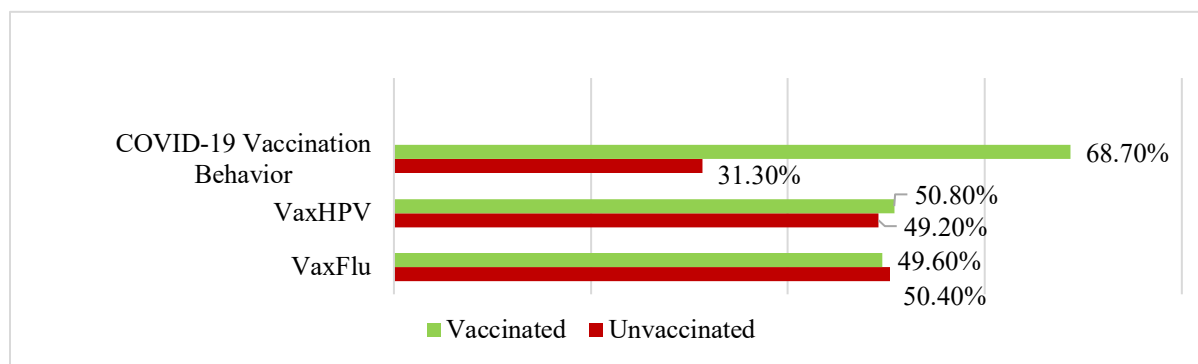


Figure 8 Comparative Vaccination Uptake

More students have been vaccinated against COVID-19 (68.70%) compared to flu vaccinations (49.60%) and the HPV series (50.80%). Undoubtedly, these percentages could slightly vary if a more liberal coding schedule were to be applied, such as coding only definite *no* answers as *no*. For this analysis, only definite *yes* answers or other affirmative statements were coded as *yes*. However, it was evident that students may have considered COVID-19 a greater health risk than other infectious diseases. This behavior then poses the question of what message was received by students to consider the subjective importance of the coronavirus shot.

As outlined in Chapter 4, greater concern levels (78.32%) were prevalent among students vaccinated against COVID-19; presumably, being protected from COVID-19 through the shot should have eased some concerns regarding the possibility and severity of the infection. However, student concerns still existed and will need to be explored further to determine the root of students' concerns. Unvaccinated students were still worried about infection with the coronavirus disease, but what were the reasons they would opt against the vaccine? Motta et al. (2021) had previously found that not all vaccination contrarians are alike – some individuals distrust science, but individuals accepting standard vaccinations may refuse the coronavirus shot. Interestingly, students may be opposed to vaccinations such as the flu and HPV shots but not COVID-19, as evidenced by the flu, HPV, and COVID-19 shot uptakes.

Hypothesis Group 3 – Risk Severity and Risk Probability

Statistically significant findings confirmed H-3, which suggested that a student's perceived high (low) risk severity and high (low) risk probability is positively (negatively) associated with receiving the COVID-19 vaccination. When comparing the

COVID-19 vaccination behavior of students who were *slightly concerned* about being infected or reinfected with COVID-19 with the reference group of *not concerned at all*, the odds ratio indicated that for every unit that was moved up on the predictor variable (*COVID-19ReInfectionFear*), the odds increased by 2.05. In other words, it was 105.20% more likely that students who were *slightly concerned* about getting (re)infected would receive the COVID-19 vaccination. In addition, when moving up a unit on the predictor, the odds continuously increased from 2.58 to 2.94 to 3.38. Moving from *not concerned at all* to *slightly concerned* showed an increase of 105.20%, an increase of 158.30% when compared to *moderately concerned*, an increase of 194.20% when compared to *very concerned*, and finally, an increase of 237.90% when compared to *extremely concerned*.

Results for the predictor variable *COVID-19 Risk Severity* also showed increased odds when increasing a unit on the predictor variable. When comparing the COVID-19 vaccination behavior of students who were *slightly concerned* about loved ones dying from COVID-19 and the impacts of their death on the students with the reference group of *not concerned at all*, the odds ratio indicated that for every unit that was moved up on the predictor variable (*COVID19-Risk Severity*), the odds increased by 1.13. In other words, it was 13.00% more likely that students who were *slightly concerned* about the death of their loved ones would receive the COVID-19 vaccination. Additionally, when moving one unit on the predictor, the odds continuously increased from 1.13 to 1.17 to 1.19. Moving from *not concerned at all* to *slightly concerned* resulted in an increase of 13.00%, an increase of 12.80% when compared to *moderately concerned*, an increase of 17.10% when compared with *very concerned*, and finally, an increase of 19.80% when compared with *extremely concerned*.

Prior research by Harrington and Kerr (2017) and O’Keefe (2012) concluded that risk should be operationalized based on probability in the health domain. Given that COVID-19 is a highly contagious disease, infections are highly likely. However, once exposed and infected, the severity of the illness is unknown: people may be asymptomatic or have subjectively milder forms of the coronavirus disease. Therefore, I argued that the perceived risk associated with exposure to COVID-19 should be viewed through the lens of severity and probability. However, at first glance, it appeared that the probability component operationalized by the variable *COVID-19ReInfectionFear* had a more significant effect on receiving the COVID-19 vaccination and would confirm prior findings pertaining to the importance of the probability component. A comparison between the overall odds of the probability element *COVID-19ReInfectionFear* with the severity element *COVID-19 Risk Severity* showed that the odds for the probability element increased to 237.90% for the *extremely concerned* group. The odds for the severity component for the “extremely concerned” group resulted in 19.80%, as outlined below in Figure 9 Risk Severity and Risk Probability Odds Comparison.

In general, risk probability odds were more than double risk severity odds. Similar to Harrington and Kerr’s (2017) suggestion that perceived likelihood may have a greater effect than probability, Tversky and Kahneman (1992) and Jervis (2004) outlined, that the Certainty Effect or the likelihood of occurrence may be a crucial consideration when addressing the probability of (re)infection. It appears that students placed greater importance on the probability component of H-3. Optimism bias (Wise et al., 2020) – the underestimation of the risk of infection may not be present; therefore, students may be more likely to get the shot.

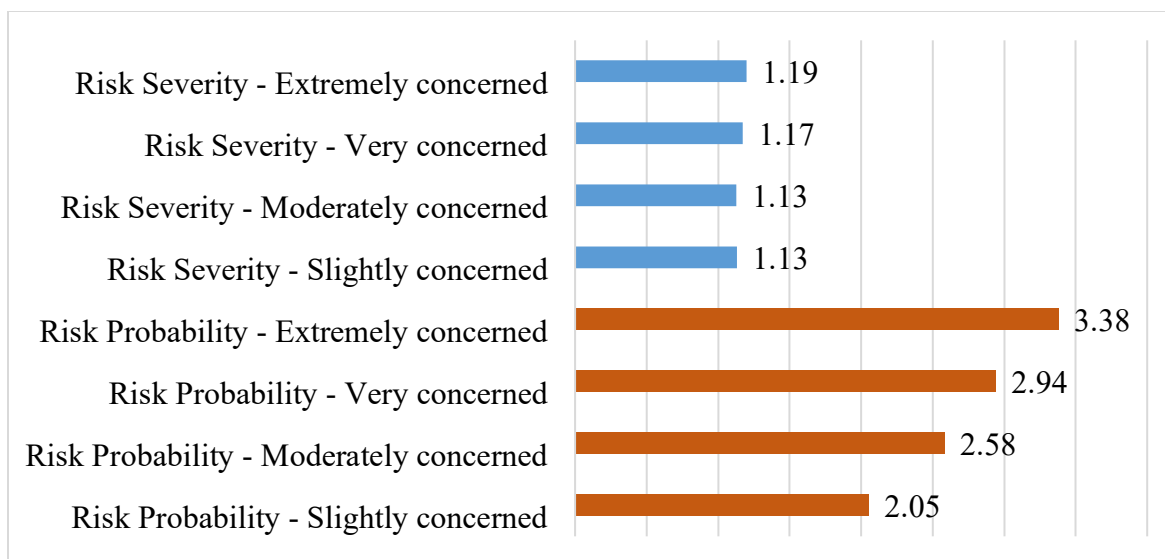


Figure 9 Risk Severity and Risk Probability Odds Comparison

The preceding data analysis and interpretation of the findings confirmed posited hypotheses but also generated more questions. What is affecting the regression analysis when the outcomes did not align with expectations? What is the profile of a student most likely to receive the vaccine? In particular, findings for H-1.1, H-1.2, and H-1.3 were in contrast with prior research, and notably, the difference between COVID-19 vaccination and HPV and flu shot uptakes warrants follow-up. H-3 related to risk severity and risk probability also produced unexpected results considering the hypothesis; however, these findings were in line with the literature. Chapter 6, the final chapter of this manuscript, addresses implications for practice and outlines opportunities for future works.

CHAPTER 6: CONSIDERATIONS FOR FUTURE RESEARCH AND CONCLUSION

My dissertation, guided by the question, *What determinants are associated with college students' decisions to vaccinate against the COVID-19 virus?* attempted to shed light on the behavior of 18-24-year-old college students enrolled in public four-year institutions. I initially expected that my analysis would confirm the proposed hypotheses and that the findings could aid in addressing student health behaviors through messaging and policy intervention, improving individual health behaviors and community health. However, as discussed in Chapter 5, some of the analyses delivered surprising results, demanding follow-up. Indeed, subsequent work investigating these results could provide greater insight to allow for improved policy toolkits for targeted messaging and increased awareness of the outcomes of individual and community health behaviors.

Considerations for Future Research

Although the regression analysis produced valuable insights, mainly related to the comparative vaccination behavior of college students, there are opportunities to expand this work. Even though quantitative work allows for the analysis of large data sets, the regression output created room for additional questions. Specifically, in light of the findings pertaining to COVID-19 vaccination behavior, one ponders: why were students who expressed various levels of concern about contracting the coronavirus forgoing the vaccination? As outlined in Chapter 4, greater concern levels were also prevalent among COVID-19 vaccinated students, but this then poses the question if students were anxious about the shot's efficacy, still facing the possibility of contracting the virus.

Unvaccinated students were also worried about infection with the coronavirus disease, but what was the reason they opted against receiving the vaccine? Students have generally been receptive to the COVID-19 vaccination as the study revealed higher uptakes than flu and HPV shots, as shown in Chapter 5. In addition, further investigation could include analysis addressing the vaccination behaviors of specific demographic subgroups present in this sample. Such subset analysis could reveal specific behaviors and may be used to address and solve challenges experienced by these subgroups. In order to further confirm this finding, a successive analysis with the inclusion of the Spring 2022, Fall 2022, and Spring 2023 data could be conducted. Presumably, the question regarding students' COVID-19 vaccination status has not changed since the Fall 2021 survey cycle. Therefore, it would be reasonable to combine Fall 2021, Spring 2022, Fall 2022, and Spring 2023 data into a data set that does not require the recoding of student answers that are not affirmative. This approach would then eliminate inadvertently introduced coding bias.

Bröder et al. (2017) pointed out that the behaviors of young adults may be influenced by parents, peers, family members, or other outside influences. It appears that some messages and framing may have reached 18-24-year-old college students as many members of that population participated in preventative health measures related to COVID-19. It would be enlightening to discover what messages and messengers attributed to this positive health behavior.

One may speculate that the coronavirus disease received greater attention than other infectious diseases such as the flu and HPV because of its novelty and its severe, contemporaneous impacts on individuals. In other words, COVID-19 may have posed

immediate threats to people, whereas cancers potentially prevented by the HPV shot could be considered future concerns. The flu may have also been perceived as somewhat normalized, being presented by medical professionals as a recurring disease. The available data and the present analysis do not offer more insight on these issues.

Were messaging and framing used to improve health literacy related to the coronavirus disease? If and how were students encouraged to receive the shot? Why is this vaccination behavior different from HPV and flu vaccination? In order to reduce the spread of the coronavirus disease, it would be vital to determine what mechanisms aided in students' participation in vaccination programs. Qualitative study using this data as a point of launch may address some of these questions.

In addition, more research regarding *COVID-19 Risk Severity* and *COVID-19 Risk Probability* should occur. There is a caveat concerning the variable *COVID-19 Risk Severity*. This variable was operationalized by using a question pertaining to the loss of a loved one: *Over the past 30 days, on average, how much have you been concerned with the following?* (NCHA III COVID-19 Questions, C. Kukich, personal communication, April 14, 2022, p. 8). This variable was selected as it seemed to be the best, albeit not perfect, fit for this context. The reasoning behind selecting this variable was the assumption that one of the worst experiences people encounter is the death of a loved one. Such loss could then have profound impacts on the individual.

The risk severity component should be re-conceptualized by creating a variable better targeted toward perceived risk severity. Campos-Vazquez and Cuiilty (2014) discovered that – although in the monetary domain – older individuals were more risk-seeking than younger populations, potentially as a function of life experience. It does

appear that young adults may have had a lower risk perception as the odds of losing a loved one were lower than the odds of the students being (re)infected with COVID-19. If young college students may not have yet experienced the loss of a loved one, reference points, and loss aversion components may not be present in their assessment. Again, a nuanced quantitative design may provide more insight. In addition, these results pose the question of whether the severity component is even needed, as the findings supported previous literature but not my hypothesis requiring both components.

Scholars have conducted research addressing governmental responses, policy-making, and policy implementation in response to the COVID-19 pandemic. Political behavior and leadership, values, and ideologies are vital components of the responses to the pandemic, as outlined by the works of Adolph et al. (2021), Druckman et al. (2021), and Roberts and Utych (2021). Case and colleagues (2021) debated whether political affiliation would drive message framing and the subsequent responses. Ideologies, combined with personality traits of political leaders and citizens, might direct policy and policy responses. Nevertheless, political behavior and party affiliation may significantly influence protective health behaviors such as vaccinating against the coronavirus. Brunson et al.'s (2021) findings support this thought process. Republican students were less likely to get the COVID-19 vaccination, stating reasons such as conspiracy theories, doubting the existence of the pandemic, and COVID-19 being a media hoax.

According to Wolaver and Doces (2021), framing bias as a function of political membership did not influence risk aversion behaviors, such as getting vaccinations; however, interactions due to age were present. Case et al. (2021) also addressed the component of expert opinion – the presentation of facts related to COVID-19 by medical

or sources – and its impact on citizens but did not find that expert messaging was a contributing factor of citizen behaviors. For this study, ideology and expert messaging were not a consideration, as data related to these aspects were unavailable. However, these factors may promote additional work investigating the interaction of ideology, expert messaging, age and political membership on university campuses, as students' political affiliation may not align with the states' political affiliation. In addition, students might be more receptive to expert messaging, given the educational surroundings. Finally, ideology may be linked to certain socio-economic indicators, ultimately influencing health behaviors. This link should be further explored.

The focus of the NCHA III survey is on student health behaviors. So, unsurprisingly, the data did not deliver information about political behaviors such as affiliation with political parties. Furthermore, due to confidentiality and the protection of institutional and student participants, the participating campuses were grouped into four geographic regions, not identifying states or institutions. In addition, students might be residents of one state and attend school in an entirely different part of the country, possibly allowing for a mismatch of states' and students' political leaning. Subsequent work should include the component of political behavior. Geographical location and campus-specific studies would have to be completed to achieve greater insight.

Targeted surveys, interviews, or focus groups in smaller settings may provide better answers to these questions, especially with qualitative analysis of open-ended responses. For example, surveys could follow up on findings such as the vaccination uptake of the coronavirus shot compared with flu and HPV vaccinations and the students' political affiliation, answering the “why” and “why not.”

In conclusion, the existing data set could be used to conduct further analysis regarding the vaccination behavior of college students – the original NCHA III data consist of 143,066 cases, including students attending private institutions. Comparative analyses between students attending private and public institutions could be conducted; expanding the student group to include students older than 24 years may produce additional insights. Additionally, a subset of 14,928 students reported COVID-19 infections of varied intensities, possibly changing the regression output if the analysis were limited to this population.

Conclusion

Health services should be readily accessible to all individuals. Public health systems function as a mechanism to provide citizens with fair, universal, and equal access, regardless of the individuals' demographic status (Palumbo, 2017), which begs the question of whether public health care resources should be considered common-pool resources or public goods. Both public goods and common-pool resources are non-excludable resources, as any individual can take advantage of the resources. However, public goods allow consumption without reducing availability (non-rivalrous), whereas common-pool resources decrease availability for others (rivalrous). Nevertheless, the exclusion of users would be costly, but exploitation by users reduces availability for others. The short-term interests of a few may outweigh the long-term interests of many; the use of resources by one reduces the quantity, and usage by others adds degradation to a resource (Ostrom et al., 1999).

The threat of availability may increase the usage rate of the resource – it may disappear faster. At the same time, the rapid inclusion of users can stress resources

resulting in challenges in finding rules that accommodate multiple systems of users and resources (Ostrom et al., 1999). E.g., public health systems are funded through taxation as a function of the population to produce taxable income. In turn, this income generation depends on the individuals' ability to be productive and contribute to the public health system. However, individuals of poor health may not be able to contribute to the system but use its resources (Palumbo, 2017). At the same time, unnecessary costs put additional stress on the health system. For example, Pike et al. (2020) analyzed the University of Washington Mumps Outbreak in 2017: forty-two infectious cases, among mainly Greek members, resulted in expenditures of \$282,762 dealing with this outbreak. Pike et al. (2020) leaned on CDC reporting that mumps infections have been increasing since 2012, mostly on college campuses and affecting young adults.

Despite Palumbo (2017) voicing concern about classifying health services as common-pool resources and the potential rationing of services, in the event of a crisis, such rationing may occur: on September 16, 2021, the Idaho Department of Health and Welfare (IDHW) declared Crisis Standards of Care, which are enacted when public health emergencies occur. IDHW's statement read, "Idaho COVID-19 hospitalizations, largely of unvaccinated individuals, continues to climb to record levels. The massive surge of COVID-19 patients has exhausted the supply of staff, available beds and necessary resources to adequately address the increased demand for healthcare services" (IDHW, 2021, p.1).

The COVID-19 pandemic has been damaging to the nation's health systems. When the demand for care rapidly increases, resources are redirected to urgent needs, causing a degradation of the resource system. Collective action problems persist in the

health policy arena – individuals engage in behaviors and choose actions that counteract policy solutions that support society. If only a few individuals do not participate in public health programs, the negative effect may not be seen. However, in more significant numbers, free riding (participation without contribution), shirking (avoidance of participation), and moral hazard (lack of participation as a result of protection) may present themselves. In their 2009 work, Siegal et al. illustrate such collective action problems through case studies using vaccination programs. Participation in vaccination programs may result in a free-rider situation: if the counts of free riders are low, they still gain protection without contributing (receiving vaccinations).

As of March 6, 2023 – nearing the third year mark of the WHO’s global pandemic disaster declaration (WHO, 2020) – American deaths amounted to 1,117,856. The U.S. population showed a vaccination rate of 69.3% (230,075,934) (CDC, 2023c). In comparison, the WHO counted 6,859,093 worldwide deaths and 5,073,870,238 fully vaccinated people (WHO, n.d.-b.). Individuals are still recovering from the effects of the pandemic and are dealing with the changes the coronavirus has brought. However, despite having recovered from the immediate symptoms of the disease, people might now suffer from long-haul COVID-19 (CDC, 2022), resulting in difficulties in conducting daily life functions.

Scholars pointed out that higher education institutions might socialize young adults into considering how students’ actions impact others (Flanagan & Levine, 2010), provide tools for critical thinking, and how their citizenship contributes both through monetary participation and physical actions to the health system as a whole (Palumbo, 2017). As outlined in this manuscript, students’ higher-than-expected COVID-19

vaccination participation at 70% is promising. Students may have received messages illustrating the seriousness of the coronavirus disease. However, it is yet to be determined what such messaging entailed. If one can outline tools that aided student participation, such tools may be tailored to other contexts – or applied when the next pandemic strikes. Regardless, more work must be done to fully understand the interface of numerous factors driving health policy decisions and citizen responses. Abel and McQueen (2020) pointed out that functional health literacy is not addressing the challenges caused by the pandemic. As facts and knowledge are dynamic, individuals would benefit from improved critical health literacy. They must be able to assess information presented to them and also be able to accept recently discovered health knowledge, such as modifications of preventative behaviors. Nutbeam et al. (2018) stated that critical health literacy is vital to making individual health decisions. However, in the light of infectious diseases such as COVID-19, critical health literacy does not only affect the individual but society as a whole (Abel & McQueen, 2020). Namely, information digested by the individual and subsequent behaviors resulting from the information consumption affects others. However, due to never-ending information streams and options, critical health literacy is challenged by individuals making choices based on their understanding of health information and ideology (Abel & McQueen, 2020).

Prospect Theory has proven to be a versatile framework applicable to numerous domains. The theory's crucial factors, such as framing, anchoring, human emotions, probabilities, and loss aversion, interface with the model of health. Essential components in Prospect Theory, such as the concepts of risk severity and risk probability, are subject to framing, and reference points, to name a few. Indeed, Case et al. (2021) found that age,

media, and the opinion and norms of a group may impact that message framing; as a college campus may be a world of its own (e.g., dorm housing for the younger student population, and social activities organized by universities), messaging provided by university administration may have a substantial impact. Moreover, educational institutions do not only provide education, but they also facilitate and connect students' community experiences: e.g., volunteering and engagement in causes.

Once connections have been discovered and appropriate questions have been asked and answered, responses to such questions may provide a blueprint for policy and its implementation. Implementation relates to governance as how one governs results from formulated and implemented policies (Hill & Hupe, 2010). Implementation success is also related to transparency – are proposed policies clearly formulated, communicated, and support subsequent, anticipated outcomes? Citizens must trust institutions, believing policymakers will implement policies according to the law and the people's will. Policies and policy tools addressing community health are more effective when citizen and community agreements to support such policies are present, optimistically leading to successful policy implementation (Hill & Hupe, 2010). Implementation requires not only the participation of the bureaucrats when executing the policy in a manner prescribed by the polity, but citizen participation is also required. For instance, even state-of-art well-implemented COVID-19 vaccine policy rollouts may falter if citizens refuse to participate for various reasons. Thaler (2020) recommended nudging and rewarding as policy tools to increase vaccination uptake rates, which IHEs have attempted. However, participation in vaccine programs may still depend on citizen values – individuals valuing liberty over security may not take to the premise of being cataloged, tracked, and their

compliance rewarded. Public health policy may be at odds with individualistic citizen values. Siegal et al. (2009) called attention to the fact that non-participation endangers the existence and continuance of public goods (health), which could be combated by contribution (vaccination) or restraint.

The question remains: what environment encourages students to be proactive and obtain preventive health measures for one disease but not the others? Variables chosen for this analysis provided some understanding into student behaviors. However, other mechanisms that demographic variables could not explain may be at play: Prospect Theory and its components of severity and probability may provide further insight into the interaction of messaging to elicit desired behaviors. It would serve public health departments and university officials to determine whether or why their messaging, framing, or capacity-building fell on fertile ground.

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APPENDIX A – Overview of Prospect Theory's Findings

Overview of Prospect Theory's Findings

Author	Context	Domain/ Context	Findings
Tversky & Kahneman, 1981	Framing	Health (Asian Disease Study)	Gain frame: Lives saved – risk averse; Loss frame: Lives lost – risk-seeking;
Wise et al., 2020	Probability	Health	Optimism bias of oblivious individuals results in the underestimation by of contracting disease; Perception of greater probability that others contract the disease first; Age, or education is not subject to optimism bias;
Attema et al., 2013, 2016	Framing	Health	Assumption: Gain frames support low risk behaviors (prevention) and loss frames support high risk behaviors (detection); Findings: Gain frames support high risk behaviors (detection) and loss frames support low risk behaviors (prevention)
Schwartz et al., 2008	Reference Points/ Screening Exams	Health	Risk aversion or risk-seeking is dependent on reference points; shift of acceptable riskiness occurs
Tversky & Kahneman, 1992	Probability/ Risk Asymmetry	Monetary/ Probability	Probability of gain: Low – risk-seeking; high – risk averse; Probability of loss: Low – risk aversion; high – risk-seeking;

Author	Context	Domain/ Context	Findings
Campos-Vazquez & Cuilty, 2014	Age/ Life Expectancy	Monetary	Age informs risky behavior due to life experience; Loss domain – risk-seeking; Gain domain – risk aversion;
Campos-Vazquez & Cuilty, 2014	Framing/ Emotions	Monetary	Emotions drive risky behavior: Sadness: Gain domain – risk aversion; Sadness: Loss domain – risk-seeking; Anger: Loss domain – risk-seeking; reduced sensitivity to losses;
Jervis, 2004	Loss Aversion	Human Behavior	Risky behavior in order to avoid and recoup losses
Lerner et al., 2013	Loss Aversion	Human Emotions	Sadness leads to impatience; Desire for immediate payoff;
Walmsley & Gilbey, 2020	Probability/ Risk Asymmetry/ Reference Points	Transportation	Confirmed assumptions of Prospect Theory; Risk aversion when faced with high probability of potential gain; Risk-seeking when faced with high probability of potential losses;
Author	Context	Domain/ Context	Findings
Coffey et al., 2020	Probability/ Risk Asymmetry/ Reference Points	Education	Life time events drive behaviors; Results in high loss aversion ratio; Gains (GPA increase) outweighed losses (reduced leisure time); Reference points (performance) inform behavior (study vs. leisure)
Table created by McCann, A., (2022)			

APPENDIX B – Prospect Theory’s Framing Element Interfacing with COVID-19

Prospect Theory's Framing Element Interfacing with COVID-19

Author	Context	Findings
Case et al., 2021	Framing/ Communication	Novice or Expert communication has no impact on gain (increased health or safety) or loss (poor hygiene) messaging; Age, media, ideology, drive gain or loss behaviors
Chen et al., 2021	Framing/ Culture	Study did not confirm premise of Prospect Theory which are: Positive outcomes in gain frames when complying with recommendations; Loss framing when dealing with uncertain results; Age was a factor of receiving the vaccination
Motta, 2021	Framing/ Community Health	No partisan differences or impact based on economic framing; General attitudes towards vaccinations drive health behavior (vaccination opponent or COVID-19 vaccination opponent); Messaging related to personal and community health needed to increase vaccination uptake;

Author	Context	Findings
Gantiva et al., 2021	Framing/ Community Health	One's response to messaging results in no difference when exposed to positive or negative health messaging; Individual's perception that others would care more about economic messaging and they themselves would care more about health messaging
Bartles et al., 2010	Framing/ Trustworthiness	Risk aversion in gain framing to confirm benefits of medical intervention; Risk-seeking in loss framing when confirming adverse conditions; Positive (gain) framing of vaccination produced greater acceptance; Loss frame (potential illness) was more effective when presented with inferior vaccine product
Wolaver & Doces, 2021	Framing/ Partisanship	Demographics, older age, and higher income drive impact on risk aversion preferences;
Hameleers, 2021	Framing/ Health Promotion	Loss framing leads to risk-seeking behavior; Gain framing leads to risk aversion
Table created by McCann, A., (2022)		

APPENDIX C – ACHA Survey Questions

ACHA Survey Questions

Source: ACHA NCHA III COVID-19 Supplemental Questions (Fall 2020, Spring 2021, Fall 2021)			
Variable Name	Variable Type	Measures	Survey Questions
COVID-19 Vaccination	Dependent Variable	Dichotomous/ Nominal	<p>Depending on survey version, questions and answers may have been reworded by ACHA.</p> <p>QCOVID19 Once a vaccine is developed for COVID-19, how likely are you to get vaccinated? (Fall 2020) <i>Very likely to be vaccinated (1), Somewhat likely to be vaccinated (2), Somewhat unlikely to be vaccinated (3), Very unlikely to be vaccinated (4)</i></p> <p>QCOVID19A Once a vaccine for COVID-19 is available to you, how likely are you to get vaccinated? (Spring 2021) <i>Very likely to be vaccinated (1), Somewhat likely to be vaccinated (2), Somewhat unlikely to be vaccinated (3), Very unlikely to be vaccinated (4), I've already been vaccinated for COVID-19 (5)</i></p> <p>QCOVID19B How would you describe your COVID-19 vaccination status? (Fall 2021) <i>I have received all the injections required to be fully vaccinated against COVID-19 (1), I have started the vaccination process, but need another shot (2), I will get vaccinated as soon as possible (3), I will only get vaccinated if required (4), I will not get vaccinated (5)</i></p>
Variable Name	Variable Type	Measures	Survey Questions
			<p>Depending on survey version, questions and answers may have been reworded by ACHA. (recoded to yes or no)</p>

<p>COVID-19ReInfectionFear</p>	<p>Independent Variable</p>	<p>Categorical/ Ordinal</p>	<p>QCOVID13 Over the past 30 days, on average, how much have you been concerned with the following? 13B <i>That you will get COVID-19</i> 13C <i>That you will get COVID-19 again</i> <i>Not concerned at all (1), Slightly concerned (2), Moderately concerned (3), Very concerned (4) to Extremely concerned (5)</i> (recoded/combined)</p>
<p>COVID-19 Risk Severity Self</p>	<p>Independent Variable</p>	<p>Categorical/ Ordinal</p>	<p>QCOVID13 Over the past 30 days, on average, how much have you been concerned with the following? 13E <i>“Someone you care about will die from COVID-19 ”</i> <i>Not concerned at all (1), Slightly concerned (2), Moderately concerned (3), Very concerned (4) to Extremely concerned (5)</i></p>
<p>Source: ACHA NCHA III Core Survey</p>			
<p>Relationship Status</p>	<p>Independent Variable</p>	<p>Categorical/ Nominal</p>	<p>N3Q76 What is your relationship status? <i>Not in a relationship (1), In a relationship but not married/partnered (2), or Married/partnered (3)</i> (recoded to <i>Not in a relationship (1) or In a relationship (2)</i>)</p>

Variable Name	Variable Type	Measures	Survey Questions
Caregiver Status	Independent Variable	Dichotomous/ Nominal	N3Q85 Are you a parent or guardian of a child under the age of 18 or do you have primary responsibility for someone else's child/children under the age of 18? <i>Yes (2) or No (1)</i>
Socio-Economic-Status Measured by Food Security	Independent Variable	Categorical/ Ordinal	RUSDAFI <i>Very low food security (5-6), (2) Low food security (2-4) to (3) High or marginal food security (0-1)</i>
Parental Educational Attainment	Independent Variable	Categorical/ Nominal	N3Q84 What is the highest level of education completed by either of your parents (or guardians)? <i>Did not finish high school (1), High school diploma or GED (2), Attended college but did not complete degree (3), Associate's degree (AA, AS, etc.) or trade/technical training (4), Bachelor's degree (BA, BS, etc.) (5), Master's degree (MA, MS, MFA, MBA, MPP, MPA, MPH, etc.) (6), Doctoral or professional degree (PhD, EdD, JD, MD, etc.) (7), or Don't know (8)</i> <i>(recoded to No HS/HS/GED/ Some College/ Unknown (8), Associate's/ Bachelor's/ Trade/Technical (5), or Master's/ Doctoral/ Professional (7))</i>

Variable Name	Variable Type	Measures	Survey Questions
Health Insurance Coverage	Independent Variable	Categorical/ Nominal	<p>Survey Questions Depending on survey version, questions and answers may have been reworded by ACHA.</p> <p>N3Q79 What is your primary source of health insurance? <i>I have a college/university Student Health Insurance Plan (1), I am covered by my parent/guardian's plan (2), I am covered by my employer-based plan (or my spouse/partner's employer-based plan) (3), I have Medicaid, Medicare, SCHIP, or VA/Tricare coverage (4), I bought a plan on my own (5), I don't have health insurance (6), I don't know if I have health insurance (7), or I have health insurance, but I don't know the primary source (8)</i> (recoded to Yes (1), No (6), or Unsure (7))</p>
Preventive Medical Screening	Independent Variable	Dichotomous/ Nominal	<p>N3Q55A Within the last 12 months, have you visited any medical provider (for example: a nurse practitioner, physician assistant, primary care doctor, or other type of medical doctor) for a check-up or any other medical reasons? <i>Yes (2), or No (1)</i></p>

Variable Name	Variable Type	Measures	Survey Questions Depending on survey version, questions and answers may have been reworded by ACHA.
VaxFlu	Independent Variable	Dichotomous/ Nominal	N3Q62 Did you have a flu vaccine within the last 12 months? <i>Yes (2), No (1), or I don't know (3)</i> (recoded to Yes or No)
VaxHPV	Independent Variable	Dichotomous/ Nominal	N3Q61 The Human Papillomavirus (HPV) vaccine (for example: Gardasil, Silgard, or Cervarix) is recommended, but usually not required, and is given in a series of 2 or 3 shots based on your age. Which of the following best describes your vaccination status for HPV? <i>I have not received any of HPV vaccine series (1), I have started, but not yet completed the HPV vaccine series (2), started the series (2), I have completed the HPV vaccine series (3), I don't know my HPV vaccination status (4)</i> (recoded to Yes or No)

APPENDIX D – Descriptive Tables

Descriptive Tables

Table 6 Students' COVID-19 Vaccination Survey Period Overview

		No	Yes	Missing
COVID19VaxDevelopFA2020	Cases	2,880	2,400	56,987
	Percent	4.60	3.90	91.50
COVID19VaxDevelopSP2021	Cases	14,990	29,937	17,340
	Percent	24.10	48.10	27.80
COVID19VaxCreatedFA2021	Cases	1,623	10,437	50,207
	Percent	2.60	16.8	80.60
Total Cases				62,267

Table 7 Students' COVID-19 Vaccination Status Actual

		Yes		No	
		Frequency	Percent	Frequency	Percent
Biological Sex	Female	30,373	71.01	13,547	69.50
	Male	12,394	28.98	5,940	30.47
	Intersex	7	0.02	6	0.03
Cases		42,774	100.00	19,493	100.00
Total Cases		62,267	68.70		31.30

Table 8 Students' Biological Sex

	Frequency	Percent
Female	43,920	70.53
Male	18,334	29.44
Intersex	13	0.02
Total Cases	62,267	100.00

Table 9 Students' Relationship and Caregiver Status

	Relationship Status		Caregiver Status	
	Frequency	Percent	Frequency	Percent
Yes	26,019	41.80	898	1.40
No	36,248	58.20	61,369	98.60
Total Cases	62,267	100	62,267	100.00

Table 10 SES Measured by Food Security

	Frequency	Percent
Very low food security	10,287	16.50
Low food security	14,666	23.60
High or marginal food security	37,314	59.90
Total Cases	62,267	100.00

Table 11 Parental Level of Education

	Frequency	Percent
Did not finish high school	3,790	6.10
High school diploma or GED	9,804	15.70
Attended college but did not complete degree	6,069	9.70
Associate's degree or trade/technical training	6,028	9.70
Bachelor's degree	18,329	29.40
Master's degree	12,670	20.30
Doctoral or professional degree	4,645	7.50
Don't know	932	1.50
Total Cases	62,267	100.00

Table 12 Parental Educational Attainment

	Frequency	Percent
Associate's/ Bachelor's/ Trade/Technical	24,357	39.10
Master's/ Doctoral/ Professional	17,315	27.80
No HS/ HS/GED/ Some College/ Unknown	20,595	33.10
Total Cases	62,267	100.00

Table 13 Students' Primary Source of Health Insurance Coverage

	Frequency	Percent
I have a college/university Student Health Insurance Plan	3,798	6.10
I am covered by my parent/guardian's plan	47,576	76.40
I am covered by my employer-based plan (or my spouse/partner's employer-based plan)	721	1.20
I have Medicaid, Medicare, SCHIP, or VA/Tricare coverage	5,553	8.90
I bought a plan on my own	591	0.90
I don't have health insurance	1,946	3.10
I don't know if I have health insurance	836	1.30
I have health insurance, but I don't know the primary source	1,246	2.00
Total Cases	62,267	100.00

Table 14 Students' Health Insurance Coverage

	Frequency	Percent
Yes	59,485	95.50
No	1,946	3.10
Unsure	836	1.30
Total Cases	62,267	100.00

Table 15 Students' Preventative Medical Screening

	Frequency	Percent
Yes	39,019	62.70
No	23,248	37.30
Total Cases	62,267	100.00

Table 16 Last 12 Months Flu Vaccine

	Frequency	Percent
Yes	30,859	49.60
No	27,862	44.70
I don't know	3,546	5.70
Total Cases	62,267	100.00

Table 17 Students' HPV Vaccination Status

	Frequency	Percent
I have not been vaccinated against HPV	9,090	14.60
I have started, but not yet completed the HPV vaccine series	3,090	5.00
I have completed the HPV vaccine series	31,632	50.80
I don't know if I've been vaccinated against HPV	18,455	29.60
Total Cases	62,267	100.00

Table 18 Flu and HPV Vaccination Uptake

	VaxFlu		VaxHPV	
	Frequency	Percent	Frequency	Percent
Yes	30,859	49.60	31,632	50.80
No	31,408	50.40	30,635	49.20
Total Cases	62,267	100	62,267	100.00

Table 19 Combination Flu and HPV Vaccination Uptake

	VaxHPV No	VaxHPV Yes	Total Cases
VaxFlu Yes	12,230	18,629	30,859
VaxFlu No	18,405	13,003	31,408
Total Cases	30,635	31,632	62,267

Table 20 Students' Concern with Contracting COVID-19

		Frequency	Percent
Over the past 30 days, on average, how much have you been concerned with the following?-That you will get COVID-19	Not concerned at all	11,505	18.48
	Slightly concerned	14,459	23.22
	Moderately concerned	13,493	21.67
	Very concerned	7,583	12.18
	Extremely concerned	5,250	8.43
	Missing	9,977	16.02
Over the past 30 days, on average, how much have you been concerned with the following?-That you will get COVID-19 again	Not concerned at all	3,449	5.54
	Slightly concerned	2,669	4.29
	Moderately concerned	1,971	3.17
	Very concerned	1,146	1.84
	Extremely concerned	742	1.19
	Missing	52,290	83.98
Total Cases		62,267	100.00

Table 21 COVID-19 ReInfection Fear

	Frequency	Percent
Not concerned at all	14,954	24.00
Slightly concerned	17,128	27.50
Moderately concerned	15,464	24.80
Very concerned	8,729	14.00
Extremely concerned	5,992	9.60
Total Cases	62,267	100.00

Table 22 Students' Concern with Someone Dying from COVID-19

	Frequency	Percent
Not concerned at all	11,679	18.80
Slightly concerned	13,629	21.90
Moderately concerned	11,579	18.60
Very concerned	10,888	17.50
Extremely concerned	14,492	23.30
Total Cases	62,267	100.00