“TIENES SUFICIENTE…?” ABILITY TO MEET BASIC NEEDS AND BEHAVIORS DURING THE COVID-19 PANDEMIC

by

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DISSERTATION ABSTRACT

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Title: “Tienes suficient…?” Ability to Meet Basic Needs and Behaviors During the COVID-19 Pandemic

The COVID-19 pandemic had a profound impact on communities around the globe, with older adults, members of minoritized racial and ethnic groups, and residents of urban areas being more susceptible to the SARS-CoV-2 virus, hospitalization, and death (Centers for Disease Control and Prevention, 2020). However, the pandemic presented threats beyond adverse physical outcomes of the disease; efforts to mitigate the pandemic such as closure of workplaces also threatened the ability to meet basic needs, such as healthcare, housing, food security, and transportation for people across different ages. Using existing participant data from the Oregon Saludable: Juntos Podemos project, this study investigated whether COVID-19 risk and protective behaviors vary as a function of age, race/ethnicity, language, and rural/urban residence. Understanding these relationships is important to the development of targeted strategies that decrease health disparities and increase health promoting behaviors. This study also investigated whether challenges in meeting basic needs moderated relationships between specific risk factors (age, race/ethnicity, language, and rural/urban residence) and COVID-19 risk and protective behaviors. Linear mixed effects regressions were used to examine associations between the sociocultural factors (age, ethnicity, language, urban/rural residence) and self-reported COVID-19 protective and risk behaviors. Findings indicate that older adults

self-reported engaging in fewer risky behaviors than younger adults, whereas both Latinx and Spanish speaking individuals reported engaging in fewer risky behaviors and engaging in more protective behaviors than their respective counterparts. COVID-19 waves were also significant predictors of engagement in risk and protective behaviors. Specifically, individuals engaged in both fewer risky and fewer protective behaviors in subsequent COVID-19 waves (i.e., Delta, Omicron, and Omicron BVAR) in comparison to individuals who were surveyed during the Alpha Wave. Lastly, basic needs moderated the relationship between BIPOC individuals and individuals surveyed during the Omicron Bivalent Wave, and their engagement in both risky behaviors and protective behaviors for the former, and protective behaviors for the latter. Implications for future research, policy, and practice are presented.

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DEDICATION

My father enjoys sharing stories of his youth and all the places throughout California that he had to travel to for work. To my surprise, it was not until we were on the road to Oregon for my move to Eugene that he shared about his experience in the Pacific Northwest as a migrant farmworker. He described a serendipitous encounter with an acquaintance from his hometown in Portland and shared stories of working in apple orchards in Washington; those and many other stories I had never heard before.

Throughout my years in the program, I frequently reflected on the significance of his return to Oregon after decades away. It was a full circle moment to realize that he was not returning to work but instead it was to bring his daughter to graduate school. Apa, you inspire me every day and I dedicate this dissertation to you.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

LIST OF TABLES

Table Page

CHAPTER I

INTRODUCTION

The COVID-19 pandemic had an adverse impact on the health and wellbeing of individuals in the United States and around the globe. To date, SARS-CoV-2, the virus that causes corona virus disease (COVID-19) has infected hundreds of millions of people and approximately 6.9 million people worldwide have died (Jamieson et al., 2021; World Health Organization, 2023). From the onset of the pandemic, the efficiency of transmission of COVID-19 has had important implications for containment and mitigation strategies. In the US, as federal and state governments declared public health emergencies, containment measures were implemented and public health organizations promoted a variety of health behaviors to curb the spread of COVID-19 (Gostin & Wylie, 2020; Stroebe et al., 2021). Although many of the measures were state-dependent mandates and varied from state to state, common strategies implemented and promoted to reduce infection and transmission included social distancing, mask-mandates, work-from-home orders, closing of non-essential businesses and schools, limits on travel, increased hand-washing, and cancelation or postponement of elective medical procedures (Czeisler et al., 2020; Gerace et al., 2022; Tran et al., 2021). However, in addition to the threat of COVID-19 itself, these mitigation and containment strategies also significantly affected society and contributed to a major economic downturn, job losses, supply chain issues, and ability to meet basic needs (Ashraf & Goodell, 2022; Chiesa et al., 2021; Guerrieri et al., 2022; He & Harris, 2020).

The unprecedented pandemic and its associated social responses and economic consequences contributed to the exacerbation of many pre-existing disparities, including access to meeting basic needs, such as food, housing, sanitation, and healthcare (Wolfson & Leung,

2020). In its wake, research has identified risk factors associated with COVID-19 susceptibility and death, including age, racial and ethnic identity, and location (i.e., residing in either urban or rural areas; Carethers, 2021; Drefahl et al., 2020; Kim et al., 2020). An important area for investigation is to identify how these risk factors may be associated with challenges in meeting basic needs experienced during the COVID-19 pandemic. The present study is designed to address gaps in this literature.

This chapter begins with an overview of the COVID-19 pandemic, including background on SARS-CoV-2, transmission, and spread. I also provide a review of COVID-19 impact, including infection, hospitalization, and death rate, as well as public health responses to the crisis. Next, I provide a review of the literature pertaining to COVID-19 and the following variables: age, racial disparities, and rural/urban residence. This includes any relationship between these variables and ability to meet specific basic needs (e.g., food, housing, sanitation, and healthcare). I highlight any implications for meeting basic needs, and for engaging in risk and protective behaviors. Several gaps in the existing literature are identified. This chapter also includes contextual information regarding the location of this study, and concludes with presenting study aims, research questions, and hypotheses.

To conduct the literature review, I began with a systematic search on databases including Google Scholar and APA PsycNET using the following keywords *COVID-19, generational differences, basic needs, protective factors, risk factors, health disparities, Latinx, food security, housing security, rural,* and *urban* to identify scholarship predominantly published between 2020-2023. Through this process I identified research pertaining to key variables.

COVID-19

In December 2019, health authorities in Wuhan, China began receiving reports of a pneumonia outbreak of unknown origin characterized by fever, dry cough, fatigue, and gastrointestinal symptoms (Ciotti et al., 2020; Wu et al., 2020). Most of the cases were eventually epidemiologically linked to the Huanan Seafood Wholesale Market. The pathogen was later identified as a novel coronavirus named SARS-CoV-2, which is structurally related to viruses that cause severe acute respiratory syndrome (SARS; Fauci et al., 2020; Li et al., 2020). By February 2020, the World Health Organization (WHO) named the disease caused by SARS-CoV-2 'coronavirus disease 19' (COVID-19) and by March 2020, the WHO declared it a global pandemic (Cucinotta & Vanelli, 2020).

In the United States, the first confirmed case of COVID-19 was reported in Washington on January 20, 2020. In four short months, the United States surpassed all other nations and reported the highest number of infections and deaths (Bergquist et al., 2020; Science News Staff, 2020). COVID-19 escalated to this level in the US and elsewhere due to its highly contagious nature, with human-to-human transmission playing a major role in the subsequent outbreaks (Li et al., 2020). Specifically, the virus has most commonly been spread from human-to-human through droplets when individuals are in close proximity (Badr et al., 2020). The transmission of the virus has been fueled not only through both respiratory (i.e., breathing in) and extra-respiratory (i.e., exposure to mucus, feces, or surfaces that contain the virus) routes, but also due to coronavirus viability in aerosols (Louis-Jean et al., 2020; van Doremalen et al., 2020).

Since this crisis was declared a pandemic, the overall pattern of COVID-19 has been defined through waves, wherein cases surge and then decline (Maragakis, 2021). At both a national and global level, waves have occurred due to increase in travel and/or due to mutations of SARS-CoV-2 that become more contagious variants. For example, after the initial global

spread of COVID-19 in late 2019 and early 2020 prompting the declaration of a pandemic in March 2020, the United States then experienced a surge in COVID-19 cases in the winter of 2020-2021 when people traveled for the holidays. Other surges were fueled by variants, such as the Delta variant in summer 2021, and the first subvariant of Omicron in winter 2021-2022 (Elliott et al., 2022; Maragakis, 2021). Although there is no clear consensus regarding dates of pandemic waves, federal reports suggest that the United States has experienced fives waves of the pandemic since 2020 (The White House, 2022).

Despite great progress in understanding SARS-CoV-2, the nature of the virus has given it an edge in evading long-term control. Initial urgent efforts were directed to develop vaccines and treatments for COVID-19 (e.g., Operation Warp Speed; Kaur & Gupta, 2020; US Department of Health and Human Services, 2020). By March 2020, the first COVID-19 vaccine candidate entered human clinical testing. A month later, there were 115 vaccine candidates, 78 of which researchers were able to confirm were active projects (Le et al., 2020). As of May 23, 2023, there were three COVID-19 vaccines approved in the United States to prevent COVID-19: Moderna, Novavax, and Pfizer-BioNTech (Centers for Disease Control and Prevention, 2023). Johnson & Johnson's/ Janssen vaccine was also authorized for emergency use, but as of May 6, 2023, was no longer available for use in the US. Although the United States has invested in building and maintaining tools to protect people from COVID-19, such as vaccines, boosters, treatments, tests, and masks, the control over COVID-19 has remained variable in success. In a survey by *Nature* of more than 100 immunologists, virologists, and infectious-disease researchers, 90% predicted that the virus may not ever truly be eradicated and would eventually become an endemic (Phillips, 2021).

Over three years after COVID-19 was declared a global pandemic, on May 5, 2023, the WHO determined that COVID-19 no longer fit the definition of a Public Health Emergency of International Concern (WHO, 2023). Similarly, on May 9, 2023, the US Department of Health and Human Services declared that the federal Public Health Emergency of COVID-19 would expire on May 11, 2023 (US Department of Health and Human Services, 2023).

COVID-19 Impact

The coronavirus has infected hundreds of millions of people and approximately 6.5 million people worldwide have died from COVID-19 (Jamieson et al., 2021; WHO, 2022). In the US, there have been approximately 103 million confirmed cases, 46 million hospitalizations, and 1.1 million deaths (COVID-19-Associated Hospitalization Surveillance Network, 2023; WHO, 2023). The effects of COVID-19 on individuals have been variable and range from being asymptomatic to the development of acute respiratory distress syndrome (Wiersinga et al., 2020). Some of the most common symptoms include cough, fever, chills, shortness of breath, muscle aches, sore throat, loss of taste or smell, diarrhea, headaches, and nasal congestion (Maragkis, 2022). Although the rates of asymptomatic transmission are uncertain, a meta-analysis conducted by Buitrago-Garcia and colleagues (2020) suggest that approximately 20% of people who are infected do not develop symptoms. In addition, long-term sequelae of COVID-19 have become an increasing concern. Studies examining the long-term consequences of COVID-19 have identified numerous complications, including lung fibrosis, venous thromboembolism, arterial thromboses cardiac thrombosis and inflammation, stroke, fatigue, concentration difficulties, and mood dysfunctions, among others (Desai et al., 2021; Han et al., 2022; SeyedAlinaghi et al., 2021). Although post COVID-19 consequences can last weeks or months, evidence suggests that individuals with more severe COVID-19 illness are more likely to suffer from its sequelae one

year after infection (Han et al., 2022). According to the Centers for Disease Control and Prevention (CDC; 2022), of people who were infected with COVID-19, approximately 13% experienced sequalae one month or longer after infection, and 2.5% at three months or longer. Among those who were hospitalized, more than 30% experienced sequalae six months later.

Due the highly infectious nature and potential consequences of COVID-19, in March 2020, the CDC implemented a series of recommendations to curb the spread of COVID-19, most notably social distancing (i.e., maintaining a minimum distance of six feet from another individual). In adherence to social distancing guidelines, cities and states implemented extensive social distancing measures that included shelter-in-place orders, travel restrictions, limits on mass gatherings, school closures, and bans on nonessential commercial activities (Wang et al., 2020). As such, both the pandemic and responses to mitigate contagion significantly burdened society, and contributed to major economic downturn, job losses, supply chain issues, and ability to meet basic needs (Ashraf & Goodell, 2022; Chiesa et al., 2021; Guerrieri et al., 2022; He & Harris, 2020).

Basic needs include food, housing, sanitation, and healthcare (Wolfson & Leung, 2020). The ability to meet basic needs is a human right, and living with unmet basic needs can be detrimental to the-health and well-being of individuals across the lifespan (Capone et al., 2020; Corey et al., 2022; Cutts et al., 2011; United Nations, 1949; United Nations, 2012). Before the pandemic, individuals' ability to meet their basic needs was a concern that often went unidentified and unaddressed (Garg et al., 2012). Although there is currently no national surveillance system for ability to meet basic needs, a 2019 nationally representative survey by the Urban Institute found that 44% of surveyed US adults had difficulty paying for housing, utilities, food, or medical care. Additionally, data regarding insecurity related to food, healthcare,

and basic sanitation, all of which comprise basic needs, illustrate the pervasiveness of the issue. For example, there are 37.2 million people living in poverty and 38.3 million people are in food-insecure in the US (Coleman-Jensen, 2021; Shrider et al., 2021). Additionally, 31.6 million people do not have access to healthcare and an estimated 930,000 are without access to basic sanitation services (Cha & Cohen, 2022). Unsurprisingly, unequal access to basic needs is a daily stressor that disproportionally affects marginalized communities, such as those experiencing greater levels of poverty and communities of color (Jailobaeva et al., 2022).

We have come to see that the effects of the COVID-19 pandemic have not been evenly distributed. Originally thought of as an indiscriminate equalizer, COVID-19 has, in reality, disproportionately affected historically marginalized and vulnerable communities (Jamieson et al., 2021; Kim et al., 2020; Mein, 2020). Beyond epidemiological consequences such as disease threat and adverse outcomes, effect of COVID-19 also encompasses severe hardships related to the basic needs of disadvantaged communities (Duran & Núñez et al., 2021; Jones & Grigsby Toussaint, 2021; Payán et al., 2022; Turner & King-Viehland, 2020; Vargas & Sanchez, 2020). Existing literature on the COVID-19 pandemic has identified age, racial and ethnic identity, and region of residence as significant factors associated with higher risk for severe disease and death, exacerbating many pre-existing health disparities (Carethers, 2021; Drefahl et al., 2020; Kim et al., 2020). However, current research exploring challenges and consequences of the pandemic has largely focused on mental health and healthcare delivery across these vulnerable groups (Chiesa et al., 2020). Limited research has explored challenges of the pandemic as it relates to the access to basic needs for disproportionately affected groups. In the following sections I summarize literature pertaining the identified risk factors of age, race/ethnicity, and rural/urban residence.

Age

Over the course of the pandemic, the cases of COVID-19 in the US have varied as a function of different sociodemographic variables. It became apparent that there was differential impact as a function of age with risk of COVID-19 illness and death highest among adults 65 years or older (Bialek et al., 2020; Garcia et al., 2021; Garg et al., 2020). COVID-19 susceptibility as a function of age has varied across studies but has appeared markedly higher among older generations of adults. For example, an early meta-analysis by Barek et al. (2020) comprised of studies published between January 2020 to May 2020, found that adults aged 50 years or older were at a higher risk for contracting COVID-19. A different meta-analysis comprised of 59 studies published from December 2019 and May 2020 showed that patients 70 years or older appear to have a 65% higher risk for COVID-19 (Pijls et al., 2021). Similarly, in their study, Garcia and colleagues (2021) found that adults aged 65 and older were seven times more at risk for severe COVID-19 outcomes than younger adults. This could be attributed to the vulnerability of older adults. Older adults have decreased efficiency of their immune system, causing them to have higher odds of contracting infectious diseases, and they often have more comorbidities (Flook et al., 2021; Zhang et al., 2022).

Due to the effect of COVID-19 infection, severe disease, and death varying as a function of age, dissemination approaches to delivering COVID-19 resources oftentimes took into consideration prominent risk factors, such as age (Babus et al., 2020). For example, in December 2020 the US Food and Drug Administration issued emergency use authorizations for the Pfizer-BioNTech and Moderna COVID-19 vaccines. Mass efforts to vaccinate began around the US, but because demands for the vaccine exceeded supply, phased distribution and prioritization was initially necessary (Persad et al., 2021). The CDC recommended prioritizing: (i) health care

personnel; (ii) residents of long-term care facilities; (iii) persons aged 75 years and over and frontline essential workers; (iv) persons aged 65 years to 74 years, and persons aged 16 years to 64 years with high-risk medical conditions, and essential workers; and (v) everyone aged older than 16 years (Brüssow, 2021; McClung et al., 2020). According to a study by Jain et al. (2021), the majority of states assigned 65–74-year age group to a higher prioritization position than was recommended by the CDC. By April 2021, all adults across the US were eligible for a vaccine (CDC, 2021).

There is evidence of some age-related differences in the participation in the protective behaviors recommended by the CDC and WHO (Luo et al., 2021). Recommendations to lower the risk of virus contraction and spread included: social distancing, mask-mandates, work-from-home orders, business and school closures, limits on travel, prohibitions against mass gatherings, increased handwashing, and cancelation or postponement of elective medical procedures (Czeisler et al., 2020; Gerace et al., 2022; Stroebe et al., 2021; Tran et al., 2021). Additionally, for older adults and those with chronic conditions, the CDC (2020) recommended they stockpile essential medications and encouraged staying home as much as possible. At the start of the pandemic, adults of all ages engaged in similar preventative behaviors (Luo et al., 2021). However, as the pandemic progressed, older adults adopted more protective behaviors than younger adults (Luo et al., 2021). This was potentially due to the older adults' awareness of being more vulnerable to severe COVID-19 outcomes. Illustratively, there are significant associations between the age of adults and feeling safe without mitigation strategies and protective behaviors, with younger adults feeling safer than adults 65 years or older (Czeisler et al., 2020). Further, it was found that one month into the pandemic, younger adults were more likely to engage in risky COVID-19 behaviors (e.g., going to someone else's residence, having

visitors at one's residence, attending a gathering with 10 or more people) than older adults (Kim & Crimmins, 2020).

However, as the pandemic continued, new patterns regarding infection and age began to emerge. Several studies found that individuals between ages 20 and 49 represented a growing proportion of SARS-CoV-2 infections in the latter half of 2020 and into 2021 (Leong et al., 2021; Malmgren et al., 2020; Monod et al., 2021; O'Driscoll et al., 2021). Between June and August 2020, 20–29-year-olds accounted for the largest portion (>20%) of total COVID-19 cases (Boehmer et al., 2020). According to Leong and colleagues (2021), the differences among age groups could be attributed to increased testing capacities and health and behavioral differences. Due to initial limited testing capacities, older adults were prioritized due to severe COVID-19 outcomes. However, more accessible testing could have contributed to the increased number of cases identified among younger and middle-aged adults (Leong et al., 2021). Additionally, as previously shared, younger adults were not only more likely to engage in risky behaviors, but they also make up a large portion of frontline workers (Boehmer et al., 2020; Kim & Crimmins, 2020). Although extant evidence shows that severe COVID-19 outcomes increase with age, transmission level of the general population has been difficult to disentangle (O'Driscoll et al., 2021; Pastor-Barriuso et al., 2020; Verity et al., 2020).

To date, getting vaccinated has been the most potent protective behavior against COVID-19 (The White House, 2022). As previously discussed, the initial supply of vaccines was limited and demand exceeded supply, necessitating phased distribution and prioritization of recipients (Persad et al., 2021). However, despite initial demand, a significant challenge to the vaccination effort has been vaccine hesitancy, or the refusal or delay in vaccination despite availability (Brownstein et al., 2022). Both phased distribution and vaccine hesitancy are likely factors that

contributed to, age related differences for who ultimately decided to receive vaccines. One study reported that as of May 2021, COVID-19 vaccine coverage was highest among adults 65 years or older and lowest among adults 18-29 (Diesel et al., 2021). Data regarding vaccine hesitancy showed similar patterns with significant generational differences. For example, Shih et al. (2021) found that Baby Boomers (59-68-year-olds) and Gen Xers (43-58-year-olds) had lower odds of vaccine hesitancy compared to Millennials (27-42-year-olds). A different study examining vaccine beliefs of adults across generational cohorts found that GenXers were less likely to agree that vaccines are effective than Baby Boomers and Millennials. In sum, there is age-related variability in the likelihood and consequences of contracting SARS-CoV-2 as well as in engagement in protective behaviors.

Age related differences in the risk of contracting COVID-19 and the likelihood of engaging in protective behaviors may be compounded by people's ability to meet basic needs. Though the research is scarce, several studies found age-related differences in people's ability to meet specific basic needs during the pandemic. In their study of 8782 surveyed adults, Chiwona-Karltun et al. (2021) found that food insecurity was more prevalent and intense for adults 36 years or younger than those aged 36 to 59 years old. Fitzpatrick et al. (2021) found a similar trend in their study; as aged increased, the odds of experiencing food insecurity were lower. In regard to healthcare, one study examining unmet healthcare needs in European adults found that adults 65 and older experienced greater barriers to accessing healthcare during the pandemic than before (Arnault et al., 2021). In sum, there is evidence that level of food security and healthcare access, contraction of COVID-19, and engagement in risk and protective behaviors associated with COVID-19 vary by age, but further research assessing relationships among these variables is needed to better inform prevention and mitigation efforts.

Racial Disparities

The impact of the pandemic has been widespread; however, extant COVID-19 research demonstrates that it has disproportionately impacted marginalized people of color, intensifying preexisting disparities (Do & Frank et al., 2021; Duran & Nuñez, 2021; Garcia et al., 2021; Guerrero & Wallace, 2021; Jamieson et al., 2021; Jones & Grigsby-Toussaint, 2021; Vargas et al., 2020). Considering that this study utilizes data from a study focused on preventing SARS-CoV-2 transmission among the Latinx community (more information can be found below in *Study Context*), this literature review is focused primarily on disparities experienced by Latinx communities. According to the CDC (2023), the highest proportion of COVID-19 cases are among racial and ethnic minorities, and Latinx community members have 1.5 times higher rates of cases, 1.8 times higher rates of hospitalizations, and 1.7 times higher rates of death compared to Whites. As of May 2023, Latinx individuals accounted for 24.2% of COVID-19 cases in the US, even though they only make up 18.5% of the US population (CDC, 2023). Health disparities are closely linked to genetic, biological, psychosocial, and economical disadvantages that have historically been exacerbated by discrimination and rooted in structural racism (Elder et al., 2009; Yearby, 2020). According to Yearby (2020), structural racism is the way systems are structured to give advantage to the majority and disadvantage minoritized racial and ethnic communities, creating differential conditions, or disparities. These disparities span health and healthcare, contributing to higher morbidity, mortality, and excessive rates of chronic diseases among minoritized racial and ethnic groups (Colen et al., 2018).

Research regarding the inequities experienced by the Latinx community in the COVID-19 pandemic has identified specific drivers related to disproportionate transmission of the virus (Rodriguez-Diaz et al., 2020). For example, in the United States, lower socioeconomic status is

associated with racial and ethnic minority status. Latinx community members are more likely to live in multigenerational, crowded homes and have jobs in essential service industries; these conditions barred them from working remotely from home or engaging in CDC social distancing recommendations to curb COVID-19 spread (Baquero et al., 2020; Lopez et al., 2021; Prince et al., 2021; Yancy, 2020). The most common occupations of Latinx adults include cleaning, maintenance, construction, agriculture, and service industries (Dubina, 2021). Many of these occupations were exempt from mandated stay-at-home orders and workers continued to work on-site (Selden & Berdahl, 2020). More specifically, according to a 2021 Pew Research Center survey, 45% of Latinx adults worked in jobs that required them to leave home since February 2020. With the high presence of Latinx workers in essential work industries, the inability to engage in flexible work-from-home privileges, and consistent interactions with fellow workers and the public, the risk of exposure to COVID-19 across the Latinx community was heightened. There are similar findings among Black individuals, who are also more likely to be overrepresented in the essential workforce and live in more densely population neighborhoods of lower SES (Shah et al., 2020). As mentioned, social distancing was not always enforceable or feasible in settings with limited space (i.e., food, cleaning, and service industries). Inability to engage in social distancing and lack of personal protective equipment (PPE), especially early in the pandemic, were common experiences of workers in these essential industries and increased the potential for exposure to and spread of COVID-19 (Baquero et al., 2020; Michaels & Wagner, 2020). Additionally, Latinx and Black adults also have higher prevalence of comorbid chronic health conditions, such as obesity, diabetes, and hypertension, which increases risk of hospitalization and death from COVID-19 (Lopez et al., 2021; Price-Haywood et al., 2020).

The literature regarding racial differences in challenges meeting basic needs during the COVID-19 pandemic is mixed. For example, a scoping review of the literature found evidence to suggest that food insecurity was especially prevalent among Latinx households (Salgado de Snyder et al., 2021). Additionally, an analysis from the Corona Tracking Survey found that approximately 40% of both Latinx and Black families reported food insecurity (Gutpa et al., 2021). However, one study examining food insecurity found that there was no statistically significant difference between the level of food insecurity between White and Latinx groups (Morales, 2020). The author acknowledged that this may be due to the notable increase of food insecurity among White household during the pandemic. A poll by the Pew Research Center (2021) found that 62% of surveyed Latinx adults reported that they experienced at least one of seven hardships associated with meeting basic needs (i.e., food insecurity, house insecurity, inaccessible healthcare, etc.), the most prominent of which was trouble paying bills (35%) and food insecurity (31%). In contrast, a lower proportion of non-Latinx adults reported experiencing hardships in the pandemic, specifically, 25% of them reported trouble paying bills and 17% experienced food insecurity. Lastly, unemployment rates for BIPOC adults grew, while rates for White individuals declined, putting minoritized individuals at an increased risk of hardship and difficulty meeting their basic needs (Daniels & Morton, 2023; Inanc, 2020).

During the pandemic, the pivot to remote telehealth posed a further challenge to accessing another basic need, medical care. Access to resources and ability to obtain and use technology to connect with providers are factors associated with a certain level of privilege. Within the Latinx community, this would include a having a higher socio-economic status, education, and health and technology literacy (Ramirez et al., 2021). A study by Luo et al. (2021) found that Latinx adults and other historically socioeconomically disadvantaged

communities were less likely to use telehealth services. In addition, anti-immigrant rhetoric and laws also contribute to mistrust and hesitancy in engaging in help-seeking behaviors with the healthcare system, especially among undocumented immigrants who have concerns regarding privacy and confidentiality associated with their immigration status (Ornelas et al., 2020). Furthermore, actions of the Trump Administration to limit and discourage Latinx essential workers from seeking out social services and healthcare contributed to the unequal access to relief and care this community needed (Select Committee on the Coronavirus Crisis, 2022). These add to the extant barriers undocumented Latinxs experience when seeking healthcare, such as ineligibility for federally subsidized public health programs and limited access to jobs with employer-based insurance (Baquero et al., 2020; Gwynn, 2021).

Additional challenges for the Latinx community include language barriers. Health outcomes can be influenced by language barriers; individuals who experience inequitable access to healthcare due to language barriers have more adverse health outcomes (Lucero et al., 2021; Squires, 2017). In regard to the COVID-19 pandemic, proficiency in English was identified as a critical factor in facilitating access to COVID-19 resources (Mulpur & Turner, 2021). Specifically, primarily Spanish-speaking individuals had one of the highest COVID-19 positivity rates compared to other limited English proficient individuals (Kim et al., 2020) and higher rates of COVID-19 cases overall (Rodriguez-Diaz et al., 2020; Wilkins et al., 2021). Language barriers for this vulnerable community may have restricted access to accurate and comprehensive information about the COVID-19 pandemic and prevention strategies, especially when information was not equitably delivered when compared to English resources (Kusters et al., 2022). Within the Latinx community, primarily Spanish-speaking individuals tend to be immigrants and undocumented (Rodriguez-Diaz et al., 2020).

Rural vs. Urban

After the first reported US case in Washington State, COVID-19 quickly spread across the country, and urban cities such as New York City, NY, Seattle, WA, and Los Angeles, CA, became virus hotspots (Oster et al., 2020; Souch & Cossman, 2021). Due to the highly infectious nature of the virus and densely populated areas that comprise urban settings, little attention was initially placed on rural areas of the US (Souch & Cossman, 2021). However, after the initial surge of infections in early 2020, the epicenters of the disease shifted during the second wave of the pandemic in the second half of 2020. Surges in cases shifted from urban cities to rural areas such as the South and Midwest (Cuadrados et al., 2021).

Approximately 63% of the counties in the US are classified as rural, but only about 15% of the US population live in these areas (CDC, 2017; Paul et al., 2020). Evidence of COVID-19-related disparities among rural populations continues to grow. Compared to urban communities, rural Americans were uniquely vulnerable to being at higher risk of severe COVID-19 outcomes due to the high prevalence of risk factors. Rural residents tend to be older, have more underlying chronic health conditions associated with adverse COVID-19 outcomes (i.e., obesity, diabetes, hypertension), have higher rates of risk behaviors, and have less access to primary care providers (Andraska et al., 2021; Callaghan et al., 2021; Jensen et al., 2020; Souch & Cossman, 2021). A spatiotemporal analysis of COVID-19 prevalence rates found that in urban communities, mortality rates of COVID-19 infection were higher among residents 65 years or older, but infection rates were six times higher among young and middle-aged adults (ages 22-49; Paul et al., 2020). Additionally, in a study of 5000 rural adults, Callaghan and colleagues (2021) found lower adoption of preventive strategies among rural residents compared to their urban

counterparts. Specifically, rural residents were significantly less likely to wear a mask, sanitize their home, and practice social distancing.

Beyond the vulnerability for severe COVID-19, rural communities also face challenges related to their ability to meet basic needs. Although the pandemic has threatened the ability to meet basic needs for individuals across the country, rural communities face additional challenges compared to urban residents. Rural residents face constraints in accessing resources (e.g., healthcare, food) in conjunction with greater distances from resources, lower quality of healthcare, limited hospital capacity, and lower incomes (Andraska et al., 2021; Segal et al., 2021). Additionally, access to adequate housing and sanitation has historically been a challenge in rural communities and is more prevalent in the South, among Native Americans, and in migrant communities (Bischoff et al., 2012; Chillag & Lee, 2020; Gasteyer et al., 2016; VanDerslice, 2011; Wedgworth & Brown 2013). Most rural communities are already at a disadvantage due to limited health infrastructure, availability of resources, and pre-existing disparities. To improve mitigation efforts, a clearer understanding is needed of relationships between rural/urban residence, challenges associated with meeting basic needs, and engagement in risk and protective behaviors related to COVID-19.

The Present Study

This review of the literature has described the COVID-19 pandemic and the impacts of both the pandemic and mitigation strategies. Currently there is limited research identifying associations between ability to meet basic needs and engagement in risk and protective behaviors for people at different levels of risk based on age, racial/ethnic group membership, and urban/rural residence.

These relationships may also vary during different waves (or surges of infection rates) of the pandemic. Accounting for waves in this analysis is important given changes in the social landscape throughout the pandemic. This includes changes in public health messaging, effectiveness of vaccination efforts, general attitudes toward the pandemic, and distribution of pandemic related aid (Maragakis, 2021). For example, state-specific resources such as the since-exhausted Oregon Worker Relief Fund provided temporary financial relief to undocumented people who did qualify for federal unemployment insurance. Additional details regarding the specific context of this study are discussed below.

Learning more about how COVID-19 risk and protective strategies are associated with difficulty meeting basic needs is important to better inform future research, policy, and practice. Examining the intersection of race/ethnicity, age, and rurality when identifying factors associated with unmet needs could inform strategies for on-going pandemic mitigation.

The purpose of the present study is to understand the extent to which the ability to meet basic needs is associated with engaging in risk and protective behaviors for COVID-19. Further, I wish to understand whether difficulty meeting basic needs during the pandemic moderates the relationships between age, ethnicity, language, urban/rural, pandemic wave time, and engagement in COVID-19 protective and risk behaviors.

Study Context

The context for this study is the state of Oregon. Oregon is a predominantly rural state, with much of the state population residing in western Oregon in the Portland metropolitan area, the state capital of Salem, and the Eugene-Springfield area (Gastil et al., 2022). Although Oregon is predominantly White (61.6%), its population has diversified over the years and Latinxs currently make up the second largest ethnic and racial group in the state (18.7%; US Census

Bureau, 2021). The pattern of disproportionate COVID-19 infection has been reflected in Oregon's infection rates. According to a report by the Oregon Health Authority (OHA; 2022), Latinx Oregonians accounted for 37% of COVID-19 cases with known ethnicity in 2020 and 17% in 2021. After adjusting for age, OHA found that the hospitalization and case-fatality rates were 1.5 and 1.3 times higher for Latinxs than that of non-Latinxs in 2021. Considering Oregon's characteristics, its COVID-19 infection rates, and evidence suggesting group differences in pandemic impact, this study examines the ability to meet basic needs in conjunction with prominent risk factors.

Using existing participant data from the Oregon Saludable: Juntos Podemos project, the present study aims to address gaps in the literature via the following primary research questions.

Research Questions

1. Are there significant relationships between age, ethnicity, language, urban/rural, pandemic wave time and (a)-COVID-19 risk behaviors and (b) COVID-19 protective behaviors?
2. Does ability to meet basic needs moderate the relationship between age, language, ethnicity, urban/rural, pandemic wave time and (a) COVID-19 risk behaviors and (b) COVID-19 protective behaviors?

Hypothesis

1. I hypothesize that age, language, ethnicity, urban/rural, and pandemic wave time will account for significant variance in self-reported (a) COVID-19 risk behaviors and (b) COVID-19 protective behaviors. Specifically, that younger age, language, ethnicity, and urban residence will be associated with more risky behaviors and that younger age and urban residence will be associated with fewer protective behaviors. Due to mixed

findings in much of the literature, a direction is not specified for language and ethnicity and their association with protective behaviors, or pandemic wave time as it is associated with both risk and protective behaviors.

2. I hypothesize that the relationship between age, language, ethnicity, urban/rural, pandemic wave time and self-reported (a) COVID-19 risk behaviors and (b) COVID-19 protective behaviors will vary as a function of people's ability to meet their basic needs, with difficulty meeting basic needs amplifying these relationships.

CHAPTER II

METHODS

The current dissertation includes secondary analyses of data from the Oregon Saludable Juntos Podemos (OSJP) project that was federally funded from an award from National Institute on Drug Abuse of the National Institutes of Health (Award Number P50 DA048756-02S2; PIs Leve, Cresko, DeGarmo). The purpose of the OSJP project was to test the effectiveness of a culturally and trauma-informed promotores intervention to improve health behaviors, including increases in testing, to reduce the spread of COVID-19 among the Latinx population in Oregon (DeGarmo et al., 2022). This project was a part of a larger group of studies within the Rapid Acceleration in Diagnostics (in) Underserved Populations (RADx-UP) program funded by the National Institutes of Health (NIH). RADx-UP is a health research program launched with the aim to learn more about COVID-19 disease, aid in the development of rapid and accurate SARS-CoV-2 testing, and increase access across the US (Tromberg et al., 2020). Participants provided informed consent and completed a 15–20-minute survey either on paper or electronically via Qualtrics on their personal device or a sanitized tablet provided by the research team. Surveys asked general information (i.e., name, date of birth, address, contact information, race, ethnicity, and gender), participant health beliefs, behaviors, relationships, social life, and COVID-19 related information, including information about symptoms, test results, medical history, and vaccination status. Measures assessing basic needs, protective, and risky behaviors were from RADx-Up Common Data Elements and the PhenX Toolkit (Hamilton et al., 2011; RADx-UP Coordination and Data Collection Center, n.d.). All consent procedures and protocols were reviewed and approved by the Committee for Protection of Human Subjects and the University of Oregon Institutional Review Board.

Data was collected throughout two phases of OSJP that occurred between February 2021 and August 2022. Phase I of OSJP was between February 2021 and August 2021 and included a cluster randomized trial to evaluate strategies designed to accelerate COVID-19 testing. A facilities-location-problem approach was used to optimize testing site locations with geomapping of the Latinx population to determine potential locations for testing events; 48 sites across nine Oregon counties were determined (Searcy et al., 2023). A random-number generator was used to randomize within county sites to the intervention group or outreach as usual group. Sites in the intervention group had a *Promotores de Salud* intervention as an onsite component at testing events to promote individual and public health protective behaviors like wearing a mask and physical distancing that were important earlier in the pandemic. Sites in the outreach-as-usual group did not have the *Promotores de Salud* intervention (DeAnda et al., 2022). Testing procedures were the same across both conditions. Phase II of OSJP occurred between September 2021 to August 2022 and implemented a testing approach that relied on weekly information from state, county, and community partnerships about optimal testing locations to determine testing sites.

Participants

Participants included community members in the state of Oregon who were 15 years of age or older, had proficiency in English or Spanish, and visited one of OSJP's 48 COVID-19 testing sites and consented to participate in a survey. The sample (N=1644) is comprised of 1126 Latinx (71%), 402 non-Latinx White (25.3%), and 59 non-Latinx Black, Indigenous, and people of color (BIPOC) (3.7%) individuals. The mean age was 40.53 years (range 15-93). Participants also self-identified as female (58.2%), male (39.9), non-binary (0.5%), transgender 0.3%),

gender non-binary (0.1%), or bigender (0.1%). Approximately 1% of individuals preferred not to answer the question regarding gender.

Measures

Sociodemographics

Participants self-reported sociodemographic information such as age, race/ethnicity, zip code, and languages spoken at home. Age is a continuous variable within the analysis. Determination of urban or rural residence was made utilizing the zip code and the Oregon Office of Rural Health geographic definitions; any geographic areas ten or more miles from the centroid of a population center of 40,000 people were classified as rural. All other areas were classified as urban (Oregon Office of Rural Health, 2020).

Pandemic Wave Time

Pandemic wave time was determined based on the date that the data was collected. According to federal reports, the United States has experienced fives waves of the pandemic since 2020 (The White House, 2022). However, there is no clear consensus regarding the start and end of a pandemic wave. The determination of exact pandemic wave time cutoffs for the purpose of this study was made upon review of existing literature (Katella, 2023; The New York Times, 2023; World Health Organization, 2022). Based on this review, participants categorized as Alpha Wave completed the survey at a testing event held between March 1, 2021 and June 15, 2021; the Delta Wave was June 16, 2021 through December 15, 2021; the Omicron Wave was December 16, 2021 through March 31, 2022; and Omicron Bivalent Wave was April 1, 2022 to August 31, 2022.

COVID-19 Risk Behaviors

COVID-19 risk behaviors were assessed using responses to the question, "Which of the following have you done in the last five days? Select all that apply." The six items included *gone to a residence that is not your own (e.g., friend, neighbor, or relative) or attended a gathering of less than 10 people; had visitors such as friends, neighbors, or relatives at your residence; attended a gathering with more than 10 people, such as a reunion, wedding, funeral, or religious service; had close contact (2 arm's length) with people who you do not live with; went out shopping for groceries, vegetables, medicines, etc.;* and *none of the above*. This measure was part of the PhenX Toolkit (Hamilton et al., 2011). The item was adapted by the RADx OSJP project team through the removal of two response options (i.e., *avoided contact with people who could be high risk for transmitting coronavirus* and *traveled to and from work*). The adapted measure was reviewed by the project's Community and Scientific Advisory Board for face validity, readability, and clarity. A COVID-19 risk behaviors score was derived by summing the number of reported risky behaviors. Higher scores reflect higher levels of engaging in COVID-19 risk behaviors during the past five days. The internal consistency reliability of COVID-19 risk behaviors in the present sample was $\alpha = .51$.

COVID-19 Protective Behaviors

COVID-19 protective behaviors were assessed using responses to the question "Which of the following have you done in the last seven days to keep yourself safe from coronavirus? Only consider actions that you took or decisions that you made personally." Participants responded with "yes" or "no" to 16 different items including *washed your hands with soap or used hand sanitizer several times per day, canceled or postponed personal or social activities, canceled a doctor's appointment,* and *worn a mask or other face covering*. This measure was adapted from the PhenX Toolkit (Hamilton et al., 2011). Due to this measure being cohort specific, items were

cut based on investigator feedback by the RADx OSJP project team and modifications were reviewed by the project's Community and Scientific Advisory Board for face validity, readability, and clarity. COVID-19 protective behaviors scores were derived by counting the frequency of reported protective behaviors. Higher scores reflect higher levels of engaging in COVID-19 protective behaviors during the past seven days. The internal consistency reliability of COVID-19 protective behaviors in the present sample was α= .77.

COVID-19 Related Basic Needs Challenges

Participants completed a six-item measure of challenges related to meeting basic needs experienced during the COVID-19 pandemic. This measure was from the RADx-Up Common Data Elements and required for the study (RADx-UP Coordination and Data Collection Center, n.d.). The items were not adapted by the RADx OSJP project team. Items were introduced with the prompt, "The COVID-19 pandemic may cause challenges for some people, whether they get COVID-19 or not. In the past 6 months have you or your family experienced any of the below challenges?". The items were, *"Getting the health care I need (including for mental health)," "Having a place to stay/live," "Getting enough food to eat," "Having clean water to drink," "Getting the medicine I need" and "Getting to where I need to go."* The 3-point Likert-type response options from 0 (*no, not a challenge*) to 2 (*yes, this is a major challenge*). Scores were derived by summing up responses to each item of the scale. Higher scores reflect higher experiencing more challenges. The internal consistency reliability of COVID-19 protective behaviors in the present sample was α = .88.

Data Analytic Plan

All statistical analyses were conducted using IBM SPSS Statistics Version 29 for Mac and R Studio Statistical Software (4.2.2). The R packages *tidyverse, VIM, misty, naniar, lme4,*

lmerTest, pan, and *mitml* were utilized. To test the study hypothesis, the primary analytic approach involved linear mixed effects regressions or multilevel growth models (MLM; Derick et al., 2009) to test hypothesized predictors of COVID-19 risk and protective behaviors and interactions (hypothesis 1) and whether these behaviors are moderated by basic needs (hypothesis 2). The following is an example set of equations for model 2 that tested the interaction of risk behaviors and basic needs. $\text{RiskBehaviors}_{ij}$ represents Risk Behaviors for individual *i* in site (cluster) *j*. Rurality was measured at Level 2. Age, Language, Ethnicity, Pandemic Wave, Basic Needs, and interactions with Basic Needs were measured at Level 1.

Level 1: $Risk\ Beh\ y_{ij} = \beta_{0i} + \beta_{1i}Age + \beta_{2i}Spanish + \beta_{3i}Latinx + \beta_{4i}BIPOC + \beta_{5i}DeltaWave + \beta_{6i}OmicronWave + \beta_{7i}OmicronBvarWave + \beta_{8i}BasicNeeds + e_{ij}$

Level 2: $Risk\ Intercept\ \beta_{0i} = \gamma_{00} + \gamma_{01}Rural + U_{0i}$

$Age\ \beta_{1i} = \gamma_{10}$

$Spanish\ \beta_{2i} = \gamma_{20} + \gamma_{21}Rural$

$Latinx\beta_{3i} = \gamma_{30} + \gamma_{31}Rural$

$BIPOC\beta_{4i} = \gamma_{40} + \gamma_{41}Rural$

$DeltaWave\beta_{5i} = \gamma_{50} + \gamma_{51}Rural$

$OmicronWave\beta_{6i} = \gamma_{60} + \gamma_{61}Rural$

$OmicronBvarWave\beta_{7i} = \gamma_{70} + 7Rural$

$BasicNeeds\beta_{8i} = \gamma_{80} + \gamma_{81}Rural$

CHAPTER III

RESULTS

Preliminary Analysis and Assumption Testing

Demographic information and descriptive statistics were explored, and bivariate correlations were calculated using SPSS (see Table 1, Table 2, Table 3, respectively). Upon inspection of the distribution of Rural Code, less than 1% (n = 8) of participants fell within the frontier category. This does not provide enough cases to conduct any meaningful comparisons that could be statistically reliable. Therefore, the three codes were combined into rural versus urban. Only one correlation between predictor variables exceeded $r = .80$, thus largely meeting the assumption for multipotentiality (Field, 2009). The exception is the relationship between Spanish being the primary language spoken at home and Latinx identified individuals, $r = .807$. Thus, multicollinearity assumptions were further assessed with the variance inflation factor (VIF) score in R. All VIF scores of the variables were below 5.0, which according to Craney and Surles (2002) is a common cutoff score to determine collinearity.

Table 1

Demographics

Variables	*n*	%
Age		
15-20	166	10.5%
21-30	292	18.4%
31-40	357	22.5%
41-50	360	22.7%
51-60	230	14.5%
61-70	124	7.9%
71-80	47	3.1%
81-90	6	0.3%
91-93	3	0.1%
Spanish Primary Language		
Yes	1075	66.2%
No	549	33.8%
Race/Ethnicity		
Non-Latinx White	402	25.3%
Latinx	1126	71.0%
None-Latinx BIPOC	59	3.7%
Rural Code		
Urban	985	60.4%
Rural	645	39.6%

Table 2

Descriptive Statistics of Factors by Pandemic Wave

Pandemic Wave	Alpha Wave			Delta			Omicron			Omicron Bvar		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Age	41.78	15.677	403	40.78	15.112	730	39.40	15.722	275	38.43	15.823	177
White	.21	.405	413	.25	.434	746	.43	.496	260	.10	.302	168
Latinx	.78	.415	413	.70	.458	745	.52	.501	260	.88	.332	168
BIPOC	.01	.120	413	.05	.212	726	.05	.226	260	.02	.153	168
Spanish	.74	.440	420	.66	.475	753	.46	.499	269	.81	.395	182
Urban/Rural	-.03	1.001	412	-.02	1.000	754	-.49	.875	277	-.94	.353	187
Risk Behaviors	2.29	1.604	420	1.10	1.342	756	.71	1.346	280	.10	.552	188
Protective Behaviors	5.72	2.966	420	5.14	2.982	756	2.92	1.807	280	2.00	1.288	188
Basic Needs	2.63	3.218	403	2.36	3.119	728	1.96	2.927	253	3.38	3.810	168

Note. Age (15-93 years), White (White = 1, non-White = 0), Latinx (Latinx = 1, non-Latinx = 0), BIPOC (BIPOC = 1, non-BIPOC = 0), Spanish (Predominantly Spanish speaking = 1, non-predominantly Spanish speaking = 0), Rural/Urban (Urban = - 1, Rural = 1), Alpha Wave (data collected during Alpha Wave = 1, data not collected during Alpha Wave = 0), Delta Wave (data collected during Delta Wave = 1, data not collected during Delta Wave = 0), Omicron Wave (data collected during Omicron Wave = 1, data not collected during Omicron Wave = 0), Omicron Bvar Wave (data collected during Omicron Bvar Wave = 1, data not collected during Omicron Bvar Wave = 0), Risk Behaviors (range = 0-9), Protective Behaviors (range = 0-13), Basic Needs (range = 0-12).

Table 3

Means, Standard deviations, and Bivariate Correlations of Research Variables

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	40.53	15.47	—												
2. White	.25	.44	.105**	—											
3. Latinx	.71	.45	-.102**	-.910**	—										
4. BIPOC	.04	.19	0.006	-.114**	-.308**	—									
5. Spanish	.66	.47	-.078**	-.746**	.807**	-.221**	—								
6. Rural/Urban	-.21	.98	.031	.039	-.044	.015	-.034	—							
7. Alpha Wave	.26	.44	.047	-.065**	.091**	-.071**	.095**	.107**	—						
8. Delta Wave	.46	.50	.015	-.003	-.016	.048	-.009	.175**	-.540	—					
9. Omicron Wave	.17	.38	-.034	.181**	-.190**	.039	-.193**	-.129**	-.265**	-.418**	—				
10. Omicron Bvar Wave	.11	.32	-.048	-.120**	.125**	-.024	.109**	-.268**	-.210**	-.332**	-.163**	—			
11. Risk Behaviors	1.59	1.54	-.04	.135**	-.137**	.017	-.145**	.176**	.263**	.187**	-.259**	-.348**	—		
12. Protective Behaviors	4.55	2.96	.008	-.187**	.177**	.001	.182**	.133**	.231**	.183**	-.250**	-.309**	.181**	—	
13. Basic Needs[a]	2.48	3.22	.065*	-.211**	.219**	-.040	.212**	-.043	.029	-.033	-.071**	.098**	-.089**	-.083**	—

Note. White (White = 1, non-White = 0), Latinx (Latinx = 1, non-Latinx = 0), BIPOC (BIPOC = 1, non-BIPOC = 0), Spanish (Predominantly Spanish speaking = 1, non-predominantly Spanish speaking = 0), Rural/Urban (Urban = - 1, Rural = 1), Alpha Wave (data collected during Alpha Wave = 1, data not collected during Alpha Wave = 0), Delta Wave (data collected during Delta Wave = 1, data not collected during Delta Wave = 0), Omicron Wave (data collected during Omicron Wave = 1, data not collected during Omicron Wave = 0), Omicron Bvar Wave (data collected during Omicron Bvar Wave = 1, data not collected during Omicron Bvar Wave = 0), Risk Behaviors (range = 0-9), Protective Behaviors (range = 0-13), Basic Needs (range = 0-12).

*p <.05. **p <.01

[a] Reflects challenges meeting Basic Needs.

Next, assumptions testing was conducted to determine if the data fulfilled assumptions of linear mixed effects regressions with respect to linearity, homogeneity of variance, normal distribution, and that data was missing completely at random (Schielzeth et al., 2020). See Figure 1 and Figure 2 to see plots of predictors for risk behaviors and protective behaviors, respectively.

Figure 1. Assumption Testing for Predictors in Relation to Risk Behaviors

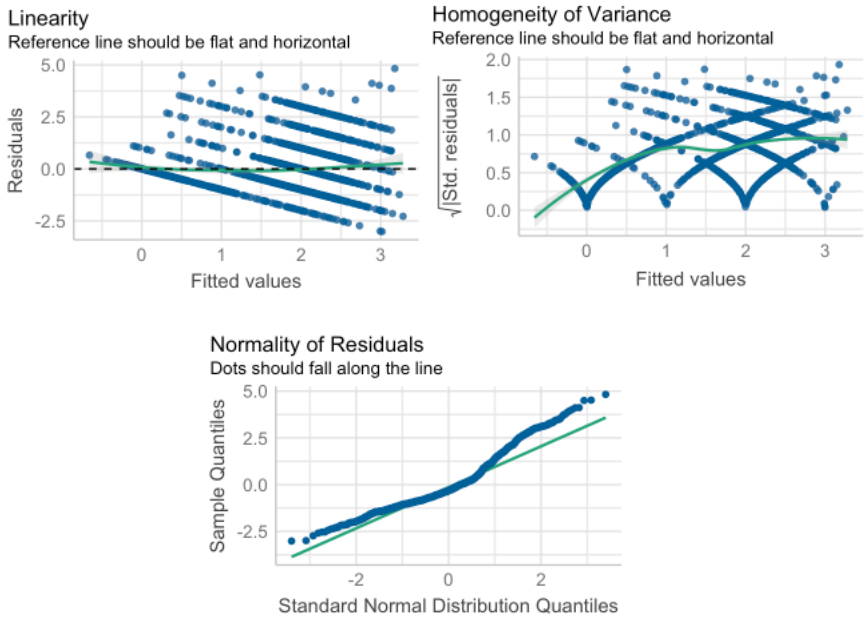
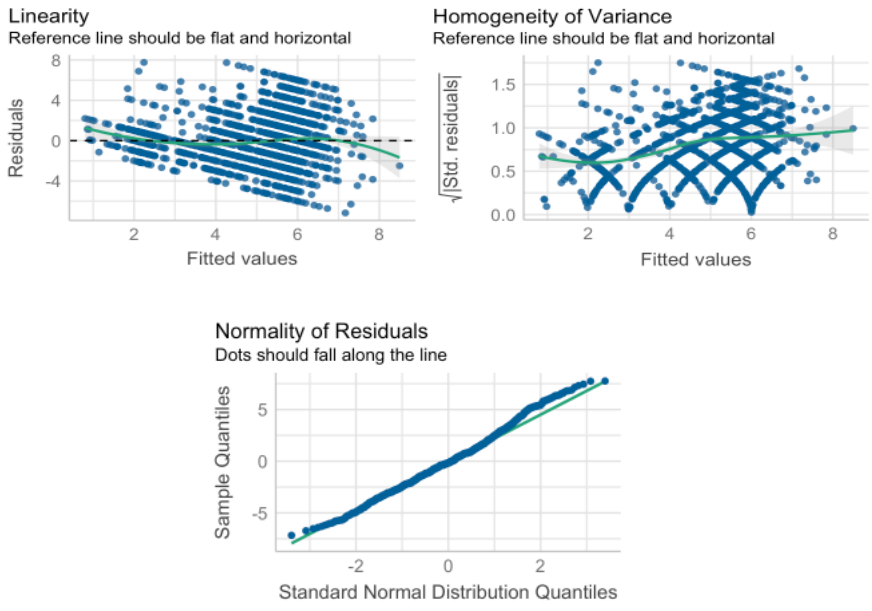


Figure 2. Assumption Testing for Predictors in Relation to Protective Behaviors



Additionally, assumptions for missing data need to be met before statistical inferences can be made wherein the validity of assumptions requires "formal evaluation before any further analysis" (Li, 2013). Thus, Little's test of Missing Completely at Random (MCAR) was performed in order to assess missing data and determine the best way to mitigate the effects of missingness. MCAR analysis indicated that the values were missing not at random (MNAR) ($\chi^2[102] = 395.715$, $p = .000$). Missing data pattern analysis indicated that of 1644 cases, 10.52% of cases had missing data. Attrition analysis of study variables was conducted utilizing t-tests. Among the five predictor variables, there were three differences observed between complete and incomplete cases, incompleters were more likely to be Latinx relative to completers (M = 1.91, SD = .44 and M = 1.77, SD = .50, t = -2.75, p < .01), were more likely to be from rural areas relative to completers (M = -.19, SD = .983 and M = -.42, SD = .910, t = 2.89, p < .01), and were more likely have completed the survey during the Omicron Wave (M = 2.51, SD = 1.06 and M = 2.10, SD = .902, t = -5.60, p < .01).

According to Buhi and colleagues (2008), when data is minimally to moderately missing (e.g., > 5%, < 50%), multiple imputation (MI) is the more sophisticated missing data technique to employ; MI replaces missing data values with a combination of single and multiple imputed results. Data was multiply imputed using the pooled estimates from ten imputed datasets.

Linear Mixed Effects Models

Risk Behaviors

Results of the linear mixed effects models predicting risk behaviors are presented in Tables 3 and 4. The main effects only model indicated that age (β = -.009, $p < .000$), Spanish language (β = -.361, $p < .003$), Latinx (β = -.269, $p < 0.037$), Delta Wave (β = -.513, $p < .000$), Omicron Wave (β = -1.809, $p < .000$), and Omicron Bivalent Wave (β = -2.138, $p < .000$) were

associated with engagement in fewer risk behaviors. Specifically, participants who were older, endorsed speaking Spanish primarily at home, were Latinx, and those who completed the measures during the Delta, Omicron, or Omicron Bivalent waves, engaged in fewer risk behaviors than their respective counterparts.

Basic Needs as a Moderator of Predicting Risk Behaviors

The fit of a linear mixed effect model testing basic needs as a moderator was compared to that of the main effects only model (see Table 4). Lower AIC (5024.432 versus 5239.862), BIC (5130.306 versus 5298.532), and greater R^2 values (.304 versus .284) indicated that the model including the interaction terms exhibited better fit and explained greater variance in risk behaviors than the main effects only model (Dedrick et al., 2009). However, the interaction between age and basic needs was a marginally but not a statistically significant predictor of risk behaviors ($\beta = -.001$, $p = .067$). No other interactions between risk factors and meeting basic needs were significant predictors of risk behaviors.

Protective Behaviors

Results of the linear mixed effects models predicting protective behaviors are presented in Tables 3 and 4. The main effects only model indicated that Spanish language ($\beta = .614$, $p < .009$), Latinx ($\beta = .745$, $p < 0.003$), and BIPOC ($\beta = 1.008$, $p < .006$) were positively associated with engagement in protective behaviors. Delta Wave ($\beta = -.611$, $p < .000$), Omicron Wave ($\beta = -2.566$, $p < .000$), and Omicron Bivalent Wave ($\beta = -3.772$, $p < .000$) were negatively associated with engagement in protective behaviors (see Table 3). Specifically, participants who endorsed speaking Spanish primarily at home and those who were non-Latinx Black, Indigenous, People of Color (BIPOC) engaged in more protective behaviors. Participants who completed the

measures during the Delta, Omicron, or Omicron Bivalent waves, engaged in fewer protective behaviors.

Table 4

Linear Mixed Effects Model Coefficients Estimating Risk and Protective Behaviors, Main Effects Model

	Risk Behaviors			Protective Behaviors		
	Est.	SE	*p*	Est.	SE	*p*
Age	-.009	.002	< .001	.001	.005	.908
Spanish	-.361	.120	.003	.614	.235	.009
Latinx	-.269	.129	.037	.745	.254	.003
BIPOC	-.178	.186	.339	1.008	.366	.006
Rural/Urban	.036	.056	.517	.014	.090	.873
Delta Wave	-.513	.092	< .001	-.611	.171	< .001
Omicron Wave	-1.809	.116	< .001	-2.566	.222	< .001
Omicron Bvar Wave	-2.138	.146	< .001	-3.772	.277	< .001

Table 5

Linear Mixed Effects Model Coefficients Estimating Risk and Protective Behaviors, Interaction Model

	Risk Behaviors			Protective Behaviors		
	Est.	SE	*p*	Est.	SE	*p*
Age*Basic Needs	-.001	.001	.067	-.003	.002	.063
Spanish*Basic Needs	.025	.045	.582	-.066	.077	.393
Latinx*Basic Needs	-.037	.051	.465	.023	.094	.803
BIPOC*Basic Needs	-.043	.081	.590	.316	.161	.050
Rural/Urban*Basic Needs	.003	.012	.819	.019	.023	.411
Delta Wave*Basic Needs	.023	.026	.388	-.093	.054	.084
Omicron Wave*Basic Needs	.057	.036	.115	-.112	.071	.115
Omicron Bvar*Basic Needs	.041	.036	.251	-.135	.070	.054

Basic Needs as a Moderator of Predicting Protective Behaviors.

The fit of a linear mixed effect model testing basic needs as a moderator was compared to that of the main effects only model. Lower AIC (6979.295 versus 7282.532), BIC (7085.169 versus 7341.203), and greater R^2 values (.261 versus .235) indicated that the model including the interaction terms exhibited better fit and explained greater variance in protective behaviors than the main effects only model. The interaction between BIPOC and basic needs and Omicron Bivalent Wave and basic needs were a significant predictor of protective behaviors ($\beta = .316$, $p = .050$; $\beta = -.135$, $p = .054$). More specifically, a one standard unit increase in basic needs predicted approximately .3 standard units higher of protective behaviors among BIPOC individuals and .1 standard units lower of protective behaviors among individuals during the Omicron Bivalent Wave.

CHAPTER IV

DISCUSSION

Across the United States, the COVID-19 pandemic exacerbated challenges to already vulnerable and marginalized communities (Jamieson et al., 2021; Kim et al., 2020; Mein, 2020). Individuals with certain demographic characteristics (i.e., characteristics associated with age, racial and ethnic identity, and rural residentially) experienced higher susceptibility to COVID-19 infection and death (Carethers, 2021; Drefahl et al., 2020; Kim et al., 2020). However, the pandemic not only aggravated epidemiological inequities, it also increased hardships related to accessing basic resources (Wolfson & Leung, 2020). Prior to the dissemination of the COVID-19 vaccine, the most notable effort to curb the spread of COVID-19 included the implementation of extensive social-distancing mitigation efforts (CDC, 2020). These efforts, in conjunction with the pandemic, contributed to major social and economic consequences, including supply chain issues, job loss, economic downturn, and ability to meet basic needs (Ashraf & Goodell, 2022; Chiesa et al., 2021; Guerrieri et al., 2022; He & Harris, 2020). Thus, the purpose of this study was twofold: first, to better understand the relationships between identified COVID-19 risk factors and engagement in COVID-19 risk and protective behaviors. The second was to better understand whether difficulty meeting basic needs during the COVID-19 pandemic moderated the relationships between significant COVID-19 risk factors (e.g., age, ethnicity, language, urban/rural, pandemic wave time) and engagement in COVID-19 risk and protective behaviors.

Research exploring demographic risk factors associated with the pandemic as they relate to engagement in both COVID-19 risk and protective behaviors is currently limited. Although research on health-related behaviors has generally examined "indices of protective *or* risky behaviors separately" (Nishimi et al., 2022), these COVID-19 behaviors are not mutually

exclusive and engagement in both these behaviors can influence the risk of infection. Currently, there is a gap in the literature regarding our knowledge of how consistently people engaged in both risk and protective health behaviors during the pandemic. Based on available research, it was hypothesized that the identified risk factors of age, ethnicity, language, urban/rural residency, and pandemic wave time would account for variance in self-reported COVID-19 risk and protective behaviors. More specifically, I hypothesized that younger age, language, ethnicity, and urban residence will be associated with more risky behaviors and that younger age and urban residence will be associated with fewer protective behaviors. Due to mixed findings in much of the literature, a direction is not specified for language and ethnicity and their association with protective behaviors or for pandemic wave time and its association with both risk and protective behaviors.

Predictors of COVID-19 Risk and Protective Behaviors

Significant predictors of COVID-19 risk behaviors were age, language, race/ethnicity, and COVID-19 wave, whereas significant predictors for protective behaviors included language, ethnicity, and COVID-19 wave. In the following paragraphs these findings are considered in the context of the current literature. Results from the first MLM model testing hypothesized predictors of COVID-19 risk and protective behaviors indicated that older adults reported engaging in fewer risky behaviors than younger adults. This data is consistent with previous reports that older adults engaged in fewer COVID-19 related risky behaviors compared to their younger counterparts (Kim & Crimmins, 2020; Luo et al., 2021; Schneider et al., 2021).

Additionally, results indicate that both Latinx and Spanish speaking individuals reported engaging in fewer risky behaviors and engaging in more protective behaviors than their respective counterparts. Regarding risk behaviors among Latinx individuals, these findings are

counter to what prior research would suggest. Latinx individuals have suffered from adverse impacts of COVID-19 due in part to existing health disparities and their overrepresentation in essential job service industries that prevented engagement in many CDC recommended social distancing guidelines, which required or at least pressured engagement in risky behaviors (Baquero et al., 2020). In a study by Martin and colleagues (2023), Latinx adults identified job-insecurity as a primary influencer of participants' decisions to engage in risky health behaviors. Due to these systemic barriers, I anticipated that this community would have reported more engagement in COVID-19 risk behaviors.

In regard to preventative behaviors, results add to emerging evidence of mixed results regarding engagement in protective behavior among Latinx individuals. In one study, when compared to Whites, Latinx individuals reported engaging in more protective behaviors, such as mask wearing (Schneider et al., 2021). However, other studies found no differences between the self-reported engagement of protective behaviors of Latinx individuals and their White and BIPOC counterparts (Nishimi et al., 2022; Sauceda et al., 2020).

Research has identified that predominantly Spanish-speakers tend to be immigrants (Oh et al., 2023; Rodriguez-Diaz et al., 2020). Literature regarding the health behaviors of Latinx immigrants prior to the pandemic suggests that they practice better health related behaviors than their non-immigrant counterparts (Gorman et al., 2010; Kimbro, 2009; Lopez-Gonzalez et al., 2005). Although there is emerging literature on the behaviors of Latinx community members through the pandemic, little is known about the behaviors of Latinx immigrants specifically and potential heath disparities occurring among this group. In their study of Latinx immigrant families, Quandt and colleagues (2022) found that structural factors, such as job insecurity, labor

demand, and poverty, contributed to engagement in COVID-19 related risk behaviors, similar to their non-immigrant counterparts.

The existing research regarding preventative behaviors among Spanish speaking individuals also appears to be mixed. One study exploring attitudes toward engaging in preventative behaviors found Spanish-speaking immigrants had higher, more positive attitudes toward COVID-19 protective behaviors than non-Latinx whites (Oh et al., 2023). However, Thomas (2023) found that a sample of predominantly Latinx immigrants endorsed engaging in COVID-19 protective behaviors the least.

The results of this study provide a clearer picture of engagement in risk and protective behaviors across different time points in the pandemic. Most of the aforementioned studies were cross sectional in nature and collected data during the first few months of the pandemic (March-September 2020) utilizing nationally representative samples from online surveys (Luo et al., 2021; Nishimi et al., 2022; Sauceda et al., 2020; Schneider et al., 2021). Exceptions are Kim and Crimmins (2020), who conducted a longitudinal study on COVID-19 related behaviors across three months (March-May 2020), and Martin and colleagues (2023), who recruited a community sample from July to September 2020, and were the only team to do so in collaboration with community partners. The sample for the present study was collected across 18 months, and risk and protective behaviors do appear to have changed over time in the pandemic (Kim & Crimmins, 2020; further elaborated below). Findings of the present study may differ from prior studies because it was collected beyond the initial months of the pandemic and captured data across different phases or waves (February 2021 through August 2022). It is also important to consider that not only was data for the present study collected across a larger period of time but the larger study comprised of a *Promotores de Salud* intervention that included 1) culturally

tailored outreach strategies to advertise and promote participation in the SARS-CoV-2 testing events and 2) the delivery of a brief health education intervention to promote COVID-19 preventative behaviors to participants who attended OSJP testing events (Budd et al., 2022; De Anda et al., 2022; DeGarmo et al., 2022). Findings of Phase I of the OSJP project suggest that the intervention had value in promoting the well-being of participants (De Anda et al., 2022). Public health interventions that incorporate core cultural values (e.g., *familismo*, more information below) positively reinforce engagement in protective behaviors (Martin et al., 2023). An additional explanation regarding why findings of the present study differed from previous studies (e.g., Nishimi et al., 2022; Sauceda et al., 2020; and Thomas, 2023) may be due to the advantage of having a predominantly Latinx sample that indeed stemmed from a culturally-matched intervention that occurred beyond the initial months of the pandemic.

To my knowledge, this is the first study to suggest that Latinx individuals and primarily Spanish-speaking individuals reported engaging in fewer risky COVID-19 behaviors than their non-Latinx and primarily English-speaking counterparts. These results could be due to the extended period of time for data collection (rather than only the initial months of the pandemic) in conjunction with the Latinx cultural value of *familismo*, or the need and duty to put one's family above oneself. *Familismo* is a multi-faceted driving force that not only impacts behavior broadly but directly influences healthcare decision-making among Latinx families (Campos et al., 2014; Garcini et al., 2021; Penwell & Larkin, 2010). *Familismo* captures the collectivist nature of the Latinx community, and in relation to health, *familismo* has been associated with prosocial behaviors (Garcini et al., 2021; Schwartz et al., 2010). Mitigation strategies that are at direct odds with cultural values, such as social distancing and quarantining due to *familismo* in the context of the pandemic, have been reframed and leveraged to instead promote positive

health behaviors. Research across a variety of health conditions, such as hepatis C treatment, mental health, and breast cancer treatment, and now, COVID-19, highlights the effectiveness of using health seeking behaviors as a way to protect the family and community (Davilia et al., 2011; DeGarmo et al., 2022; Garcia et al., 2021; Garcini et al., 2021; Piña-Watson et al., 2013; Sheppard et al., 2008). In Oregon, a qualitative study found that COVID-19 vaccination campaigns that promoted *familismo* and framed vaccination as a way to protect family members appealed to Latinx participants (Garcia et al., 2021). Additionally, our own larger OSJP study implemented culturally tailored messaging focused on engaging in protective behaviors to protect the family and community across Oregon from February 2021 and August 2022 (Budd et al., 2022; De Anda et al., 2022; DeGarmo et al., 2022). Although higher rates of protective behaviors were reported by Latinx and Spanish speaking participants, it is unclear whether the larger OSJP intervention with messaging that highlighted *familismo* contributed to these results. Given that approximately half of the data for the present study was collected at sites that did not receive the cultural messaging, it is also possible that the results are a reflection of the pre-existing fundamental value of *familismo* within these communities.

Although there were no statistically significant differences between BIPOC individuals and their White counterparts regarding engagement in risk behaviors, results indicate that BIPOC individuals reported engaging in more protective behaviors. This result adds to the mixed findings regarding COVID-19 related health behaviors of BIPOC individuals. For example, Orom and colleagues (2022) found that when compared to White respondents, Black participants engaged in protective behaviors to a greater extent. Meanwhile, Dickinson and colleagues (2021) found no evidence of BIPOC individuals engaging in protective behaviors differently than their

White counterparts, and other studies report a lower uptake of protective behaviors due to historical medical mistrust of BIPOC individuals (Bogart et al., 2021; Ojikutu et al., 2022).

Lastly, results suggest that individuals engaged in both fewer risky behaviors and fewer protective behaviors in subsequent COVID-19 waves (i.e., Delta, Omicron, and Omicron BVAR) in comparison to individuals who were surveyed during the Alpha Wave. There have been confounding reports on the engagement in risk behaviors throughout the pandemic's subsequent waves. One cross-sectional study with participants from Canada, Germany, the UK, and the US found that as the pandemic's phases and COVID-19 variants evolved, engagement in protective behavior was stable (Perry et al., 2022). Others have reported, however, that as the pandemic continued on, individual suffered from "pandemic fatigue," wherein engagement in protective behaviors decreased and risk behaviors increased (Trogen & Caplan, 2021). Meanwhile, Petherick and colleagues' (2021) cross-sectional study found a monotonic increase in low-cost protective behaviors (e.g., mask wearing) throughout the pandemic, and a "U-shape pattern" consisting of a large decline in adherence to protective behaviors followed by a small rebound for high-cost behaviors, such as social distancing, over time. Results of the present study add to the literature regarding lower engagement in risk and protective behaviors during the later waves of the pandemic. As previously emphasized, in order for individuals to limit the risk of infection and potential adverse outcomes, they need to engage in protective behaviors while avoiding risky behaviors (Nishimi et al., 2022). These behaviors can fluctuate with the ever-changing COVID-19 dynamics: engagement in these behaviors can increase or decrease, respectively, depending on the current risk of infection due to variants and rising infection rates.

One risk factor that did not have any statistically significant findings in relation to risk or protective behaviors was urban/rural residence. Rural residence has been identified in previous

studies as a risk factor due to associated challenges (e.g., limited health infrastructure, availability of resources) and unique aspects of its residents (e.g., older, more comorbid chronic health conditions; Andraska et al., 2021; Jensen et al., 2020; Segal et al., 2021; Souch & Cossman, 2021). In terms of behaviors, one study found that rural residents engaged in fewer protective behaviors compared to their urban counterparts (Callaghan et al., 2021). Considering this literature, it is unclear why the current study did not identify a significant relationship between risk or protective behaviors and urban/rural residence. One explanation could be due to the aforementioned 18-month span of data collection. It is reasonable to expect that both risk and protective behaviors fluctuated throughout this period for individuals who live in rural or urban communities (see Table 2). Another possible explanation could be due to the effects of the OSJP intervention itself. A goal of the OSJP intervention was to overcome access barriers in this largely rural state. In order to maximize access, a facilities-location-problem approach was used to optimize testing site locations to determine potential locations for testing events to increase public health services to Latinx residents of non-urban areas (Searcy et al., 2023). Intentional regard for rural residents, in conjunction with potential intervention effects, could explain the null results associated with urban/rural risk factor in the current study.

Basic Needs as a Moderator to COVID-19 Risk and Protective Behaviors

The second aim of the present study was to examine the relationship between COVID-19 risk factors of age, ethnicity, language, urban/rural, pandemic wave time, and engagement in COVID-19 risk and protective behaviors and how they are associated with difficulty meeting basic needs, so as to better inform future research, policy, and practice. The second MLM model tested whether difficulty meeting basic needs during the COVID-19 pandemic moderated the relationships between significant COVID-19 risk factors and engagement in COVID-19

protective and risk behaviors. Contrary to the hypothesis, no significant interactions for predicting risk behaviors were found, a point that is addressed later in this section. However, there were two significant interactions for predicting protective behaviors (BIPOC and Omicron Bivalent Wave). Findings indicated that for BIPOC individuals, the more basic needs challenges they endorsed, the more protective behaviors they engaged in. Drivers of this behavior could include increased awareness of and susceptibility to COVID-19 among BIPOC individuals. Studies published early on in the pandemic reported BIPOC communities having lower levels of knowledge regarding COVID-19 (Wolf et al., 2020) and low intent to comply with recommended mitigation behaviors (Van Scoy et al., 2020). However, efforts to increase awareness in marginalized communities, such as the We Can Do This COVID-19 national public health campaign that debuted in early 2021 (US Department of Health and Human Services, 2023) could have indeed been successful. A contrary finding by Jones et al., 2020 was conducted earlier in the pandemic, perhaps before more effective outreach strategies were implemented. The results of the present study show no differences between BIPOC and White participants on risk behavior and relatively more engagement in protective behaviors for BIPOC participants who had greater difficulty accessing basic needs relative to BIPOC individuals with lesser difficulty accessing basic needs. Altogether, these results shed light on potential phenomena occurring among disadvantaged communities. While BIPOC communities engaged in CDC-recommended mitigation strategies, it is important to understand the implications that those behaviors have on access to having basic needs met.

The lack of a hypothesized interaction effects for predicting risk behaviors are only partially supported by existing literature on the basic needs of individuals with specific risk factors and their engagement in mitigation behaviors. As previously reported, marginalized

communities (i.e., older adults, communities of color, rural residents) have suffered adverse pandemic effects in meeting their basic needs, such as paying for housing, utilities, food, or medical care (Andraska et al., 2021; Arnault et al., 2021; Center for Budget and Policy Priorities, 2022; Cole, 2020; Segal et al., 2021). In this study, risky behaviors were quantified through self-reported engagement in social behaviors during the past five days and items include going to a residence that is not one's own or having gone shopping for groceries, vegetables, medicines, etc. (see Appendix A for full measure). Although research regarding the relationship between COVID-19 identified risk factors and the relationship between basic needs challenges and engagement is risk behaviors is limited, literature outside the scope of COVID-19 has found that individuals will go to great lengths, including engagement in risky behaviors that are unique to each situation, to have their needs met. For example, one study by Dong and colleagues (2018) found that in their sample of racially diverse adults who were out on probation, participants endorsed needing to sell illicit drugs to access adequate resources such as food and safe housing. In a different article, Snyder (2008) discussed workers voluntarily engaging in exploitative sweatshop work, work that is long, monotonous, dehumanizing, and dangerous, in order to meet their basic needs. Research has also explored individuals selling or trading sex as a means of meeting their basic needs (Firmin et al., 2016; Hickle & Roe-Sepowitz, 2017). Snyder (2008) posits that when basic needs are at risk of being unmet, engaging in risky behaviors is next-best alternative, a lesson that is supported by results of the aforementioned studies. Reasons for null results associated with risk behaviors in the present study may be due to the specific nature of how risk behaviors were assessed. Additionally, individuals who experienced challenges in meeting their basic needs could have had less resources that made it more difficult to engage in

risky behaviors. For example, limited socialization with people outside the household or not attending large gatherings due to limited resources such a money or transportation.

Lastly, results also indicated that during the Omicron Bivalent Wave (the last wave during which study data was collected), the more basic needs challenges individuals endorsed, the fewer protective behaviors they engaged in. Results suggest that during the earlier waves of the pandemic, people's difficulty meeting basic needs did not seem to alter their engagement in protective behaviors or risk behaviors (as evidenced by null results). It was only during the last wave of the pandemic that protective behaviors were altered. These results add to the limited research regarding the ability to meet basic needs and engagement in COVID-19 protective behaviors. Existing data has primarily focused on engagement in protective behaviors independently. In our study, the Omicron Bivalent Wave was between April 1, 2022, to August 31, 2022. By this point in time, many states in the US had lifted their mask mandates (The New York Times, 2022). In addition, this finding is consistent with evidence of "pandemic fatigue" impacting engagement in protective behaviors (Harvey, 2020; Raheel et al., 2022). Engagement in fewer protective behaviors during the Omicron Bivalent Wave for individuals who endorsed greater basic needs challenges could be attributed to no longer having access to exhausted or expired pandemic related aid aimed to address economic hardship (Fay, 2023; see Table 2), a point I return to in the next section.

Overall, results of second MLM model indicated that difficulty meeting basic needs during the COVID-19 pandemic did not moderate the relationships between most of the identified COVID-19 risk factors and engagement in COVID-19 risk and protective behaviors. This finding is further considered in the following section.

Strengths and Limitations

Several study strengths should be acknowledged. First, to my knowledge, this is the first study exploring the relationship between a set of COVID-19 identified risk factors and engagement in both risk and protective behaviors. In addition, this is the first study that explores the relationships between mitigation efforts, community member access to basic needs, and engagement in both protective and risk behaviors. These data can inform the development of strategies to decrease health disparities and promote healthy behaviors, especially as we continue to live with the ever-evolving COVID-19 virus. A third strength of this study was exploring engagement in risk and protective COVID-19 behaviors independently from one another. According to Nishimi and colleagues (2022), previous research on health-related behaviors has generally examined "indices of protective *or* risky behaviors separately," choosing to study one behavior over the other and not both independently at the same time. In order to minimize the risk of adverse health outcomes associated with COVID-19 infection, individuals must engage in protective behaviors and minimize risk behaviors. This study seeks to address the gap in the literature regarding engagement in COVID-19 risk and protective health behaviors. A fourth strength was the collection of data across an 18-month period, which allowed for exploration of differences in different waves of the pandemic. A fifth strength of this study was the robust participation of Latinx community members. The OSJP *Promotores de Salud* intervention was created with the goal to address COVID-19 related health disparities in Oregon (DeGarmo et al., 2022). A sixth strength of this study was the incentives participants received for filling out the study survey. Participants received their choice of a $30 gift card to either Walmart or Fred Meyer. These places were chosen by the research team in consultation with community partners as these stores were accessible to participants throughout the state of Oregon and provided access to basic needs resources such as food and gas. The monetary amount of the incentive was not

only ethical and substantial enough to get resources, but also reflected the value of *respecto* for the time that participants spent filling out the survey. Since the same reward was available across data collection sites and over time, and was offered after completion of the survey, it is unlikely to have influenced responses to the items assessing challenges meeting basic needs.

This study also has several limitations. First, data were cross-sectional and thus causal conclusions cannot be inferred. Second, this study may be prone to selection bias. Individuals 15 years or older who visited one of OSJP's 48 COVID-19 testing sites were invited to participate in the survey. The purpose of OSJP was to promote health behaviors, including testing for SARS-CoV-2 to reduce the spread of COVID-19 among the Latinx population in Oregon (DeGarmo et al., 2022). Testing sites were specifically chosen with the goal to identify the most optimal locations to target Latinx community members (Searcy et al., 2023). Thus, the results of this study may not be generalizable to the population of Oregon. Additionally, selection bias could also influence our sample regarding who ultimately decided to come to a testing event. Individuals who choose to come to a testing event may have different COVID-19 related behaviors, have higher health literacy, or have more resources associated with ability to attend a testing event compared to individuals who did not attend testing events. However, outreach strategies to target Latinx and Spanish speaking communities utilized a community-based participatory approach and the *Promotores* intervention was developed through close collaboration with community-based organizations (CBOs) and community leaders who became members of the Community and Scientific Advisory Board (CSAB; Anda et al., 2022; DeGarmo et al., 2022). Community partnerships and having bilingual and bicultural community members serve as *promotores* increased our confidence in our ability to reach a population that is often excluded in research.

A third limitation includes the potential of social desirability bias, wherein individuals may have responded in a manner that they thought would reflect more favorably on themselves, such that protective behaviors could have been over-reported and engagement in risk behaviors be underreported. Although we attempted to minimize this source of bias by anonymizing data, it is still possible that this was in effect. A fourth limitation to this study is the low reliability of the measure for risk behaviors ($\alpha = .51$). Generally, $\alpha = 0.6\text{-}0.7$ is an indication of acceptable reliability (e.g., protective behaviors $\alpha = .77$), while 0.8 or greater is very good (e.g., basic needs $\alpha = .88$; Ursachi et al., 2015). Because these items are summed rather than averaged, this is not a major concern. Another limitation of this study is the measure of challenges meeting basic needs. This measure came directly from the RADx-Up Common Data Elements and, despite high reliability, has not been validated. Potential implications of not using a validated measure include potential lack of sensitivity to truly assess what it intends to measure. However, results of bivariate correlations (Table 3) suggest that the measure of basic needs is sensitive to some expected differences in demographic characteristics (i.e., age, White, Latinx, Spanish speaking), pandemic waves (i.e., Omicron and Omicron Bvar), and risk and protective behaviors. This study also attempted to account for changes in the social landscape, including vaccination efforts, general attitudes, and distribution of pandemic related aid, through the use of pandemic wave as a variable. This way of accounting for time lacked precision, for example, different forms of aid were available and coincided with our data collection timeline, including the Child Tax Credit, Economic Impact Payments, COVID-19 student loan forbearance program, CARES Act that imposed a temporary moratorium on evictions, among others (Internal Revenue Service, 2023; US Department of Housing and Urban Development, 2023; USA Spending, 2023). These resources most likely supported individuals facing hardship and facilitated meeting basic needs.

Implications and Future Directions

This study provided insight into the interplay of identified COVID-19 risk factors, self-reported engagement in risk and protective behaviors, and the potential moderating role of access to basic needs. Research on COVID-19 related risk and prevention behaviors is of utmost importance for understanding how individuals and communities, particularly those most marginalized and underserved, have responded to the pandemic.

In order to further understanding pandemic-related behaviors, future research can focus on monitoring behavior over time. Results from this study highlighted how individuals engaged in risk and protective behaviors during multiple waves of the COVID-19 pandemic, from early 2021 and into late summer of 2022. Specifically, results suggest that participants engaged in fewer risky behaviors and fewer protective behaviors during the later pandemic waves, as compared to individuals surveyed during the Alpha wave. These differences align with changes in public health guidelines and the impact of "pandemic fatigue" at large, and these results could inform ongoing and future preventative efforts to consider strategies that are less taxing to engage in and more sustainable over time, or to investigate the viability of 'booster' strategies to re-invigorate prevention behaviors. Although this study assesses participation in risky and protective behaviors at different timepoints, studies exploring behaviors across time and after the end of the state-of-emergency can provide insight into how behaviors adapt to ever-evolving situations. Such research could inform interventions and public health strategies to effectively balance COVID-19 mitigation strategies with individual behaviors.

Engagement in risk and protective behaviors are related to not only sociodemographic factors but also additional variables that were not captured in this study, such as beliefs and self-perceptions of health (Quandt et al., 2022). Future studies can incorporate beliefs and attitudes

about the pandemic. Additionally, research on health behaviors indicates that adequate perception of risk is associated with better engagement in health behaviors (Park et al., 2021; Smail et al., 2021). As we continue to live with this new normal and anticipate future public health concerns, elevating knowledge of risk and risk perception in vulnerable communities could increase the level of engagement in preventative health behaviors.

Continuing and future public health efforts should be informed by the disruptions caused by the pandemic and address the impact of accessing basic needs. According to Turcotte-Tremblay and colleagues (2021), researchers, policy makers, and practitioners "have not developed the reflex of considering unintended consequences over time." Future policies should be informed not only by the advantages of interventions but also weigh unintended consequences and who is most susceptible to the effects of those consequences. In this study, I identified several COVID-19 related demographic risk factors associated with adverse health consequences, all of which have established literature connecting them with existing health disparities (Carethers, 2021; Drefahl et al., 2020; Kim et al., 2020). The continued disproportionate impact of the pandemic and its consequences on communities of color cannot be understated and should not be ignored. As coronavirus variants continue to emerge and resurgences occur, COVID-19 remains a s significant public health threat; public health agencies have the responsibility to prioritize increasing access to health care, communication, public health awareness, and economic support through the expansion and creation of health and social services programs that serve underserved communities.

Conclusion

The COVID-19 pandemic profoundly impacted society, with vulnerable and minoritized communities suffering disproportionate adverse effects. Throughout the pandemic, individuals

adopted a range of behaviors, including both protective measures and risky actions. This study affirmed that certain risk factors (i.e., age, ethnicity, language, and pandemic wave time) accounted for the variance in in self-reported COVID-19 risk and protective behaviors. This study also found that difficulty meeting basic needs during the COVID-19 pandemic moderated the relationships between two COVID-19 risk factors and engagement in COVID-19 protective behaviors. Findings add to the literature and help address the gap regarding engagement in COVID-19 risk and protective behaviors. These data can inform new or existing policies and interventions that aim to promote healthy and reduce risky behaviors as they relate to COVID-19 or any future public health emergency.

APPENDICES

APPENDIX A

COVID-19 Risk Behaviors

Which of the following have you done in the last five days? Select all the apply.

1 = Gone to a residence that is not your own (e.g., friend, neighbor, or relative) or attended a gathering of less than 10 people. 0 – No 1 – Yes
2 = Had visitors such as friends, neighbors, or relatives at your residence. 0 – No 1 – Yes
3 = Attended a gathering with more than 10 people, such as a reunion, wedding, funeral, or religious service. 0 – No 1 – Yes
4 = Had close contact (2 arm's length) with people who you do not live with. 0 – No 1 – Yes
5 = Went out shopping for groceries, vegetables, medicines, etc. 0 – No 1 – Yes
6 = None of the above. 0 – No 1 – Yes

APPENDIX B

COVID-19 Protective Behaviors

Which of the following have you done in the last seven days to keep yourself safe from coronavi rus? Only consider actions that you took or decisions that you made personally.

1 = Canceled or postponed travel for pleasure
2 = Canceled or postponed work or school activities
3 = Canceled or postponed personal or social activities
4 = Visited a doctor
5 = Canceled a doctor's appointment
6 = Avoided public spaces, gatherings, or crowds
7 = Prayed
8 = Avoided eating at restaurants
9 = Stockpiled hand sanitizer or disinfectant wipes
10 = Worked or studied at home
11 = Worn a mask or other face covering
12 = Stockpiled medication

APPENDIX C

Basic Needs

The COVID-19 pandemic may cause challenges for some people, whether they get COVID-19 or not. In the past 6 months have you or your family experienced any of the below challenges?

0=No, not a challenge 1=Yes, a minor challenge 2=Yes, this is a major challenge

Getting the healthcare I need (including for mental health). ___
Having a place to stay/live. ___
Getting enough food to eat. ___
Having clean water to drink. ___
Getting the medicine I need. ___
Getting to where I need to go. ___

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