The Association between Physical Pain, Depression, Anxiety, and Nervios among Latinx Agricultural Workers

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The Association between Physical Pain, Depression, Anxiety, and Nervios among Latinx Agricultural Workers

A Clinical Dissertation Presented to
The University of San Francisco
School of Nursing and Health Professions
Health Professions Department
PsyD Program in Clinical Psychology

In Partial Fulfillment of the Requirements for the Degree
Doctor of Psychology

By
Iveth Cuellar Celallos
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PsyD Program Signature Page

This dissertation, written under the direction of the candidate’s dissertation committee and approved by members of the committee, has been presented to and accepted by the faculty of the PsyD Program in Clinical Psychology in partial fulfillment of the requirements for the degree of Doctor of Psychology. The content and research methodologies presented in this work represent the work of the candidate alone.

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Dedication and Acknowledgements

I dedicate this work and project to the people who work in agriculture, especially people who migrate from Mexico and Latin America to the U.S. in efforts to work toward a better future. I dedicate this work to children and grandchildren of agricultural workers, who grow up with rich knowledge that is passed down verbally and spiritually. I acknowledge and thank the communities that allowed me to participate and work in their spaces -mil gracias por compartir sus experiencias e historias. Fue un honor trabajar con las comunidades. I dedicate this project to the many immigrant communities in the U.S. for we have a vision and are working every single day to reach our goals, despite the barriers, obstacles, and challenges. This work is for all the women who have influenced me to continue my studies, to ask questions, and to fight for what I want. Many of the women who have influenced me would have been great scholars, researchers, and students, if they only had the opportunity to study. Seguimos en la lucha. I want to thank all my mentors, colegas, and teachers, who have been present with me and have guided me throughout my studies, professionally, academically, and personally. Lastly, I dedicate this work to mi familia -mi hermana, Cynthia, mi hermano, Jorge H., mi papá, Jorge, y mi mamá, Martha. Muchas gracias por enseñarme tanto, por su amor, y por su apoyo tan inmenso.
Abstract

The purpose of this study was to examine the association between physical pain, chronic pain, socio-cultural factors and mental health outcomes such as depression, anxiety, and nervios among Latinx agricultural workers. Survey data were collected in Northern California ($N = 104$). The sample of Latinx agricultural workers consisted of 47 (45.2%) female and 57 (54.8%) male respondents. The average age of participants was 43.13 years ($SD = 14.37$). Over half of participants were married (60.6%). The majority of participants (95.2%) reported Mexico as their country of origin. Most (85.6%) participants reported currently working in agriculture. Two hierarchical multiple linear regressions and one hierarchical binary logistic regression were conducted to assess how physical pain factors and socio-cultural factors predicted depression (Model 1), anxiety (Model 2), and nervios (Model 3). Results showed that high levels of physical pain significantly predicted high levels of depression and anxiety among agricultural workers, but not chronic pain. High levels of familismo (Support from Family) subscale significantly predicted lower levels of depression and anxiety and high levels of marianismo (Silencing Self to Maintain Harmony) subscale significantly predicted lower levels of anxiety, even when controlling for demographics. Physical pain, chronic pain, and socio-cultural factors were not significant predictors of nervios. Being married predicted high levels of anxiety and being employed predicted lower levels of anxiety. Implications of this study show that further research is necessary to explore depression, anxiety, and nervios in relation to physical pain among agricultural workers in order to provide culturally appropriate treatment.
Introduction

There are an estimated 3 million agricultural workers in America (Migrant Health Promotion (MHP) Salud, 2014). Latinx migrant or seasonal farmworkers and agricultural workers, hereunto referred to as agricultural workers, in the U.S. are amongst the most vulnerable populations placing them at higher risk for physical and mental health problems (Tribble et al., 2016). This vulnerability is due to factors such as immigration status, acculturative stress, low socio-economic status (SES), living conditions, family separation, and lack of access to health care (Finch et al., 2004; Hiott et al., 2008; Hovey & Magaña, 2002; Hovey & Magaña, 2003; Kupersmidt & Martin, 1997; Organista et al., 2017). Agricultural workers experience high levels of psychological distress which has been shown to be associated with depression, anxiety, suicidal ideation, and high levels of physical pain (Grzywacz et al., 2011; Hovey & Magaña, 2003). In this study, physical pain will include musculoskeletal pain and persistent headaches. This study will also explore chronic pain and its relation to depression, anxiety, nervios, and sociocultural factors among agricultural workers. Although, agricultural workers show substantially lower rates of mental health conditions compared to non-agricultural workers, studies report that the reliability of the prevalence rates is uncertain due to linguistic and cultural barriers to receiving mental health care, which can interfere with the diagnosis and treatment of agricultural workers (Bogess and Ochoa Bogue, 2014; Tribble et al, 2016).

In addition to the psychological distress, the long work hours and poor safety conditions add physical stress that causes musculoskeletal discomfort or pain (Shipp et al., 2009; Swanberg et al., 2016; Tribble et al., 2016). The experience of physical pain and mental health has been shown to be associated by socio-cultural factors such as education, language, ethnicity, and cultural values (Dueweke et al., 2015; Shipp et al., 2009; Garcia-Valencia et al., 2018; Tribble et
al., 2016). Finch et al. (2004) explored the physical and mental health of Mexican migrant agricultural workers \( (n=1,001) \) as it relates to acculturation and acculturative stress. The researchers found that the longer that agricultural workers stayed in the U.S. (about 10 years or more) the more stressors they were exposed to, which lead to poor physical and mental health outcomes (Finch et al., 2004). It is crucial to understand the interrelations of socio-cultural factors, physical pain, and mental health of Latinx agricultural workers.

Mexican agricultural workers use idioms of distress, such as “nervios” (nerves), to describe symptoms aligned with anxiety and/or mood disorders such as anger, bad mood, feeling trapped, and losing control, which will be elaborated further in this paper (Mysyk et al., 2008). Studies have argued that “nervios” is associated with anxiety and depression, that it has been predominantly reported by Puerto Ricans, and that it has been assessed within some communities of agricultural workers (Guarnaccia et al., 2010; Mysyk et al., 2008; O’Connor, Stoecklin-Marois & Schenker, 2015; Weller et al., 2008). The potential risks, danger, and need for mental health intervention are chronic concerns for this invisible community as levels of acculturation increase, which serve as a predictor of high levels of psychological distress (Hovey & Magaña, 2002). To the researcher’s knowledge, there has not been a study that analyzes the interrelation between physical pain and depression, physical pain and anxiety, and physical pain and nervios, with consideration of acculturative stress, familismo, fear of deportation, marianismo, and machismo among agricultural workers.

**Research among Latinx Populations**

Many research studies report the challenges of conducting research among Latinx populations due in part to the limited empirical knowledge that exists. As a result, only few studies take into account the heterogeneity of Latinx populations (Alegria et al., 2004; Alegria et
al., 2017; Campos et al., 2019; Cornelio-Flores et al., 2018; Hiott et al., 2008; Nuñez et al., 2016; Riosmena et al., 2015; Tribble, Summers et al., 2016), but the majority of research studies ignore the diversity of these populations (Bakhshaie et al., 2018; Cobb et al., 2017; Grzywacz et al., 2011). As the populations grow, it is important to take a step back and look at health disparities within specific subpopulations within Latinx communities. Looking at certain communities will assist practitioners in conceptualizing the experiences of patients and ecological factors, such as physical, financial, and social influences, that contribute to their physical and psychological well-being in their environment. The focus on Latinx agricultural workers in the U.S. allows researchers to obtain specific information to better understand the unique experience of anxiety, depression, and nervios, while considering the risk and protective factors among agricultural workers. Understanding the unique ways in which Latinx agricultural workers experience mental health and physical pain are important for adequate intervention development.

This study will use a Community Engaged Research (Adhikari et al., 2019) framework to explore how physical pain, chronic pain, and socio-cultural factors (e.g., acculturative stress, familismo, and fear of deportation, machismo, and marianismo) predict (1) depression; (2) anxiety, and (3) nervios, and (4) examine how socio-cultural factors predict depression, anxiety, and nervios when controlling for demographics among Latinx agricultural workers. The goal of this quantitative, cross-sectional study is to obtain a clearer understanding of Latinx agricultural workers’ mental health and its association with experiences of physical pain as well as how socio-cultural factors impact mental health outcomes. The aims and hypotheses of this study are:

1) To examine how physical pain, chronic pain, and socio-cultural factors predict depression among adult Latinx agricultural workers.
H\textsubscript{1a}: It was hypothesized that higher levels of physical pain, and chronic pain significantly predict depression among Latinx agricultural workers.

H\textsubscript{1b}: After controlling for demographics (age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status), it was hypothesized that higher levels of physical pain, fear of deportation, acculturative stress, \textit{machismo}, \textit{marianismo}, and \textit{familismo} are predictors of depression among Latinx agricultural workers.

2) To examine how physical pain, chronic pain and socio-cultural factors predict anxiety among Latinx agricultural workers.

H\textsubscript{2a}: It was hypothesized that higher levels of physical pain and chronic pain are significant predictors of anxiety among Latinx agricultural workers.

H\textsubscript{2b}: After controlling for demographics (age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status) higher levels of physical pain, fear of deportation, acculturative stress, \textit{machismo}, \textit{marianismo}, and \textit{familismo} are predictors of anxiety among Latinx agricultural workers.

3) To examine how physical pain, chronic pain, and socio-cultural factors predict \textit{nervios} among Latinx agricultural workers.

H\textsubscript{3a}: It was hypothesized that lower levels of physical pain and chronic pain are significant predictors of \textit{nervios} among Latinx agricultural workers.

H\textsubscript{3b}: After controlling for demographics, it was hypothesized that lower levels of physical pain, and higher levels of fear of deportation, \textit{marianismo}, \textit{machismo} and \textit{familismo} are predictors of \textit{nervios} in Latinx agricultural workers.
Literature Review

Latinx Population in the U.S.

The Latinx population is the largest and fastest growing minority group in the nation (Ennis et al., 2011; Paulus et al., 2016; Dominguez et al., 2015; United States Census Bureau, 2018). About 36 million self-identified Mexican immigrants were living in the U.S. in 2014, and it is estimated that this population will increase by 22% by the year 2060 (Alegria et al., 2017). As of 2010, Latinx make up 16% of the U.S. population and it is expected to comprise approximately 30% of the U.S. population in 2040 (Bakhshaie et al., 2018). This was an increase of 43% (15.2 million) from the year 2000 (Ennin et al., 2011). The 2010 Census indicated that “more than half of the growth in the total population of the U.S. between 2000 and 2010 was due to the increase in the Hispanic population” (Ennis et al., 2011). Within the subpopulations of Latinx or Hispanics, as described in the 2010 Census, the self-identified Mexican origin group had the largest growth by 54% (20.6 million in 2000 to 31.8 million in 2010). The Cuban population grew by 44%, followed by Puerto Ricans (36%). On the 2010 Census, Latinx who reported their origin as “Other,” included origins such as Dominican, Central American, South American, and Spaniard. The largest group of Central Americans were from El Salvador (3.3% of total Latinx in the U.S.) and the largest group of South Americans were from Colombia (1.8% of total Latinx in the U.S.). In terms of geography, 36% of Latinx resided in the South and 41% resided in the West of the U.S. The three states with the largest populations of Latinx were California, Texas and Florida (Ennis et al., 2011).

The number of Latinx immigrants is also on the rise, and this group has had a major impact on the productivity and economic growth in the U.S. for the past two decades (Alegria et al., 2017; Bakhshaie et al., 2018). In 2018, 17.4% of foreign people contributed to the U.S. labor
force, with Latinx immigrants making up nearly 50% of the foreign-born workforce in the U.S. (Bureau of Labor Statistics, 2019). According to statistics in 2015 of the Pew Research Center, when reporting work in farming, fishing, and forestry in the U.S., 594,751 (4.2%) workers were foreign-born Latinx and 137,154 (0.9%) of workers were U.S.-born Latinx (Flores et al., 2017).

In terms of education, Comodore-Mensah et al. (2018) analyzed the National Health Interview Survey (NHIS) among immigrants in the U.S. and reported that 71.1% (n=21,870) of Mexican/Central American/Caribbean Latinx adults had received less than or equal to a high school education. In 2016, the Pew Research Center found that 37.3% of Mexican immigrants in the U.S. (25 years and older) attained an education that was less than 9th grade, followed by 25.2% of Mexican immigrants who were high school graduates, and 12.6% who attained some college (Radford & Budiman, 2018). Thirty-three percent of Central American immigrants in the U.S. attained an education that was less than 9th grade, 26.2% were high school graduates, and 16.2% had some college education. Lastly, 27.4% of South American immigrants and 30.9% of Caribbean immigrants were high school graduates (Radford & Budiman, 2018). As the target population in this study, the above data reflects that Mexican immigrants have lower education levels, compared to other Latinx subgroups. This study will collect the level of education as a demographic of participants.

**U.S. Agricultural Worker Population**

Seasonal and migrant agricultural workers are distinct in that seasonal agricultural workers have home environments that are more long term and near their job site, viewed as more “settled” and migrant agricultural workers travel more of a distance from their home environment, living in temporary housing for the purpose of employment (Castañeda et al., 2015; Grzywacz et al., 2011; Hovey & Magaña, 2002; Kupersmidt & Martin, 1997). However,
migration streams to follow crops is becoming less relevant and there are increasing numbers of agricultural workers who are rooting themselves in specific areas (Castañeda et al., 2015); therefore, this study will be focusing on agricultural workers as a whole. The agricultural industry depends primarily on foreign-born workers, and the population of hired crop laborers continues to grow, especially in California (Villarejo et al., 2010). In fact, 91% of agricultural workers in California are of Mexican descent (Villarejo et al., 2010). About 3 to 5 million migrant and seasonal agricultural workers make up the U.S. population of agricultural workers each year (Ramos, Su, Lander, & Rivera, 2015). The U.S. Department of Labor and the Employment and Training Administration partnered with contractors to conduct the National Agricultural Worker Survey (NAWS) from 2013 to 2014, interviewing 4,235 agricultural workers (Hernandez et al., 2016). They found that 68% of participants were born in Mexico and 27% were U.S.-born. A small percentage of agricultural workers were born in Central America (4%) and 1% of workers claimed their native countries such as South America, the Caribbean, Asia, or the Pacific Islands. Of the 27% of agricultural workers who were born in the U.S., 18% self-identified as Mexican-American, 3% as Mexican, and 6% self-identified as Puerto Rican, Chicano, or other Hispanic combined. In terms of race, 85% identified themselves as Latino or Hispanic (including Latino/a, Hispanic, Hispano/a, Mexican, Mexicano/a, Mexican-American, and Chicano). One percent classified themselves as Guatemalan, Honduran, or Salvadoran (Hernandez et al., 2016).

An increasing number (5%) of indigenous groups work in agriculture (Hernandez, Gabbard et al., 2016). According to the Indigenous Farmworker Study (IFS) (N=53,602) (Mines et al., 2010), most indigenous groups that have come to the U.S., particularly to California are from the southern parts of Mexico, such as Guerrero, Puebla, and Oaxaca (Mines et al., 2010).
An estimate of 53,602 Mexican indigenous adult agricultural workers have been accounted for in California. Results from this study showed that over 80% of indigenous farmworkers migrated from Oaxaca, 9% migrated from Guerrero, and 2% migrated from Puebla to California. Most indigenous agricultural workers speak an indigenous dialect such as Mixteco, Zapoteco, and Triqui and learn Spanish as a second language. In less than two decades, the population of indigenous agricultural workers, who migrated to California from Mexico, had a major increase (From 7% to 29% between 1991-1993 and grew by 29% between 2006-2008) (Mines et al., 2010).

Worker authorization status plays a crucial role in the identity and lifestyle of agricultural workers. The H-2A visa provides temporary authorization for employment, specifically in agriculture in the U.S. and can last up to 12 months. In 2008, the US Department of Labor issued 173,103 H-2A visas (Grzywacz et al., 2011). In 2016, the number of issued visas decreased as the U.S. certified 165,741 H-2A visas out of 172,654 that applied (NCFH, 2018).

The National Agriculture Workers Survey was administered between 2013 and 2014 examined demographics, employment characteristics and conditions of agricultural workers (Hernandez et al., 2016). Slightly more than half of the 4,235 agricultural workers in the sample had work authorization from the U.S. and 1% had work authorization through other visa programs. Thirty-one percent were U.S. citizens, and 21% of agricultural workers were legal permanent residents (Hernandez et al., 2016). Latinx agricultural workers in the States include individuals who do not have authorization to be employed and are considered undocumented or “unauthorized” to be in the U.S. (Grzywacz et al., 2011; Hernandez et al., 2016; U.S. Department of Homeland Security, 2018). Some agricultural workers migrate to the U.S. on their own, some migrate with family, and others have family that were in the U.S. before or after they migrated. Grzywacz et
al. (2011) created a longitudinal study centered on Latinx agricultural workers in North Carolina and reported that 64.11% of their sample (N=288) were married and away from their spouse, 23.34% of agricultural workers were married and living in the U.S. with their spouse, followed by 12.20% of individuals who were not married. Duweke et al. (2015) surveyed and interviewed Latina migrant agricultural workers and 75% of the sample (N=20) reported that their migrating group included their own family. Five percent of Latina migrant agricultural workers migrated with friends, 5% migrated with both family and friends, 5% migrated alone, and 10% did not specify (Duweke et al., 2015). Familism or familismo (discussed in detail below) is highly valued in Latinx cultures and it is known that the migration experience impacts mental health depending on who a person migrates with (e.g., family or no family) (Campos et al., 2014; Duweke et al., 2015).

Not only is the location of family members important to know, but the physical location of where agricultural workers live. The locations in which low-income families, including ethnic minorities, reside are likely to be polluted and hazardous (Lott, 2002). Agricultural workers reported various factors in their poor housing conditions. They had a difficult time finding housing and if (or when) they found housing, agricultural workers reported crowding issues within their homes (Grzywacz et al. 2011; Hiott et al., 2008; Hovey & Magaña, 2003). The NAWS (2016) reported that 62% of agricultural workers lived in single-family homes, 18% lived in mobile homes, 17% lived in apartments, and 4% lived in other types of housing (Hernandez et al., 2016). Of the population from the NAWS (2016) 18% of agricultural workers lived in property owned or administered by their employers, and 14% were working on the farm versus 4% of agricultural workers who were working off the farm site (Hernandez et al., 2016). Agricultural workers reported no heat, water leaks, water stains, mold in kitchens and bathrooms,
and cockroaches (O’Connor et al., 2015). Kupersmidt and Martin (1997) showed that poor living conditions had been consistent within migrant labor camps for over two decades, with unclean and unsafe areas (e.g., rotten boards on porches and missing screens on windows), pests such as cockroaches and spiders, lack of air conditioning and indoor plumbing, and shared communal bathrooms. For vulnerable communities, such living conditions impact their physical health and mental health (Kupersmidt & Martin, 1997; O’Connor et al., 2015). Although this study will not be assessing housing conditions, it is important to know that agricultural workers are positioned in stressful situations, which bring other vulnerabilities that are discussed later.

Health Disparities among Latinx in the U.S.

Chronic Pain and Physical Pain

Chronic pain is defined as pain conditions that typically last more than 3 months or past the time of tissue healing (Dowell et al., 2016). Chronic pain can result from an underlying medical disease or condition, injury, medical treatment, inflammation, or an unknown cause (Dowell et al., 2016). Chronic pain is one of the most common medical conditions in the U.S.; however, there are mixed results about the prevalence of chronic pain in Latinx populations (Aufiero et al., 2017; Cornelio-Flores et al., 2018; Dalhamer et al. 2018). Non-Mexican Latinx immigrants report better social and physical functioning and less pain than U.S.-born whites, U.S.-born Mexicans, U.S.-born non-Mexican Latinx, and Mexican immigrants (Bzostek et al., 2016). The Center for Disease Control (CDC) reports that, out of a total population sample of 50,009,000 participants, the prevalence rate for chronic pain in Hispanics (15.1%) is lower than the prevalence rate for chronic pain in non-Hispanic whites (23%) (Dahlhamer et al., 2018). The data on chronic pain among Latinx communities in the U.S. shows that Latinx adults are less likely to seek pain treatment with a medical provider and when treatment is sought out, pain
conditions may be more severe compared to their white counterparts (Cornello-Flores et al., 2018; Aufiero et al., 2017).

Hollingshead et al. (2016) and the National Institute of Minority Health (NIMH) highlight that Hispanic Americans report less pain conditions compared to non-Hispanic white and non-Hispanic black respondents in national surveys (U.S. Department of Health and Human Services, 2016). Hispanic Americans report pain conditions such as back pain and arthritis and report significantly low rates of chronic pain, neck pain, acute pain, temporomandibular joint and muscle disorder (TMJMD)-type pain, lower and upper extremity pain, and diagnosed arthritis (Hollingshead et al., 2016; Torres et al., 2017). The National Health and Nutrition Examination Survey (NHANES) reflected that Mexican-Americans are most likely to report chronic head and abdominal pain and are less likely to report overall chronic pain, chronic widespread and regional pain (Hollingshead et al., 2016).

Physical pain is defined by the Honor Society of Nursing as what most people refer to when they say something hurts on their body and is associated with damaged tissue of their body. Physical pain can be caused by many factors and can be described as throbbing, aching, or burning. Physical pain can also be described as acute, meaning it’s only present for a short period of time, or chronic, meaning it lasts for months (Sharecare, Inc., 2020). As previously mentioned, physical pain includes musculoskeletal pain and headaches in this study. Hispanic Americans are more likely than other ethnic or racial groups to work in manual labor or blue-collar jobs, which places them at an increased risk for injury (Hollingshead et al., 2016; U.S. Department of Health & Human Services, 2016). This population is also less likely to miss work in the short term, due to injury or physical pain compared to whites (Hollingshead et al., 2016; U.S. Department of Health & Human Services, 2016). Hispanic Americans may be more likely
to push through their pain due to the high value of work within their culture (Hollingshead et al., 2016; U.S. Department of Health & Human Services, 2016). However, symptoms of physical pain may catch up in the long term as Hispanic Americans show high rates of disability (Hollingshead et al., 2016; U.S. Department of Health & Human Services, 2016).

These data and health disparities are major influences for studies to explore Latinx identity and how Latinx communities perceive physical pain (Aufiero et al., 2017; Hollingshead, Ashburn-Nardo et al., 2016). For example, to understand the differences in physical pain perception among different ethnic and demographic populations, Aufiero et al. (2017) applied a standardized pain stimulus by inflating a blood pressure cuff above Caucasian and Latinx adult patients’ blood pressure and holding it for 3 minutes. Physical pain scores were obtained by using a 10 cm visual analog scale (VAS) and a 5-point likert scale. Aufiero et al. (2017) showed that Latinx (50 Participants) reported greater physical pain on the likert scale, but not the VAS, compared to Caucasians (50 participants). Women (59 females) reported greater physical pain on both the likert and VAS scales compared to men (41 males). This study supports mixed results for Latinx experiencing physical pain and also illustrates that women report more pain compared to men, which is important to keep in mind as we explore levels of pain among Latinx agricultural workers. Lastly, it is important to keep in mind that Latinx patients who report intense pain in primary care settings often endorse severe anxiety and depression, compared to non-Latinx white patients (Cornelio-Flores et al., 2018).

**Mental Health**

The U.S Department of Health and Human Services Office of Minority Health and the CDC emphasize that poverty level affects mental health status. Hispanics living below poverty level, compared to Hispanics over twice the poverty level, are over twice as likely to report
psychological distress. The most common mental health disorders among Latinx are generalized anxiety disorder, major depression, posttraumatic stress disorder (PTSD) and alcoholism (Anxiety and Depression Association of America (ADAA), 2018). Twenty percent of Latinx who experience symptoms of a psychological disorder talk to a doctor about their symptoms and 10% contact a mental health professional (ADAA, 2018). The death rate from suicide for Hispanic men (11.2%) was four times the rate for Hispanic women (2.6%) in 2017 (U.S. Department of Health and Human Services Office of Minority Health, 2019; National Center for Statistics, 2018). When compared to non-Hispanic white populations, the suicide rate for Hispanics was less than half (6.7% of Hispanics compared to 17% of non-Hispanic whites). In 2017, suicide was the second leading cause of death for Hispanics, ages 15-34 years old. In 2018, non-Hispanic whites received mental health treatment twice as often as Hispanics. There were fewer Hispanics (55.9%) who had a major depressive episode within the past year and received treatment for depression than non-Hispanic whites (70.5%) in 2018 (National Center for Statistics, 2018; U.S. Department of Health and Human Services Office of Minority Health, 2019).

According to the data above, Latinx are in better mental health than non-Hispanic whites due to different factors, which is true for a certain period of time for immigrant Latinx due to length of stay in the U.S. discussed in the next section (Alegria et al. 2017). At the same time, we also see that a low percentage of Latinx adults are receiving services or mental health treatment compared to whites, which have major implications for the mental health of Latinx communities over time (ADAA, 2018; U.S. Department of Health and Human Services Office of Minority Health, 2019). Similar to health disparities among Latinx adults experiencing physical pain, there are health disparities in mental health among Latinx compared to their white counterparts in the
U.S. A major part of this health disparity is related to poverty levels and access to care (U.S. Department of Health and Human Services Office of Minority Health, 2019). Many Latinx adults in the U.S. dedicate themselves to their employment and ensuring that their families, in the U.S. and/or in their country of origin are stable in terms of basic needs. However, low-income earnings affect the quality of housing, the neighborhood or location, and resources available, leading to poor health while caring for their families. Poor housing conditions, low-income neighborhoods, and limited resources for Latinx living in poverty lead to stress and it is a public health issue (U.S. Department of Health and Human Services Office of Minority Health, 2019).

Health disparities are not only found in comparison of Latinx populations to their white counterparts, but within Latinx communities. More specifically, there are differences between the mental health of immigrant Latinx and U.S.-born Latinx. Immigrant Latinx are at a significantly lower risk of any depressive disorder than U.S.-born Latinx (Alegria et al., 2017; Vega et al., 2004); however, research shows that this is only for Mexican immigrants (Alegria et al., 2017; Vega et al., 2004). Similarly, Latinx immigrants are at lower risk for anxiety disorders, compared to U.S.-born Latinx. Specifically, Latinx immigrants have a lower prevalence of social phobia and post-traumatic stress disorder. Problematic alcohol use and repeated drug use increased across generations, with the second and later generations reporting higher rates than the first generations (Alegria et al., 2017). Latinx immigrants are also at a significantly lower risk for alcohol abuse, drug dependence, and drug abuse compared to U.S.-born Latinx and these findings hold true for Mexican immigrants only. The data presented reflect that Mexican immigrants in the U.S. are at a lower risk of developing depressive, anxiety, and substance use disorders compared to U.S.-born Latinx adults, which will be discussed in the following section.
Health Paradox

Multiple research studies discuss a paradox for the Latinx population, such as the immigrant paradox, the Latina paradox, and the Hispanic paradox, all of which suggest that despite the obstacles of language barriers, immigration status, lack of access to health care services, low SES, poverty, exposure to multiple migration related stressors, and stressful experiences in general, recently arrived Latinx immigrants find themselves in better physical health and mental health compared to their U.S. counterparts (Alegria et al., 2008; Alegria et al., 2017; Dominguez et al., 2015; Straub, 2014; Vega et al., 2004). The Hispanic paradox highlights that regardless of the decrease in access to health care, preventative care services, and social determinants of health, Hispanics have a longer life expectancy by an estimated two years, and lower overall mortality (Dominguez et al., 2015). It is reported that Hispanics living in the U.S. overall have lower death rates for most leading causes of death and lower prevalence of self-reported cancer, heart disease, and smoking compared to Whites (Dominguez et al., 2015). The low mortality rates can be explained by high levels of family support for some Hispanic groups (Dominguez et al., 2015). Although these paradoxes exist, they can last for a limited amount of time, depending on the length of stay in the U.S., age upon arrival to the U.S., and increasing levels of acculturation, which have an impact on mental health (Dominguez et al., 2015; Riosmena, 2015; Vega et al., 2004). There are major limitations to this paradox because it holds true for Mexican Latinx over Latinx groups such as Cubans and Puerto Ricans (Alegria et al., 2017).

The Latina paradox and part of the Immigrant paradox specifically focus on reduced infant mortality despite low socioeconomic status from the mother (Barr, 2008; Straub, 2014). Barr (2008) noted that Hispanic women who immigrated to the U.S. had a 20% lower rate of
infant mortality than U.S.-born Hispanics. There is a strong negative association between foreign nativity and reduced low birth weight in Hispanic women (Barr, 2008; Straub, 2014). The association seemed strongest in women with the lowest levels of education (Barr, 2008). Foreign nativity has protective effects on Latina immigrants due to unique cultural aspects valued in Mexico and Central America (Barr, 2008). The protective effects may come from strong family and social support networks and strong cultural support for maternity such as healthy traditional dietary practices, and selfless devotion to the traditional maternal role, also known as marianismo (Barr, 2008; Lorenzo-Blanco et al., 2013). The healthy normative and behavioral context for maternity, as Barr (2008) describes, also protects Latinas from engaging in risky behaviors such as tobacco, alcohol, and/or marijuana use while pregnant and, in turn, operate as a protective factor for daughters and granddaughters of Latina immigrants. These factors will be further discussed in the Risk and Protective factors section. In literature centered on Latinx agricultural workers, most studies present the Latinx health paradox within the Latinx population as a whole. Considering the Latinx health paradox in the context of agricultural workers, it is key in determining who within Latinx agricultural populations is experiencing depression and anxiety and how they are maintaining themselves to overcome obstacles.

One of the challenges that immigrants face in the U.S. is acculturation to the dominant culture. The longer immigrants stay in the U.S., the more time they have to learn to acculturate, however there are health risks to the length of stay in the U.S. Studies have suggested that the risk for depression in Latinx immigrants increases during the period of acculturation (Alegria et al., 2008; Cobb et al., 2017; Lorenzo-Blanco & Cortina, 2013; Vega et al., 2000). Vega et al., (2004) reported on 12-month rates of mental disorders among adults of Mexican origin in central California. They found that 9.2% of immigrants who had spent less than 13 years in the U.S.
self-reported mental disorders. In a study of 3,012 Mexican Latinx participants, Vega et al. (2004) assessed for affective disorders, anxiety disorders, and substance use disorders, as well as noting any other mental disorders in general. The authors reported that 18.4% of immigrants who lived in the county for 13 or more years reported mental disorders (Vega et al., 2004). The researchers also highlighted rates of mental disorders among U.S.-born participants of Mexican origin (27.4%) and the general U.S. population (28.5%). Vega et al. (2004) reported that women had higher rates of mood and anxiety disorders compared to men. Males had higher levels of substance use problems within both immigrant and U.S.-born subpopulations. A key fact to consider is that the participants in this study had lower levels of mental health problems in the previous year across all disorder types among Mexican immigrants compared to U.S.-born adults of Mexican origin. It was concluded that the younger the age of entry to the U.S. and the greater time of residence in the U.S. led to higher risk of substance use and non-substance use psychiatric disorders for Mexican immigrants (Vega et al., 2004). Evidently, the Latinx paradox wears off after about 13 years, specifically for Mexican immigrants, which implies that the health of a Latinx immigrant may look well when they first arrive and as they enter a process of acculturation they are also acculturating to a similar decline of mental health and physical health in U.S.-born whites. It is important that Latinx immigrants attend the doctor’s office, as expected, as well as meet with a mental health provider regularly, however the resources to do so are not always accessible for this community compared to U.S.-born whites.

**Physical and Mental Health Related to Chronic Pain among U.S. Latinx Agricultural Workers**

Agricultural work involves strenuous physical labor and is one of the most hazardous industries in the U.S. in terms of occupational fatal and non-fatal injuries (Hovey & Magaña,
In agriculture, individuals work long hours and in poor safety conditions. Furthermore, they often remain in physically stressful postures, are constantly doing repetitive motions, and do not have enough water to drink while working, which can lead to musculoskeletal discomfort (pain) (Hovey & Magaña, 2003; Shipp, et al., 2009; Swanberg et al., 2017; Tribble et al., 2016). Musculoskeletal pain is the most common type of pain among agricultural workers (Brock et al., 2012; Kelly et al., 2012). Tribble et al. (2016) compared Latinx agricultural workers (N=111) to Latinx non-agricultural workers (N=78) or manual laborers by looking at a longitudinal study called the PACE project conducted in 2013 in North Carolina, which examined health consequences of occupational exposures, with a focus on cognitive and neurological outcomes. The authors reported that more non-agricultural workers (17.1%) than agricultural workers (7.3%) had neck and shoulder pain, but did not differ in other areas of musculoskeletal pain (Tribble et al., 2016). Brock et al. (2012) interviewed 83 Latinx agricultural workers in a medical clinic in South Georgia to examine their health status and found that pain was reported by 81.9% of participants. Kelly et al. (2012) also assessed the health status of migrant agricultural workers (N=390 males) in Virginia, of which 57.2% of participant were from Mexico (N=223). Of the Mexican agricultural workers, 29.1% reported pain; the lowest percentage of reported pain compared to Jamaican (59%) and Haitian (31.4%) agricultural workers (Kelly et al., 2012).

Agricultural workers who are exposed to repeated physical stressors can experience soft tissue damage causing an inflammatory response (Xiao et al., 2013). Agricultural workers report high levels of chronic musculoskeletal pain in their hands, forearms, lower backs, hips, legs, ankles/feet, necks, shoulders, and knees (Shipp et al., 2009; Swanberg et al., 2017; Xiao et al., 2013). Neck pain can occur when agricultural workers pick fruit or engage in other tasks that
require them to reach above their heads. Lower back pain can result from stooping (Xiao et al., 2013). Xiao et al. (2013) determined that stooping, bending, and working for more than 30 hours per week was associated with chronic hip pain for both men (55.3%) and women (44.7%) of a sample size of 759 Latinx agricultural workers. The researchers also found that chronic pain was more prevalent among women and people over 65 years old. One observation the research group made from their findings was that men often drove tractors or other heavy farm equipment and were not able to see this in female participants as there were only 9 women who drove tractors in this study (Xiao et al., 2013). These data points reflect that some job tasks are assigned more to men versus women, which can inform their level of pain. Overall, the data shows that although the labor that agricultural workers engage in is physically stressful to the body and potentially developing various levels of pain, Latinx agricultural workers are reporting less pain than Latinx non-agricultural workers. However, pain is associated with age and gender among agricultural workers. The information above shows that agricultural workers are reporting pain and considering the lack of resources such as access to health insurance and fair wages, this population finds themselves in an extremely vulnerable position, compared to their U.S. white counterparts.

There are several variables associated with chronic back pain including depression and anxiety among agricultural workers (Shipp et al., 2009). In 2002, Hovey and Magaña, using the Center for Epidemiologic Studies-Depression Scale (CES-D), determined that 30% of participants (N=20 females) in two Midwest states self-reported high levels of depressive symptoms compared to 20% of the general population that showed symptoms of depression on the CES-D with a score of a 16 or higher. Likewise, Hiott et al. (2008) used the CES-D and reported that 41.6% of male migrant agricultural workers (N=125) exhibited symptoms of
depression compared to the 20% that is expected from the general population on CES-D.
Grzywacz et al. (2011) explored a longitudinal study in North Carolina to document the variation in depressive symptom across the agricultural season (4 months) and identify structural and situational factors associated with mental health across time. The authors found that 25% of their sample (N=228) of migrant agricultural workers met high levels of depression at some point during the agricultural season (Grzywacz et al., 2011). Dueweke et al. (2015) looked at protective psychological resources for Latina agricultural workers and found that 35% of participants (N=20) reported some level of suicidal ideation within the past year. Ramos et al. (2015) looked at stress factors contributing to depression among Latino agricultural workers in Nebraska and found that 30.4% of the sample (N=200) reported to be stressed indicated by the Migrant Farmworker Stress Inventory (M=62.45) and that nearly half (45.8%) of agricultural workers showed symptoms of depression. Agricultural workers who were exposed to economic and health stressors were more likely to be depressed (p<0.01) (Ramos et al., 2015).

Tribble et al. (2016) found that Latinx non-agricultural workers reported higher (15.7%) levels of depression compared to Latinx agricultural workers (9.2%). An exploratory study by Bogess and Ochoa Bogue’s (2014) revealed that Non-agricultural worker patients (n = 3,618,131) were diagnosed with anxiety disorders including PTSD at a 2.2% rate, while migrant seasonal agricultural workers (n = 732,048) were diagnosed at a 1.4% rate (Bogess & Ochoa Bogue, 2014). There was a significant association between depressive symptoms and neck and shoulder pain, in their sample of 189 agricultural workers and non-agricultural workers or manual laborers (Tribble et al., 2016). Villarejo et al. (2010) examined the health status of immigrant Latinx agricultural workers by studying the California Agricultural Worker Health Survey (N=654) conducted in 1999. Villarejo et al. (2010) reported that more women (13%)
experienced depression compared to men (2%). In fact, women who experienced persistent pain were more than twice as likely to receive a diagnosis of depression as women who did not experience pain (Villarejo et al., 2010).

The most common classes of psychiatric disorders and psychological conditions among agricultural workers in California are anxiety and stress (Grzywacz, 2010). Tribble et al. (2016) reported that non-agricultural workers reported higher (10%) levels of stress compared to Latinx agricultural workers (2.9%). In a study that looked at stress and sociocultural factors related to health status among U.S.-Mexico border agricultural workers (N=299), the researcher found that high levels of stress were significantly associated ($p<.001$) with increased poor mental health and physical health (Carbajal et al., 2014). Males were about half as likely as females to report poor mental health (Carbajal et al., 2014). Using the Personality Assessment Inventory (PAI), Hovey and Magaña (2003) found that 25% of Mexican migrant agricultural workers in their sample ($n=20$ women) showed high levels of anxiety compared to the expected 16% of the general population who reported levels of anxiety on the PAI of a score of 60 or greater. Hovey and Magaña (2002) found that 30% of agricultural workers in this sample (N=95) exhibited symptoms for high levels of anxiety (M=55.2) compared to the mean score (M=50.5) of the general population. Agricultural workers surpassed the expected 16% threshold on each anxiety scale of the PAI: overall anxiety, anxiety cognitive, anxiety affective, and anxiety physiological (Hovey & Magaña, 2002). Hiott et al. (2008) found that 18.4% ($n=125$) of agricultural workers in Eastern North Carolina reported levels of anxiety that were above the 60-score threshold, suggesting potential impairment in functioning.

Substance use is common among Latinx migrant agricultural workers and it is comorbid with depression, anxiety and physical pain (Grzywacz et al., 2011; Hiott, 2008). In California,
the most prevalent personal risk behavior was alcohol consumption (Villarejo et al., 2010). In Villarejo et al.’s (2010) study, two-thirds (64%) of participants said that they regularly consumed alcohol and one-eighth (13%) of females also reported regular consumption of alcohol. Twenty-eight percent of males and 1% of females self-reported binge drinking (having 5 or more drinks in one episode) and both males and females reported using alcohol while working (Villarejo, 2010). Specifically, U.S.-born and immigrant Latino males tend to have higher levels of substance use problems while Latina females tend to have more mood and anxiety disorders (Vega et al., 2004). Studies argue that the substance use and alcohol use is related to the everyday family conflict, discrimination and racism, acculturation, assimilation, and social stress (Lorenzo-Blanco et al., 2013; Vega et al., 2004).

The data on mental health among Latinx agricultural workers informs that this population is experiencing psychosocial stressors and are reaching high levels of depression and anxiety. Female Latinx agricultural workers are reporting suicidal ideation, depression, and anxiety as well as pain at higher rates than men and it was noted earlier that Latinx are less likely to see a mental health provider compared to their white counterparts. Latinx agricultural workers are at a high disadvantage when living and working in poor conditions, which places this population at risk for poor physical and mental health outcomes, a large public health issue. High poverty levels and lack of access to resources within Latinx community further supports this health disparity, which affects agricultural workers in inequitable ways compared to whites in the U.S.

**Expressions of Psychological Distress**

One concept that is noteworthy is the Spanish term *nervios* also referred to as, nerves. Mysyk et al. (2008) conceptualize *nervios* as an embodied metaphor in the Canada/Mexico Seasonal Agricultural Workers Program. They reveal that *nervios* has been associated with
anxiety and/or mood disorders among rural Mexicans in both clinical and community studies. *Nervios* is an idiom of distress that is also associated with long-term chronic stressors. For example, in Guatemala, *nervios* is a culturally accepted way to express or communicate personal suffering and interpersonal tensions (Mysyk et al., 2008). Some of the symptoms that were associated with the phenomenon were: bad mood, anger, rage, desperation, lack of concentration, sweating, difficulty sleeping, fatigue, trembling, pain, and feeling trapped. Additionally, some of the fears that were associated with the term were: fear of becoming ill, losing control, becoming violent, something happening to a family member, and of losing one’s mind (Mysyk et al., 2008). *Nervios* is a key concept to be aware of when considering the mental health of Latinx migrant agricultural workers because it is a common expression of distress among Latinx groups, and it is listed as an idiom of distress in the *Diagnostic and Statistical Manual of Mental Disorders V as ataque de nervios* (American Psychological Association (APA), 2013; Guarnaccia et al., 2010; Martinez, 2017; Mysyk et al., 2008; O’Connor et al., 2015; Weller et al., 2008).

Weller et al. (2008) also studied expressions of distress or folk illnesses in Latin America such as *susto* (fright) and *nervios* (nerves) in relation to mental health. They interviewed 200 participants (67% women) in Guadalajara, Mexico and asked questions regarding their socio-demographics, stress, depressive symptoms, and whether they had experienced *susto* or *nervios*. *Susto* is commonly reported in Mexico, Central America, South America, and also recognized by the Zapotecs (an indigenous group in Mexico) (APA, 2013; Weller et al., 2008). *Susto* is an illness related to a frightening event that causes the soul to leave the body, resulting in unhappiness and sickness. Symptoms that are often reported include appetite disturbances, inadequate or excessive sleep, troubled sleep or dreams, feelings of sadness, low self-worth or
dirtiness, interpersonal sensitivity, lack of motivation to do anything...sadness, poor self-image, and suicidal ideation (APA, 2013). Somatic symptoms that may appear in susto are muscle aches and pains, cold in the extremities, pallor, headache, stomachache, and diarrhea (APA, 2013; Weller et al. 2008). Weller et al. (2008) showed that susto and nervios were prevalent across sociodemographic subgroups and nervios appeared more often in women (76.1%) compared to men (42.4%) (Weller et al., 2008). Susto was significantly associated with stress and depressive symptoms; however, nervios had a much stronger association compared to those who did not report nervios. Susto and nervios were expressions of psychological stress and most participants with depression reported susto and/or nervios (Weller et al., 2008). This study will focus on nervios; however, it is important to note other idioms of distress such as susto as it may be reported by someone in distress.

O’Connor et al. (2015) looked at nervios among unaccompanied and accompanied (family) Latinx male agricultural workers (N=422) and found that 22% of agricultural workers reported nervios of household status. Nervios was associated with low family incomes, medium/high acculturation and poor housing conditions. Also associated with nervios were poor/fair self-reported health, depressive symptoms, and high perceived stress (O’Connor et al., 2015).

Guarnaccia et al. (2010) examined the social and psychiatric correlates of ataque de nervios by looking at the National Latino and Asian American Study with a sample of 2,554 Latinx participants. Fifteen percent of Puerto Ricans reported ataque de nervios, compared to 9.6% of Mexicans, 9% of Cubans, and 7% of other Latinx (Guarnaccia et al., 2010). Ataques de nervios were more frequent in women (59.6%), those with disrupted marital status (26%), and those more acculturated in the U.S. (spending more than 70% of life in U.S.) (69.2%). Those
who reported *ataque de nervios* had a higher frequency of rate of meeting criteria for affective, anxiety and substance abuse disorders (60%) (Guarnaccia et al., 2010). Martinez (2017) studied the impact of *ataque de nervios* on severity and cognitive function of anxiety disorders. The study had a Puerto Rican sample of 56 participants with anxiety disorders and 19 subsample participants and compared those with and without *ataque de nervios*. Martinez (2017) found that participants with *ataque de nervios* showed decreased attention, concentration, and immediate memory compared to those without *ataque de nervios*. Guarnaccia et al. (2010) and Martinez (2017) include more Puerto Rican identified people experiencing *nervios*, which prompts the question for this study of another population; whether Latinx farmworkers are experiencing *nervios* and its relationship to physical pain as well as other socio-cultural factors.

**Vulnerabilities of Mental and Physical Health**

*Gender Roles in Latinx Culture*

Gender roles within the Latinx culture are an influence to the life-style, values, and mental health of Latinx people (Bracero, 1998; Lorenzo-Blanco & Cortina, 2013; Nuñez et al., 2016; Valencia-Garcia et al., 2008). One of the most common ways that gender roles are understood in Latinx culture is the idea of *machismo* and *marianismo*, which include positive and negative factors and can function as risk and protective factors (Arciniega et al., 2008). Bracero (1998) suggests that the discussion of *machismo* and *marianismo* operates to rationalize rather than reveal the social inequities of power relations between sexes. This rationalization aids in understanding traditional gender roles such as Latinos in relation to Latinas and vice versa. *Machismo* and *marianismo* both have negative and positive aspects, which assist practitioners’ views of physical health and mental health within Latinx communities (Arciniega et al., 2008; Bracero, 1998; Lorenzo-Blanco & Cortina, 2015; Nuñez et al., 2016). The concepts of *machismo*
and *marianismo* are traditional values; however, social norms support the power differentials that are reflected by these traditional roles.

*Machismo* is most commonly compared to dominance, aggression, sexism, sexual prowess, and reserved emotions (Núñez et al., 2016). The negative connotation of *machismo*, according to social norms, however, can distract from the positive aspects that are brought by protecting and supporting the family, being brave, and providing for the family. The positive aspects of *machismo* include protection and support of their family, and characteristics such as chivalry and bravery (Bracero, 1998; Núñez et al., 2016). Arciniega et al. (2008) call these positive aspects *caballerismo*, which was positively associated with ethnic identity and problem-solving and distinguished it from traditional *machismo*, which was related to aggression and antisocial behavior, greater levels of alexithymia (the awareness one has of one’s own and other’s emotions), and more wishful thinking of coping mechanisms. Traditional *machismo* was also associated with less education; however, there were no differences across education level on *caballerismo* scores (Arciniega et al., 2008). The positive characteristics can also communicate how Latino men identify themselves and function within their family system. Núñez et al. (2016) studied machismo, *marianismo* and negative cognitive-emotional factors in a sample of 4,426 Latinx participants. They reported that *machismo* was associated with negative cognitive emotional factors such as cynical hostility. Furthermore, there is meaning behind anger and aggression and if Latinx gender roles, according to society, tend to move men away from showing emotion, it is also crucial to understand how this information may impact depression, anxiety, and physical pain.

*Marianismo* refers to a set of values that highlight the female gender role, which views women as family and home-centered and promotes passivity, vulnerability, defenselessness and
self-sacrifice in favor of their children and husband (Nuñez et al., 2016; Valencia-Garcia et al., 2008). *Marianismo* imposes for women to respect patriarchal values and the idea is based on the Virgin Mary (Bracero, 1998; Nuñez et al., 2016). Consequently, the description of *marianismo* is created based on the expectations of men that align with social norms (Bracero, 1998).

According to social norms, Latino men expect women to be passive, obedient, and homebound from a young age, which supports male domination to occur (Bracero, 1998; Nuñez et al., 2016; Valencia-Garcia et al, 2008). Bracero (1998) emphasizes that, from a male dominant worldview, *marianismo* holds a necessary value system known as *controlarse*, which translates to self-containment and the conscious control or suppression of negative emotions such as anger or other unacceptable impulses. Nuñez et al. (2016) reports that the cultural script of *marianismo* has a negative effect on health outcomes in Latinas, such as less emotional well-being and increased negative cognitive emotional factors in regard to high depressive symptoms. In their study, Nuñez et al. (2016) found that aspects of *marianismo* were associated with higher levels of negative cognitions and emotions after adjusting for sociodemographic factors across Hispanic ethnic groups and level of acculturation. The Marianismo subscales of Subordinate to Other and Silencing Self to Maintain Harmony were positively associated with increased depression and anxiety, which is a risk factor for chronic illness and overall poor physical health (Nuñez et al., 2016).

*Marianismo*’s positive aspects include nurturing and maternal characteristics that play a large role in Latinx families and although the idea of *controlarse* has negative health outcomes, it also serves as a protective factor against male aggression, dominance, and sexism (Bracero, 1998). Bracero (1998) points out that the concepts of *marianismo* and *controlarse* have commonalities with stoicism. *Marianismo* reflects less of a learned helplessness, but a learned
attitude of stoicism. Although the teachings of stoicism call for indifference to suffering and consequently, the need for emotional distancing, emotional distancing is an adaptive coping strategy when faced with personal adversity and social injustice (Bracero, 1998). In psychology, the word “stoic” is used to describe a person’s affect, which means that a person lacks in showing emotion. This “stoic” description is also a coping mechanism that is rooted from traditional cultural gender roles (Bracero, 1998). As we learn more about the Latinx population in the U.S., agricultural workers also share these cultural customs, which are often overlooked.

**Risk Factors for Poor Mental and Physical Health Outcomes**

There are several risk factors for increased psychological distress. Some risk factors are associated with the process of immigration. Factors include lack of support, family separation, immigration status, and level of acculturation. Gonzalez et al. (2017) theorize a “stepwise” pattern of immigration, which states that one or few family members immigrate to the U.S. first, followed by others. A “stepwise” pattern of immigration takes place because families have limited economic resources to support the travel of all family members. In many cases, one or both parents immigrate first, while the other family members wait until enough money is saved to finance their trip. From the early 1940s to the mid-1960s, men have made up the largest proportion of immigrants from Mexico and Central America. The Mexican Farm Labor Agreement (Bracero program), a guest worker program agreement between Mexico and the U.S. set guidelines for living conditions and wages for about 20 years. In recent years, more women have immigrated because of an increase in demand for service and domestic workers. Consequently, their children can arrive in the U.S. first and reside with relatives or friends while parents and siblings stay in their country of origin. Families that are separated during the
immigration process tend to be those experiencing high levels of poverty (Gonzalez et. al., 2017).

One major risk factor of poor mental health for migrant agricultural workers is the lack of family support. They often experience family separation after immigrating to the U.S. Lack of family support and concerns about being away from family can lead to them developing symptoms of anxiety and depression (Dueweke et al., 2015; Grzywacz et al., 2010; Hiott et al., 2008, Ramos et al., 2015). Being away from family members, including extended and nuclear family, leads to social isolation, which causes deep sadness and emotional toll (Gonzalez et al., 2017; Organista et al, 2017). The idea of what life would be like and the reality or the “daily struggle” make it more challenging to maintain emotional balance. The daily struggle of migrant day laborers (N=344), as described by Organista et al.’s (2017) mixed methods study, included periods of unemployment and victimization by wage theft. This experience was one of the reasons why participants in this study later decreased their communication with their family as they did not want to talk about or inform their family of the daily struggles because they feared they would not understand. The participants wanted to avoid impacting the well-being of their family members, which led to an increase in isolation and repression of feelings of despair and desesperacion (Organista et al., 2010). Organista et al. (2010) focuses on day laborers, who are different from agricultural workers, and highlights an experience of the difficulties that Latinx immigrants face after migrating to the U.S. There is little research on the communication of the true experience of agricultural workers to their family members.

Another risk factor that leads to decline in mental health of migrant agricultural workers is documentation status. According to the 2013-2014 NAWS, an estimate of 47% (n=4,235) agricultural workers who reside in the U.S. are “unauthorized” in terms of legal status
This can be extremely stressful because the daily fear of detainment and deportation, exploitation, and discrimination increases (Hiott et al., 2008). Due to these concerns, migrant agricultural workers may not speak up about their poor living conditions, another risk factor, and lack of water when working in the field, leaving no choice, but to live in such conditions, which can result in developing symptoms of depression, anxiety, and poor physical health (Grzywacz et al., 2011; Tribble et al., 2016). For Latino migrant day laborers, their lifestyle revolves around restrictions by immigration surveillance, limited access to cultural, and community resources and services in the U.S. (Organista et al., 2016). According to Organista et al. (2016), these factors have an effect on physical health and psychological distress among immigrant day laborers, which can also be experienced by agricultural workers as well.

Socioeconomic status (SES) is a factor for anxiety, depression, and physical pain among agricultural workers in the U.S. In impoverished areas, many individuals live with an inadequate income and unemployment, which become stressors of daily life (Straub, 2014). It is important to note that in the U.S. there is a general idea that the more education is attained, the more likely it is to get a high paying job (Barr, 2008). Mexican immigrants are the largest Latinx group in the U.S. with the lowest levels of education, compared to other Latinx groups, which can lead to lower paying jobs and increased poverty levels (Radford & Budiman, 2018). The 2013-2014 National Agricultural Worker Survey reported that 30% of agricultural worker families had a total income level that was below the national poverty guidelines. The average total income for families from agricultural employment ranged from $20,000-$24,999 for the previous year (2012-2013), when completing the survey (NAWS, 2016). Valencia-Garcia et al. (2018) examined depression and physical pain among migrant agricultural workers in the Salinas Valley, C.A. and found that 59% of agricultural workers reported an annual household income of
$20,000 or less. Lower SES is associated with more frequent reports of musculoskeletal pain, pain intensity, and physical disability. Also, a lower SES places people, who are experiencing chronic pain, in a more vulnerable position to harmful effects of stress on health and physical functioning (Straube, 2014). Carvajal et al. (2013) found that stress was the strongest factor in relation to the reporting of poor mental health and poor physical health for 299 Latinx agricultural workers in Yuma County, Arizona near the U.S.-Mexico border. Straub (2014) reviewed a study by Rios and Zautra (2011) who included women participants (n=250) with osteoarthritis and/or fibromyalgia. Women who experienced greater financial hardship, reported a higher level of pain severity due to daily financial worries compared to the women with little or no financial hardship. Women who were not employed and experienced financial hardship exhibited the most physical pain reactivity due to daily financial worries (Rios & Zautra, 2011).

Due to the economic need in the Shenandoah Valley of Virginia, most agricultural workers refrain from missing work if they are experiencing an illness or injury, and if a person decides to attend their injury or illness, they fear the possibility of losing their job (Kelly et al., 2012). These economic conditions are a large barrier for agricultural workers to seek health care, diagnosis, and treatment of disorders, diseases, and injuries. Many workers only see the doctor when their condition becomes severe or debilitating (Kelly et al., 2012; Villarejo, 2010).

Many Latinx immigrant communities lack access to health and mental health care and at the same time find themselves at high poverty levels (Rhodes et al., 2015; Riosmena et al., 2015). In 2015, 39% of foreign-born Latinx, between the ages of 18 and 64, were uninsured (Flores et al., 2017). Riosmena et al. (2015) reported that immigrants had the lowest levels of health insurance coverage and less access to regular sources of care than other groups in the U.S., with Latinx being one of the lowest covered. Furthermore, in 2015, the poverty rate for
foreign-born Latinx, between ages 18 and 64, in the U.S. was 20.1% compared to 15.9% of U.S.-
born Latinx (Flores et al., 2017). A large difference is reflected in poverty rates compared to
white counterparts (9.9%) in 2015 (Flores et al., 2017). Latinx populations, including Latinx
immigrants, may not have access to private insurance as their jobs can provide very little in
terms of health insurance and other benefits, while low wages can prevent immigrants from
affording their own health insurance (Riosmena et al., 2015). To explore how health insurance
and level of income relate to depression, anxiety, nervios, and physical pain, this study will
obtain these demographics from participants in the form of survey questions.

Discrimination has an impact on symptoms of depression, anxiety, physical pain, and
substance use among Latinx agricultural workers (Cobb et al., 2017; Dueweke et al., 2015;
Grzywacz et al., 2011; Hiott et al., 2008; Hovey & Magaña, 2002; Hovey & Magaña, 2003).
Cobb et al. (2004) found that people who experience everyday discrimination, such as
mistreatment, as well as subtle and relatively slights and insults, tend to report poorer mental
health compared to those who do not. For Latinx, discrimination has consistently shown positive
correlations with depressive symptoms (Cobb et al., 2004; Lorenzo-Blanco & Cortina, 2013).
Hovey and Magaña (2002) specified that Mexican and Central American immigrants
experiencing high acculturative stress were at risk for depression and suicidal ideation. Lorenzo-
Blanco and Cortina (2013) suggest that high levels of acculturation and low levels of family
cohesion led to increases of symptoms of depression. Hovey and Magaña (2003) found that for
Mexican migrant agricultural workers, acculturation involved not only geographical and social
isolation, which are related to physical isolation, but also emotional isolation, which is related to
an emotional inability to confide in others and keep feelings inside rather than share feelings.
with others. The physical and emotional isolation emphasizes the fear, anxiety, and stress from the dominant cultural norms involved in the lifestyle of migrant agricultural workers in the U.S.

**Protective Factors for Mental and Physical Health**

For immigrant or foreign-born agricultural workers, later arrival to the U.S., different from the length of stay discussed in the Health Paradox section, protects them from an earlier onset of psychiatric disorders such as anxiety, depression, and substance use (Alegria et al., 2017). The researchers found that immigrants who arrived to the U.S. at age 7 years old or younger did not show any difference in prevalence of psychiatric disorders compared to individuals born in the U.S. Arriving at age 7 years old or older was associated with a later onset of depression for men and substance use disorders for women and men. The average age of agricultural workers in the 2019-2020 National Farmworker Association Survey was 41 years and they reported to have been in the U.S. for about 21 years, on average, which indicates that workers arrived to the U.S. at about age 20 years (Gold et al., 2022). The age of arrival to the U.S. becomes a protective factor for migrant agricultural workers, who have been shown to arrive in the U.S. after the age of 7 years (Castañeda et al., 2015; Miles et al., 2010).

While ethnic identity can be associated with increased symptoms of depression as one begins to acculturate to U.S. culture – perhaps by setting the culture of origin to the side or being pressured to do so, it also becomes a protective factor from psychological distress that may stem from the attempt of adapting to the dominant culture. Cobb et al. (2017) pointed out that in the process of acculturation, Latinx immigrants retain their culture-heritage and acquire the receiving-culture or new culture, meaning one’s culture-heritage is not necessarily lost when adapting to a new one. Some Latinx agricultural workers may not have family physically near them and can only contact family members via telephone. They look for community and access
to resources from their countries of origin; specific food, music, fiestas, paisanos as well as culturally competent medical services that protect against conditions such as depression and desesperacion (desperation) related to poor living conditions (Alegria et al., 2017; Organista et al., 2017). Alegria et al. (2017) suggested that social processes such as development and maintenance of interpersonal relationships, accumulation of social capital, and expansion of social networks fall under the umbrella of social resilience, which can positively impact mental health for Latinx immigrants. These social processes allow for ways to cope with and repair disruptions and disconnections caused by migrating (Alegria et al., 2017).

For Latinx agricultural workers that live with their family or have family members nearby, the concepts of family cohesion and familismo, or familism, can help with specific symptoms of distress in different occasions. Lorenzo-Blanco and Cortina (2013) identified family cohesion as a strong emotional bond that creates family closeness and communication. Familismo emphasizes trust and loyalty between family members and embraces a general orientation to the family. The characteristics of familismo help foster positive interpersonal relationships, high family unity, social support, and interdependence, promoting family support. Women endorse higher levels of family cohesion compared to men and women’s mental health is more negatively influenced by low family cohesion than men’s mental health (Campos et al., 2014; Dueweke et al., 2015; Lorenzo-Blanco & Cortina, 2013). Research shows that high levels of family cohesion decrease the risk of lifetime depressive disorders among Latinx immigrants and is a protective factor during crises and psychological distress (Alegria et al., 2017; Valdivieso-Mora et al., 2016). However, it is key to note that for low SES families, high familism can also cause stress and conflict, especially for young Latina women (Alegria et al., 2017; Campos et al., 2014; Valdivieso-Mora et al., 2016). This could be explained by higher
levels of connection and obligation to family such as caring for family members, responsibility, being exposed to difficulties/struggles, and/or working to fulfill one’s own goals with that of their family (Alegria et al., 2017).

Recently, the demands for workers have called more women to immigrate to the U.S. as well as violence and economic conditions in other countries (Gonzalez et al., 2017; Salas et al., 2013). Salas et al. (2013) interviewed 43 Mexican immigrant families to examine the effects of immigration legislation on Mexican immigrant families’ health and mental health. One of the themes in their qualitative study was “Arriesgando la vida” (They risk their life) in which narratives of mothers speak about the need to migrate to the U.S. because families will not survive economically in Mexico and lack food resources. Salas et al. (2013) share that Mexican families are exposed to high rates of crime and violence, including drug violence. Mexican immigrants seek economic, political, and social benefits in the U.S. Mothers are willing to risk their lives to migrate to the U.S. to flee from poverty and violence and consequently impact their mental and physical health (Salas et al., 2013). In their qualitative study that looked at protective psychosocial resources for Latina migrant agricultural workers, Dueweke et al. (2015) found that having an end goal, such as saving money for a house in Mexico or sending their children to college is an example of a psychosocial reserve capacity resource. Reserve capacity resources are resources that are specifically tailored to psychosocial factors in minority status and socioeconomic-driven health disparities. Other protective factors for Latina migrant agricultural workers identified by Dueweke and colleagues (2015) included showing pride in their ability to endure physical hardship and support their family through agricultural work. Protective factors are attempts to see the good in a difficult situation, which speaks volumes about the strength in
Latinx agricultural workers. Despite their vulnerable position, Latina migrant agricultural workers’ ability to provide for their family shows tremendous strength and empowerment.

**Purpose of Study**

The aim of this study centers on how physical pain, chronic pain predict depression, anxiety, and nervios among adult Latinx agricultural workers as measured by psychological and physical pain scales. This study also aims to explore how socio-cultural factors predict depression, anxiety, and nervios as measured by socio-cultural factor scales, even when controlling for demographic variables. The reason that employment status, country of origin, marital status, length in the U.S., and age of entry to the U.S. were used as controlled demographic variables was due to the associations that were already determined by previous literature (Alegria et al., 2008; Alegria et al., 2017; Arcury et al., 2018; Arcury et al., 2021; Vega et al., 2004). As Mexican and agricultural worker populations continue to grow in the United States, the 5 demographic variables used in the analysis are key factors for social determinants of health for immigrant populations and will inform about their impact on mental health outcomes in the context of agricultural workers in this study as many agricultural workers are immigrants (Alegria et al., 2008; Alegria et al., 2017; Arcury et al., 2018; Arcury et al., 2021; Vega et al., 2004).

This study is meant to carry out a process of research that is intended to work with vulnerable communities by using a community engagement framework, discussed in the Methods section below, as there are multiple factors that play a role in the systemic oppression of communities of agricultural workers (Adhikari et al., 2020; Minkoff-Zern, 2019; Oceguera, 2022). It is key for non-agricultural workers and researchers from predominantly white
institutions to take this particular framework into consideration when working with agricultural workers in order to respect, build relationships, and minimize risk and exploitations (Adhikari et al., 2020). This study is intended to be shared with the communities of agricultural workers, who participated in this study and to add to body of literature that focuses on the mental health of agricultural workers.

There are two research questions for each of the three mental health outcomes (depression, anxiety, and nervios) in this study. The first question for depression is: How do physical pain and chronic pain predict depression among Latinx agricultural workers? The second question for depression is: After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), how do socio-cultural factors (acculturative stress, familismo, fear of deportation, marianismo, and machismo) predict depression among Latinx agricultural workers?

The first question for anxiety is: How do physical pain and chronic pain predict anxiety among Latinx agricultural workers? The second question for anxiety is: After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), how do socio-cultural factors (acculturative stress, familismo, fear of deportation, marianismo, and machismo) predict anxiety among Latinx agricultural workers?

The first question for nervios is: How do physical pain and chronic pain predict nervios among Latinx agricultural workers? The second question for nervios is: After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), how do socio-cultural factors (acculturative stress, familismo, fear of deportation, marianismo, and machismo) predict nervios among Latinx agricultural workers?
Methods

Design

This study is a quantitative, cross-sectional study that used a Community Engagement framework (Adhikari et al., 2020) to explore the relationship between depression, anxiety, nervios and physical pain. In addition to physical pain, this study measured key socio-cultural factors and also examined the association between socio-cultural factors and depression, anxiety and nervios. The Community Engagement framework allows for communities involved as participants to partake in the process of the research that is tailored to their community’s environment and culture. Adhikari et al. (2019) describe the goals of a community engagement framework:

“(1) Respecting individuals, communities, and stakeholders; (2) building trust and social relationships; (3) determining appropriate benefits; minimizing risks, burdens, and exploitation; (4) supporting the consent process; (5) understanding vulnerabilities and researcher obligations; (6) gaining permissions, approvals and building legitimacy and (7) achieving recruitment and retention targets.”

A community engagement framework holds researchers accountable for investigating health concerns among vulnerable communities in an ethical manner. This study was conducted, in person, to assess self-reported symptoms of depression, anxiety, nervios and physical pain, including chronic pain, among agricultural workers in CA. In cross-sectional studies, data are collected at one point in time or over a short period of time to get a “snapshot” of the prevalence of an outcome and characteristics that are associated (e.g., outcome of interest and risk factors) within a population (Levin, 2006). The motive behind the cross-sectional survey was the dearth of research information in the literature about physical pain, depression, anxiety, and nervios
among agricultural workers and it is key to gather information from agricultural worker communities in order to improve screening, interventions, and treatment. This study’s sample size is 104 participants ($n = 104$).

**Procedures**

The Institutional Review Boards (IRB) approval from the University of San Francisco was obtained on May 11th, 2021 and renewed on April 6th, 2022, which followed the sixth goal of the community engagement framework of gaining approvals and building legitimacy (Adhikari et al., 2020). This study was conducted during the COVID-19 pandemic and shelter-in-place order; therefore, data was collected as soon as the stay-at-home-orders were lifted with safety precautions. Data collection occurred October 2021 - April 2022. The researcher reached out to 2 community agencies that provides resources and mental health services to Latinx communities and Latinx agricultural workers near the California Bay Area where agricultural workers reside, work, and obtain community resources. According to the first goal of the community engagement framework of respecting individuals, communities, and stakeholders met with agency staff and interacted with the community members to present this research project and collaborate with community members and agency staff (Adhikari et al., 2020). The researcher discussed with agency staff about the best method to engage with as many agricultural workers as possible, how to integrate the researcher’s recruitment with the agencies’ system of operation, and to learn about common grocery stores or markets utilized by the communities to purchase gift cards for this study participants. The researcher made multiple visits to the communities to become familiar, establish a relationship, and gain trust from the community members, the second goal of the community engagement framework (Adhikari et al., 2020). The researcher connected with the communities by attending events, in person, according to safety
regulations, such as food pantry distributions, cultural celebrations, and other regular week days to meet community members. The researcher announced this study to the communities, informed about the researcher’s intentions and the purpose for being present, as well as asked the communities if this study makes sense to their experience and asked for permission to conduct surveys. The communities allowed the researcher to work with them. In line with the fourth goal of the community engagement framework of supporting the consent process, the researcher explained the consent form regardless of the method of completing the survey (online or hard copy) and allowed the community members to volunteer their participation (Adhikari et al., 2020). If people met the criteria, members who are interested in this study, signed a consent form and the survey was administered in Spanish or English, according to the participant’s preferred language. This survey was administered electronically, via Qualtrics, and using paper and pencil. Not all participants were able to use a smart technology device and the researcher was available to teach community members how to use the device in three steps, also included in the flyer, to assist the community feel comfortable completing the survey. The researcher was available to answer questions about completing the survey by phone or in person during the data collection process. According to the third goal of the community engagement framework of determining appropriate benefits, minimizing risk, burdens, and exploitation, the researcher provided each participant with $20.00 in the form of a gift card to the local market, most commonly used by the agricultural worker communities along with information on how to access health care and mental health care services. The researcher referred participants to mental health services as needed. Community members who did not participate in this study were also able to receive information about health care and mental health care services. It was important to understand the vulnerabilities of agricultural worker communities and the greater Latinx communities in the
area as well as understand researcher obligations, the fifth goal of the community engagement framework. This procedure included researching vulnerabilities of agricultural workers and Latinx immigrants, which the researcher mindfully implemented into the data collection process, such as, explaining that this study was not part of the government and also adhere to ethical standards of research with vulnerable communities (Adhikari et al., 2020). As part of this community engagement project, the researcher will commit to report the study findings to the community once this project has been completed and approved by the dissertation committee. The researcher will work with agency staff to present the findings to the community. It will involve presenting the results to staff and how to create a community event for agricultural workers to create community and learn more about the relationship between physical pain, depression, anxiety, and nervios. Planning with agency staff will also involve how to deliver results to the community in terms of preferred language and using layman terms.

**Participant Recruitment**

This study was conducted with a population that is hard to reach and during the COVID-19 pandemic as communities were transitioning back to in-person activities. A power analysis was conducted and it projected that 200 participants were required; however, due to the COVID-19 pandemic, it was planned for only 100 participants to be recruited. According to the seventh goal of the community engagement framework of achieving recruitment and retention rates, the data collection did not end until the 100-participant goal was met (Adhikari et al., 2020). This study used a convenience and targeted sample (Passer, 2014). This study targeted Latinx agricultural workers. The researcher reached out and worked with two communities that provided resources for Latinx and agricultural worker communities located in Northern California. Recruitment included distribution of flyers within the community area and during
community food pantries at two community core agency locations. Participation was voluntary, anonymous, and confidential. The inclusion criteria for the targeted sample included people who met all of the following:

A. Are Latinx agricultural workers or have conducted agricultural work within the last two years
B. Are age 18 years old or older
C. Speak English or Spanish
D. Experience physical pain (musculoskeletal pain/headaches)

Since the agencies provided mental health services and both were one of, if not, the only agencies in the area that provide culturally sensitive services and resources to agricultural workers in Spanish, the inclusion criteria did not include mental health experiences criteria. It made sure to capture the physical pain experience since the agencies do not provide medical services for physical and chronic pain. The exclusion criteria of this study consist of people who meet any one of the following:

A. Have not conducted agricultural work
B. Are children below the age of 18 years old
C. Speak a language other than English or Spanish
D. Has not experienced physical pain such as musculoskeletal pain or headaches

**Measures**

The outcome measures for this study include the PHQ-9, GAD-7, and *Ataque de Nervios*. The predictor variables include the Acculturative Stress Scale, the Familism Scale, the Fear of Deportation instrument, the *Marianismo* Belief Scale, and the *Machismo* Scale. Demographic
variables, also predictor variables, were included and explained below. The following measures are included in the survey for this study and described in detail below.

**Demographics**

Demographic information was collected as a part of the survey, which includes: age, gender, marital status, health insurance, level of education, employment status, level of income, age of entry to the U.S., length of stay in the U.S., and country of origin. Age, age of entry to the U.S., length of stay, and years working in agriculture were continuous variables. Marital status, health insurance, level of education, and level of income were categorical variables. Gender was a categorical variable, however, participants only responded with male or female and therefore, the gender variable was converted into a dichotomous variable (1 = Female; 2 = Male). Country of origin was also initially a categorical variable; however, it was converted to a dichotomous variable (0 = No Mexico; 1 = Yes Mexico) as most of the sample population identified “Mexico” as their country of origin. Employment status was a dichotomous variable (0 = Not currently working; 1 = Yes currently working). Only 5 demographic variables were used in the main analysis as control variables: marital status, country of origin, age of entry to the U.S., length of stay in the U.S., and employment status. Demographic variables such as age, gender, education, income, years working in agriculture, and health insurance were still part of this study’s survey in order to describe the characteristics of the sample population.

**Depression**

The Patient Health Questionnaire (PHQ-9) is a 9-item short form questionnaire intended for adults, scored on a 4-point scale, ranging from 0 to 3 (0=Not at all, 3=Nearly every day) and is based on the criteria of major depressive disorder according to the Diagnostic and Statistical Manual of Mental Disorders IV (Kroenke et al., 2001). Kroenke et al. (2001) reported that the
PHQ-9 had very good internal reliability with an alpha score of .89. For Spanish-speaking populations, the PHQ-9 was highly satisfactory and can be used to measure depression in a primary care setting (Muñoz-Navarro, 2017). For a cutoff value of 10 points, the PHQ-9 has the following properties: sensitivity, 0.95; specificity, 0.67. The diagnostic algorithm for depression (DSM VI) had a sensitivity of 0.88 and specificity of 0.80 (Muñoz-Navarro, 2017). In this study the PHQ-9 was used to measure the depression outcome variable. The total score was calculated for the PHQ-9 and the total mean was calculated for the sample. The PHQ-9 had good internal reliability ($\alpha = .81$) in this study.

**Anxiety**

The General Anxiety Disorder-7 (GAD-7) was developed to assess symptom severity of Generalized Anxiety Disorder and probable case of Generalized Anxiety Disorder (Spitzer et al., 2006). It is a 7-item self-report questionnaire scored on a 4-point scale, ranging from 0 to 3 (0=Not at all, 3=Nearly every day) and is based on the criteria of generalized anxiety disorder according to the Diagnostic and Statistical Manual of Mental Disorders IV (2000). The GAD-7 has good internal consistency (Cronbach alpha = .92) and good test-retest reliability (Intraclass correlation = 0.83). The scale also shows good criterion, construct, and factorial validity (Spitzer et al., 2006). The GAD-7, Spanish Version, has good internal consistency reliability ($\alpha = 0.93$) and convergent validity shown by significant correlations with the PHQ-9 (0.70, $p<0.01$) and Perceived Stress Scale (0.66, $p<0.01$) (Mills et al., 2014). In this study, the GAD-7 was used to measure the anxiety outcome variable. The total score was calculated for the GAD-7. The GAD-7 had excellent internal reliability ($\alpha = .92$) in this study.

**Nervios**
The Ataque de Nervios Symptoms Measure (Guarnaccia et al., 2010) is a 15-item measure to assess symptoms of the syndrome, “attack of nerves,” that is primarily associated with Spanish-speaking populations. Respondents are considered to meet syndrome criteria for an ataque de nervios if they respond positively to the screener question and answer yes to four or more of the symptoms. These questions follow the methodology of the National Latino and Asian American Study (NLAAS) and have repeatedly demonstrated good validity in terms of identifying the ways in which ataque de nervios is manifested (Guarnaccia et al., 2010; Lopez & Guarnaccia, 2000). The reliability of this measure is acceptable (α = 0.658) (Moitra et al., 2018). Ataque de Nervios was used to measure the nervios outcome variable in this study. The Ataque de Nervios measure was initially scored as a continuous variable, however, was converted into a dichotomous variable to indicate if someone met the ataque de nervios criteria (endorsed 4+ symptoms within the scale). Ataque de Nervios had an acceptable internal reliability (α = .78).

Physical Pain and Chronic Pain

The Numerical Rating Scale (NRS) is a 1-item question with an 11-numeric segmented horizontal bar (0 = No pain and 10=Severe pain) (Hawker et al., 2011). The NRS has excellent construct validity in patients with rheumatic and other chronic pain conditions (r >0.86). The NRS also has good reliability for literate and illiterate patients (r = 0.96 and r = 0.95 respectively) (Hawker et al., 2011). The NRS was used as continuous predictor variable for physical pain in this study.

The Patient-Reported Outcomes Measurement Information System Pain Interference (PROMIS PI), supported by the National Institutes of Health (NIH), is a 6-item scale that measures the interference of physical pain within the past 7 days, based on a 5-point scale (1=Not at all and 5=Very much) (Kroenke, 2018). Raw scores are translated into a T-score using
a conversion table with a mean of 50 and standard deviation of 10 (Amtmann et al., 2010; Patient Reported Outcome Measurement System, 2017). Pain interference scoring manual). Higher scores indicate greater pain interference. Cronbach’s alpha was .90 (Arthur et al., 2016). The PROMIS PI was used as a predictor variable for physical pain. The total score was calculated. The PROMIS PI had an excellent internal reliability (α = 96) in this study.

This study also assessed for chronic pain using a dichotomous variable (0 = No chronic pain; 1 = Yes chronic pain). To determine if chronic pain was endorsed, this study assessed for duration of persistent physical pain, also a common condition (Aufiero et al., 2017; Cornelio-Flores et al., 2018; Dalhamer et al. 2018). The survey asked if a person’s persistent pain occurred for 3 months or more, which is also the criteria for chronic pain and chronic headaches (Dowell et al., 2016). In other words, chronic pain in this sample was measured by a dichotomous variable.

Cultural Factors

**Acculturative Stress.** The Acculturative Stress Scale is a 9-item scale to measure stress related to cultural change (Gong et al., 1998). The scale was adapted from the Mexican American Prevalence and Services Survey (Vega et al., 1998). Respondents are asked to answer “yes” or “no” to each item and each item is summed to determine a score of total level of acculturative stress (Internal consistency: KR-20= .60) (Gong et al., 1998). To keep all measures in this study consistent for variable reporting and data analysis, the dichotomous scale has been adjusted to a continuous variable 5-point likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Acculturation scale in Cuellar et al. (1980), from which the Acculturative Stress Scale was originally adapted, was given in
English and Spanish and scored on a 5-point likert scale to differentiate levels of acculturation, which this study attempts to accomplish for acculturative stress as well. In this study, the item 2 of the Acculturative Stress scale was reverse-coded as it was positively-worded, instead of being negatively-worded like the rest of the items in this scale. The total score was calculated for the Acculturative Stress scale. In this study, the Acculturative Stress scale was a predictor variable with an internal good internal reliability ($\alpha = .84$).

**Familismo.** The Familism Scale is a 14-item scale developed to represent 3 attitudinal familism subscales: family obligations, perceived support from family, and family as referents (Sabogal et al., 1987). This measure is based on a 5-point Likert scale ranging from 1 to 5 (1=strongly agree, 5=strongly disagree). This measure has been translated into Spanish. In a sample of Hispanic and non-Hispanic Whites, the Cronbach’s alpha suggests moderate internal consistency with a factor of .76 for familial obligation, .70 for perceived support from family, and .64 for family as referents. The scale’s validity includes three conceptually clear factors (eigenvalues greater than 1) accounting for 48.8% of the variance were extracted. Item ratings are reverse-scored for higher scores to indicate higher levels of familism (Campos et al., 2019; Sabogal et al., 1987). In this study, the Familism scale was predictor variable measured Familial Obligations ($\alpha = .84$), Support from Family ($\alpha = .92$), and Family Referent ($\alpha = .91$) with overall good internal reliability. The total score was calculated for each subscale.

**Fear of Deportation.** The Fear of Deportation instrument is a 7-item questionnaire to assess fear or concerns of being deported by measuring
avoidance of several activities (e.g., "Ask for help from government agencies") (Arbona et al., 2010). The items in this instrument are scored using a dichotomous scale with a 0 or 1 (0 = "no avoidance of the activity for fear of deportation,” 1 = "avoidance of the activity for fear of deportation"). The responses to each question are summed with a possible range of total score of 0 to 7. The items were also translated into Spanish using Brislin's (1986) back translation method. In a sample of Mexican and Central American immigrants, internal consistency was established (internal consistency of responses assessed by the Kuder–Richardson 20 reliability coefficient was .91) (Arbona et al., 2010). To keep all measures in this study consistent for variable reporting and data analysis, the dichotomous scale was adjusted to a continuous variable, a 5-point likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Fear of Deportation instrument was used as a predictor for this study to measure fear of deportation and the total score was calculated. In this study the internal reliability for this instrument was excellent (α = .91).

*Marianismo*. The Marianismo Beliefs Scale (MBS) is a validated, 24-item scale used to measure traditional female gender role beliefs among Latinx based on the construct of *marianismo* (Castillo et al., 2010; Nuñez et al., 2016). Each item includes a 4-point scale range from 1 (strongly disagree) to 4 (strongly agree). The MBS consists of 5 subscales for which this project will only use 3 of the 5 subscales: *family pillar* (Latinas are the main source of strength for the family), *subordinate to others* (Latinas should show respect and obedience to men), *silencing self to maintain harmony* (Latinas should not share personal thoughts or
needs in order to maintain harmony in the relationship with male partner). The reliability for the subscales reflects the following coefficient alphas respectively: 0.77, 0.76, and 0.78 (Castillo et al., 2010). The score is calculated as the mean of items in each subscale or of the scale as a whole. Higher scores indicate more adherence to *marianismo* beliefs, regardless of whether using subscale scores or total scores (Castillo et al., 2010). The *Marianismo* Beliefs Scale used as a predictor in this study. The subscales, Family Pillar (α = .89), Subordinate to Others (α = .88), and Silencing Self to Maintain Harmony (α = .89) had overall good internal consistency of items within the scale. The total score was calculated for the three subscales.

**Machismo.** The *Machismo* Scale is a 20-item questionnaire based on a 7-point scale (1=Very strongly disagree to 7=Very strongly agree) that measures two dimensions of machismo such as traditional *machismo* (described as aggressive, sexist, chauvinistic, and hypermasculine) and *caballerismo* (described as nurturing, family centered, and chivalrous), encompassing both negative and positive aspects (Arciniega et al., 2008). Internal consistency estimates for traditional *machismo* and *caballerismo* were 0.84 and 0.71, respectively in a sample of Mexican American men. The traditional *machismo* and *caballerismo* subscales of the *Machismo* Scale demonstrated evidence of convergent and discriminant validity. Traditional *machismo* was related to aggression ($r = .35, p < .001$), antisocial behavior ($r = .21$ and .37, respectively for number of arrests and fights), and greater levels of alexithymia (the awareness one has of one’s own and other’s emotions) ($r = .43, p < .001$). *Caballerismo* was positively associated with
affiliation ($r = .23$, $p < .05$) and ethnic identity ($r = .25$, $p < .05$) (Arciniega et al., 2008). The *Machismo* Scale was used as a predictor in this study and the total score for both subscales were calculated. In this study the *Machismo* Scale has overall good internal validity as it measured Traditional *Machismo* ($\alpha = .86$) and *Caballerismo* ($\alpha = 86$).

**Data Analyses**

SPSS version 28.0 was used to conduct the analyses of this study’s data. Descriptive statistics were conducted in order to describe the sample demographics. Participant demographic characteristics included age, gender, marital status, health insurance, education, employment status, income, years working in agriculture, age of entry to the U.S., length of stay in the U.S., and country of origin. Demographic information variables were measured and identified by frequency counts, percentages, averages, as well as their standard deviations. T-tests were conducted to look demographic variables by gender. Descriptive statistics were also acquired for depression, anxiety, *nervios*, physical pain, chronic pain, and pain interference using frequency counts, percentages, averages, and standard deviations. T-tests were also conducted to examine physical pain and mental health variables by gender.

The following is the process of the main analysis:

Figure 1 (see Appendix A) describes the data analysis with the visual hypothesis model. Three regression models of analysis for depression, anxiety, and *nervios* were conducted. First, a hierarchical multiple linear regression analysis (see Appendix D) was conducted to assess how physical pain and chronic pain predict depression and how socio-cultural factors impacted depression, even after controlling for demographics. Three Blocks were utilized within this regression. In Block 1, physical pain, pain interference, and chronic pain variables were added.
In block 2, acculturative stress, fear of deportation, 3 familismo (Familial Obligations, Support from Family, and Family Referent) subscales, 3 marianismo (Family Pillar, Subordinate to Others, and Silencing Self to Maintain Harmony) subscales, and 2 machismo (Traditional Machismo and Caballerismo) subscales were added with the physical pain factors (constant) to examine how each variable predicted depression. In Block 3, age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status were added to the physical pain factors (constant) and the socio-cultural factors (constant) to examine how socio-cultural factors predicted depression, when controlling for demographic variables. These particular demographic variables were used in the regression due to established associations with depression (Alegria et al., 2008; Alegria et al., 2017; Arcury et al., 2018; Arcury et al., 2021; Vega et al., 2004). R square and R square change were obtained from the SPSS Model Summary of the multiple linear regression to determine the significance of the variance percentage for the added variables of the specific block. The p and beta values were obtained for each variable in the model, which were included in the model. The F and p-values for each block in the model were obtained from the ANOVA table as part of the regression model output.

Second, another hierarchical multiple linear regression analysis (see Appendix E) was conducted to assess how physical pain and chronic pain predict anxiety and how socio-cultural factors impacted anxiety, even after controlling for demographics. Three Blocks were utilized within this regression. In Block 1, physical pain, pain interference, and chronic pain variables were added. In block 2, acculturative stress, fear of deportation, 3 familismo (Familial Obligations, Support from Family, and Family Referent) subscales, 3 marianismo (Family Pillar, Subordinate to Others, and Silencing Self to Maintain Harmony) subscales, and 2 machismo (Traditional Machismo and Caballerismo) subscales were added with the physical pain factors
(constant) to examine how each variable predicted depression. In Block 3, age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status were added to the physical pain factors (constant) and the socio-cultural factors (constant) to examine how socio-cultural factors predicted anxiety, when controlling for demographic variables. $R$ square and $R^2$ change were obtained from the SPSS Model Summary of the multiple linear regression to determine the significance of the variance percentage for the added variables of the specific block. The $p$ and beta values were obtained for each variable in the model, which were included in the model. The F and p-values for each block in the model was obtained from the ANOVA table as part of the regression model output.

Third and lastly, a hierarchical binary logistic regression analysis (see Appendix F) was conducted to assess how physical pain and chronic pain predict nervios and how socio-cultural factors impacted nervios, even after controlling for demographics. Three Blocks were utilized within this regression. In Block 1, physical pain, pain interference, and chronic pain variables were added. In block 2, acculturative stress, fear of deportation, 3 familismo (Familial Obligations, Support from Family, and Family Referent) subscales, 3 marianismo (Family Pillar, Subordinate to Others, and Silencing Self to Maintain Harmony) subscales, and 2 machismo (Traditional Machismo and Caballerismo) subscales were added with the physical pain factors (constant) to examine how each variable predicted depression. In Block 3, age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status were added to the physical pain factors (constant) and the socio-cultural factors (constant) to examine how socio-cultural factors predicted nervios, when controlling for demographic variables. The beta, Wald, p, exponential beta and confidence interval were obtained from the logistic regression model for each variable in the block, which are included in the model. To monitor the significance for the
variance of each block the Omnibus Tests of Model Coefficients included in the logistic regression was examined to obtain the Chi-square, degrees of freedom and the $p$-value.
Results

Demographics

As can be seen in Table 1 (see Appendix B) 104 agricultural workers participated in this study and completed the survey in Spanish. Sixty-four surveys were completed online and 40 surveys were completed on a hard copy (paper/pencil). T-tests were conducted to examine age, age of entry to U.S., length of stay in U.S., and years of working in agriculture by type of survey. The 64 participants that completed the survey online ($M = 38.47, SD = 14.693$) compared to the 40 participants that completed the hard copy survey ($M = 50.60, SD = 10$) demonstrated a significantly younger age, $t(100.82) = -4.965, p = .004$. Participants who completed the survey online ($n = 62, M = 15.68, SD = 12.63$) compared to participants who completed the survey on hard copy ($n = 40, M = 24, SD = 10.91$) demonstrated a significant difference in length of stay in the U.S., $t(91.77) = -3.530, p = .041$. T-test results showed no significant differences between type of survey when examining age of entry to U.S. and years working in agriculture ($p > .05$).

The sample of Latinx agricultural workers consisted of 47 (45.2%) female-identified and 57 (54.8%) male-identified respondents ($n = 104$). The average age of agricultural workers was 43.13 years ($SD = 14.37$). Over half of the participants were married (60.6%). The majority of participants (95.2%) reported Mexico as their country of origin. Participants ranged in age of entry to the United States from 0 to 74 years ($M = 24.05, SD = 11.18$). Participants ranged in length of stay in the United States from 5 months to 49 years ($M = 18.95, SD = 12.61$) (two responses missing). Most (85.6%) participants reported that they were currently working in agriculture. In the past year, 72.1% of participants had a household income of $25,000 per year or less. For a detailed description of the demographic characteristics of this study’s population sample, please see Table 1 (Appendix B). T-tests were conducted to examine age, age of entry to
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U.S., length of stay in U.S., and years working in agriculture by gender. T-tests results showed no significant differences were found between genders (p >.05).

Physical Pain, Depression, Anxiety, and Nervios

Table 2 (see Appendix C) describes the levels of physical pain, pain interference, chronic pain, depression, anxiety, and nervios. Participants were asked to rate their physical pain from 0 to 10 (the higher number indicated greater pain). On average, agricultural workers in this study rated their pain 2.24 (SD = 2.26) out of 10. Most (79.7%) participants reported that their pain interference was average (t-score = 50). Seventy-six percent of the participants reported that they did not experience chronic pain, meaning that their physical pain was not persistent during 3 months or more. The majority (75%) of participants reported subclinical levels of depressive symptoms (scores of 0 to 4). When asked about anxiety, the majority (80.8%) of agricultural workers reported subclinical levels of symptoms of anxiety. When asking about nervios, the majority (90.4%) of participants did not meet the criteria for nervios and 9.6% met criteria for nervios. T-tests were conducted to examine physical pain, pain interference, chronic pain, depression, anxiety, and nervios by gender. T-test results showed no significant differences were found between genders (p >.005).

Main Analysis

Table 3 (see Appendix D), Table 4 (see Appendix E), and Table 5 (see Appendix F) describe the hierarchical multiple linear regressions for each of the two outcome variables, depression (Model 1) and anxiety (Model 2), and also describes the hierarchical logistic regression for the third outcome variable, nervios (Model 3) respectively. The three models have three blocks each to examine: how physical pain factors predict mental health outcomes (Block 1), how socio-cultural factors predict each mental health outcome (Block 2), and how socio-
cultural factors predict mental health outcomes when controlling for demographic variables (Block 3).

In Model 1 for the depression outcome (see Appendix D), Block 1 examined physical pain, pain interference, and chronic pain variables, which accounted for 53.9% of the variance ($F(3, 98) = 38.13, p<.001, R^2 = .539$). In this model, physical pain ($\beta = .334, p<.05$) and pain interference ($\beta = .438, p<.001$) were significant predictors of depression. That is, agricultural workers who experienced more physical pain and pain interference, also reported higher levels of depression. However, chronic pain ($\beta = -.060, p = .440$) was not a significant predictor for depression. Block 2 added acculturative stress, fear of deportation, *familismo* (Familial Obligations) subscale, *familismo* (Support from Family) subscale, *familismo* (Family Referent), *mariánismo* (Family Pillar) subscale, *mariánismo* (Subordinate to Others) subscale, *mariánismo* (Silencing Self to Maintain Harmony) subscale, *machismo* (Traditional Machismo) subscale, and *machismo* (Caballerismo) subscale to the pain variables ($F(13, 88) = 11.33, p<.001, R^2 = .626$). Results from Block 2 revealed the model was statistically significant ($R^2$ change = .087, $p<.05$) and found that *familismo* (Support from Family) subscale ($\beta = -.230, p<.05$) was a significant predictor depression. That is, agricultural workers who experienced higher levels of support from family also reported lower levels of depression. Block 3 added the controlled demographic variables such as age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status to the socio-cultural factor and pain variables ($F(18, 83) = 8.91, p<.001, R^2 = .659$). Although the model was statistically significant, the additional controlled demographic variables did not account for a significant percentage of the variance ($R^2$ change = .033, $p>.05$) and all five demographic variables were not statistically significant predictors of depression ($p = <.05$). Physical pain and pain interference continued to be statistically significant across Block 2
In Model 2 for the anxiety outcome (see Appendix E), Block 1 accounted for 57.6% of the variance \((F(3, 98) = 44.44, p<.001, R^2 = .576)\). Physical pain \((\beta = .441, p<.001)\) and pain interference \((\beta = .416, p<.001)\) were significant predictors of anxiety. Agricultural workers who experienced higher levels of physical pain and pain interference also reported higher levels of anxiety. Chronic pain \((p>.05)\) was not a significant predictor of anxiety. Block 2 was significant and accounted for 62.4% of the variance \((F(13, 88) = 11.23, p<.001, R^2 = .624)\). Although the model was statistically significant, the additional socio-cultural factor variables did not account for a significant percentage of the variance \((R^2\text{ change} = .048, p>.05)\). Familismo (Support from Family) subscale \((\beta = -.230, p<.05; \beta = -.270, p<.05)\), and marianismo (Silencing Self to Maintain Harmony) subscale \((\beta = -.194, p<.05; \beta = .264, p<.05)\) were significant predictors of anxiety for Blocks 2 and 3 respectively. That is, agricultural workers who experienced higher levels of support from family and who reported to believe in higher levels of silencing self to maintain harmony also reported lower levels of anxiety. Acculturative stress, fear of deportation, familismo (Familial Obligations) subscales, familismo (Family Referent) subscale, marianismo (Family Pillar) subscale, marianismo (Subordinate to Others) subscale, machismo (Traditional Machismo) subscale, and machismo (Caballerismo) subscale were not significant predictors of depression for Blocks 2 and 3 of Model 2 \((p>.05)\). Block 3 accounted for 67.3% of the variance \((F(18, 83) = 9.50, p<.001, R^2 = .673)\). The model was statistically significant \((R^2\text{ change} = .049, p<.05)\) and found marital status \((\beta = .017, p<.05)\) and employment status \((\beta = -.196 p<.05)\) to be significant. That is, agricultural workers who identified as married also reported higher levels of anxiety and agricultural workers who were employed also reported lower levels of anxiety. Age
of entry to U.S., length of stay in U.S., and country of origin were not significant predictors of anxiety \( (p > .05) \). Physical pain and pain interference continued to be statistically significant across Block 2 \( (\beta = .355, p < .001; \beta = .431, p < .001, \text{ respectively}) \) and Block 3 \( (\beta = .305, p < .05; \beta = .435, p < .001, \text{ respectively}) \), within Model 2.

For Model 3 for the nervios outcome (see Appendix F), a logistic regression was conducted since nervios was a dichotomous variable in nature. Block 1 analyzed physical pain, pain interference, and chronic pain variable and it accounted for 36.3\% (Nagelkerke \( R^2 = .363 \)) of the variance. Block 1 was statistically significant \( (x^2 (3, n = 104) = 19.24, p < .001) \) and revealed that pain interference \( (B = .256, \text{ Wald} = 9.907, p < .05) \) was a statistically significant predictor of nervios. That is, agricultural workers, who report high levels of pain interference are 1.29 times more likely to report high levels of nervios \( \text{Exp} (\beta) = 1.293, 95\% \text{CI [1.1, 1.5]} \). Physical pain \( \text{Exp} (\beta) = .854, 95\% \text{CI [.614, 1.2]} \) and chronic pain \( \text{Exp} (\beta) = 1.741, 95\% \text{CI [.320, 9.482]} \) were not significant predictors of nervios. Block 2 added fear of deportation, familismo (Familial Obligations) subscale, familismo (Support from Family) subscale, familismo (Family Referent), marianismo (Family Pillar) subscale, marianismo (Subordinate to Others) subscale, marianismo (Silencing Self to Maintain Harmony) subscale, machismo (Traditional Machismo) subscale, and machismo (Caballerismo) subscale to the pain variables. Block 2 accounted for 54.6\% (Nagelkerke \( R^2 = .546 \)) of the variance, however, Block 2 was not significant \( (p > .05) \). Pain interference \( (B = .315, \text{ Wald} = 8.734, p < .05) \) continued to show significance in predicting nervios. That is, agricultural workers that reported high levels of pain interference were 1.37 times more likely to experience high levels of nervios \( \text{Exp} (\beta) = 1.370, 95\% \text{CI [1.1, 1.6]} \). Fear of deportation, familismo (Familial Obligations) subscale, familismo (Support from Family) subscale, familismo (Family Referent), marianismo (Family Pillar)
subscale, _marianismo_ (Subordinate to Others) subscale, _marianismo_ (Silencing Self to Maintain Harmony) subscale, _machismo_ (Traditional Machismo) subscale, and _machismo_ (Caballerismo) subscale were not significant predictors of _nervios_ across Blocks 2 and 3 ($p > .05$). Block 3 added the controlled demographic variables such as age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status to the socio-cultural factor variables. Block 3 accounted for 71.6% (Nagelkerke $R^2 = .716$) of the variance and was statistically significant ($X^2 (5, n = 104) = 11.74, p < .05$). Age of entry to U.S., length of stay in U.S., country of origin, marital status, and employment status were not significant predictors of _nervios_ ($p > .05$). Physical pain, pain interference, and chronic pain were not significant predictors of _nervios_ across Blocks 2 and 3 ($p > .05$).
Discussion

The purpose of this study was to determine how physical pain and chronic pain predict depression, anxiety, and nervios. This study also explored how different socio-cultural factors (e.g., fear of deportation, acculturative stress, familismo, marianismo, and machismo) impact depression, anxiety, and nervios, even after controlling for demographic factors (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin). The socio-cultural, demographic, and physical pain factors were viewed as vulnerabilities in this study as some of these predictor variables can be risk factors and/or protective factors for mental health outcomes, which is why it was important to include them as predictors when examining depression, anxiety, and nervios. For example, fear of deportation and acculturative stress can be risk factors of mental health outcomes. However, familismo, marianismo, and machismo are constructs containing different elements of cultural tradition that protect an individual from and also place an individual at risk for mental health outcomes. This study analyzed data from a sample size of 104 agricultural workers who have worked in agriculture within the last two years. Results will be discussed below by mental health outcome and clusters of variables that were not significant predictors across mental health outcomes.

Depression

It was hypothesized that higher levels of physical pain, and chronic pain significantly predict depression among Latinx agricultural workers. This hypothesis was partially supported as higher levels of physical pain, but not chronic pain, statistically significantly predicted higher levels of depression. Consistent with the literature, this study supports the association between physical pain and depression in Latinx agricultural workers (Shipp et al., 2009; Tribble et al., 2016; Villarejo et al., 2010). However, it is important to note that this study showed that there
were very low numbers of agricultural workers who potentially met the criteria for a diagnosis of
depression as most agricultural workers reported minimal levels of depression. Only 2
participants scored moderate to severe levels of depression. Tribble et al. (2016) also found a
significant association between symptoms of depression and musculoskeletal pain and also found
that agricultural workers reported low numbers of depression compared to non-agricultural
workers. Hiott et al. (2008) found a high incidence of depression and anxiety in their study (over
40%), however, they add that their sample population of agricultural workers had recently
arrived to the U.S. into a region that did not have an established Latinx community to help with
their transition. Hiott et al. (2008) report that usually levels of stress, which can exacerbate
symptoms of depression, are high and temporary for recent immigrants. In this study, agricultural
workers have been in the U.S. for an average of almost 19 years. This study did not show a
significant association between length of stay in the U.S. and depression, when controlling for
demographics. Perhaps, while the current study’s sample has predominantly been in the U.S. for
some time and have adapted to living in the U.S. or have found communities that support them,
agricultural workers may only feel mild symptoms of depression. A question of interest is, how
does established community and resources impact depression for agricultural workers? For this
particular sample, although physical pain is a predictor of depression, this is not a clinical sample
in the case of examining depression due to the small sample size.

Chronic pain was not a significant predictor of depression in this study. Although there
are mixed findings about the association between chronic pain and depression among Latinx,
Xiao et al. (2013) states that chronic pain is associated with women over the age of 65 years
among Latinx agricultural workers. The average age of this study was 43.13 years. It is possible
that if agricultural workers are experiencing chronic pain, that they are no longer able to work in
this type of job. Xiao et al. (2013) found that chronic pain was dependent on common work positions in agriculture work. For example, chronic pain was associated with bending and stooping for more than 30 hours/week for both men and women. Chronic pain was also associated with crawling, kneeling and driving tractors (Xiao et al., 2013). The current sample population perhaps worked in settings where these positions are not common or agricultural workers are able to hold these positions due to their age and physical strength as most agricultural workers rated their physical pain low (less severe) and 75% reported that their physical pain was not persistent for three months or more. This may be a similar case for chronic pain across all three mental health outcomes in this study as chronic pain was not a significant predictor across mental health outcomes.

After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), it was hypothesized that higher levels of physical pain, fear of deportation, acculturative stress, *machismo*, *marianismo*, and *familismo* are predictors of depression among Latinx agricultural workers. This hypothesis was not supported as higher levels of *familismo* (Support from Family) subscale statistically significantly predicted lower levels of depression, even when controlling for demographics. Fear of deportation, acculturative stress, *machismo*, and *marianismo* were not predictors of depression, even when controlling for demographics.

In this study, high levels of familism (Support from Family) subscale significantly predicted lower levels of depression, which can be supported by the literature (Lorenzo-Blanco & Cortina, 2013). However, *familismo* can also be a risk factor, which the hypothesis for *familismo* in this study was based on. Alegria et al. (2017) and Cahill et al. (2021) reported that *familismo* was associated with symptoms of depression among Latinx young adults due to
Family Obligations and Family Referent subscales that can cause stress, especially in families who are low income. The hypothesis for familismo in this study was also considering that people migrate to the U.S. at a younger age (Gold et al., 2022). This study showed that although the mean age of arrival to the U.S. was about 24 years, agricultural workers have been in the U.S. for about 19 years. This sample population is now about 19 years older since the time of arrival to the U.S. and while the sample endorsed familismo (Support from Family), this sample population did not endorse Family Referent and Family Obligation subscales as significant predictors for depression, which indicates that fulfilling goals with that of their family’s and family responsibilities and obligations are not significantly impacting symptoms of depression for agricultural workers. Instead, Support from Family is significantly impacting their symptoms of depression in a positive way, which shows that support from family is highly valued and practiced in this sample population. Not only is familism important for Latinx communities, but it is especially important for vulnerable communities such as agricultural workers, who are in need of resources, basic needs, and receive low wages (Dueweke et al., 2015). The lack of resources and poverty can lead to symptoms of depression (Grzywacz et al., 2011). However, despite the vulnerabilities that can lead to mental health concerns, agricultural workers are reporting low levels of depression. Overall, it is important to account for migration patterns, such as the “stepwise” pattern, which describes that one or two parents may migrate to the U.S., first, followed by their children or other family members when families are financially able to support the trip (Gonzalez et al., 2017). In this study, perhaps multiple family members of agricultural workers have been able to come to the U.S. over the past 19 years and there is more support within larger families in the U.S. and less Family Referent and Family Obligation to worry about. In the case that agricultural workers do not have family members in the U.S. in this study,
Family Referent and Family Obligations may not be a significant impact on depression due to agricultural workers possibly primarily focusing on their daily routine to be able to live in the U.S.

*Marianismo* was not a significant predictor of depression in this study and there are mixed findings (Cano et al., 2020; Nuñez et al., 2016). Nuñez et al. (2016) found *marianismo* to be associated with negative cognitive emotional factors such as depression in a sample of 4,426 Latinx participants. One explanation for the lack of association between *marianismo* and depression in this study could be explained by the protective factors of *marianismo* such as being family-centered (Nuñez et al., 2016; Bracero, 1998). It is possible that if most family members are contributing to support their families, then they are practicing a protective factor of their traditional gender roles, which can create *familismo* through family support instead of emphasizing on particular gender roles. Bracero (1998) states that *machismo* and *marianismo* operate to rationalize social inequalities between sexes. Just how each traditional gender role can operate to rationalize inequalities; it is possible that they can also rationalize equalities that the gender roles bring due to their protective factors as both roles can equally contribute to family support. It is possible that in this study the protective aspects of *machismo* and *marianismo* bring families together. In addition, protective aspects of *machismo* and *marianismo* also bring a sense of equality, showing that both gender roles are able to protect and care for their family, which in a sense helps break the societal gender norms. Therefore, it is likely that *familismo* (Support from Family) subscale is able to capture a collective response, belief, and attitude in this study, when looking at how it predicts depression.

Cano et al. (2020) examined depression and gender roles among Latinx immigrant women in a sample size of 231 participants. The authors also used the *Marianismo* Beliefs Scale
and did not find Silencing Self to Maintain Harmony to be a significant predictor of depression, which supports the results for depression in this study. Cano et al. (2020) emphasize that marianismo is perceived as a one-dimenstional “passive-subordinate construct and historically, many studies expect marianismo to be a risk factor for depression. However, very few studies focus on the protective factors of marianismo (Cano et al., 2020). The authors also found that other aspects of marianismo, such as spiritual pillar, to be a predictor of lower odds of depression, which this current study did not examine. Perhaps, if this study included the Spiritual Pillar subscale for marianismo, it is possible that marianismo would have an impact on depression. In the next discussion about anxiety, marianismo emerges as predictor, which continues to look at the impact of how marianismo predicts mental health outcomes.

Fear of deportation, acculturative stress, and machismo were also not significant predictors of depression, which will be discussed toward the end of the discussion section as these variables are not significant predictors across all mental health outcomes in this study.

Anxiety

It was hypothesized that higher levels of physical pain and chronic pain significantly predict anxiety among Latinx agricultural workers. This hypothesis was partially supported as higher levels of physical pain, but not chronic pain, statistically significantly predicted higher levels of anxiety. The literature supports that physical pain is associated with anxiety among agricultural workers (Shipp et al., 2009; Tribble et al., 2016; Villarejo et al., 2010). However, chronic pain was not a significant predictor of anxiety. In a more recent article, Garcini et al.’s (2021) sample of Latinx worked in jobs with high occupation injury rates and one of their findings included the association between anxiety symptoms and chronic pain. Garcini et al. (2021) looked at gender differences and confirmed that chronic pain is associated with older age
as found by other studies (Xiao et al., 2013). In this present study, the average age of agricultural workers was 43.13 years old and agriculture work is one of the most hazardous jobs in terms of occupational fatal and non-fatal injuries (Grzywacz et al., 2011). Although work position was not examined in this study, it is important to note that there are distinct body positions of work based on the crop in agriculture work (Garcini et al., 2021). Perhaps the population in the current study has not experienced physical pain persistently for 3 months due to a younger average age than 65 years and/or work in different positions that are not as impactful to the body. A question of interest is, based on the repetitive and constant motions that agricultural workers’ bodies endure, what does pain tolerance look like agricultural workers?

After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), it was hypothesized that higher levels of physical pain, fear of deportation, acculturative stress, machismo, marianismo, and familismo are predictors of higher levels of anxiety among Latinx agricultural workers. This hypothesis was not supported as higher levels of familismo (Support from Family) subscale and marianismo (Silencing Self to Maintain Harmony) subscale statistically significantly predicted anxiety, even after controlling for demographics. Fear of deportation, acculturative stress, and machismo were not predictors of anxiety, even when controlling for demographics.

In this study, familismo (Support from Family) was a significant predictor of lower levels anxiety, which is aligned with the literature (Diaz & Niño, 2019). Diaz and Niño (2019) looked at familismo in a sample of Latinx and also found that familismo (Support from Family) was linked to lower levels of anxiety in their study. They also found that those who reported higher levels of familismo (Family Referent) subscale, exhibited worse depression and anxiety (Diaz & Niño, 2019). This current study measured familismo (Family Referent) subscale and results
found no significance in predicting depression or anxiety. On the other hand, family support is already an important value for most Latinx cultures and to be in a situation where there are many potential risk factors of anxiety for agricultural workers, this study reveals that *familismo* (Support from Family) continues to impact, not only depression, but anxiety in a positive manner by predicting lower levels of anxiety. Similar to the results for depression in this sample, Family Referent and Family Obligations do not have a significant impact on anxiety as the Support from Family subscale. Perhaps this sample does not have to care much for other members of the family such as elders or work to fulfill their goals with that of their families. It is also possible that the families of agricultural workers are more independent and have less illnesses or health conditions compared to Latinx non-agricultural workers. Yet, family support is significant for lower levels of anxiety, which indicate that the value and care for family continues to be present within the culture of Latinx agricultural workers. It has been shown that *familismo* is negatively associated with acculturation and it is also possible that families in this study are acculturated to the U.S. (Campos et al., 2014). In this study acculturative stress is not a significant predictor of anxiety, which indicate that agricultural workers are not experiencing a heightened level of stress due to acculturation, which will be further discussed later in this discussion section. One question of interest is, what does family mean to agricultural workers? What does family look like for agricultural workers?

Another predictor of lower levels of anxiety in this study, was *marianismo* (Silencing Self to Maintain Harmony) subscale, which is contradicts the literature (Nuñez et al., 2016). Nuñez et al. (2016) found *marianismo* to be associated with negative cognitive emotional factors such as anxiety. In contrast, the current study shows that Silencing Self to Maintain Harmony is a significant predictor of less anxiety. Nuñez et al. (2016) argue that *marianismo* and *machismo*
relate to worse psychological health such as anxiety, because they are coexisting constructs that are socially accepted norms and beliefs that support men and women in traditional gender roles and promote a patriarchal power structure. In this current study, Silencing Self to Maintaining Harmony as a predictor of less anxiety aligns with society’s traditional gender roles as women are not expected to voice their opinion (Bracero, 1998; Nuñez et al., 2016). The traditional role of a woman almost works to accommodate the traditional role of a man and according to society’s view of gender roles, it may be better for a woman to silence herself to avoid making a big deal or speaking up rather being looked down upon for stepping outside of what is expected of her from society. Silencing of self may be a way of managing the anxiety of the restricting expectations of a woman’s traditional role, not just in society, but in the home as well. Results in this study also showed that marital status was a significant predictor of anxiety, which may be related to gender roles, where a woman might be able to also be the bread-winner, despite the continued view of inferiority toward women (Bracero, 1998; Dueweke et al., 2015; Nuñez et al., 2016; Salas et al., 2013).

In explaining Silencing Self to Maintain Harmony as a significant predictor of anxiety, it is key to consider the idea of controlarse or “controlling oneself” and the similarity of stoicism that it shares with marianismo. Bracero (1998) highlights that although the idea of controlarse has negative mental health outcomes, it also serves as a protective factor against male aggression, dominance, and sexism. Stoicism is a learned attitude of emotional distancing used as a coping strategy in the face of personal adversity and social injustice (Bracero, 1998). It is possible that the protective aspect of silencing self or controlarse intercepts a learned attitude from society, such as helplessness. Silencing oneself can be an act of resistance in the face of adversity and social injustice, such as gender and racial-based discrimination and maltreatment,
which can be associated with a lower level of anxiety. More research around the concept of marianismo and silencing oneself would be beneficial in understanding Latinx communities who work in agriculture.

Lastly, this study showed that being employed was a predictor of lower levels of anxiety. It is understandable if not being employed creates anxiety as agricultural workers would probably not be able to pay their necessities and bills. Most agricultural workers in this study made $25,000 or less for their yearly household income and being married to someone many times means contributing to taking care of the family’s needs. This also shows that perhaps agriculture workers want to provide financial support for their family or household, which aligns with this study results of familismo (Support from Family) as a predictor of lower levels of anxiety and depression. It would be important to continue examining the role of marital status and mental health experience in the context of agricultural workers and continue to explore gender differences.

**Nervios**

It was hypothesized that higher levels of physical pain and chronic pain significantly predict lower levels of nervios among Latinx agricultural workers. This hypothesis was not supported as higher levels of pain interference, but not physical pain or chronic pain, was a statistically significant predictor of lower levels of nervios. The concept of nervios and ataque de nervios has been understudied in the context of Mexican and agricultural worker populations. The hypotheses for nervios were based on its research with predominantly Puerto Rican communities and on its positive associations with anxiety and depression (Alcantara et al., 2012; England et al., 2007; Guarnaccia et al., 2010; Lewis-Fernandez et al., 2002; Moitra et al., 2018). There was one study with a sample population of Mexican agricultural workers, which attempted
to understand the affective negativity of nervios (England et al., 2007). They found that fear, feeling trapped, giving in, provocation, control salience, and cognitive sensory motor distress contribute to the affective negativity of nervios (England et al., 2007). However, much of the literature on nervios examines its relationship to anxiety, panic attacks, anxiety sensitivity, and depression as they all have overlapping symptoms (Alcantara et al., 2012; Guarnaccia et al., 2010; Lewis-Fernandez et al., 2002; Moitra et al., 2018). This study explored what nervios looked like for Mexican agricultural workers. Although this study showed that physical pain and chronic pain were not significant predictors of nervios, pain interference was a significant predictor of nervios before adding the controlled demographic variables, but not after adding them. This indicated that the demographic variables accounted for a percentage of the variance, however, none of the demographic variables were significant predictors of nervios, meaning that the demographic factors do not have a large impact on nervios in agricultural workers. This can also mean that there are too many variables being explored for the small sample size. Adding more variables to a regression model can improve variance, which can seem like the data

O’Connor et al. (2015) reported that nervios was associated with self-reported poor or fair physical health. In this study agricultural workers reported that their physical pain was mostly low with an average report of about 2.24 out of 10, which is between fair and poor. However, physical pain was still not significant. It should be noted that there are mixed findings in how Latinx perceive their physical pain compared to Whites (Aufiero et al. (2017). Aufiero et al. (2017) used a likert scale and a Visual Analogue Scale (VAS), which is similar to the Numerical Rating Scale used to measure physical pain in this study, to measure physical pain in Latinx and non-Latinx patients. The authors found that more Latinx patients reported less physical pain than non-Latinx whites using the VAS compared to using the likert scale (Aufiero
et al., 2017). However, more Latinx females reported physical pain compared to Latinx males when using both the VAS and the likert scale (Aufiero et al., 2017).

There is a possibility that the sample of agricultural workers in this study may be underreporting the self-rating of their physical pain due to the high value of work as Latinx are most likely to push through physical pain at work due to the high value of work within their culture (Hollingshead et al., 2016). Another reason to underreport their physical pain and even nervios is because agricultural workers don’t want to lose their job (England et al., 2007). In England et al. (2007), agricultural workers made sure that they worked to capacity and remained in control of their reactions to being provoked due to fear. Workers knew that their employers were allowed to send them back to Mexico immediately and permanently if nervios or any other health condition impacted their productivity (England et al., 2007). This piece of information that England et al. (2007) provided is extremely important to keep in mind as it can help contextualize self-reports of physical pain or even nervios to experiences of agricultural workers. While pain interference is a significant predictor of nervios, physical pain is not, which indicates that there is existing physical pain in order to interfere with a person’s daily life. Agricultural workers are already marginalized and disadvantaged due to their social status and perhaps agricultural workers don’t want to look bad or weak in front of their employer (Hovey & Magaña, 2015).

After controlling for demographics (marital status, employment status, age of entry to the U.S., length of stay in the U.S., country of origin), it was hypothesized that higher levels of physical pain significantly predict lower levels of nervios and that high levels of fear of deportation, machismo, marianismo, and familismo are predictors of nervios among Latinx agricultural workers.
Marianismo and familismo were not significant predictors of nervios. While there is limited research on marianismo and familismo in relation to nervios, both socio-cultural factors and nervios are more prevalent among women (Campos et al., 2014; Nunez et al, 2016; Moitra et al., 2018). Based on the prevalence data and the associations between depression, anxiety, and nervios, it was hypothesized that marianismo and familismo would predict nervios even after controlling for demographics. However, studies showed that symptoms of ataque de nervios are independent of symptoms of depression, anxiety, and even panic disorder (Alcantara et al., 2012; Lewis-Fernandez, 2002; Moitra et al., 2018). This study showed that the results from depression and anxiety models shared some similar predictors, however nervios did not, which indicates that this mental health outcome is different from depression and anxiety. Socio-cultural factors have less of an impact on nervios. Nervios and ataque de nervios are in the DSM V as an idiom of distress and, while the concept of nervios is being acknowledged, there is still more to learn about nervios. While it may seem that ataque de nervios has overlapping symptoms with depression and anxiety, it seems that ataque de nervios can happen once rather than the past two weeks like depression or anxiety, for example. The ataque de nervios measure used in this study asks if a person has ever felt out of control and this determines if a person has experienced an attack of nervios or not. The Cronbach’s alpha for ataque de nervios was acceptable, indicating that the items in the measure are actually measuring ataque de nervios were acceptable. However, there is much more to understand this complex concept. In this study, there were no significant differences in levels of depression, anxiety, and nervios based on gender. In this particular study with Mexican agricultural workers, there were no significant predictors of nervios after controlled demographic variables were added to the regression model. The overall results for nervios inform that more research is needed examining marianismo and familismo, in
relation to nervios. A question of interest from the results is, how well do we, as a field of clinical psychology, understand the construct of nervios? Is nervios being assessed appropriately?

**Pattern of Non-Significant Socio-Cultural Factors Across Mental Health Outcomes**

Fear of deportation, acculturative stress, and machismo were three socio-cultural factors that were not significant across mental health outcomes in this study. Fear of deportation was not a significant predictor for depression, anxiety, nor nervios, which is against what the literature reports (Castillo et al., 2021; Hiott et al., 2008; Medeiros and Guzman, 2020). Castillo et al. (2021) highlighted that there has been increasing anxiety among immigrant communities of agricultural workers and that fear of deportation has been correlated with anxiety and depression. Medeiros and Guzman (2020) emphasize that after the “Trump Era,” agricultural workers’ heightened fear of deportation and social isolation had a negative impact on emotional and mental health such as stress, anxiety, depression, and nervios. Measuring someone’s experience related to deportation can be difficult as it can be extremely vulnerable to do so, especially after the “Trump Era.” This study measured fear of deportation and while this study is anonymous, it can still be difficult to report one’s fear of deportation due to the lack of trust from Latinx communities of institutions and government organization for the same reason that their reporting can expose whether people are at risk of deportation or “undocumented.” There are many people in the U.S. who are not accounted for because of their immigration status (Grzywacz et al., 2011; Hernandez et al., 2016; U.S. Department of Homeland Security, 2018). There is a chance that the participants in this study are underreporting their experience of fear of deportation due to the lack of trust in privileged systems such as the university systems that attend communities with populations that are oppressed such as Latinx agricultural workers.
Another explanation for the lack of relationship between fear of deportation and depression, anxiety, and nervios could be because, now that the “Trump Era” has passed and people in this study have been in the U.S. for an average of about 19 years, the fear of deportation may not be so heightened. Agricultural workers have been in the U.S. for quite some time, which means that people who are undocumented or who have family members that are undocumented have had to learn how to survive and move forward. This is not to say that workers are not experiencing fear at all, but it may not be so intense over the years. Results in this study also show that support from family is related to lower levels of depression and anxiety, which contribute to their mental health outcomes. People may also feel supported and protected by their communities such as the two communities where this study completed participant recruitment. Both sites work on creating and building community and also stand for rights of the people related to immigration as well as celebrate Latinx traditions and gather for vigils, for example, to commemorate and be in community with others. Alegria et al. (2017) reports that Latinx adults may have better behavioral health when living in neighborhoods with a high density of members of the same group. In this study it is possible that a combination of community support and family support may aid these two specific communities of agricultural workers in feeling safe and accepted despite immigration/documentation status.

Acculturative stress was also found not to be a significant predictor of depression, anxiety, or nervios, which is against the literature findings (Blanco and Cortina, 2013; Finch et al., 2004; Hovey and Magaña, 2002). The literature suggests that acculturative stress is a risk factor for mental health outcomes (Blanco and Cortina, 2013; Finch et al., 2004; Hovey and Magaña, 2002). Although communities of immigrant Latinx agricultural workers may experience difficulty acclimating to the U.S. culture after arriving, it does not necessarily guarantee that they
will experience acculturative stress and/or that people will lose their heritage culture (Cory et al., 2017). Acculturative stress was not sufficient to significantly predict mental health outcomes in this study and it could also be possible that people have acculturated to the U.S. leading to less fear of deportation given the amount of time that the sample population has been in the U.S. (Valentín-Cortés et al., 2020).

*Machismo* was not a significant predictor of depression, anxiety, and *nervios*. There are two possible reasons why *machismo* might not have been a significant predictor of depression, anxiety and *nervios*. In numerous studies about *machismo*, evidence suggests that *machismo* does not solely have a negative view built by societal norms. Arciniega et al. (2008), Nunez et al. (2016), and Bracero (1998) highlight the positive aspects of *machismo* and Arciniega et al. (2008) calls these positive aspects, *caballerismo*. It is helpful to think about the positive aspects of *machismo* as the *caballerismo* may be able to help as a protective factor. For example, protecting, supporting one’s family, and bravery can have an effect in the anti-social behavior and aggression that is associated with traditional *machismo*. This is not to say that the aspects of traditional *machismo* don’t exist, but there is more to understand about the role and experience of self-identified Latinos and how much *caballerismo* influences traditional *machismo* in relation to anxiety, depression, and *nervios*. A second reason to think about why *machismo* was not a significant predictor of depression, anxiety, and *nervios* could have been because the identity or gender role of a man can be expressed by traditional *machismo*, which is an identity that is expected by society, and may not be as impactful to depression, anxiety or *nervios*.

**Demographics: Age of Entry to U.S., Length of Stay in U.S., and Country of Origin**

In this study, demographic variables such as age of entry to U.S., length of stay in U.S., and country of origin were not significant predictors across mental health outcomes, which is
inconsistent with the literature. Vega et al. (2004), Castañeda et al. (2015) and Alegria et al. (2017) reported that based on age of entry to the U.S., length of stay in the U.S. and country of origin, immigrants were more or less at risk of developing a mental health disorder. Specifically, if one arrived to the U.S. age 7 or younger, that one was more at risk of developing a mental health disorder and if one arrived to the U.S. after the age of 7 years, they were less at risk of developing a mental health disorder (Castañeda et al., 2015; Miles et al., 2010). If a person stayed in the U.S. for 10 or more years, they were at risk of developing a mental health disorder and if a person stayed in the U.S. less than 10 years, they were less at risk for developing a mental health disorder (Alegria et al., 2017). A person who is Latinx or immigrant Latinx is at lower risk of mental health disorders than a U.S.-born Latinx and this is only true for those who identify as Mexican (Alegria et al., 2017; Vega et al., 2004). However, in this study it is evident that age of entry to U.S., length of stay in U.S. and country of origin are not significant for mental health outcomes and that some socio-cultural factors are significant predictors, even when adding these controlled demographic variables, which indicate that there may be other variables or factors that can predict or provide more information about a person’s mental health. The average age of entry to the U.S. was 24 years old and the average length of stay in the U.S. was about 19 years. If the Latinx health paradox applied to this study’s population, it would be expected for the sample to exhibit moderate to severe symptoms of depression, anxiety, and nervios because most participants have been in the U.S. for more than 10 years, even though most participants arrived to the U.S. after the age of 7 years and are originally from Mexico. However, this is not the case. Perhaps some of these demographic variables no longer apply to Mexican immigrants or U.S.-born Mexicans and requires more research in the Latinx Health Paradox. Perhaps there is a difference between Latinx agricultural workers and non-agricultural
workers. The Latinx health paradox states that Latinx immigrants arrive with better health and mental health (Alegria et al., 2017; Vega et al., 2004). A question of interest is, what does the mental health and physical health of Latinx immigrants look like currently?

**Implications**

**Clinical Implications**

This study implied that there is a need for more building of community agencies that are protective and stand with agricultural workers. It is important to take into consideration social determinants of health such as employment, social support and social context. When thinking about clinical implications for agricultural workers, this sample was not clinically significant and this implies that this study cannot be used for clinical purposes such as interventions and practice, but instead can be used to continue exploring mental health outcomes and symptoms, while taking a wholistic approach to working with agricultural workers to learn more about their experience. This is a call for more clinicians to provide mental health services to agricultural worker communities. There are very few studies on nervios among Latinx communities and much fewer studies on nervios among agricultural workers that this study could reference. Clinically, there needs to be a clear understanding of nervios from clinicians in order to be able to assess for it and have the tools to intervene for it. Although this study is not a clinical sample, data is still needed on how agricultural workers are experiencing nervios in order to inform clinical practice. Are clinicians assessing for ataque de nervios adequately?

**Research Implications**

This study implied that it is important to have a bilingual and bicultural researcher in the field. Representation of a Spanish-speaking and Latinx researcher in this study had such a large impact in connecting with the community of agricultural workers. Having the researcher speak to
the community in Spanish and realizing that the researcher was interested in learning more for the community as a psychologist in training meant a lot to the community. This study also implied that there is a large essence of comunidad and cultura, community and culture among the agencies and members of the community. The measures and instruments used in this study are not capturing comunidad and cultura. There is something about being in community and celebrating Latinx cultures that uplifts the community in such a positive way despite what challenges workers are experiencing. For the field of Latinx psychology, how can comunidad and cultura be captured? This is a population that is hard to reach and the process to recruit and build a relationship with agricultural workers can take time due to a number of factors and experiences that make the community extremely vulnerable. Researchers should be understanding of this. Lastly, there are research implications as this study is not clinically significant. This study is statistically significant only, meaning that its mathematically significant, however, these results can be used to build on this research study in order to clarify whether the variables being measured are also clinically significant as well. Overall, there is a need for more Latinx and those with a background in agriculture work, personal and/or research, who can go to the field and work with agricultural workers to learn more about their experience with their skills and expertise.

**Strengths, Limitations, and Future Considerations**

The strengths of this study include its focus on the agricultural worker population to add to the gap in the literature about this highly invisible community. This research examined different variables such as socio-cultural factors in agricultural workers to learn more about the community. Another strength was conducting this study during the COVID-19 pandemic and that participants were from two different agencies that intended for their services to fit needs of
agricultural workers. An advantage of using the method of a convenient and targeted sample include the likelihood of making the process of data collection easier and less costly (Passer, 2014). Lastly, using the community engagement framework was another strength as it held the researcher accountable in working with vulnerable communities such as agricultural workers and understanding the role of being an ethical researcher throughout the research process (Adhikari et al., 2020).

Having a small sample size was the largest limitation of this study. Due to COVID-19 safety practices this study used a small sample size of 104 as opposed to the 200 participants that the power analysis projected, which can affect variability and generalizability of the results and findings. It was difficult to get a sample size of 104 during this time as the surge of COVID-19 cases were increasing during the data collection process and the agencies were decreasing the food pantry events, where participants were being recruited. The small sample size limited the variability of responses to the measures of depression, anxiety, and nervios to predominantly mild symptoms to each outcome. Therefore, this study is not a clinically significant study. More participants should be recruited to have the variability in responses and to be able to answer all research questions adequately. This study did not compare subpopulations of agricultural workers (e.g., migrant and seasonal agricultural workers). Another limitation is that participants were not able to elaborate on their experiences and instead were limited to closed-ended responses on the survey. Adding in some qualitative questions and considering mixed methods would help gain a better understanding of experiences. This study only captured agricultural workers who were comfortable reading and writing in Spanish and/or who had someone who was able to help them with completing the survey whether it was reading and writing using paper and pencil or completing the survey on-line. As a result, this study did not capture information
from agricultural workers who may have not known how to read or write in Spanish and/or didn’t have someone to help them and therefore, missing part of the community of agricultural workers. In order to capture agricultural workers who are not comfortable reading, having a bigger research team to use this survey as a standard structured interview would be helpful.

Measuring community support came up a lot in conversations with agricultural workers and it was observed that community support played a large role in the lives of workers. Capturing data with a qualitative question would be helpful in learning more about how community support impact mental health outcomes. This way the researchers are completing the survey instead of the participants. This study used one item to measure physical pain. In the context of agricultural workers, their physical bodies are in constant motion and operate in different ways compared to the general population. It’s important to learn about the experience of pain tolerance in agricultural workers in order to measure it appropriately. Using a valid and reliable measure for physical pain in agricultural workers with multiple questions can address this limitation. Lastly, there was a limitation in considering muscle pain and headaches as these overlap with symptoms of COVID-19, which included muscle pain and headaches. Measuring COIVD-19 would help distinguish pain experiences.

For future considerations and in addition to what has been suggested for the limitations, it will be important to gain more understating of the concept of nervios. Nervios is a term used by communities and its key for the field of psychology to continue learning more about the idiom of distress from the community. Conducting a qualitative study on the experiences of physical pain and mental health outcomes, such as depression, anxiety, and nervios, would be complementary of this study to learn in more depth about the experiences of agricultural workers from their narrative versus choosing a best response that fits to their actual response from likert scale.
Conclusion

The findings for this study showed that high levels of physical pain significantly predicted high levels of depression and anxiety among agricultural workers, but not chronic pain. High levels of familismo (Support from Family) subscale significantly predicted lower levels of depression and anxiety and high levels of marianismo (Silencing Self to Maintain Harmony) subscale significantly predicted lower levels of anxiety, even when controlling for demographics. Being married predicted high levels of anxiety and being employed predicted lower levels of anxiety. Physical pain, chronic pain socio-cultural factors were not significant predictors of nervios.

This study will aid in contributing to the limited research in the area of physical pain and mental health in Latinx agricultural workers. The examination of socio-cultural factors within the population informs how they can impact mental health outcomes what can be used to continue researching and inform practice in community-based clinics serving agricultural workers. Agricultural workers are a vulnerable community who also hold protective factor and the continued focus on examining mental health among the population will call attention to the community’s needs. Results indicate that future research should continue to examine the implications of the association between physical pain and mental health outcomes such as depression, anxiety, and nervios, and to continue examining how socio-cultural factors are impacting their mental health.
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in relation to anxiety symptoms and disorders among economically disadvantaged


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Appendix A

Figure 1

Hypothesis Model

Note: In this study, it is hypothesized that there will be positive and negative associations between physical pain and socio-cultural factors (IV/Predictor) such as familismo, fear of deportation, acculturative stress, marianismo, and machismo, to mental health outcomes such as depression, anxiety, and nervios.
# Appendix B

## Table 1

Demographics Characteristics of Sample (n = 104)

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Percent</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>104</td>
<td>43.13</td>
<td>14.37</td>
<td>18-75</td>
<td>0-1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>45.2</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54.8</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>21.2</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>60.6</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serious Relationship; not married</td>
<td>13.5</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>2.9</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>1.9</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country of Origin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>95.2</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>2.9</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guatemala</td>
<td>1.9</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Entry to U.S. (years)</td>
<td>104</td>
<td>24.05</td>
<td>11.17</td>
<td>0-74</td>
<td></td>
</tr>
<tr>
<td>Length in the U.S. (years)</td>
<td>102</td>
<td>18.95</td>
<td>11.18</td>
<td>.42 - 49</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1.9</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never went to school</td>
<td>22.1</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th grade or less</td>
<td>60.6</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>15.4</td>
<td>16</td>
<td></td>
<td></td>
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<tr>
<td>High school diploma/GED</td>
<td>1.9</td>
<td>2</td>
<td></td>
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<tr>
<td>Years Working in Agriculture</td>
<td>102</td>
<td>14.09</td>
<td>11.24</td>
<td>.17 - 46</td>
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</tr>
<tr>
<td>Missing</td>
<td>1.9</td>
<td>2</td>
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<td></td>
<td></td>
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<tr>
<td>Currently Employed in Agriculture</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>85.6</td>
<td>89</td>
<td></td>
<td></td>
<td>0-1</td>
</tr>
<tr>
<td>No</td>
<td>14.4</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Medical Insurance</td>
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<td></td>
</tr>
<tr>
<td>Medi-Cal, Medicaid, or Medicare</td>
<td>57.7</td>
<td>60</td>
<td></td>
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<tr>
<td>Covered California</td>
<td>6.7</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Insurance</td>
<td>3.8</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Don’t have insurance</td>
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<td>23</td>
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<td></td>
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<tr>
<td>Other</td>
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<tr>
<td>Yearly Household Income</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$0 - $5,000 per year</td>
<td>17.3</td>
<td>18</td>
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<td>9</td>
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<td>$35,001 or more per year</td>
<td>8.7</td>
<td>9</td>
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Note. Missing = No response.
Appendix C

Table 2

Depression, Anxiety, **Nervios**, Physical Pain, Pain Interference and Chronic Pain Characteristics of Sample (\(n = 104\))

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Percent</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
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<td>2.49</td>
<td>3.42</td>
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<td>2.30</td>
<td>3.79</td>
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<td>Average (t-score = 50)</td>
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Note. The greater score indicates greater level of the variable.
## Appendix D

**Table 3**

Model 1: Hierarchical multiple linear regression predicting depression outcome ($n = 104$)

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<th>$R^2$ Change</th>
<th>F</th>
<th>p</th>
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Note.
* Significant p values
β = Standardized beta, which compares the strength of the effect of each individual independent variable to the dependent variable.
$R^2$ = Variance in dependent variable that is explained by the independent variables in the regression models.
$R^2$ Change = Improvement of $R^2$ when other predictors are added.
$F$ = Ratio of the average variability used to test overall fit of the model
Model based on 95% confidence interval.
## Appendix E

### Table 4

Model 2: Hierarchical multiple linear regression predicting anxiety outcome \( (n = 104) \)

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<th>Predictors</th>
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<th>( p )</th>
<th>( R^2 )</th>
<th>( R^2 ) Change</th>
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Note.

*Significant \( p \) values

\( \beta \) = Standardized beta, which compares the strength of the effect of each individual independent variable to the dependent variable.

\( R^2 \) = Variance in dependent variable that is explained by the independent variables in the regression models.

\( R^2 \) Change = Improvement of \( R^2 \) when other predictors are added.

\( F \) = Ratio of the average variability used to test overall fit of the model

Model based on 95% confidence interval.
## Table 5

Model 3: Hierarchical binary logistic regression predicting *nervios* outcome (*n* = 104)

<table>
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<th>Predictors</th>
<th>Model 3 Nervios – Ataque de Nervios+ (Logistic Regression)</th>
<th>Nagelkerke $R^2$</th>
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<td>Wald</td>
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Note.

*Significant p values

+Nervios indicator (1) indicates meeting criteria for nervios

β = Beta compares the strength of the effect of each individual independent variable to the dependent variable.

Wald = Test statistic used to test whether the coefficient for a predictor in a logistic regression model is significantly different from zero.

Exp(β) = Odds ratio, predicted change in odds for a unit increase in the predictor.

Nagelkerke R² = Variance in the dependent variable explained by the independent variables in the model.

CI = Confidence interval is a range of values around the statistic that are believed to contain a certain probability, the true value of that statistic.

Model based on 95% confidence interval.