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Review

Caring for Individuals with Alzheimer's Disease: A Spotlight on Hispanic Caregivers

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Abstract. A caregiver is a constantly evolving role that an individual most likely undertakes at some point in their lifetime. With discoveries and research in increasing life expectancy, the prevalence of neurological-related diseases, such as Alzheimer's disease (AD) and dementia, is certainly likely to require more caregivers. The demand for AD caregivers is escalating as the prevalence of the disease continues to rise. The projected rise in AD within the Hispanic population in the United States over the next few decades is expected to be the most significant among all ethnic groups. The Hispanic population faces unique dementia risks due to cultural factors like language barriers, lower education, and limited healthcare access. Higher rates of conditions such as diabetes and cardiovascular disease further elevate dementia risk. Family dynamics and caregiving responsibilities also differ, affecting dementia management within Hispanic households. Addressing these distinct challenges requires culturally sensitive approaches to diagnosis, treatment, and support for Hispanic individuals and their family's facing dementia. With AD and other dementia becoming more prevalent, this article will attempt to expand upon the status of caregivers concerning their economic, health, and cultural statuses. We will attempt to focus on the Hispanic caregivers that live in Texas and more specifically, West Texas due to the lack of current literature that applies to this area of Texas. Lastly, we discuss the ramifications of a multitude of factors that affect caregivers in Texas and attempt to provide tools that can be readily available for Hispanics and others alike.

Keywords: Alzheimer's Association, Alzheimer's disease, caregivers, culture, dementia, disparities, Hispanics, non-Hispanic whites, West Texas

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INTRODUCTION

Alzheimer's disease (AD) is one of the most heavily researched neurological disorders on the planet. However, progress regarding its cure is still one of the many problems that we face today. AD can be defined very broadly as significant damage to a person's memory and cognition that also affects one's communication and reasoning [1]. The average post-diagnosis survival rate for AD typically ranges from 5 to 8 years [2]. However, this duration varies among patients due to factors such as age, gender, ethnicity, socioeconomic status, and additional health complications, including more recently, COVID-19 [3]. According to the Alzheimer's Association, Hispanics are nearly twice as likely as white Americans to receive a diagnosis of AD. However, experts suggest that cultural factors likely contribute to an even higher prevalence of the disease among Hispanics than indicated by these statistics. Around 65% of Hispanics residing in the United States (US) trace their origins back to Mexico. Despite this sizable demographic, there has been limited research specifically focusing on mild cognitive impairment (MCI) and AD within the Mexican American population [4]. With the recent growth of people being diagnosed with AD and other dementias, it is fair to state that caregivers for this population are needed, especially in the Hispanic population. We thus intend for this article to delve deeper into the current state of caregivers in the Hispanic community. We wish to understand the current economic, mental, and cultural contributions to their caregiving ability and how it relates to those they treat.

Caregiving can be defined as anyone who meets the needs of an individual [5]. This can be in the form of someone who has training and gets paid (formal caregiving) or in the form of a close family friend or family member who does not receive pay, but still fulfills the obligation of caregiving (informal caregiving) [5]. Everyone likely has, at one time or another, been a caregiver to someone in their life. However, being a caregiver has the potential to bring mental and physical risk. Many caregivers struggle with burnout and mental exhaustion [6, 7]. They can have risks of developing physical health problems as well [8, 9]. Therefore, given these risk factors and apparent mental and physical strains, it is necessary to provide tools to ensure caregiver safety as well as the safety of individuals living with dementia. The frequency of unpaid or informal elder care is notably elevated within racial/ethnic minority households. Consequently, minority caregivers often find themselves in more demanding caregiving roles that require a greater investment of time [10]. Therefore, the ethnic minority populations are likely to be at high risk for mental and physical strain in the roles they perform for their loved ones.

The Hispanic population is unique and has a rich cultural history. If we are attempting to care for this community, it is important to understand their current struggles, disparities, and culture. Therefore, we have undertaken the task of learning about the disparities seen in the economy, health, and culture of the Hispanic population in this article. We believe this allows us to gain insight into why this population is more likely to be affected by AD and potentially opt for informal caregiving. Factors like a difficult labor market and lack of access to more formal schooling and quality education can contribute to Hispanics being in a lower socioeconomic status and could prohibit them from attaining formal care [11, 12]. Factors like immigration, lack of reliable insurance, and transportation issues all can contribute to individuals living with dementia opting for informal care [13–15]. Also, family values like *Familismo* (which means commitment, dedication, and loyalty to family), machismo (which means a strong sense of masculine pride), and fatalism (an attitude of acceptance in anticipation of forthcoming events considered unavoidable) can be attributed to Hispanics receiving less formal care and depending more on their family members, may be due to the reason that some families lack awareness of the services available to them and the benefits they offer. *Marianismo* is also crucial when conducting research or providing mental health services to Latinas and their families [16]. The portrayal of "marianismo" in the writing of Latinas in the US depicts female characters, particularly among Mexican-American and Puerto Rican-American authors, as docile, self-effacing caregivers who prioritize the needs of others over their own desires. These women exemplify a willingness to sacrifice for their families, often at the expense of their own health and well-being.

These societal pressures may result in Latinas experiencing untreated mental and physical health issues, presenting significant risks to their own well-being and that of their families. Because of this type of care, Hispanics have been noted to give a disproportionate amount of time to their loved ones living with dementia compared to other ethnic groups [17, 18]. On the other hand, contrary to the traditional belief that Latinos' strong family values result in increased involvement of extended family members in caring for the sick and reduced feelings of burden, certain studies indicate low levels of social support and elevated distress among Latino caregivers [19]. Even within the framework of extensive families, the responsibility of care frequently falls on a single individual, leading to heightened rates of isolation and encountering challenging family dynamics for the primary caregiver. This reality has the potential of augmenting the risk of mental and physical burden in the Hispanic population of caregivers. The examples given here are only a few of the disparities seen in the Hispanic population.

This article explores the role of Hispanic caregivers in addressing AD and other dementias, starting with an overview of AD and its diagnostic aspects. It delves into the impact of economic and health disparities within the Hispanic community, highlighting contributing factors. Additionally, the article contributes to the limited research on West Texas, examining demographics and disparities in the region. Finally, it discusses the implications of these factors on caregivers, especially Hispanics, and highlights available resources for them and the community.

ALZHEIMER'S DISEASE OVERVIEW

According to the Alzheimer's Association, dementia refers to a loss of memory, language, problem-solving, and other thinking abilities that are severe enough to interfere with daily life [20]. Given that AD is a type of dementia, it is fitting to give it a similar definition. The term AD could therefore be defined as a type of dementia that affects memory, thinking, and behavior which can eventually lead to one's daily tasks being affected [21]. AD is the most common form of dementia accounting for 60–80% of all dementia cases, a study by Fitten and colleagues showed that Hispanic individuals living in the southwestern US typically receive a diagnosis of dementia at a younger age compared to their white non-Hispanic (NH) counterparts [21, 22]. Typical problems seen by individuals living with dementia include short-term memory loss, forgetting to pay bills, and remembering appointments to name a few. As for the typical symptoms of AD, it has been observed that memory loss, confusion, mood and behavior changes, and unaroused suspicions of friends and family are among the most common [21, 23]. In this section, we will discuss the potential origination of AD and our current understanding of its pathogenesis. Moreover, we will discuss AD from a clinical perspective as well as expand upon the effects on the family members of those who are caregiving for individuals living with dementia. Lastly, we will address the current prevalence of AD and other related dementia in the US and Texas.

Basic pathology of AD

Current research dictates that amyloid-β (Aβ) plaques (congregations of proteins) and tangles of a protein called tau appear to build up inside cells between nerve cells in our nervous system and cells, respectively [24]. The presence of these two protein indicators makes diagnosing and making predictions about the onset of AD easier, but we still are unsure as to what exact role they play in the disease [21]. No straightforward and dependable test exists for precisely diagnosing AD or related dementias. A study by Reddy and Oliver found that early signs of AD were related to mitochondrial dysfunction and synaptic damage [25]. They also found that mitophagy, which is a process of selective autophagy, plays a major role in the onset of AD as mitophagy fights against mitochondrial dysfunction. They found that, in cases of AD, the role of mitophagy may be hindered due to changes in Aβ and tau protein damage [25]. Later, Reddy and Oliver studied the concentration of amyloid-β protein precursor (AβPP) and Aβ in mitochondria and attempted to learn about their role in mitochondrial dysfunction and oxidative damage. They found that transgenic mice with AβPP and concentrations of Aβ were correlated to increased levels of free radicals in individuals living with AD [25]. Numerous theories have been proposed to elucidate the development of AD, encompassing concepts such as the amyloid cascade, tau hyperphosphorylation, neurotransmitter imbalances, and oxidative stress. Nevertheless, the root causes and most effective therapeutic strategies remain elusive. Currently, there exist only a handful of medications designed to alleviate symptoms, primarily focused on addressing Aβ and tau, yet these are unable to impede the disease's advancement [26].

Prevalence of AD and other related dementias

In 2024, approximately 6.9 million Americans aged 65 and above are estimated to be living with AD. Dementia is frequently overlooked in diagnosis, and even if diagnosed by a clinician, many individuals may not be aware of their condition. As a result, a significant portion of Americans with dementia may remain unaware of their condition. Studies suggest that underdiagnosis is more prevalent among older adults from Black and Hispanic backgrounds [27]. Moreover, the confusion between MCI and AD leads to the underdiagnosis of MCI. MCI is characterized by mild impairments in cognitive function and memory, while AD is a separate disease marked by continuous and significant declines in memory and overall functioning. While extensive literature has addressed risk factors for MCI, there is limited published research on the risk of MCI among Mexican Americans. Bryant and colleagues' study suggests that many previously identified risk factors for MCI in NH cohorts may not be applicable to Mexican Americans. This highlights the necessity for further research aimed at comprehending factors associated with cognitive aging in this underserved population [28]. Similarly, it can be assumed that established risk factors for AD among NH whites may not apply universally across all ethnic groups, including Hispanics.

According to recent studies, Texas is currently fourth in the US, in the total number of patients diagnosed with AD and second in total deaths [1]. In Texas alone, there were 10,101 deaths of patients with AD in 2019 [18]. Interestingly, the Alzheimer's Association found that approximately 7.5% of the Hispanic population in the US will be diagnosed with AD and other dementias between the ages of 65–74 [18]. This is significantly more than their NH white counterparts being diagnosed at a rate of 2.9% [18]. These numbers begin to separate substantially with age. Between the ages of 75–84, 27.9% of all Hispanics will be diagnosed with AD and other dementias compared to 10.9% of NH whites [18]. For elder adults above the age of 85, 62.9% of Hispanics and 30.2% of NH whites will be diagnosed with AD and other dementias [18]. Therefore, given the rising number of individuals with AD, we see that there is a substantial increase in the number of workers needed to take care of these individuals living with dementia. Currently, 333 geriatricians work in Texas, but there will need to be an estimated 276.9% increase in these numbers for the demand to be met in the year 2050 [29]. Overall, we see that the prevalence of AD is rising in all communities, especially the Hispanic community. We also see that there is a growing need for more healthcare professionals to take care of this population.

Clinical signs and symptoms

The current clinical signs and symptoms of individuals with AD vary from person to person and can vary from severe to manageable [30]. Since most individuals living with dementia are diagnosed with AD when they pass the age of 65, it is important to distinguish the symptoms of AD individuals from normal healthy aging. Cognitive abilities are vital for the everyday functioning of elderly individuals. Unfortunately, certain aspects of these cognitive skills, such as memory, problem-solving, and processing speed, tend to diminish with the aging process [31]. The alterations in cognition, grey and white matter volume, white matter integrity, neural activation, functional connectivity, and neurotransmission are linked to both normal aging and AD. It is evident that these changes are more obvious in AD, advancing at a quicker pace and forming the foundation for an AD diagnosis [32]. There is evidence that aging is associated with a chronic inflammatory state in the peripheral and central nervous systems, and the mechanisms behind this chronic neuroinflammation are being addressed. Nevertheless, the buildup of Aβ greatly increases neuroinflammation and hastens the development of AD via several mechanisms [33].

Aging-related decline in cognitive abilities is a common occurrence. However, some individuals may experience more severe memory and cognitive problems as they age. Knowing the distinctions between common age-related memory problems and diseases like dementia and MCI becomes more crucial as you age. MCI, which is characterized as a stage in between normal cognitive function and dementia, is more common as people age and is common in the older population [34]. Nevertheless, despite MCI's widespread prevalence, little is known about it, and many individuals living with dementia put off seeing a doctor. AD is therefore more likely to strike MCI sufferers [35]. As of 2021, the World Health Organization disclosed that more than 55 million individuals worldwide are affected by dementia. Projections indicate that this number is expected to rise to 78 million by 2030 and further escalate to 139 million by 2050. A recent study compared the documented diagnostic rates of dementia and MCI throughout the Medicare population [36], researchers discovered that while MCI case detection rates increased between 2015 and 2019, 7.4 of 8 million (92%) predicted cases of MCI went undiagnosed. In contrast to NH white beneficiaries, who had a detection rate of 0.098 for MCI, Black and Hispanic beneficiaries had rates of

0.039 and 0.048, respectively. For MCI, those who were simultaneously eligible for Medicare and Medicaid had estimated detection rates that were lower (0.056 versus 0.085) than those who were just eligible for Medicare. From 2015 to 2019, the diagnosis of dementia was more common than anticipated (1.086 to 1.104), with NH white beneficiaries accounting for most cases (1.367), compared to 0.696 for Black beneficiaries and 0.758 for Hispanic beneficiaries. These findings emphasize the necessity of raising the general rates of dementia and MCI identification, especially in socioeconomically disadvantaged populations [36].

The symptoms of dementia and AD can arise years before any diagnosis is made [30]. Some of the major symptoms include changes in mood, elevated anxiety, and sleep disturbances [30]. Even more, elevated anxiety, depressive symptoms, and withdrawal are closely related to the onset and early stages of AD [30, 37]. A study by Atri compared the typical behaviors seen in memory for the elders with normal aging and the elders with signs and symptoms of AD. Atri describes those with normal aging to have occasional loss in memory like forgetting to go to an appointment or remembering a name, but ultimately remembering again at some point [30]. This finding agrees with previously discussed experiments. Atri later describes individuals living with AD symptoms as having severe memory loss, especially with recently learned material. For example, Atri states that individuals living with AD symptoms will forget important dates and appointments, typically ask very repetitive questions, and increasingly rely on memory aids for basic concepts [30, 38]. Atri goes on to say that normal aging elders will occasionally have trouble joining in on conversations or remembering a word or phrase while individuals with AD symptoms will have consistent trouble finding their way in a conversation and extreme difficulty and fixation on finding words or phrases [30]. Later in the progression of AD, one could see major impaired judgment, disorientation, and confusion [30]. Additionally, one could see behavioral changes, such as aggression, agitation, delusions, and hallucinations toward friends and family [30]. It can be seen here that there are several small and large differences between healthy aging and the signs and symptoms of AD. While these changes are large in hindsight, it is important to remember that these symptoms occur over several years, and diagnosing what is normal aging versus AD is an incredibly challenging task.

The effect on the family

While it is important to focus on individuals with AD and other related dementias to find better diagnostic efforts and an eventual cure, we believe it is also important to understand the impact on those who are watching their loved ones experience the disease. In this way, we can expand on the larger picture of what AD is for all and how they affect the people around them. A study conducted on participants from Maryland who self-identified as Black/African/African American, Asian, or Hispanic/Latino and who spoke English were responsible for taking care of people living with dementia revealed that Dementia diagnosis was delayed by environmental, social, and biological variables. The most prevalent early sign was memory loss, but it frequently started slowly or was thought to be a natural part of aging. The stigma and secrecy around dementia impacted families' and communities' understanding of and conversations about dementia. Family members made the initial diagnosis in primary care. The timeliness of diagnoses and whether an earlier diagnosis would have altered outcomes were perceived differently by care partners. Families' responses to dementia diagnoses varied, but most participants felt strongly that they had an obligation to care for their elder family members. Most participants said there were more advantages than disadvantages to receiving a dementia diagnosis [39]. AD diagnosis has an impact on the individuals as well as the whole family and caregivers who support them. Knowing the pressures that these people experience helps us to give them the care and support they require to live happy, healthy lives even after receiving an AD diagnosis [40].

Receiving a dementia or AD diagnosis can be quite upsetting not only for the individual suffering from it but for the entire family. Furthermore, a lot of family caregivers may feel alone in their battle to balance their obligations to their families with the need to provide critical care, particularly if they lack access to resources or support networks. In such circumstances, the knowledge of a dementia diagnosis holds significant value for both the individuals living with dementia and their family. According to a 2011 survey, 84% of respondents expressed a desire to be informed if their loved one had AD [41]. Additionally, 98% indicated that they would want a family member showing signs of confusion and memory loss to consult a doctor, and 89% would personally prefer to know if they had AD. The first step in creating community and health care systems that can support individuals with AD or other related dementias, as well as their caregivers, is early identification of dementia [42]. The benefits of early awareness, especially in the initial stages, include the ability for the individuals living with dementia and their family to plan. This involves making informed decisions about living arrangements, personal care, and addressing financial and legal matters while the individual still possesses the cognitive capacity to contribute to such decisions [43]. Early diagnosis also ensures that individuals living with dementia can derive maximum benefits from available treatments, maintain independence for a longer duration, and increase the likelihood of participating in clinical trials aimed at stabilizing, slowing, or even reversing amyloid plaque buildup in the brain's cortical gray matter. Ultimately, an early and well-documented diagnosis leads to better outcomes for individuals with AD and their caregivers [40, 44].

Current treatment

The current treatment for individuals with AD and other dementia is of importance given the predicted rise in AD prevalence in the future. The primary category of medications presently employed in the treatment of AD comprises acetylcholinesterase/cholinesterase inhibitors (ChE-Is). The early ChE-I authorized for addressing AD symptoms was tacrine. However, tacrine is no longer in use due to its adverse effects on the liver. The ChE-Is that are currently accessible in the market include donepezil, rivastigmine, and galantamine. These ChE-Is can be classified based on their mechanism of action into two groups: short-acting or reversible agents like tacrine, donepezil, and galantamine, and intermediate-acting or pseudo-irreversible agents like rivastigmine. In general, the efficacy of the three ChE-Is available in the market is comparable, and the therapeutic benefit derived from these compounds is modest, potentially lacking significant clinical significance [45]. Moreover, currently, the vast majority of therapeutics is focused on gene therapy and medications that can target Aβ plaque production [46]. However, it was also noted that many of the Aβ targeting drugs are currently unsafe for humans, and the best course of action is to blunt the cognitive deterioration of individuals with AD [46]. Many recent Food and Drug Administration (FDA) approved drugs are safe for humans, fortunately. These include donepezil, galantamine, rivastigmine, and an N-methyl-D-aspartate (NDMA) antagonist memantine [47, 48]. These drugs are ChE-Is, which inhibit the protein acetylcholinesterase. They were shown to blunt cognitive impairment in individuals with AD and are currently the mainstay in the treatment of AD [49]. However, many other treatment plans for patients with AD are instead designed to manage the symptoms that are seen in individuals with AD. Yiannopoulou and Papageorgiou found that there is a more tailored approach to treating individuals with AD. For example, they noted that simplifying the individuals with AD's current environment, establishing routines, utilizing exercise and music therapy, and using simple language were some of the most useful and common treatments for individuals with AD [47, 48]. Interestingly, another study found that natural products like flavonoids, gingerols, tannins, anthocyanins, triterpenes, and alkaloids are all potential treatment options for individuals with AD [50]. They were able to conclude that these natural remedies can inhibit and destroy Aβ production, reduce oxidative stress, and inhibit acetylcholinesterase [50]. Therefore, the future of treatment for individuals with AD is likely to include or continue upon one of these paths.

The focal point of FDA-approved medication, aducanumab, for AD lies in addressing Aβ plaques [51]. Demonstrating its efficacy, clinical trials have shown its potential in reducing Aβ plaques in individuals with early-stage AD [52], MCI due to AD, and mild AD [53, 54]. The evaluations of its safety and effectiveness were conducted through extensive long-term extension trials [55]. Memantine, another FDA-approved medication for AD, is an NMDA receptor antagonist that, according to animal research, is expected to lessen the overstimulation of the NMDA receptor in its resting state (induced by unusually high glutamate concentrations) and to restore normal receptor signaling function. Because neuronal calcium overload has been linked to the etiology of neurodegenerative disorders, reducing excitotoxicity may also have neuroprotective effects [56]. Memantine has demonstrated significant improvements in everyday life and cognitive function and is especially advised for people with mild to moderately severe AD [57]. Memantine can be taken alongside other ChE-Is and its use is entirely elective [58]. The FDA has given the ChE-Is, donepezil, rivastigmine, and galantamine, permission to be used as AD medications. These drugs prevent the degradation of the cholinergic neurotransmitter in some cases, which is crucial for memory and learning [59]. According to clinical research, ChE-Is improve daily functioning and cognitive function in persons with mild to severe AD [60]. Overall, the three main medications for AD that the FDA has approved—aducanumab, memantine, and ChE-Is —each employ a different strategy to target a different element of the disease. These drugs have demonstrated potential in dealing with the complexity of AD using multifarious and rapid techniques through various lengthy clinical trials. More recently in July 2023, lecanemab (lecanemab-irmb; LEQEMBITM), a humanized immunoglobulin gamma 1 (IgG1) that fights aggregated soluble and insoluble forms of amyloid-peptide, received a traditional approval by the US Food and Drug Administration. It is being developed by Eisai for the treatment of AD under a worldwide license from BioArctic (formerly BioArctic Neuroscience), in partnership with Biogen, and it was given its first approval for this indication on January 6, 2023, in the US. The US prescribing information states that treatment should start in individuals who are in the moderate cognitive impairment or mild dementia stage of the disease and have been positively identified as having Aβ pathology (i.e., the population in whom treatment was started in clinical trials) [61]. However, no drug that has undergone testing has demonstrated substantial improvement in alleviating the symptoms of the disease so far. There are several non-pharmacological intervention options available for AD apart from medication. Some of these approaches have the potential to enhance cognitive abilities and promote greater independence among individuals. Non-pharmacological interventions encompass memory and orientation exercises, art therapy, aromatherapy, music therapy, meditation, and interactions with animals, along with caregiver training for family members. However, the effectiveness of these common interventions is often challenging to ascertain, and further studies are required to establish their validity and benefits.

CURRENT STATE OF HISPANICS

Global statistics

In the world today, there are currently over 671,000,000 Hispanics and Latinos that live in 33 countries worldwide [62]. Many nations are home to both Hispanics and Latinos alike, but the most populated countries are Mexico, Colombia, Argentina, Spain, and Peru [62]. According to recent studies, there are currently 496 million people who are native to the Spanish language and there are 595 million people who speak it worldwide [63]. Spanish speakers make up approximately 6.3% of the world's population [63]. Many countries share the Spanish language, which is why Spanish is the second most spoken native language only behind Mandarin Chinese [63]. It is the fourth most spoken language in general only behind English, Mandarin, and Hindi [63]. The most Spanish speakers are currently found in Mexico with 130 million followed by the US with 57 million [63]. Overall, the Hispanic population makes up 8.42% of the entire world's population. Latin America and the Caribbean are ranked 4th among the most populated regions of the world [62]. This makes sense given that the total land area of this region is approximately 7.78 million sq. miles in total [62]. As for more specific details, the median age was found to be 31 years old with a fertility rate of 2.04 children per family [62]. Additionally, approximately 82.5% of this population is found to be considered urban. This approximates 539 million people worldwide [62]. In short, the Hispanic population is very large worldwide and is among the leaders in contributing to cultural diversity in different parts of the world.

United States statistics

The US is one of the most Hispanic-populated countries in the world. Currently, there are over 62.5 million Hispanics in the US [64]. This population grew substantially from the previous decade when there were only 50.5 million Hispanics [64]. Therefore, it has been noted that Hispanics are a major population that contributes greatly to the current population of the US. According to recent research, the Hispanic population made up more than half of the US population growth from the year 2010 to 2021 [64]. There was an increase of 52% which accounted for nearly 12 million people [64]. A representation of the population growth is illustrated in Table 1. These numbers show the vast increase of the Hispanic population as a number and percentage of the population of the US through the past two decades. The majority of the Hispanic populations could be found in the states of Texas and California which each house over 10 million Hispanics [64]. This was followed by Florida, New York, and Arizona [64]. A recent study found that 1 in 8 people are Hispanic in origin and are living in the US [65]. Of all Hispanics in the US, approximately 66% were of Mexican origin, 14.5% were from Central and South America and 9% were Puerto Rican [65].

Table 1
Data of current population count and percentage of different ethnicities in 2010 and 2022. The growth of different minority groups has been consistent over the past 12 years. The largest growth in population is seen in the Hispanic or Latino Populations. Data was gathered from the United States Census Bureau [157, 158]

Population and Percentages of US by Ethnicity	Percentage (%) of US Population (2010)	Population Count (2010)	Percentage (%) of US Population (2022)	Population Count (2022)
White alone	63.80%	197,388,592	58.87%	196,225,966
Hispanic or Latino	14.49%	44,846,736	16.61%	55,376,208
Black/African American	12.29%	38,013,471	12.62%	42,070,471
Asian	4.77%	14,760,994	6.08%	20,276,025
Two or More Races	1.83%	5,647,090	2.39%	7,993,849
American Indian or Alaskan Native	0.73%	2,268,775	0.73%	2,420,972
Native Hawaiian/Pacific Islander	0.16%	499,859	0.19%	635,928

CURRENT STATE OF TEXAS HISPANICS

The current situation in Texas is adequately researched and understood. The history of Texas is rich in culture and provides a great home to many groups. Texas was among the leaders of the US in the categories of cultural diversity, religious diversity, and socioeconomic diversity [66]. Given that our article will discuss the current socioeconomic status of various groups in the state of Texas, we believe it is important to discuss the current census and ethnic demographics of the state. In this section, we will discuss the current population, race, and ethnic data of Texas. Additionally, we will address the current age, gender, and languages that are spoken in Texas. Lastly, we will discuss the current education, poverty rates, and expenditures for healthcare in Texas.

Population, race, and ethnicity data

Texas is the largest of the 48 contiguous states and as of 2023, is home to 30,500,280 people [67]. This makes Texas the second most populated state in the nation, only second to California. The Texas population has been continuously rising since 1860 and is projected to reach a population of 33 million people by the year 2029 [67]. As of right now, there are only three cities in Texas that have more than one million people: Dallas, Houston, and San Antonio. Given the size of the Texas population, it is fair to assume that the number of people per square mile would be high. However, there are only 105.2 people per square mile, which ranks 26th among the rest of the nation in terms of population density. The largest counties in Texas are Harris and Dallas, and both are experiencing high growth rates since the last census taken in 2022. According to the most recent data, the racial demographics are predominantly white. We see that White people are a majority of the population (69.16%), followed by Black or African American (12.1%), then Asian (4.94%), and other races (6.25%) [68]. Of the 30 million people who live in Texas, approximately 8.5 million are Hispanic. People of Mexican descent account for 30.7% of the current population of Texas [68].

Age, gender, and language

According to the World Population Review, the median age for Texas Residents is 34.8 years with males being averaged at 33.9 years and females being averaged at 35.8 years [67]. The average age of dependency is set around 62 years old and there are currently 3,593,369 seniors in the state of Texas. This number is expected to rise. In terms of diseases like AD and other dementias, the Alzheimer's Association expects the number of elders in the US with these diseases to expand to 12.7 million people by the end of 2050 [21]. Another statistic found that the Hispanic population was one of the most likely to be found dependent [69]. Approximately 39.4% of the Hispanic population was found to be classified as dependent (individuals who qualify as either a taxpayer's eligible child or eligible relative) in 2021 [69]. This can be compared to the average level of NH whites at a level of 38.8% of the NH white population. Therefore, it is likely that Texas officials will need to allocate substantial spending, workers, and effort for the elder population in hospitals in the future. In terms of sex, there are currently slightly more females than males in Texas which were measured at 50.34% and 49.66%, respectively [67]. In terms of the most common languages in Texas, 64.9% of all residents speak only English and 28.78% of the population speak Spanish [67]. Texas is evaluated as "among the most bilingual" in the nation, with over 10.6 million residents, constituting 36 percent of its population, capable of communicating in a language other than English [70].

Current healthcare expenditures

As of 2015, the state of Texas spent approximately $43 billion on healthcare annually [71, 72]. This accounted for 43% of all budgets from state and federal resources that year [71]. Being just under half of all Texas funds, it is fair to say that more will likely be spent on the elder population, given that the Texas age of dependency is rising [67]. Diseases like AD and other dementias have a large impact on Texas's current healthcare expenditure. It was found that Texas ranks fourth among all states in the number of reported AD cases and second in the number of deaths of individuals with AD [73]. These numbers likely contribute to the average yearly expenditures. It was also found, that in 2021 there were approximately 11 million caregivers of individuals with AD who went unpaid [73]. These most likely consisted of informal caregivers like family members and friends, but this would lead to a burden of $26 billion every year for these unpaid caregivers [73].

On the other hand, in a study by Rabarison and colleagues they aimed to calculate the economic significance of informal caregiving for individuals with dementia across 38 states, the District of Columbia, and Puerto Rico from a societal standpoint. Approximately 3.2 million dementia caregivers dedicated over 4.1 billion hours of care, averaging 1278 hours per caregiver. The median hourly value of this caregiving was $10.28. The total value of these caregiving hours was estimated at $41.5 billion, with an average of $13,069 per caregiver. Caregivers of dementia patients play a crucial economic role, providing essential care that would otherwise either be unavailable or require significant financial investment [74].

A study by Deb and colleagues done in the US found that the average healthcare expenditure for individuals with AD averaged $14,508 compared to individuals without AD or other related dementias which were averaged at $10,096 [75]. Another study noted that hospitals were spending more than three times the yearly amount for patients with dementia compared to those patients without dementia [76]. Therefore, it is likely that the current state of spending for patients with AD and other dementias is consistently high. However, expenditures from the state are only a piece of the picture. Deb and colleagues found that individuals with AD and other related dementias were significantly more likely to pay for home healthcare compared to individuals without AD [75]. Therefore, the families of those who are affected by AD are also severely affected by constant spending. Individuals with AD were spending about $1000 more on prescription medication when compared to individuals without AD or other related diseases [75]. Moreover, another study found that the average out-of-pocket healthcare spending was almost double for individuals with AD and related dementias compared to those without it ($3,285 versus $1,895) [77]. Therefore, given these data, it is fair to say the rising number of individuals with AD in Texas will heavily affect the current expenditures of healthcare on the state and the families that treat those who are affected.

ECONOMIC INEQUALITIES IN THE HISPANIC POPULATION

A person's state formal schooling and access to quality education can potentially affect their likelihood of going into poverty [78]. As per the US Census data, between 2018 and 2022, 85.2% of individuals aged 25 years and above in Texas were reported to have attained at least a high school diploma. Furthermore, during the same period, 32.3% of individuals in the same age group were documented to hold a bachelor's degree or higher. Recent estimates indicate that 95% of white adults in Texas possess at least a high school diploma, whereas only 70% of Hispanic adults have achieved the same level of education. Additionally, Hispanics lag in terms of income, with the median income for a white household in 2021 being $81,384 compared to just $54,857 for a Hispanic household [79]. More NH white people are attaining higher levels of education in Texas than the Hispanic population. This fact, in turn, has the potential to give NH whites a better chance to acquire positions of higher pay compared to the Hispanic population, which could potentially leave the Hispanics more likely to be impoverished. Currently, there is a total poverty rate of 14.22% in Texas [67]. It has been seen that the most common ethnicity to be impoverished in Texas is the Hispanic population where approximately 34.42% fall below the poverty level

[67]. Concurrently, it was found that the least likely to be impoverished in Texas was the NH white population at 11.21% [67]. Since more Hispanic families tend to live below the poverty level, more students need to drop out to help their families make ends meet [80]. This can create a vicious cycle of Hispanic people getting lower levels of formal education to help familial financial needs earlier, which leads to more Hispanics getting lower-wage jobs because of their lower level of education. This then leads to more Hispanics living below the poverty line, and so on. Therefore, mechanisms must be put into action that can aid the Hispanic population in attaining higher levels of formal education and getting out of poverty faster.

Hispanic and NH whites in Texas

In the state of Texas, there is a wide gap in income between the Hispanic and NH white populations. According to the Houston State of Health, there are approximately 12,305,000 Hispanics and 11,224,000 NH whites living in Texas [81]. Between these two populations, NH whites will earn $78,633 in a median household income while Hispanics will average about $20,000 less ($58,016) [81]. In part, this could be due to the type of jobs, and labor that Hispanics and NH whites both undertake. For example, according to the US Bureau of Labor Statistics, the most common jobs for a Hispanic or Latino person are construction at 27.3% of workers being Hispanic, agriculture type jobs at 23.1%, and hospitality at 22.3% [82]. Additionally, Hispanics had the lowest share of employment in public administration (11.4%), financial activities (11.3%), and information (10.5 %) [82]. Therefore, it is fair to say that most Hispanics tend to apply and get jobs that are lower paying and typically are not present in jobs that pay higher incomes. It was previously discussed that this could be because of lower levels of educational attainment. We discussed how this could lead to a vicious cycle of receiving lower paying jobs because of lower formal education because Hispanics need to drop out to help with family financial needs. On the other hand, NH whites have the largest share of people working in jobs like Management Business and Financial Occupations at 21.2%, followed by Education, Legal, community service, arts, and media occupations at 13.5%, and lastly sales and related occupations at 11.5% [83]. The jobs that are typically occupied by NH whites do have the potential to pay more than the jobs that are typically taken by Hispanics. However, further investigation as to why economic inequality occurs is discussed further in the following section.

FACTORS THAT CONTRIBUTE TO ECONOMIC INEQUALITY

As we have seen, the Hispanic population has several factors that contribute to their socioeconomic inequality in Texas and the US. Given that this people group has been so affected by socioeconomic factors, it is important to discuss the potential factors that can add to their socioeconomic inequality. Therefore, in this section, we will be discussing a few factors that play a large role in keeping the Hispanic people group at an economic disadvantage. We will first explore the problems of the labor market and then talk about Hispanic education rates. As a result, we will gain insight into the continuing cycle of economic disparity that is prevalent in this community.

Labor market

In becoming socioeconomically stable, it is important to have equal opportunity and pay in the labor market. However, many Hispanic and Latino communities have been undercut in the labor market [12]. A study found that when Hispanics were paired with NH whites with similar resumes, Hispanics were offered a job only 31% of the time while NH whites were offered a job at 44% [12]. This is an interesting statistic given that another study in the relatively same area found that Hispanic workers were found to be viewed as more pliant and reliable [84]. In a study by Pagers et al., they found that NH Whites received callbacks for a position 31% of the time while Hispanics were called only 25.2% of the time [12]. Occasionally, it has been found that whatever race is present in the manager or hiring officer position, will affect the number of hires from that race. When Hispanics make up more than 30% of the population, prejudicial results are seen. When a White manager replaces a Hispanic one in this environment, it was found that the average share of Hispanic hires drops from 59% to 48% while the share of White hires rises from 22% to around 32% [85]. Therefore, it is likely that the labor market is an area that disproportionately puts the Hispanic population at a disadvantage. Rather this be through opportunities given or taken away, the Hispanic population is heavily affected by this socioeconomic factor.

Education

The level of education a person attains can be a determining factor as to why one may be economically disadvantaged. In the past, Hispanics have been less likely to complete higher levels of education compared to NH Whites [67]. According to the National Center for Education Statistics, NH whites over the age of 25 earned a bachelor's degree or higher at a rate of 34% compared to Hispanics at a rate of 15% [86]. Another study found that although Hispanics accounted for over 40% of the total population of Texas in 2018, only 15.2% of Hispanic or Latino Americans held a bachelor's degree or higher [1]. As seen in Table 2, with a lower level of educational attainment, one is likely to make significantly less money. However, Table 2 also shows that despite similar levels of educational attainment, the average income levels between Hispanics and NH Whites are substantially different. A study found that the average income level for NH whites was $53,730 and $35,180 for Hispanics [87]. This signifies that there is likely a higher proportion of NH white people in higher-paying jobs and a larger proportion of Hispanics in lower-paying jobs. Therefore, these data beg the question as to why many Hispanic students do not continue their education. In a study searching for the reasons behind why high school dropouts were leaving, they found Hispanic students had higher rates of dropping out for economic reasons [80]. Compared to NH whites, Hispanic male and female students reported needing to drop out for financial reasons, needing to start working, or having home responsibilities [80]. Therefore, it seems that due to their economic trouble, they must leave high school or higher levels of education to support their families. In doing so, they are repeating the cycle of developing a lower income because they have less education than other races.

HEALTH DISPARITIES IN THE HISPANIC POPULATION

Currently, there are large health disparities in the Hispanic population when compared to NH whites [88]. It is of great importance to discuss these disparities for the right actions to be taken. Therefore, we will discuss the current understanding of health disparities among the Hispanic population in the US and then in Texas.

Health disparities in the United States

The term health disparity can be defined as systematic differences in the health status of different population groups that have significant social and economic costs both to individuals and societies [89]. Compared to NH Whites, the Hispanic population tends to have higher incidences of illness and poorer health status [88]. Hispanic populations are more likely to be diagnosed with diabetes, HIV, and cervical cancers, but Hispanic populations are less likely to engage in any type of care compared to any other NH American [88]. Hispanic people (19%) were more than twice as likely to be uninsured as their white counterparts (7%). During COVID, Hispanic population experienced a greater decline in life expectancy from 2019 to 2021 compared to their NH White counterparts [90]. The disparity in acquiring and receiving healthcare in the US is significant between the population of Hispanics and NH whites. The factors that contribute to this health disparity are discussed in detail in the following section.

Health disparities in Texas

Health disparities are a very common topic of discussion in Texas as several disparities are plaguing the state of Texas. As far as the state of Texas comes compared to the rest of the nation, there is a major problem in accessing healthcare [91]. However, Texas is one of the more heavily affected states. Texas is ranked in the bottom quarter of all states when it comes to accessing care for the Black and Hispanic populations [91]. According to a longitudinal study, people of color were less likely to receive preventative medicine measures due to the presence of a systemic barrier. One of the main barriers faced is the lack of insurance a family may have. It has been seen that the rate of uninsured Hispanics in Texas is at levels of 38% or higher, which is essentially double the state average [91]. When compared to the average NH White population, the average rate of uninsured people is 15% [91]. These data beg the question as to whether there is a different experience that is had between people of color, such as Hispanics, and NH whites. The President of the Commonwealth Fund, Dr. David Blumenthal, reported that almost every person of color will experience the healthcare system in a different light from that of a NH white. Many factors can contribute to the health disparities in Texas and the US, and in the following section, we will discuss the implications of these factors in more detail.

Table 2
Simplified definitions for ethnic groups from the US Census Bureau and The Journal of Epidemiology and Community Health [159, 160]

Ethnicity	Definition
White/Caucasian	An Indo-European, originally derived from those residing in the Caucasus region. This term is commonly employed interchangeably with Caucasoid, European, or White. This term denotes the white racial group of humanity.
Hispanic or Latino	An individual of Latin American heritage (possessing a certain degree of Spanish or Portuguese ancestral roots) who self-identifies or is categorized as Hispanic, regardless of any other racial or ethnic factors.
Black/African American	An individual of African ancestry who either self-identifies as Black or is identified as such, embracing designations like African or Afro-Caribbean. Can also be classified as an individual of African descent who self-identifies or is recognized as African, with the exclusion of those of different ancestries, such as European and South Asian origins.
Asian	This term pertains to individuals originating from the Asian continent. It can also signify those with ancestral roots in the Indian subcontinent. In the US, the term has a broader scope, but it is primarily used to refer to individuals of East Asian heritage, such as Chinese, Japanese, and Filipinos.
American Indian	A person whose ancestry can be traced to the Indian subcontinent and who identifies as Indian or is acknowledged as such. It's worth noting that significant alterations to India's geographical boundaries took place in 1947 due to the creation of Pakistan.
Native Hawaiian/Pacific Islander	The term encompasses individuals with ancestral roots in the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. Pacific Islanders encompass a diverse population, each with distinct languages and cultures.

FACTORS THAT CONTRIBUTE TO HEALTH DISPARITIES

Since the Hispanic population is affected by health disparities in the US and Texas, it would be valuable to discuss the current factors that contribute to these health disparities. As of late, there are several that can be worked on to help reduce the current disparities that affect the Hispanic population. Therefore, we will go into more detail about how immigration status, insurance reliability, language barriers, current environment, and transportation all contribute to the current disparities that Hispanics face. We hope that in addressing these factors, we can begin to implement mechanisms of action to combat the current disparity seen in Hispanic populations.

Immigration

According to the latest Census Bureau, approximately 45 million people in the US are immigrants and of these 45 million people, 24% of them are Hispanics from Mexico [92, 93]. In fact, in 2021 there were about 10.7 million individuals who were born in Mexico and were living in the US [93]. In this population, immigrants tend to be at great risk for suffering health disparities In fact, it has been seen that immigrants tend to receive less than optimal care for obtaining preventative services in managing their chronic health conditions and accessing their mental health services [13]. Because of this, many immigrant populations have higher rates of preventable and treatable diseases [13]. Many studies have shown that immigrants have higher rates of asthma, prenatal care, obesity in children, HIV, and cardiovascular disease [94]. Even more, policy and lawmakers have made access to care for immigrants extremely difficult. Hispanic immigrants are faced with several challenges in current policy and in the healthcare system which enables the Hispanic immigrant population to be disparaged.

Insurance reliability and its role in access to care

Access to care is an optimal part of the healthcare experience and is relatively lower in Hispanics than in other ethnicities, like NH Whites. It was found that low-income and newly arrived Hispanic immigrants who could not speak English were the group of participants most likely to be uninsured [95]. Interestingly, Hispanic women were found to be less likely to receive screenings for things like high cholesterol, hypertension, and colon cancer [96]. These facts contribute to the finding that the Hispanic population, when compared to NH Whites, does not see their physician as much as others. Hargraves and Hadley found that Hispanics were, by far, the least likely of any ethnicity to have seen a doctor in the last year [97]. The major reason for this lack of visits was primarily a lack of insurance, low income, and no available safety net service [97]. Hargraves and Handley found that 6.5% of Hispanic and African Americans reported having some type of unmet medical need compared to only 5.6% of NH whites [97]. According to a study by Andersen and more, the most common factors that limits access to care for Hispanics are low income, lack of insurance, and lack of ties to a particular physician [14]. In certain cases, an employer will give insurance to their employee. However, it is generally given to the employee only and does not allow for the coverage to extend to their family, leaving those not working to be uncovered [95]. Sadly, about 29% of Hispanic children younger than 18 years old were found to be uninsured, making them vulnerable to treatable diseases [98]. When we compare this to only 11% of NH white children [98], we can see that a lack of insurance is a plaguing factor for the Hispanic population.

Language barriers

Language barriers are a major and increasingly pertinent issue among healthcare workers across the nation. It was found in a study by Shin and Bruno, that 47 million people speak a different language at home other than English [99]. They found that the proportion of people who speak English "not well" or "not at all" essentially doubled from 1980 being 4.8% to 2000 at 8.1%, signifying a growing level of language diversity [99]. In a few other studies, it has been found that individuals who have limited proficiency in English tend to feel less satisfied in their care with English-speaking healthcare professionals and leave with a poorer understanding of their medication or instruction [100, 101]. Another aspect where language barriers arise in a clinical setting is the level of cohesiveness an individual has with their diagnosis. Many foods, medicines, and cultural staples are not understood by doctors as they are in different languages. This can cause misunderstandings in the medical history of an individual, and what kind of lifestyle an individual has. It was also noted, in a study by Diamond and colleagues, that residents knew they had underused professional interpreters and were more likely to use family members as a substitute for these professional interpreters [102]. Given that it has been found that using professional interpreters is associated with higher rates of improved care and fewer errors than when using ad hoc interpreters, it is odd to see that many physicians tend to avoid using these professional interpreters who are there for their aid [103, 104]. Therefore, it is likely that healthcare professionals contribute to the disparity seen in non-English speakers, especially Hispanics.

Environment

Due to low socioeconomic status, some populations, like that of the Hispanic population, can be more likely to develop different health issues/diseases. Given that Hispanics were previously discussed to be the most impoverished population in the state of Texas (34.42% below the poverty level) [67], it is fair to say that Hispanics are consequently more likely to develop these types of diseases. For example, a study found that lead ingestion, which is likely to occur in substandard housing, contributes to lowered cognitive function and stunted physical growth in exposed children [105, 106]. Also, since pollution and allergens are more common in disadvantaged neighborhoods, asthma and diseases of this nature were found to be worsened. A study by Gresenz and colleagues indicates that for Mexican American immigrants, residing in areas with a higher concentration of Spanish speakers or Hispanic immigrants is linked to improved access to healthcare, particularly for recent immigrants compared to more established ones. Conversely, among uninsured US-born Mexican Americans, residing in areas with a higher density of Spanish-speaking immigrants is associated with poorer access to care. These findings underscore the significance of local population characteristics, such as language and nativity, in healthcare access for US Hispanics. Further research is warranted to explore these dynamics across diverse racial and ethnic groups, utilizing various geographic measures, and investigating the mechanisms through which these characteristics impact access to care [107]. Therefore, it is possible with the given findings, that one's environment can provide a place of health disparity among affected populations. Factors like poverty and lower levels of education most certainly can be contributors to this health disparity as well.

Transportation

One of the most obvious and crucial necessities of attending a doctor's appointment is to have the means to get to the office. However, the Hispanic community is severely affected by a lack of transportation means [95]. Many Hispanics complain of not being able to go to doctors' appointments since they typically only have one car to share between the family and others need it for work-related matters [95]. In a study by Guidry and others, individuals who were undergoing cancer treatments would miss appointments entirely due to a transportation barrier [15]. The study found that Hispanics were more likely to report barriers like distance to a clinic, access to a car, and no available drivers to take them [15]. This last point is made more important when noting that older Hispanics are much less likely than NH White communities to drive on their own [98]. Therefore, we see that public transportation and other modes of transportation are needed. However, many public transportation services are missing or are inadequately maintained to be considered a reliable source of transportation for these individuals [98].

THE CULTURAL ASPECT OF THE HISPANIC PEOPLE

To better understand the beliefs and customs of the Hispanic people, we must discuss the cultural aspects that this group holds. It is in our best interest to maintain this cultural respect and work in unison with Hispanic beliefs instead of changing them to suit whatever standard is in place at any healthcare institution. In learning about the Hispanic culture, healthcare providers could potentially relate to and treat this people group better than ever before. Therefore, in this section, we will discuss the mechanisms of the family, the Spanish language, and the religious views from the perspective and life experiences of someone who lived in and was assimilated with a Hispanic family and culture. Additionally, we will begin to relate to what Hispanics believe about assimilating individuals outside of the Hispanic community and maintaining their diet, and healthcare. In this way, we pay respect to the Hispanic culture and begin to understand more about how to help treat Hispanic individuals with AD in the future.

The family

In the Hispanic culture, the family tie holds significant value. There is the immediate family that includes the father, mother, and children, but the closeness of a family ranges past the immediate family and will include cousins, uncles, aunts, and grandparents [108]. It is very common for the family to meet up on a weekly to monthly basis to hear about recent events, talk about plans, and have good food that is prepared by varying members of the family. There is great pride in any accomplishment achieved by any part of the family. It is common for the entire family to attend events together such as pep rallies, graduations, weddings, and things of this nature [109]. To be expected, it is generally customary for family members to gather on religious and non-religious holidays to spend the day with each other. Therefore, this tie between Hispanic families is unique.

Strong familialism (familismo) is exhibited by the Hispanic or Latino culture, encompassing a diverse range of horizontal and vertical interactions within a family [110]. Compared to Euro-Americans, Hispanics or Latinos typically report higher levels of family cohesion [111]. The common belief is that filial obligations result from parental sacrifices. Even though many scholars have looked at parental investment and filial obligations from a variety of perspectives, they have not come to any conclusions [112]. The value of the family as a collective unit over individual needs is one of familism's defining characteristics; nonetheless, familism has long been criticized for fostering misconceptions about how families should care for older relatives. Gelman and colleagues discovered that caregivers' personal narratives did not all share the same views of familismo and how it affects providing care for the elders [19]. A study by Mendez-Luck and colleagues stated that most Hispanic caregivers shared a common perspective on caregiving as a voluntary commitment, and nearly all of them undertook self-sacrificial actions to fulfill the *marianismo* role. Despite these commonalities, caregivers born in the US and immigrant caregivers employed distinct terminology when describing identical concepts or attributed different meanings to various essential aspects of caregiving. This indicates that these two groups harbored diverse motivations and orientations towards the caregiving role [113].

The Spanish language

The most common language to speak in the family is Spanish [114]. It is a language that is held with pride by the Hispanic people and is the usual language of choice for them. It is occasionally discouraged to speak other languages in the house as it may be considered rude to exclude other members of the family from the conversation who only speak Spanish. However, if someone does not speak Spanish in the family, it is encouraged for them to learn the language while together [115]. The members who do speak Spanish will talk with those who do not in Spanish and attempt to teach them the ins and outs. In the household, Spanish is spoken in both a formal and informal way. To the elders of the family and to others who are distinguished in age and merit in the Hispanic culture, formal usage of Spanish is expected. It is spoken and encouraged as a sign of respect to the elders who most likely speak that as a primary language [116]. In terms of speaking to others who are of equal or younger age or generation, it is acceptable to speak informally. It is common for children to be fluent in both English and Spanish, especially if they were born in the US. Even though this is the case in the younger generations, it is common for them to first learn Spanish and then subsequently learn English in school [117]. Therefore, children will typically serve as translators to their elders in almost any scenario that they need. For example, children will typically be the ones to order for their parents at restaurants and be the primary point of trust at doctor's appointments. In this way, there is a lot of pressure to be accurate and thoughtful in their translating efforts [118].

Religious views

Most Hispanic families will tend to align themselves as Christians and more specifically, Catholicism. More than 90% of the Spanish-speaking population identifies as Catholic in the US [119]. With this, it is common for the church to dictate many practices for the Hispanic family. It is common in Hispanic culture to base events around the sanctity of the church and its holidays. For example, it is highly encouraged to be wed in the church for Hispanic family members. Doing otherwise may strike more traditional members of the family as wrong or improper. Many great family gatherings are also based around the church. It is common for the entire family to gather and be present for an event known as the dedication of a baby to the life of Christ. Even more, out of respect and tradition, the entire family will be encouraged to engage in church affairs and practices as a mainstay of their lives. However, it is important to note that religious attendance has been declining in the US for all groups [120]. Even though there is a small decline in attendance and practice, it is still a fair assumption that Hispanic families have great respect and honor for their practiced religion.

Current diet

Hispanic families of US will typically engage in a three-meal system throughout their days. It is common for the women of the family to cook most meals. It is common for any Hispanic meal to be based on a combination of tortillas, beans, potatoes, rice, and some meat products. Breakfast is generally the smallest of the three meals and will include a base of tortillas, eggs, potatoes, and a meat product. This can vary between pork, beef, or something else [121]. Common drinks will include coffee or water. Lunch is generally the first big meal that will be served in the household and the immediate family is generally together during this time. It is even accustomed to set time aside for this part of the day, as a sign of respect to those who prepared the meal [119]. The meal will most usually consist of the same base that has been previously described. The last meal of the day is dinner. This is also a heavy meal that the family will typically have together. This meal can be considered very similar to Lunch and will generally have the same aspects to it. Occasionally, between the main three meals it is common to have informal snack breaks that are designated for spending time with family talking about current affairs and things of the sort [122]. Typically, the snacks will be anything from cereal to sandwiches to plain coffee. The meal is not meant to be special or by any means considered a formal gathering. Drinks in the Hispanic family can vary between water, beer, soft drinks, or a Hispanic staple called "Aguas Frescas" [123, 124]. This drink is translated to mean "Fresh Water", but this drink is not just water. Typically, the average Agua Fresca will consist of a fruit (watermelon, mango, cantaloupe), water, and vanilla extract [125].

Healthcare

The Hispanic family tends to rely on each other in almost any difficult circumstance. This will include sicknesses where the main caregiver will typically be the mother or eldest daughter in any Hispanic family. It is most common for women to know the most about healthcare issues and the needs of the entire family [126–128]. Because of this, it can be considered difficult to get Hispanic individuals with AD to see the doctor. The reason for the underutilization of medical care among Hispanics isn't solely due to limited access, availability, and transportation. It also involves a preference for homeopathic and indigenous remedies that are more natural. Additionally, the concept of *Machismo* can make visiting a doctor less likely. This is the concept that men will attempt to endure any pain and hold the view that visiting a doctor could be a sign of weakness in character [126, 127, 129]. Therefore, the family caregivers will try to alleviate any issue before the individual with AD needs to go and visit a doctor. Even if a person from a Hispanic family eventually does get to a doctor, the family will typically always be involved in the process. The patient will confirm with their family about the functionality of medications, the treatment plan, and essentially any part of the visit [130]. It can be a hindrance to the care of the individual with AD when family members do not agree with the doctor.

Moreover, the presence of comorbidities in Hispanic population plays a significant role in increasing the risk of developing dementia. Comorbid depression and diabetes significantly elevate the risk of MCI and AD among elderly Mexican Americans [131]. Sometimes, having an illness can be viewed as something unavoidable. Many Hispanic family members will convey that they felt that they were destined to get a disease and that God is the only one who could heal them. This concept is referred to as *fatalismo* [126]. It is common for Hispanics to pray and rely on other religious efforts to be healed from a sickness instead of getting seen by a professional. In many cases, family members report being healed completely by the work of God. Often, it leads the individual with AD to feel more confident in the management of their health and could lead to them avoiding the doctor entirely or managing their health poorly. Many studies have found that Latino individual with type 2 diabetes would consistently bring up religion as a means of management in their care [17, 132]. The concept of *fatalismo* is a common way of thinking in the Hispanic family and is something that they hold to be true.

CURRENT UNDERSTANDING OF WEST TEXAS

West Texas is a very under-researched area. In searching for relevant articles and data about West Texas and its people, we found very little research at all. Most of the data is from government articles that simply state facts about the region and its people. Therefore, we want to begin a collection of facts about the area of West Texas to be a useful tool for others attempting to learn about this region of Texas. Table 3 represents information on counties, demographics, and population of West Texas. In this section, we will cover basic information about West Texas, but then explain the current education levels, economic status, and rates of poverty and disease. In this way, we can begin to contribute to research that needs to be done in this area.

Table 3
The average income amount for Hispanics and NH Whites in 2016 in relation to their level of educational attainment. Hispanics tend to make around $5,000 less on every level of education. This exemplifies one of the factors that contribute to economic disparities between these populations. Data was gathered from the National Center for Educational Statistics [161]

Level of education attained	Income amount ($) for Hispanics	Income amount ($) for NH Whites
Less than high school	$25,000	$29,100
High school completion	$29,000	$35,000
Associate's degree	$34,900	$39,700
Bachelor's degree or higher	$49,300	$54,700

Education

The West Texas region falls slightly below the Texas average for attaining an education [71]. However, it is important to note that there has been a steady increase in educational attainment since 2010. This is most probably due to the availability of higher education institutions. In this way, many students most likely feel justified in taking on more years of schooling. However, as of right now, it is important to know the exact data of this region. Currently, 20.7% of the West Texas population has less than a high school education, 25.5% has a high school education, 26.9% has some college or associate degree, 13.8% have advanced degrees (bachelor's degree or higher), and 13% are unable to get an education [71]. Since many students are getting college-level education, some research has been done on the most common degrees. In the West Texas region, the most common degree path is Liberal Arts and Sciences, followed by health professions and related clinical sciences, and then business management and marketing [71].

Economy and poverty

The West Texas region is an area that comprises many professions and traditional practices. The rate of employment rose dramatically over the past 10 years when the region's employment went up a total of 36% [71]. In recent years, the West Texas region contributed to 2.5% of the state's total employment [71]. The most recent studies say that there are common jobs that West Texans tend to attain. The most common jobs in the West Texas area are construction trade workers, motor vehicle operators, extraction workers, food and beverage serving workers, and material moving workers, in this order [71]. However, these account for the most common jobs by numer-

Table 4
Information pertaining to the counties, demographic characteristics, and populations of West Texas

Description	Details
West Texas definition	West Texas is a region consisting of 180 counties [1, 133].
Northern border	Dallam, Sherman, Hansford, Ochiltree, and Lipscomb counties.
Southern borders	Brewster, Terrell, Crockett, Sutton, and Kimble counties.
Eastern border	El Paso County.
Western border	Several counties from Wilbarger to Llano.
Land area	Approximately 131,000 sq. miles
Population	Approximately 2.7 million people [1, 133].
Largest cities	El Paso: Population around 885,000- Lubbock: Population around 321,000 – Midland: Population around 180,000 [68].
Healthcare industry	Faces challenges due to low population density in relation to the booming Texas population. Considered underserved and underprivileged.
Ethnic composition	Hispanic Americans: Approximately 47.6% of the total region [67] – Non-Hispanic Whites: Approximately 45.6% – African Americans: Approximately 4.2% [67].

ical growth alone. When comparing them to the top occupations by location quotient, we see that extraction workers and construction workers are the most common [71]. The most common paying job with the highest income is a physical scientist who earns around $145,000 per year [71]. This makes sense due to the growing push for research in college and postgraduate institutions.

In terms of poverty rates, West Texas tends to stand above the state and national averages [133]. The latest research dictates that per capita income is lower than the state average which subjects more families to living below the poverty line in West Texas [133]. According to recent data, the average poverty rate among all ages in the US is 12.4%, and in Texas is 15.4% [133]. Texas is already in a state of higher poverty levels. Even more though, we see that West Texas is at a poverty rate of 18.5% for people of all ages [133]. These numbers increase when looking at more specific age groups. For poverty related to children, the US rate is at 16.1% and the West Texas rate is at 23.9% [133]. For people over the age of 65, the average poverty rate in the US is approximately 9.9% while the West Texas region sits at 16.3% [133]. This is nearly double the national average.

Healthcare

The status of healthcare in this region is, again, generally under-researched. However, some studies have found that the West Texas region is highly underserved and is a region in which healthcare industries find difficulty striving [1, 133]. Because of the relatively low population density seen in West Texas, it is difficult for healthcare industries to find reliable numbers to support their practices [1, 133]. In turn, this makes the availability of healthcare to those who need it very sparse. Some cities may not even have hospitals or clinics several miles from their hometown. The Texas Tech University Health Sciences Center (TTUHSC) in Lubbock is one of the only hospitals in all of Texas and West Texas to house a Level 1 Trauma Center and Burn Center [134]. While this is a nice and needed hospital in West Texas, it is one of the few that exist. Therefore, some individuals with AD will not be able to afford to make the trip to Lubbock or El Paso to reach their Trauma Centers and must settle for care that may not meet their needs. Even more, healthcare institutions in other urban cities drive immigrants to move from West Texas to their urban cities [133]. This further reduces the amount of spending that can be done on West Texas Healthcare. In total, while there is development for new hospitals and trauma centers in West Texas, the lack of population density and support for healthcare institutions maintains the difficulty of establishing a consistent point of care for the inhabitants in this region.

CAREGIVERS FOR INDIVIDUALS WITH ALZHEIMER'S DISEASE AND DEMENTIA

Caregiving for individuals with AD and other dementia is usually a very unforgiving and mentally taxing job. According to Johns Hopkins Medicine, a caregiver can be defined as a person who tends to the needs or concerns of a person with short- or long-term limitations due to illness, injury, or disability [135]. Caregivers have a wide variety of roles and duties that any one person can do. Typical examples of a caregiver include transporting individual with AD to medical appointments, purchasing and organizing medications, assisting in bathing or eating, advocating on a individual with AD's behalf, and doing general housework [135]. If one person fits one or more of these roles and others, they can be considered a caregiver. Many times, family members are given the role of caregiver spontaneously with no warning or help. The job can be considered tiresome, lonely, daunting, physically straining, and brutal. With the constant time needed to care for the individual with AD, the caregiver will likely become stressed beyond what they had expected [6, 136, 137]. In the long term, feelings of isolation and loneliness likely persist [137]. This means that being a caregiver for an individual with AD is one of the most taxing jobs that someone in healthcare could undertake. Treating an individual with AD is different than any other job that one could do, and it is of high importance, nonetheless. In this section, we will discuss the role of caregivers for individuals with AD and other related dementias. We will discuss the implications of what caregivers are expected to face on a day-to-day basis as well as the risks they see. We will then dive into the role of caregivers in a Hispanic family where we will expand on the unique experiences they face. Lastly, we will discuss tools that are proven to help aid these caregivers.

Prevalence of hispanic and NH white caregivers

The Family Caregiver Alliance reports that of all caregivers in the US, 62% are NH White and 17% are Hispanic. Interestingly, they also reported that Hispanic caregivers have the highest prevalence of caregiving at 21% compared to 16.9% from NH Whites, despite having lower numbers of caregivers. Hispanic caregivers averaged 30 hours per week of caregiving compared to 20 hours a week from NH Whites [135]. Because of factors like this, Hispanic caregivers were noted to have higher rates of experiencing burdens [138]. In Texas alone, the Alzheimer's Association found that there are approximately 1,000,000 unpaid caregivers [29]. This number of unpaid workers means that there have been approximately 1.5 billion hours of work that have gone unpaid in the state of Texas alone [29]. If the state were to compensate the workers for their care of individual with AD, they would be earning approximately $23.5 billion [29]. In the US, approximately 16 million total unpaid caregivers are treating their friends, family members, or others [139]. The total number of hours that this population works is well over 17 billion [139]. As far as demographics, two of every three caregivers are women, and one of every four caregivers is giving care to an aging individual with AD as well as a child under the age of 18 [139]. One study found that family members compose about 78% of all caregivers of individual with AD [140]. They were able to determine that of all the caregivers (participants of the study) interviewed, 30.5% of them were parents of the person with AD, 25.5% were other relatives, and 16.5% were the individual with AD's children [140].

Formal and informal caregiving

Caregiving is generally defined into two types: formal and informal caregiving. Formal caregivers are professionals who have been paid to aid in meeting the daily needs of individuals while informal caregivers are often family, friends, and volunteers who are not paid for their services [1]. In general, Hispanic populations tend to rely on informal caregivers (usually within the family) to support their family members with AD and other dementias compared to their NH White counterparts [1]. The reasons can be explained by looking at the previous discussion about health disparities and the Hispanic population. Factors like lack of immigration and healthcare policies [141], insurance [97], language barriers [100, 101], and transportation issues [15] are all potential reasons for this higher rate of informal caregiving among Hispanics. Another reason may be a simple lack of knowledge that other options exist. A study by Pharr and others stated that many Hispanic caregivers viewed the art of caregiving as an essential family experience [5, 142]. They even stated that they were unaware of existing formal care practices [5]. Therefore, informal caregiving may be a matter of simple happenstance rather than a true choice against formal care.

Risk for caregivers

Most caregivers in the Hispanic population tend to be informal [1]. With this, they are potentially subjecting themselves to the risk of injuries and mental strain throughout their time serving as a caregiver. One study attempting to learn the musculoskeletal damage that can occur in informal caregivers of elder individuals with AD found that informal caregivers who worked for more than 12 hours a day, lacked a basic guideline for their care since they have relatively little time off from working compared to formal caregiving [143]. They later discovered that the area with the most musculoskeletal symptoms was the spine of the caregiver [143]. Another study found that when informal caregivers perceived that they were expending more effort for their elder individuals with AD, they were 3.3 times more likely to experience some type of spinal issue compared to those who did not expend this effort [144]. Furthermore, a study by Brown and Mulley found that 67% of their interviewed informal caregivers sustained at least one type of injury (back pain, hernias, etc.) while working with elder individuals with AD [9]. They even found that 8 of the informal caregivers were unable to continue working entirely for their patients and needed extended leave [9]. What is most shocking of all, however, is that 37% of the patients that these informal caregivers were treating sustained at least one type of injury as well [9]. Therefore, it is fair to state that informal caregiver to any elder patient is at slightly elevated risk for developing musculoskeletal issues in their spine or other areas [9, 143, 144].

There are also several mental risk factors that informal caregivers have been noted to experience. Some of the most prevalent are caregiver burnout and mental exhaustion. Caregiver burnout can be defined as the strain perceived by a caregiver when caring for a loved one over a certain period [145]. This idea is completely subjective to the idea of the caregiver [6]. In a systematic review of the literature, it was found that individuals with dementia, who had varying levels of severity, significantly contributed to caregiver burnout. Specifically, it was found that individuals with AD with dementia who had poor functional status, some high prevalence of behavioral issues, and a high level of psychiatric symptoms were more likely to bring caregiver burnout to their family caregivers [6]. They also found that lower levels of education attainment the individual with AD had received in their lifetime greatly contributed to caregiver burnout [6]. Interestingly, another study found that many of the caregivers of individuals with AD and other types of dementia were between the ages of 40 to 60 years old [146]. This finding highlights that older adult, who might themselves need care, were taking care of elder individuals with AD. It could be stated that these caregivers were getting to a point in their life where they too would need the assistance of a caregiver. As for mental exhaustion, Valente and colleagues found that caregivers of elder individuals with AD with moderate dementia were more likely to have mental exhaustion and a negative self-perception of health [7]. Overall, a literature review found that burnout syndrome was very common among informal caregivers of individuals with dementia [147]. They found that many studies stated the importance of evaluating a caregiver's burnout syndrome in informal caregivers due to the likelihood of worse quality of life, depressive symptoms, anxiety, and abusive behavior among caregivers [147].

Hispanic caregivers

According to recent studies, approximately 17% of all family caregivers in the US are Hispanic [1], and because of previously discussed factors such as low socioeconomic status [87], low levels of education [1], and a lack of insurance reliability [95] many Hispanics have opted for informal caregiving. The Hispanic population is generally concentrated in states like California, Texas, Florida, New Mexico, Arizona, and New York [148]. With this being known, it was found that there was not one study done on Hispanic caregivers of individuals with dementia in Texas, New Mexico, or Arizona [149]. This fact warrants that more research is needed to be done in the states that hold the highest population of Hispanics and Hispanic caregivers. Given this, there are still some studies that reflect the experience of Hispanic caregivers.

A study on the usage of informal care among different ethnicities found that Hispanics averaged 11 hours of informal care compared to NH whites which averaged about 7.5 hours [150]. For Hispanic caregivers, the concept of *familismo* is very important and may contribute to this time discrepancy. Hispanic families tend to use fewer professional services for this very reason [1]. One study found that the major cultural norm for many Hispanic families was the idea of taking care of your own [151]. In the concept of *familismo*, the primary caretaker is generally the eldest daughter of the family [1, 152]. In recent studies, there are some discrepancies between the impact of these Hispanic women caregivers and the impact on their mental health because of the concept of *familismo*. Magaña and Smith found that Hispanic mothers were less likely to report psychological distress compared to their NH white mother counterparts [136]. This is speculated because Hispanic mothers tend to perceive the burden of caregiving in a lesser light while perceiving the greater benefits that caregiving can bring [152]. However, other research has found that Hispanic caregivers tend to have higher rates of depression compared to other caregivers. One study found that approximately 31% of Hispanic women caregivers were feeling symptoms of depression when caregiving for family members who were diagnosed with AD [153]. Another recent study found that *familismo*, on the other hand, does not affect perceived caregiver burden [154]. With these conflicting results, there is a need to continue the study of the impact of *familismo* on Hispanic caregivers and the effects it has on mental and physical health. However, since *familismo* is such a large part of the Hispanic culture [1, 152], it would be insensitive and wrong to attempt to change this part of the culture of Hispanic caregivers. Instead, tools should be implemented to give Hispanic caregivers help in managing their mental, physical, and spiritual health when taking care of any individuals with AD. This idea is what the next section will highlight.

Tools for hispanic caregivers

The Hispanic community typically does not use formal caregiving and will generally rely on informal caregiving for their needs [1, 150, 151]. With this known, we must develop and maintain innovative measures that maintain the respect of the Hispanic culture and provide support to caregivers who are focusing on individuals with mental health issues like AD and other dementias. One of the possible interventions that can be implemented is encouraging informal Hispanic caregivers to receive training from other qualified formal Hispanic caregivers. It has been speculated that implementing Latino educators who have insight into the culture will aid in giving access to other Hispanic communities [1]. This study believes that Hispanic educators would better engage the Hispanic community and provide a basis of understanding for caring for individuals with diseases like AD and other dementias [1]. Other educational tools could include taking online courses, again taught by Hispanic educators. One study compared the levels of depressive symptoms in caregivers of elder individuals with AD when one group took an 8-week psychoanalytic course about the common points of frustration in caregiving [155]. They were able to find that the caregivers who took the course when compared to those who did not, were able to experience much fewer signs of depressive symptoms as well as being better equipped to control their frustration and anger in caregiving [155]. Another potential point of help that can be given to Hispanic caregivers is the use of Remote Monitoring Technologies (RMTs) [1]. RMTs for individual with AD refer to a range of technological solutions and devices designed to track and assess the health, safety, and well-being of individuals living with AD, even when they are not in close physical proximity to caregivers or healthcare professionals. Having wearable technologies likely allows caregivers to be better able to support the individual with AD and provide lasting benefits like preventative care [1]. One study by Chiang and colleagues found that having RMT aided in reducing caregiver burden and augmented the caregiver's ability to manage stress levels as well as build a better family function [156]. Other technological resources include using Global Positioning System (GPS) location devices for wandering individuals with AD. In this way, any individual with AD who loses their way can be found and potentially spared from any injuries. With these studies and results, it is fair to state that giving Hispanic caregivers the tools to maintain their physical and mental well-being is beneficial to both parties involved. Therefore, it is warranted that we spend time and effort allocating resources to give the Hispanic population a better experience that respects their culture while ensuring the well-being and increasing the quality of life of caregivers and individuals living with AD.

CONCLUSION AND FUTURE DIRECTIONS

The prevalence of AD and other related dementia is increasing. The reason for this trend can be attributed to several factors but likely stems from the idea that several advancements are being made in maintaining a longer life span. It has been seen that with this longer life span, the prevalence of AD in the world today is increasing. The Hispanic population is one of the most heavily affected and therefore, they are one of the populations that has seen the largest need for more healthcare workers. Many times, this population will lean toward giving their loved ones living with AD informal care which can be attributed to several reasons. The Hispanic population has been seen to have a lower socioeconomic status due to lower levels of formal education and an unforgiving labor market. Additionally, the Hispanic population has been plagued by many health disparities like unreliable insurance, language barriers, and transportation issues. Hispanics are even likely to prefer family affairs as is seen in their culture. Concepts of *machismo*, marianismo, *familismo*, and *fatalismo* can put pressure on the family to care for their sick members and avoid care in hospitals where trained professionals are. With these factors, caregivers have a very difficult and strenuous process that tends to be unforgiving. Mental and physical strains seen on the job are put on the caregiver which can translate into their personal life. It is important to provide tools to these caregivers like receiving training and using tools like RMTs and GPS for individuals with AD to help reduce their caregiver burden.

Supporting Hispanic informal caregivers of individual with dementia requires a culturally sensitive and comprehensive approach. To assist these caregivers effectively, it is essential to provide culturally responsive education in Spanish, covering dementia awareness, caregiving techniques, stress management, and available resources. Community outreach efforts should be directed towards Hispanic community centers, churches, and organizations to raise awareness and organize support groups and educational sessions. Bilingual support services, helplines, and resources will facilitate better communication and understanding. Counseling and mental health support, led by culturally responsive therapists, can help caregivers cope with the emotional challenges they face. The importance of culturally responsive therapists is emphasized for the understanding of cultural assets and struggles that are unique to the Hispanic population. Respite care services should be made available to prevent burnout and promote self-care. Ensuring that care facilities are culturally inclusive and respectful of Hispanic values is also important. Additionally, offering guidance in navigating healthcare systems, legal matters, and financial assistance will be beneficial. Establishing peer support groups, utilizing technology for remote support, and collaborating with healthcare providers to identify appropriate resources are essential components of a holistic approach. Developing culturally sensitive materials and resources that align with Hispanic traditions and family dynamics will enhance engagement and effectiveness in assisting Hispanic informal caregivers of individuals with AD. As the Hispanic population rises and ages soon, the rates of chronic health issues such as diabetes and hypertension rise as well [149]. It is crucial to be able to detect and appropriately address the concerns of the Hispanic informal caregiver population on time before chronic diseases begin to develop. With all these interventions, we can assess what needs have to be addressed for optimal delivery of care for the caregiver.

This article strives to add to the current literature on Hispanic caregivers and their status in treating individuals with AD and other related dementias. We believe by adding to the current research, we can continue to provide support to the millions of people who are struggling with the burden that comes with caregiving. We think that providing research on the area of West Texas will help expand the current literature and encourage others to begin researching this area more. Therefore, we believe that our future direction will be to continue researching this area and the people this impacts.

AUTHOR CONTRIBUTIONS

Ricardo Isaiah Garcia (Conceptualization; Data curation; Formal analysis; Investigation; Methodology); Sachi Khemka (Data curation; Formal analysis; Investigation); Aryan Roghani (Data curation; Formal analysis; Investigation); Ruhananhad P. Reddy (Data curation; Formal analysis; Investigation); Vasanthkumar Pattor (Data curation; Formal analysis; Investigation); Michael Jacob (Data curation; Formal analysis; Investigation; Methodology); Aananya Reddy (Data curation; Formal analysis; Investigation); Ujala Sehar (Conceptualization; Data curation; Formal analysis; Investigation; Methodology); Hemachandra Reddy (Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology).

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CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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