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Challenges to the recognition and assessment of Alzheimer's disease in American Indians of the southwestern United States

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Abstract

Little is known about Alzheimer's disease (AD) and related neurodegenerative diseases in American Indian (AI) populations. To provide appropriate health care to elder AIs, whose population is expected to increase dramatically during the next 50 years, it is imperative to attain a better understanding of the interaction of culture and disease in this underserved population. Raising awareness in the AI population regarding the nature of dementia as it compares to normal aging and the development of culturally appropriate instruments to detect and stage AD are essential for future health care efforts. Barriers restricting clinical service to this population include historical factors relating to access to health care, cultural beliefs regarding aging, demographic diversity of the population, competing epidemiologic risk factors, and lack of proper assessment tools for clinicians.

Keywords

American Indian; Alzheimer's disease; Elder health research; Mental status

1. Introduction

Several reports suggest the possibility of decreased prevalence of Alzheimer's disease (AD) and/or dementia in American Indians [1–3]. However, it is probable that AD is underdiagnosed in the American Indian (AI) population for several reasons, some unique to the AI population. Lack of access to appropriate health care for a large portion of the population might result in misdiagnosis or underdiagnosis by health care systems. Competing risk factors for early mortality in this population including accidents, suicide, infectious diseases, and other causes of mortality [4,5] reduce the number of individuals who live long enough to be vulnerable to AD later in life. This might result in a decreased awareness of this disease among AIs and their health care providers. The presence of other dementias such as those resulting from vascular lesions might be more common in this population because of high rates of stroke as well as risk factors more closely linked to other types of dementia [1,6]. Comorbidity [7] of AD with vascular dementia increases the complexity of diagnosis of AD, and cognitive decline might be attributed solely to the vascular component. It is important to distinguish between AD and other dementias because there are multiple causes of dementia, and appropriate medical

treatment depends on the diagnosis. Competing cultural understandings of declining cognitive ability probably pose the greatest barrier to diagnosing AD. Cultural understanding of what is “normal” and accepted in aging might lead to minimization of significant clinical signs. In at least some AI cultures, elders with difficulties remain in the home with family instead of family members seeking outside treatment for their loved one; these individuals would be less likely to be identified by the health care system. Finally, lack of proper assessment tools has hindered diagnosis of AD in this population [8,9]. Translating tools to measure cognitive function not only across language but also cultural and experiential barriers poses a daunting task.

Recent, albeit preliminary, evidence suggests that with an increasing life expectancy, more cases of dementia and AD are being detected in clinics and nursing homes serving AIs [10–13]. A more accurate reflection of the prevalence of AD in AI communities awaits a study with adequate sampling of the population; however, it is reasonable to expect that AD will become an increasing problem that will begin to have significant impact on AI health care services.

Many AI people might consider memory loss as a part of normal aging [14]. Changing these perceptions and paving the road to diagnosis and treatment of AD begin with outreach and education programs. (During the past 4 years we have developed extensive and ongoing contacts with AI communities. Three of the authors of this article are American Indians. In addition to numerous outreach/education presentations in elder centers on Arizona reservations, in September 2007, we held the fourth annual conference on the impact of ADs on the AI population. The audience for all of these conferences and presentations is composed of AI elders and health care workers. We are also working with the Inter-Tribal Council of Arizona and with Native Health, Inc, a Phoenix-based nonprofit AI healthcare delivery clinic.)

2. Impact of historical factors on detection of AD in elderly American Indians

Historical factors and the corresponding issues of mental health have been shown to be important in understanding present-day health issues in AIs [15–18]. For this reason, the physicians and psychologists who wrote the Supplement to the 2001 Surgeon General’s report on mental health structured each chapter in a way that takes into account the unique character and circumstances that influenced the course of mental health issues particular to the ethnic minority population that was being described. “Over the last 150 years, a series of critical events” has shaped the forces that currently impinge on the health of Native people, “their perceptions of themselves, others’ perceptions of them, and eventually current mental health policies and funding” [18]. AIs are unique among ethnic minority populations in the United States because they have a distinctive history with regard to the federal government, beginning with the “destruction of entire Indian nations” [5], colonization, treaties, forced relocation, and attempts at assimilation through the removal of their children and the impact of missionaries. Forced education in boarding schools caused considerable trauma to the mental health of AIs [19–21], in addition to resulting in the long-term undermining of tribal ways of childrearing and language use [22]; ultimately, the boarding school experience resulted in “natural resistance to the forced assimilation of European American culture” [17]. AIs are also unique in that they are the only ethnic group in the United States affected by policies that have been characterized as a unique “government-to-government” relationship among the federal government, the states, and the Indian tribes” [22]. However, the nature of the relationship between the federal government and AIs is one of dependency. The very existence of the Indian Health Service (IHS) came from treaty obligations to serve the needs of the Native populations of the United States as a dependent population. Whether perceived as representatives of the federal government or as researchers who have come to exploit the Native community, clinicians need to take into account that “initial feelings for an AI elder may be quite different than those of an Anglo person when entering an institutional setting” [17]. These sociopolitical/interpersonal factors can have a considerable effect on the nature of the interaction. Because

“individuals react differently when there is an unequal power base” [17], benefit in rapport might be gained by holding the assessments in a familiar setting, such as a tribal senior center on the reservation.

3. Cultural barriers to recognition of Alzheimer’s disease in elderly American Indians

Given the multitude of more immediate service needs and health care priorities facing their communities, in comparison to the general Anglo American population, tribal communities might not consider cognitive research to be a priority, especially because they might not perceive AD as a medical crisis. In the Arizona Alzheimer’s Disease Consortium American Indian Outreach Program we discovered that many of the AI people with whom we interacted (including many service providers) had limited knowledge of AD as a medically diagnosable disease.

Diverse cultural recognition and interpretation of declining cognitive ability probably pose the greatest barriers to diagnosing AD in the AI population. Explanatory models of illness powerfully impact how disabled people are treated and cared for in a culture; these models create order and meaning and identify proper treatment strategies [23]. Although explanatory models for dementia vary from tribe to tribe and individual to individual, some of the reported examples include “naturalization” of cognitive impairment and dementing behavior (dementia as part of the Creator’s plan for a person’s ultimate learning); an imbalance in the patient’s spiritual, emotional, and social environment (dementia caused by breaking a cultural taboo or speaking of negative consequences of illness, which causes those events to occur); the spirit having already crossed over into the next world (dementia as communication with the spirit world); and the stress of trying to live in the Native world and the Anglo American world (dementia as conflict between traditional and nontraditional ways of life) [14]. If AD is not viewed by the culture as a pathologic event, then there might be no reason to seek treatment.

In addition, because the traditional caretaking unit in AI cultures is the family, caregivers might feel the responsibility to care for their elders within the family and not seek assistance from outside sources. Thus, a decline in memory or other cognitive functions might not be brought to the attention of the health care system by the family.

The expected increase in cases of AD will be a new phenomenon in many Native communities because few elders in these communities had lived long enough to develop these diseases [24]. This might add to the burden of traditional family-based AI caretaking networks [25, 26], contributing to such related problems as elder abuse [27,28]. Because this trend is not yet widely apparent and competes with other, more immediate health needs, many AI communities might not currently perceive AD detection and treatment as health priorities.

4. Barriers to clinical identification of AD in elderly American Indians of the southwest United States

The current medical consensus holds that the best treatment options for AD involve early diagnosis and strategies that slow the rate of decline. State-of-the-art neuroimaging techniques are advancing rapidly in the detection of early AD correlates, but neurologic examination, history taking, and mental status assessment continue to retain their primary role in diagnosis [29]. An important step toward diagnosing AD in underserved communities is the development of culturally appropriate instruments to determine cognitive status.

A considerable corpus of research has been accumulating concerning the impact of culture on assessment and treatment [30,31]. Relevant data show that responses to cognitive tests,

treatment, and follow-up are influenced by such factors as education, genetic variability, socioeconomic status, ethnicity, literacy, and acculturation [30,31]. Less easily documented differences that have been demonstrated between European American people and Native people might also influence the assessment process and outcome. These include differences in cognitive processing styles, sociopolitical/interpersonal orientation, and personality/sociality [17]. These differences between AIs and the majority population are also seen among individuals within tribes, between tribes, and reflected in the interaction between the individual and the medical assessor.

Demographics impinge on assessment and treatment out-come. If clinicians administering these instruments are not aware of AI demographic factors, they might assume similarities with the Anglo American populations that do not exist. Demographics shared among many AIs who differ significantly from the general population include the fact that they are more likely to live in a rural location [32] and to experience poverty [33]. The rural AI population is considerably poorer; rural Native elders have 70% or less of the per capita income of urban elders [34]. Whether they live in a rural or urban setting, Native people have higher poverty levels and lower educational achievement than any other ethnic group in this country [32,35]. The quality of the education received on tribal lands or in “missionary schools” might be quite different from a similar Anglo American cohort. Most cognitive tests are influenced by education, and many show a correlation with socioeconomic factors. Some investigators have suggested that poverty, “institutionalized racism” [17], and the restricted exposure to health care systems might affect treatment and prevention [36]. Although these factors might lead to AIs being falsely identified as cognitively impaired when they are not, there is also a risk that if practitioners believe that AIs are prone to lower test scores because of cultural or demographic factors, they might disregard signs of dementia when a disease is truly present. Both opposing factors can contribute to increased inaccuracy in diagnosis.

Recent findings by Jervis et al [37] in the performance of AIs on the Mini-Mental State Examination and Mattis Dementia Rating Scale show “widely disparate frequencies of cognitive impairment identified with available normative data” and lead the authors to suggest strongly that population-specific norms for these measures are needed. They call for “investigation of the possible effects of ethnicity, socioeconomic status, type-character of education, language status, and other variables” [37]. Discriminating the cause of poor or reduced performance is difficult in any group. The unique challenges in this population further suggest the need for more culturally appropriate assessment tools and further research. (Brickman et al [38] provide an in-depth discussion of issues related to culture and neuropsychological assessment.)

As with other ethnic minority groups, AIs are a heterogeneous population. The greatest challenge to developing health policies and clinical instruments for the detection of dementia is the incredible cultural and linguistic diversity within “American Indians/Alaska Natives,” a single category used by the U.S. Census Department. Although Native cultures are grouped into (usually) 10 geographic culture regions for heuristic purposes, within each culture area are many culturally diverse tribal groups that often speak linguistically distinct languages. In the United States, there are 561 federally recognized tribes [39] that speak more than 200 different languages [5]. This cultural diversity is further evident in the documented range of traditional religions, social relationships, and family structures [40]. For example, the Hopis live in permanent villages on mesas in northern Arizona. Once supported by agriculture, they continue to practice agricultural rituals that ensure community-wide well-being, such as ceremonies in which dancers impersonate and bring to life ancestral spirits known as katsinam. In contrast, even though most Navajos, whose reservation surrounds that of the Hopis, live and work in towns on or off the reservation, they continue to have scattered homesteads in which extended families live far from towns and raise sheep, goats, and horses. Navajo ceremonies

focus more on individual health and healing. In addition, each tribe has its own unique history with regard to relations with the federal government and the encroachment of Anglo Americans into tribal territory [41]. This history might have a bearing on their openness to non-Native individuals/entities and willingness to consider participation in research projects.

Not only is each AI tribe different from other tribes, but within a single tribe differences exist among tribal members in their level of involvement in both traditional and Anglo American cultural practices. Some members might seldom leave their community and remain deeply involved in traditional forms of knowledge, including spiritual practices and tribal history. Others might live and work in cities and/or be relatively acculturated to the mainstream American culture. Therefore, there are both intertribal and intra-tribal variances within the AI population that might significantly influence performance on assessment instruments.

With such significant and seemingly overwhelming factors to overcome in developing culturally appropriate instruments, some researchers have suggested using current standard instruments and generating new norms for this population. Unfortunately, with the diversity within the AI population this might amount to establishing new normative data on each subgroup (each of which might have a limited population) and trying to account for multiple factors such as degree of acculturation. All of these factors might change over time, which would require redeveloping the normative values for each age cohort. In addition, some AI groups are too small to have enough people to produce normative data. A set of neuropsychological test norms have been developed for African Americans [42–48]. Because this group is also heterogeneous, these norms might be of limited utility for the general African American population. (Manly [49] provides a discussion of further limitations of normative data, especially in ethnic minorities.) Others are concerned that culturally appropriate tests might be too culturally specific and lose their validity because the data that they generate cease to be comparable cross-culturally within the population.

An initial investigation into this area [50] examined whether performance on the Consortium to Establish a Registry for Alzheimer's Disease Neuropsychological Battery (CERAD-NB, a cognitive screening battery used to evaluate dementia in the elderly) is affected by cultural differences. The performance of 40 elderly Oklahoma Cherokee and Choctaw and 40 demographically similar whites, all of whom had been clinically diagnosed with AD, showed no statistically significant differences between the two groups. The authors concluded that “the CERAD-NB appears to be an efficient cognitive screening assessment in English-speaking Native Americans with known or suspected dementing illness” and that “it appears that special norms may not be necessary in this population.” However, they called for “additional studies of larger samples ... to explore factors such as education, acculturation, and degree of Native American heritage” [50].

As noted by the authors, one of the limitations of their study is that only 20% of the Cherokee and Choctaws had 100% blood quantum, and the majority of the participants had 25% or less blood quantum, making the genetic loading quite small [51]. In addition, it is possible that genetic Indian ancestry interacts with immersion in Native cultural practices and degree of acculturation. The Cherokee Nation of Oklahoma is composed of descendants of those who were removed from their homelands in North Carolina in 1838 to 1839; the land controlled by the tribe is not a reservation but a jurisdictional service area. Members of the present-day Choctaw Tribe of Oklahoma are descendants of those who were removed from their ancestral homelands primarily in Mississippi between 1831 and 1836. Thus, assessments of elderly AIs in Oklahoma might yield results that are not characteristic of AIs in other parts of the United States because of their unique history and degree of acculturation. Individuals who continue to live in their original homelands might be more likely to retain more of their cultures and native languages, which could potentially affect findings from the cognitive assessment. For

example, almost all of Arizona's AI land bases are on or near ancestral homelands. By comparing an AI population that is closely linked to their ancestral lands and culture with those that are more acculturated, we might better understand the relationship of culture and AD.

5. Specific cultural issues in mental status testing

In administering existing assessment instruments to AI elders in central Arizona, we have observed that several considerations need to be addressed to make these assessments more culturally appropriate. To illustrate this, we now discuss recurring patterns in the responses from Native elders that differed from European American "target" responses on a standard mental status examination. Because this information is based on the preliminary phase of our outreach program, the observations might be valuable in generating hypotheses, but it is premature to draw any firm conclusions.

A common clinical screen for memory problems involves asking the elder to repeat a five-component name and address and "remember it for a few minutes." The person is then asked a series of unrelated personal questions tapping long-term memory (birthplace, birth date, education, and history of employment) and then asked to recall the five components of the name and address from memory.

Because the organization of memory is based on experience [52], our interpretation of responses from AI elders who have grown up in rural areas might not be an accurate reflection of their cognitive abilities. For example, many elders on the Navajo Nation still live in houses and traditional hogans widely scattered across the landscape to provide grazing room for their livestock; they remember where someone lives by markers in the landscape rather than numbered houses on named streets. In rural areas, many tribal households did not have street addresses until as recently as the 1990s, when it became a requirement to obtain 911-dispatched emergency service. Rather than demonstrating a decline in cognitive ability, poor performance on this question might be more indicative of the environment in which an individual grew up and currently resides.

The inability to recall a name and address dictated in a testing context also relates to a fundamental difference in Anglo and Native language styles and language interpretive systems [53,54]. Test items in mental status exams are so decontextualized that they might become meaningless to an AI person and lack the mnemonic features that would, in another context, make them easily recalled. Memory in Native language styles is closely related to oral traditions; without a story or more information about who "John Brown" (from the name and address recall task extracted from the clinical dementia rating work form) happens to be, there is little contextual significance to assist in remembering anything about him or where he lives. Furthermore, story-telling is a cooperative enterprise in contrast to the individualized nature of the test-taking enterprise. "Fundamental genres that occur in recurrent situations" enable listeners to anticipate what will be recounted in "shared past experiences" [55]. However, test items constitute a decontextualized genre that is alien to AI "culturally determined patterns of language use" [56], a fact that might affect performance in neuropsychological assessment. "The nuances of the examiner-respondent interface can potentially result in inaccurate conclusions" [17]. Anglo Americans might be more accustomed to remembering isolated facts as presented in test-taking situations, whereas AIs might not have such experience and might have more difficulty because this information has no special significance.

Questions involving historical facts or current events involve similar cultural confounds. In many tribal communities, "national" events that do not directly affect their community might be relatively unimportant to elders and therefore not commonly known. For example, we replaced a question that read "Who is the current President?" with "Who is the current Tribal Chairman?" However, even this question might not be a reliable measure of cognitive ability

within the tribal community because many, especially elders, might not consider this to be especially relevant to their lives. Some elders might not involve themselves in tribal affairs for various reasons; thus, attempting to replicate a question with more localized information might still not yield a meaningful result. Furthermore, changing test questions or formats to more appropriately reflect the person's background or culture might significantly impact the psychometric properties of the instrument including scoring, cut scores, and interpretation of the results. Thus, even attempts at finding "equivalent" questions in the AI's culture can be challenging.

Clinical assessment of judgment and problem solving can involve questions that require the respondent to classify objects by similarities and differences. The elder is asked how two entities are similar or different, and greater "credit" is given for more abstract, higher level "correct" responses. Some of the examples involve objects that might not be encountered by many AI elders, or the context of the encounter might be quite different (eg, pieces of office furniture). One possibility is that these questions could be changed to include objects that are encountered by Native elders; however, cognitive anthropologists consider understanding of the world to be structured by cultural models. A cultural model defines the elements that constitute a specific domain [57], and as with memory recall, classification depends on experience. For example, in the completion of a similarities and differences task, one question requires the respondent to explain the difference between a canal and a river. One senior responded "A canal has water in it. A river is dry." Her answer was perfectly logical, given the climatic conditions of the Sonoran Desert where this test was being administered. Rivers are dry for nearly all year; canals are used for irrigation and thus contain water. There might also have been a cultural component in this because she came from a tribal culture that traditionally practiced agriculture and canal irrigation, thereby associating canals more closely with water.

For one of our studies, an elderly monolingual Navajo woman and her bilingual daughter drove from the Navajo Nation for the mother's cognitive assessment. The assessment proceeded smoothly not only because the daughter conveyed the concepts and terms through translation but also because her presence provided emotional support, increasing her mother's comfort level. When her daughter translated a question that required the mother to distinguish the differentiating qualities of vinegar versus those of sugar, the mother looked puzzled. She then responded in Navajo that she had never encountered this substance called vinegar, which was validated by the daughter. Without the daughter's translation, the mother's inability to differentiate between the two substances could possibly have been considered to be an indication of declining cognitive ability.

Language fluency, bilingualism, and literacy are relevant factors in the "translation" of instruments. Although a person might speak English, this does not mean that he or she is fluent in this language. English might be a secondary language, or a person might be of limited English proficiency [17]. Identifying the level of fluency is important because this can affect the comprehension of the testing instructions, language processing speed (whether a person might think in English or his or her native language), and the comfort level of the test-taking experience, thus influencing performance and results of testing [58]. AIs with an apparent good level of conversational English might have difficulties with the conceptual parts of a mental status exam, not because of concept formation deficits but because of unfamiliarity with the subtleties of the language. For example, one question from our mental status exam poses "How is a lie different from a mistake?" Again, these words are given to the elder without any context. It is possible that if these words were translated into the elder's native language, more elders could explain the differences between these concepts.

Although bilingual family members might be useful in some aspects of translation, there are major limitations to use of nonprofessional translators in general and in an AI population in

particular. Interpreters and translators must stay emotionally uninvolved with the discussions and maintain neutrality [59], which is difficult, if not impossible, when a family member takes on these roles. Information might be incorrectly relayed in a way that is misunderstood, misinterpreted, or even omitted if an untrained family member serves in this role [60]. With the close-knit nature of the AI family, respect for elders inherent in the culture, and tendency for group solidarity [61], a family member might unintentionally correct or modify an elder's response during the translation.

Nearly every Native elder whom we assessed had trouble with mathematical computations in the calculations section of the mental status exam. This difficulty has also been reported elsewhere [9]. Without pen and paper, the subject is asked questions such as "How many quarters in \$6.75?" and is instructed to "Subtract 3 from 20 and keep subtracting 3 from each new number all the way down." It has been suggested that AI reasoning processes are less linear-sequential-analytic and more global and holistic [62,63]. Some researchers also suggest significant differences in cerebral lateralization [64]; however, the differences in early educational and environmental experiences can not be ignored. AI responses could therefore be more indicative of differences in cognitive processing as a result of life experiences rather than a true measurement of cognitive impairment (eg, acalculia).

Another question requires elders to explain how they would locate an individual in a large city with which they are unfamiliar. Nearly all Native elders reply that they would ask someone, which is a "wrong" response on the mental status exam (correct would be to look in a phone book). In a Native community usually everyone knows everyone, and asking someone would be the most common and most efficient way to locate a person or family.

One of the most important issues involves rapport. As part of our exploration into cultural factors, at the end of each examination we ask the AI participant to review the cognitive assessment instruments and provide any comments on what could be changed to make them more fair, or if there were any "strange" things about them. One of the standard instruments is a story that the participant is asked to recall immediately and then 20 minutes after hearing it. When the story test was reviewed with one participant, she commented that she expected that after she heard our story, we would have asked her about her story as well. Essentially, she was saying that we violated her social procedures, and she was not "interested" in the test's story. Therefore, we could not tell whether her low recall was due to a learning problem, cultural issues with the story content, or because she was not appropriately engaged because of the way the task was presented.

This interchange exemplifies disparities in the ways that scientists and AIs frame the testing encounter. An enormous gulf exists between the priorities and perceptions of many scientists and most AI elders. AIs tend to have less intrinsic interest in the task of assessment and respond more on the basis of the client-examiner relationship in contrast to European Americans [65–67].

For the clinician, this was a professional encounter; his goal was to treat the elder with respect, while not biasing the test results in any way so that they would be a true measure of cognitive abilities and thus comparable to results from other individuals. He patiently explained the purpose of the test and provided evidence that he was competent to administer the test by stating his professional credentials. The Native elder, on the other hand, considered this to be a personal encounter in which she needed to establish some kind of human relationship. Earlier, the woman asked who the examiner was. When she did this, she was not asking about professional credentials, but rather where he was from geographically and perhaps something about his family and his personal reasons for administering the test. Only by establishing who he was in

personal terms would she feel comfortable enough to reveal what she considered to be personal information on the exam. A measure of trust needed to be established first.

Over time, AIs have experienced countless tests, evaluations, and other analyses on the basis of European American standards that have cast AI people in a less than capable, substandard light [17,68–70]. Trust in the assessor provides some measure of assurance that this person will use the test results in a way that benefits Native elders. The initial meeting between AI participant and examiner and the manner in which the assessor identifies himself or herself sets the tone for the session [17]. Furthermore, people who administer the assessments should expect to be talked about within the community in terms of their sincerity and character, or if actions are perceived as disrespectful. This is why establishing good relationships are vital to the assessment endeavor. AI elders might be more uncomfortable if they do not come into contact with medical personnel on a regular basis, and when a Native elder seems uncomfortable, the clinician needs to take this into account. Because cognitive evaluations require the active involvement and engagement of the person being evaluated in the assessment process, the issue of effort becomes paramount. Effort could be decreased not only by a clash in cultures but by other factors such as anxiety, depression, or mistrust of the examiner. Methods and instruments used to assess effort in clinical and forensic cases might be important for assessing engagement in the AI population. However, addressing the issue of respect with the elder before the assessment begins might vastly increase the probability of successful engagement in the assessment process.

6. Conclusion

AD is expected to become a more prominent health care issue for AIs as time goes on. There are several unique challenges to both the detection and assessment of AD in the AI population that must be recognized and addressed if clinical services are to be more effectively provided [8,71–73]. Through presentations followed by question and answer sessions in elder centers in Arizona Indian communities, the Arizona Alzheimer's Disease Outreach Program is seeking to both provide information on state-of-the-art research as well as understand the views of the communities we visit on topics related to aging and cognition. Ongoing work by our group, supported by a grant from the Alzheimer's Association, is evaluating the cultural appropriateness (for Arizona AIs) of existing assessments that were designed to be more "culture fair" (such as color trails [74]) as well as assessing the applicability of more standard assessments in this population. By understanding the impact of cultural and experiential factors in seeking and using health services, we can begin to address this area that has a major impact on the health disparities between AI populations and the majority population.

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References

1. Hendrie HC, Hall KS, Pillay N, Rodgers D, Prince C, Norton J, et al. Alzheimer's disease is rare in Cree. *International Psychogeriatrics* 1993;5:5–14. [PubMed: 8499574]
2. Rosenberg RN, Richter RW, Risser RC, Taubman K, Prado-Farmer I, Ebalo E, et al. Genetic factors for the development of Alzheimer disease in the Cherokee Indian. *Arch Neurol* 1996;54:997–1000. [PubMed: 8859062]
3. US Department of Health and Human Services. Indian Health Service Mental Health. Culture, race, and ethnicity. [Accessed: December 4, 2007]. Available at: <http://www.ihs.gov/publicinfo/publications/trends98/part4.pdf>

4. Jervis MS, Manson S. American Indians/Alaska Natives and dementia. *Alzheimer Dis Assoc Disord* 2002;16:S89–S95. [PubMed: 12351922]
5. U.S. Department of Health and Human Services (USDHHS). A supplement to Mental Health and Human Services, Public Health Service, Office of the Surgeon General, 2001, trends in Indian health 1998–1999. Rockville, MD: US Department of Health and Human Services; 2001. Indian Health Service Mental Health; Culture, Race, and Ethnicity.
6. Sandefur, JR.; Rindfus, RR.; Cohen, B. Washington, DC: National Academy Press; 1996. Demography of American Indian elders: social, economic, and health status—American Indian demography and public health; p. 218-231.
7. Feldstein AR. The pre-therapeutic classification of co-morbidity in chronic disease. *J Chron Dis* 1970;23:455–468.
8. Ferraro FR. Assessment and evaluation issues regarding Native American elderly adults. *Journal of Clinical Geropsychology* 2001;7:311–318.
9. Finke B. How do we screen for and diagnose dementia in AI/AN elders? *The IHHS Provider* 2003;28:7–8.
10. Sabbagh M, Silverberg N, Walker D, Connor DJ, Seward JD, Crocker-Sabbagh IP, et al. Case series of clinically probable dementia with Lewy bodies in two Native Americans. *Alzheimer Dis Assoc Dis* 2004;18:259–260.
11. Pueschel, M.; Community-based dementia care key in IHS. *U.S. Medicine. The Voice of Federal Medicine*. [Retrieved November 2004]. from <http://www.usmedicine.com/article.cfm?articleID=982&issueID=68>
12. Jervis, LL. Cognitive impairment among Northern Plains American Indian elders. Presented at the New Mexico Geriatric Center Grand Round Series. 2006 May 18 [Accessed: July 23, 2007]. Available at: <http://hscapp.unm.edu/hscmedia/index.cfm?D=4&C=1>
13. Jervis L, Manson S. Cognitive impairment, psychiatric disorders, and problematic behaviors in a tribal nursing home. *Journal of Aging and Health* 2007;19:260–274. [PubMed: 17413135]
14. Henderson JN, Henderson LC. Cultural construction of disease: a “supernormal” construct of dementia in an American Indian tribe. *Journal of Cross-Cultural Gerontology* 2002;17:197–212. [PubMed: 14617965]
15. Duran, E.; Duran, B. Native American postcolonial psychology. New York: State University of New York Press; 1995.
16. Braveheart MY, DeBruyn LM. The American Indian holocaust: healing historical unresolved grief. *American Indian and Alaska Native Mental Health Research* 1998;8:56–78. [PubMed: 9842066]
17. King, J.; Fletcher-Janzen, E. Neuropsychological assessment and intervention with Native Americans. In: Fletcher-Jensen, E.; Strickland, T.; Reynolds, C., editors. *Handbook of cross-cultural neuropsychology*. New York: Kluwer Academic/Plenum Publishers; 2000. p. 105-122.
18. Manson S. Extending the boundaries, bridging the gaps: crafting mental health: culture, race, and ethnicity: a supplement to the Surgeon General’s report on mental health. *Cult Med Psychiatry* 2003;27:395–408. [PubMed: 14727676]
19. Ssasz, M.; Carmelita, R. American Indian education: handbook of North American Indians. In: Washburn, WE., editor. *History of Indian-white relations*. Vol. vol 4. Washington, DC: Smithsonian; 1998. p. 284-300.
20. Meriam, L. The problem of Indian administration. Baltimore: Johns Hopkins Press; (reprinted: Johnson Reprint, NY, 1971)
21. Irwin MH, Rol S. The psychological impact of sexual abuse of Native American boarding school children. *J Am Acad Psychoanal* 1995;24:461–473. [PubMed: 8778083]
22. Joe, J. Revaluing Native American concepts of development and education revaluing Native American concepts of development and education. In: Greenfield, P.; Cocking, R., editors. *Cross-cultural roots of minority child development*. Hillsdale, NJ: Erlbaum; 1994. p. 107-113.
23. Washburn, W., editor. Introduction: history of Indian-white relations. Vol. vol 4. Washington, DC: Smithsonian; 1998.
24. US Department of Health and Human Services. Office of Public Health, Office of Program Support, Program Statistics Team. Trends in Indian Health: elders, 1998–9. [Accessed: December 4, 2007]. Available at: http://www.ihs.gov/NonMedicalPrograms/IHS_Stats/files/elders/1998.pdf

25. Yeo, G.; Gallagher-Thompson, editors. Background: ethnicity and the dementias. Washington, DC: Taylor and Francis; 1996. p. 3-7.
26. Hennessy CH, John R. The interpretation of burden among Pueblo Indian caregivers. *Journal of Aging Studies* 1995;9:215–229.
27. Hennessy CH, John R. American Indian family caregivers' perceptions of burden and needed support services. *Journal of Applied Gerontology* 1996;15:275–293.
28. Brown AS. A survey on elder abuse at one Native American tribe. *Journal of Elder Abuse Neglect* 1989;1:17–37.
29. Knopman DS, Dekosky ST, Cummings JL, Chui H, Cory-Bloom J, Relkin N, et al. Practice parameter: diagnosis of dementia (an evidence-based review)—report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2001;56:1143–1153. [PubMed: 11342678]
30. Dick, MB.; Tend, EL.; Kempler, D.; Davis; Taussig, IM. The cross-cultural neuropsychological test battery (CCNB): effects of age, education, ethnicity and cognitive status on performance. In: Ferraro, FR., editor. *Minority and cross-cultural aspects of neuropsychological assessment*. The Netherlands: Swets & Zietlinger: Lisse; 2002. p. 17-41.
31. Manly JJ, Schupf N, Tang MX, Stern Y. Cognitive decline and literacy among ethnically diverse elders. *J Geriatr Psychiatry Neurol* 2005;18:213–217. [PubMed: 16306242]
32. Barnes, PM.; Adams, PF.; Powell-Garner, E. Health characteristics of the American Indian and Alaska native adult population: United States, 1999–2003—advanced data from vital and health statistics. [Retrieved October 3, 2007]. from <http://www.cdc.gov/nchs/data/ad/ad356.pdf>
33. Beals J, Manson S, Mitchell C, Spicer P. AI-SUPERPPF Team. Cultural specificity and comparison in psychiatric epidemiology: walking the tightrope in American Indian research. *Cult Med Psychiatry* 2003;27:259–289. [PubMed: 14510095]
34. Manson, S. 1995 mental health status and needs of the American Indian and Alaska Native elderly: handbook on ethnicity, aging, and mental health. Padgett, editor. Westport, CT: Westport; 1995. p. 132-141.
35. Ogunwole, SU. Washington, DC: U.S. Government Printing Office; 2006. We the people: American Indians and Alaska natives in the United States, census 2000 special reports—U.S Census Bureau CENSR-28. Available at: <http://www.census.gov/prod/2006pubs/censr-28.pdf>
36. Johnson K, Anderson N, Bastida E, Kramer BJ, Williams D, Wong M. Macrosocial and environmental influences in minority health. *American Psychologist* 1995;14:601–612.
37. Jervis LL, Beals J, Fickensher A, Arciniegas DB. Performance on the Mini-Mental State Examination and Mattis Dementia Rating Scale among older American Indians. *J Neuropsychiatry Clin Neurosci* 2007;19:173–178. [PubMed: 17431064]
38. Brickman AM, Cabo R, Manly JJ. Ethical issues in cross-cultural neuropsychology. *Applied Neuropsychology* 2006;13:91–100. [PubMed: 17009882]
39. Federal Register; Indian entities recognized and eligible to receive services from the United States Bureau of Indian Affairs. 2007. p. 13648 Accessed through <http://www.doi.gov/bia/Winter2007-TribalLeaders.pdf>. 167. 72:55
40. Kehoe, A. Engle-wood Cliffs, NJ: Prentice Hall; 1992. North American Indians: a comprehensive account.
41. Griffin-Pierce, T. Native peoples of the Southwest. Albuquerque, NM: U of NM Press; 2000.
42. Rilling LM, Lucas JA, Ivnik RJ, Smith GE, Willis FB, Ferman TJ, et al. Mayo's older African American normative studies: norms for the Mattis dementia rating scale. *Clin Neuropsychol* 2005;19:229–242. [PubMed: 16019706]
43. Lucas JA, Ivnik RJ, Willis FB, Ferman TJ, Smith GE, Parfitt FC, et al. Mayo's older African Americans normative studies: normative data for commonly used clinical neuropsychological measures. *Clin Neuropsychol* 2005;19:162–183. [PubMed: 16019702]
44. Lucas JA, Ivnik RJ, Smith GE, Ferman TJ, Willis FB, Petersen RC, et al. A brief report on WAIS-R normative data collection in Mayo's older African Americans normative studies. *Clin Neuropsychol* 2005;19:184–188. [PubMed: 16019703]
45. Lucas JA, Ivnik RJ, Smith GE, Ferman TJ, Willis FB, Petersen RC, et al. Mayo's older African Americans normative studies: WMS-R norms for African American elders. *Clin Neuropsychol* 2005;19:189–213. [PubMed: 16019704]

46. Ferman TJ, Lucas JA, Ivnik RJ, Smith GE, Willis FB, Petersen RC, et al. Mayo's older African American normative studies: auditory verbal learning test norms for African American elders. *Clin Neuropsychol* 2005;19:214–228. [PubMed: 16019705]
47. Lucas JA, Ivnik RJ, Smith GE, Ferman TJ, Willis FB, Petersen RC, et al. Mayo's older African Americans normative studies: norms for Boston Naming Test, Controlled Oral Word Association, Category Fluency, Animal Naming, Token Test, Wrat-3 Reading, Trail Making Test, Stroop Test, and Judgment of Line Orientation. *Clin Neuropsychol* 2005;19:243–269. [PubMed: 16019707]
48. Pedraza O, Lucas JA, Smith GE, Willis FB, Graff-Radford NR, Ferman TJ, et al. Mayo's older African American normative studies: confirmatory factor analysis of a core battery. *J Int Neuropsychol Soc* 2005;11:184–191. [PubMed: 15962706]
49. Manly JJ. Advantages and disadvantages of separate norms for African Americans. *Clin Neuropsychol* 2005;19:270–275. [PubMed: 16019708]
50. Whyte SC, Cullum M, Hynan L, Lacritz LH, Rosenberg RN, Weiner MF. Performance of elderly Native Americans and Caucasians on the CERAD: Neuropsychological Battery. *Alzheimer Dis Assoc Disord* 2005;19:74–78. [PubMed: 15942324]
51. Weiner MF, Rosenberg RN, Svetlik D, Higgins M, Womack K, Fuller C, et al. Dementia diagnosis, treatment, and research with American Indians. *Alzheimer's & Dementia* 2006;2:327–329.
52. Freeman LC, Romney AK, Freeman SC. Cognitive structure and informant accuracy. *American Anthropologist* 1987;89:310–325.
53. Dauphinais, L. Unpublished doctoral dissertation. Norman, OK: University of Oklahoma; 1981. American Indian and Anglo perceptions of speaker, message structure, and message orientation.
54. Dauphinais, P. Unpublished doctoral dissertation. Norman, OK: University of Oklahoma; 1981. American Indian College student preference of counselor communication style.
55. Heath, SB. *Ways with words: language, life and work in communities and classrooms*. Cambridge, UK: Cambridge University Press; 1983.
56. O'Conner, MC. Aspects of differential performance by minorities on standardized tests: linguistic and sociocultural factors. In: Gifford, BR., editor. *Test policy and test performance: education, language, and culture*. Boston: Kluwer Academic; 1989. p. 129-181.
57. Strauss, C.; Quinn, N. *A cognitive theory of cultural meaning*. New York: Cambridge University Press; 2001.
58. Gollan TH, Fennema-Notestine C, Montoya RL, Jernigan TL. The bilingual effect on Boston Naming Test performance. *J Int Neuropsychol Soc* 2007;13:197–208.
59. Langdon, HW. *Interpreter/translator process in the educational setting: a resource manual*. Sacramento, CA: Resources in Special Education; 1992.
60. Kayser, H. Hispanic cultures. In: Battle, D., editor. *Communication disorders in multicultural populations*. Boston: Andover Medical Publishers; 1993. p. 114-157.
61. LaFramboise T. American Indian mental health policy. *American Psychologist* 1988;43:388–397. [PubMed: 3389584]
62. Cattey M. Cultural differences in processing information. *Journal of American Indian Education* 1980;20:23–28.
63. Tharp, R. Intergroup differences among Native Americans in socialization and child cognition: an ethnographic analysis. In: Greenfield, P.; Cocking, R., editors. *Cross-cultural roots of minority child development*. Hillsdale, NJ: Erlbaum; 1994. p. 87-105.
64. Scott S, Hynd G, Hunt L, Weed W. Cerebral speech lateralization in the Native American Navajo. *Neuropsychologia* 1979;17:89–92. [PubMed: 431814]
65. Dana, RH. The Thematic Apperception Tests (TAT). Major psychological assessment instruments. Newmark, CS., editor. Newton, MA: Allyn and Bacon; 1985. p. 89-134.
66. Gibbs JT. The interpersonal orientation in mental health consultation: toward a model of ethnic variations in consultation. *Journal of Community Psychology* 1980;8:195–207.
67. Roll S, Millen L, Martinez R. Common errors in psychotherapy with Chicanos: extrapolation from research and clinical experience. *Psychotherapy Theory, Research, and Practice* 1980;17:158–168.
68. Dalton R. When two tribes go to war. *Nature* 2004;430:500–502. [PubMed: 15282577]

69. Rubin, R. Indian givers. Phoenix New Times. 2004 May 27 [Retrieved October 2, 2007]. from <http://www.phoenixnewtimes.com/issues/2004-05-7/feature.html/1/index.html>
70. Manson, S. American Indian and Alaska native mental health research. Journal of the National Center, 2(3). Spring; 1989 [Retrieved October 2, 2007]. from [http://aianp.uchsc.edu/ncaianmhr/journal/pdf_files/2\(3\).pdf](http://aianp.uchsc.edu/ncaianmhr/journal/pdf_files/2(3).pdf)
71. Gardiner, JC.; Tansley, DP.; Ertz, DJ. Native Americans: future directions. In: Ferraro, R., editor. Minority and cross-cultural aspects of neuropsychological assessment. Lisse, Netherlands: Swets & Zeitlinger; 2002. p. 241-261.
72. Ferraro FR, McDonald LR, Allery A, Irwin A, Lambert P, Sutherland J, et al. Mini Mental Status Examination performance in Native American elderly: preliminary data. Journal of Native Aging and Health 2007;2:15–17.
73. Ferraro, FR.; Bercier, B.; Holm, J.; McDonald, J. Preliminary normative data from a brief neuropsychological test battery sample of Native American elderly. In: Ferraro, FR., editor. Minority and cross cultural aspects of neuropsychological assessment. Netherlands Swets and Zeitlinger: Lisse; 2002. p. 227-240.
74. D'Elia, LF.; Satz, P.; Uchiyama, CL.; White, T. Color Trails Test (professional manual). Lutz, FL: Psychological Assessment Resources Inc; 1994.