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**DISCUSSION**

To our knowledge, this is the first study to describe historical losses and their associated symptoms in an urban population of Indigenous adults at risk for diabetes. Nearly half (49%) of participants with Indigenous ancestry from the United States or Canada and a third (32%) of participants with Indigenous ancestry from Latin America thought about one or more historical losses at least weekly. In addition, 62% of all participants experienced at least one symptom associated with historical losses sometimes, often, or always. These findings illustrate that historical trauma, as measured by the HLS and HLAS scales, was frequently experienced in this sample of Indigenous adults living in an urban area.

In 2004, Whitbeck et al. reported HLS and HLAS data for 143 Indigenous adults recruited from two reservations in the American Midwest. Weekly or more often, over half of these adults thought about various losses, and some items from the HLAS were endorsed by over 60% of respondents. Indigenous adults in our sample, recruited from an urban area, experienced similar historical losses and associated symptoms as their reservation-based counterparts but at slightly lower levels. It is possible that individuals residing in tribal reservations face additional stressors such as deep poverty, unemployment, and other socioeconomic barriers (Krogstad, 2014), which may exacerbate symptoms associated with historical trauma.

The literature comparing historical trauma and associated symptoms among Indigenous groups with diverse ancestry is scarce (Brave Heart et al., 2011). Findings from the present study further the extant literature on differences in experiences and magnitude of historical loss and trauma by ancestry. We found that a higher proportion of participants with Indigenous ancestry from the United States or Canada endorsed thinking about one or more historical losses weekly, daily, or several times a day, compared to their counterparts with Latin American ancestry. This was also shown in our multivariate analysis where participants who were Indigenous to the United States or Canada had higher scores in the HLS and HLAS, even after controlling for other covariates. Observed differences may reflect group differences in historical experiences with

colonization, assimilation, and acculturation. Such differences may reflect the importance of place in contextualizing historical trauma, in particularly histories and experiences of displacement and land loss (Walters, Beltran et al., 2011). Indigenous participants of Latin American descent could also be experiencing other, and perhaps more, salient discrimination events related to assumptions of foreign-born status and current anti-immigrant sentiment across the country. Given the diversity of Indigenous populations, it may be important to consider ancestry differences in HLS and HLAS when designing and delivering interventions in this context.

The finding that participants who more frequently engaged in cultural practices may be particularly vulnerable to experiences of historical trauma is a complex finding requiring further exploration. It is important to emphasize that, in general, the literature supports a buffering effect of engagement in traditional cultural and spiritual practices in combating negative impacts of environmental insults and are generally recommended for diabetes programs (Brave Heart et al., 2011; Mitchell, 2012; Shaw et al., 2013). It is possible that participation in cultural and religious practices may have increased awareness of historical trauma and its sequelae. This experience may result in an increased need for support and opportunities to process. Interventions could provide support and opportunities to heal and develop culturally congruent and appropriate coping or cultural revitalization strategies. This may be particularly relevant for urban communities that may lack or have more intermittent cultural sources of support and racial socialization available to them. It is also possible that the positive association of participation in cultural activities and historical losses does not account for other important variables. Prior research has shown that stronger ethnic identification and less comfort in mainstream society were associated with increased thoughts of historical loss among AI college students (Tucker et al., 2016). Additionally, systematic reviews have identified engagement in traditional Indigenous ways of life to be associated with lower adherence to self-management recommendations, in part due to mistrust in providers (Scarton & de Groot, 2016). These studies point to the potential role of additional variables—such as discrimination and mistrust—in explaining findings. Thus, findings not accounting for these additional variables should be interpreted with caution.

Positive bivariate associations observed in this study between depression and food insecurity with HLS and HLAS scores may elucidate how historical trauma could compromise diabetes prevention efforts, in particular by negatively influencing health behaviors. For example, previous studies have shown that depression and food insecurity are negatively associated with physical activity (Cueva et al., 2020; Delahanty et al., 2006; To et al., 2014), positively associated

with obesity (Luppino et al., 2010; Pan et al., 2012), and independently associated with an increased risk of diabetes (Kahl et al., 2015; Gucciardi et al., 2014). Thus, incorporating interventions that address depression and food insecurity may be important adjunctive strategies for successful diabetes prevention in the context of historical trauma. Indeed, food is integrally connected to culture and traditional knowledge and practices (Alonso et al., 2019; DeBruyn et al., 2020; Satterfield et al., 2016). Discussions around traditional foods have been implemented as a way of discussing culture and history and promoting conversations around health and diabetes prevention in Indigenous communities (DeBruyn et al., 2020). These conversations and activities involve growing and preparing foods, storytelling, and talking circles. Moreover, the food sovereignty movement has received recent attention, particularly among tribes (DeBruyn et al., 2020), as a way to restore the local food environment, while incorporating elders and intergenerational knowledge sharing. An example of this traditional food movement can be found in Phoenix, AZ, where an urban garden ties sustainable food access with education, capacity building programs, and storytelling to connect food with health and well-being for urban Indigenous communities (Wesner, 2015).

Other urban Indigenous programs are also using holistic approaches to improve diabetes prevention and control. The Sogorea Te' Land Trust program<sup>1</sup> in Northern California incorporates food access and nutrition activities (urban gardens, cooking of culturally appropriate recipes, food distribution), mental health (activities aimed at increasing socialization and involving elders as role models), language revitalization programs, spirituality (via ceremonies), and promotion of physical activity (in part via working in the land). Other aspects involve leadership opportunities, creating a space to share and return to, and conducting advocacy around land rights and historical trauma. Additional research is needed to assess the efficacy of these types of programs as a different strategy for addressing diabetes and other chronic diseases in Indigenous communities.

Despite these promising efforts, a few limitations exist. First, the majority of research has been conducted in tribal communities (Alonso et al., 2019; DeBruyn et al., 2020; Satterfield et al., 2014), highlighting the need for similar programs in urban areas. Second, while traditional components of DPP interventions involve discussion and content around healthy eating and nutrition, our findings suggest a need to address food security as well. For example, programs adapted for urban medically underserved communities, including Indigenous ones, concentrate on promoting healthy food choices (Benyshek et al., 2013; Seidel et al., 2008); however, it is less

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<sup>1</sup> <https://sogoreate-landtrust.org>

evident whether they discuss or address potentially underlying food insecurity. In fact, scholars have pointed to a lack of efforts to address underlying socioeconomic factors (including food insecurity, poverty) that can facilitate long lasting and systemic prevention of diabetes, obesity, and other comorbid conditions (Spencer et al., 2016). Finally, while DPP interventions include discussions around stress management and problem solving, discussions around depression or historical trauma associated symptoms (e.g., anxiety) are not typically included. Storytelling and talking circles appear to be the most common strategies used to incorporate historical trauma and incorporate cultural and traditional values into Indigenous diabetes programs (Rosas et al., 2016; Satterfield et al., 2014).

### **Research and Clinical Implications**

A dearth of empirical research exists addressing the health of urban Indigenous communities in the context of diabetes and historical trauma. While limited research and interventions exist for urban Indigenous populations, some studies have successfully implemented culturally congruent strategies including talking circles, storytelling, and photovoice to engage Indigenous participants in a DDP (Rosas et al., 2016). Additional research providing data for different groups (e.g., urban vs. tribal communities, different ancestry groups), exploring nuances in cultural and demographic characteristics and their impact on chronic conditions, as well as exploring potential interventions is crucial.

Clinically, our results can increase awareness among primary care providers and other health care professionals of the prevalence of historical loss and associated symptoms among Indigenous adults at risk for diabetes. Clinical interventions such as the Historical Trauma and Unresolved Grief Intervention (Brave Heart, 1998) could potentially be integrated with diabetes prevention. The positive association observed between depression and historical loss and associated symptoms underscores the importance of integrating support for mental wellness. As such, culturally centered depression interventions may be important for effective diabetes prevention. Primary-care based brief low-intensity depression interventions have been shown to be effective with diverse populations (Lopez-Montoyo et al., 2019). Additionally, incorporating traditional medicine could be a potential strategy for ameliorating the impacts of trauma (Marsh et al., 2016) and positively influence health (Mainguy et al., 2013).

Given the complexity of historical trauma and its associated symptoms, which can include symptoms of anxiety, depression, substance use, and post-traumatic stress (Sotero, 2006), holistic



approaches to addressing mental health are needed. Moreover, providers must be educated on the multiple ways in which historical trauma can be experienced by current generations. For example, via experiences as children (e.g., exposure to relatives who were direct victims of trauma and subjugation), behavioral and social problems in the community (e.g., suicides, substance use), collective memory and oral traditions (e.g., accounts of trauma shared via storytelling), and through direct experiences of ongoing trauma and marginalization (e.g., deep poverty and deprivation, discrimination, social inequities) over the individuals' lifetime (Sotero, 2006). This complexity also calls for new paradigms and programs (Duran et al., 1998; 2019) and the need to connect the past with the present in the case conceptualization and in treatment planning.

### **Study Limitations and Future Directions**

The present study has limitations to consider. First, experiences of historical loss and trauma captured in this study may not be generalizable to Indigenous populations living on reservations or in other urban areas. In addition, the cross-sectional design of this study limits the ability to ascertain causal relationships between historical loss and trauma and participant characteristics. Future studies using longitudinal designs should examine direction of associations and test whether intervening in certain psycho-social variables (e.g., depression) can reduce the endorsement and impacts of historical trauma-associated symptoms. Longitudinal research is also needed for understanding complex relationships between historical losses, associated symptoms, and health behaviors. Moreover, we employed HLS and HLAS as our primary measures of historical trauma, which conceptualize a complex phenomenon mostly within the spectrum of emotional distress. Although we adapted some of the content for our population, it is possible that other measures might be better able to capture specific stressors faced by urban Indigenous populations. Additionally, it is possible that participants and community members may have different conceptualizations of and reactions to historical trauma compared to those measures by Whitbeck and others. As the empirical literature surrounding historical trauma continues to grow, psychometric refinement of measures and population specific data is needed. We hope our data contributes to this effort and can be used by future metanalysis or other cross-study synthesis efforts. Finally, future studies should consider other factors that also contribute to diabetes and other chronic conditions. For instance, exposure to pollutants (e.g., polychlorinated biphenyls, pesticides) has been associated with diabetes and obesity in Indigenous communities (Aminov &

Carpenter, 2020; Codru et al., 2007). Thus, future studies should assess key environmental and social factors that can further illuminate risk and areas for additional intervention.

The results of this study suggest that historical trauma and associated symptoms are prevalent among urban Indigenous adults at risk for diabetes, particularly Indigenous adults from the United States and Canada. Strategies that address these challenges may improve engagement and success in prevention programs for Indigenous individuals in urban areas. Additionally, observed associations between HLS and HLAS with frequent participation in cultural activities deserves more attention to understand how this cultural asset could be leveraged to improve diabetes prevention for this population.

## CONCLUSION

The prevalence of diabetes in the United States calls for reinvigorated efforts to attenuate this public health crisis. The results of this study highlight the needs of urban Indigenous adults, which are distinct from the significant public health efforts needed on U.S. reservations. These findings suggest that as preventive efforts serving Indigenous adults expand in urban environments, behavioral interventions must incorporate strategies that address community-identified barriers to success. For our community partner and in this study, historical trauma was identified as a challenge that manifested as comorbid depression and low food security, which could decrease the likelihood of successful diabetes prevention efforts. Identifying and addressing the unique challenges specific to distinct communities and unique to urban settings has the greatest potential for successful program implementation and diabetes prevention.

## List of Abbreviations

AI/AN: American Indian, Alaska Native; DPP: Diabetes Prevention Program; HLS: Historical Loss Scale; HLAS: Historical Loss Associated Symptom Scale.

## REFERENCES

Ablon, J. (1964). Relocated American Indians in the San Francisco Bay Area: Social interaction and Indian identity. *Human Organization*, 23(4), 296-304. <http://www.jstor.org/stable/44125165>

- Aminov, Z., & Carpenter, D. O. (2020). Serum concentrations of persistent organic pollutants and the metabolic syndrome in Akwesasne Mohawks, a Native American community. *Environmental Pollution*, 260, 114004. <https://doi.org/10.1016/j.envpol.2020.114004>
- Alonso, L., Decora, L., & Bauer, U. E. (2019). Obesity and diabetes in the Winnebago Tribe of Nebraska: From community engagement to action, 2014–2019. *Preventing Chronic Disease*, 16(8), 190181. <https://doi.org/10.5888/pcd16.190181>
- Benyshek, D. C., Chino, M., Dodge-Francis, C., Begay, T. O., Jin, H., & Giordano, C. (2013). Prevention of type 2 diabetes in urban American Indian/Alaskan Native communities: The Life in BALANCE pilot study. *Journal of Diabetes Mellitus*, 3(4), 184–191. <https://doi.org/10.4236/jdm.2013.34028>
- Blumberg, S. J., Bialostosky, K., Hamilton, W. L., & Briefel, R. R. (1999). The effectiveness of a short form of the Household Food Security Scale. *American Journal of Public Health*, 89(8), 1231–1234. <https://doi.org/10.2105/ajph.89.8.1231>
- Brave Heart, M. Y. (1998). The return to the sacred path: Healing the historical trauma and historical unresolved grief response among the Lakota through a psychoeducational group intervention. *Smith College Studies in Social Work*, 68(3), 287–305. <https://doi.org/10.1080/00377319809517532>
- Brave Heart, M. Y., Chase, J., Elkins, J., & Altschul, D. B. (2011). Historical trauma among Indigenous Peoples of the Americas: Concepts, research, and clinical considerations. *Journal of Psychoactive Drugs*, 43(4), 282–290. <https://doi.org/10.1080/02791072.2011.628913>
- Brave Heart, M. Y., & DeBruyn, L. M. (1998). The American Indian Holocaust: Healing historical unresolved grief. *American Indian and Alaska Native Mental Health Research*, 8(2), 56–78. <https://doi.org/10.5820/aian.0802.1998.60>
- Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Archives of Internal Medicine*, 158(16), 1789–1795. <https://doi.org/10.1001/archinte.158.16.1789>
- Centers for Disease Control and Prevention (CDC). (2017). *National diabetes statistics report, 2017*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. <https://www.cdc.gov/diabetes/data/statistics/statistics-report.html>
- Centers for Disease Control and Prevention (CDC). (2020). *National diabetes statistics report 2020: Estimates of diabetes and its burden in the United States*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>

- Codru, N., Schymura, M.J., & Negoita, S., (2007). Diabetes in relation to serum levels of polychlorinated biphenyls and chlorinated pesticides in adult Native Americans. *Environmental Health Perspectives*, 115(10), 1442-1447. <https://doi.org/10.1289/ehp.10315>
- Cueva, K., Lovato, V., Carroll, D., Richards, J., Speakman, K., Neault, N., & Barlow, A. (2020). A qualitative evaluation of a community based, culturally relevant intervention to promote healthy food access in American Indian Communities. *Journal of Community Health*, 45(3), 458-464. <https://doi.org/10.1007/s10900-019-00760-4>
- DeBruyn, L., Frank, M., Fullerton, L., & Satterfield, D. (2020). Integrating culture and history to promote health and help prevent type 2 diabetes in American Indian/Alaska Native communities: Traditional foods have become a way to talk about health. *Preventing Chronic Disease*, 17, 1–14. <https://doi.org/10.5888/pcd17.190213>
- Delahanty, L. M., Conroy, M. B., Nathan, D. M., & Diabetes Prevention Program Research Group (2006). Psychological predictors of physical activity in the diabetes prevention program. *Journal of the American Dietetic Association*, 106(5), 698–705. <https://doi.org/10.1016/j.jada.2006.02.011>
- Duran, E. (2019). *Healing the soul wound: Trauma-informed counseling for Indigenous communities* (2<sup>nd</sup> ed.). Teachers College Press.
- Duran, E., Duran, B., Brave Heart, M. Y., & Yellow Horse-Davis, S. (1998). Healing the American Indian soul wound. In: Danieli Y. (Eds), *International Handbook of Multigenerational Legacies of Trauma* (pp.341-354). Springer, Boston, MA.
- Evans-Campbell, T. (2008). Historical trauma in American Indian/Native Alaska communities: A multilevel framework for exploring impacts on individuals, families, and communities. *Journal of Interpersonal Violence*, 23(3), 316–338. <https://doi.org/10.1177/0886260507312290>
- Gucciardi, E., Vahabi, M., Norris, N., Del Monte, J. P., & Farnum, C. (2014). The intersection between food insecurity and diabetes: A review. *Current Nutrition Reports*, 3(4), 324–332. <https://doi.org/10.1007/s13668-014-0104-4>
- Indian Health Service. (2018). *Urban Indian health program*. Fact sheets. Indian Health Service, Rockville, MD. <https://www.ihs.gov/newsroom/factsheets/uihp/>
- Jiang, L., Manson, S. M., Beals, J., Henderson, W. G., Huang, H., Acton, K. J., Roubideaux, Y., & Special Diabetes Program for Indians Diabetes Prevention Demonstration Project (2013). Translating the Diabetes Prevention Program into American Indian and Alaska Native communities: Results from the Special Diabetes Program for Indians Diabetes Prevention demonstration project. *Diabetes Care*, 36(7), 2027–2034. <https://doi.org/10.2337/dc12-1250>
- Kahl, K. G., Schweiger, U., Correll, C., Müller, C., Busch, M. L., Bauer, M., & Schwarz, P. (2015). Depression, anxiety disorders, and metabolic syndrome in a population at risk for type 2 diabetes mellitus. *Brain and Behavior*, 5(3), e00306. <https://doi.org/10.1002/brb3.306>

- Knight, R. G., Williams, S., McGee, R., & Olanan, S. (1997). Psychometric properties of the Centre for Epidemiologic Studies Depression Scale (CES-D) in a sample of women in middle life. *Behaviour Research and Therapy*, 35(4), 373–380. [https://doi.org/10.1016/s0005-7967\(96\)00107-6](https://doi.org/10.1016/s0005-7967(96)00107-6)
- Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., Nathan, D. M., & Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine*, 346(6), 393–403. <https://doi.org/10.1056/NEJMoa012512>
- Krogstad, J. M. (2014). *One-in-four Native Americans and Alaska Natives are living in poverty*. Pew Research Center. <https://www.pewresearch.org/fact-tank/2014/06/13/1-in-4-native-americans-and-alaska-natives-are-living-in-poverty/>
- Lopez-Montoyo, A., Quero, S., Montero-Marin, J., Barcelo-Soler, A., Beltran, M., Campos, D., & Garcia-Campayo, J. (2019). Effectiveness of a brief psychological mindfulness-based intervention for the treatment of depression in primary care: Study protocol for a randomized controlled clinical trial. *BMC Psychiatry*, 19(301). <https://doi.org/10.1186/s12888-019-2298-x>
- Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: A systematic review and meta-analysis of longitudinal studies. *Archives of General Psychiatry*, 67(3), 220–229. <https://doi.org/10.1001/archgenpsychiatry.2010.2>
- Mainguy, B., Valenti Pickren, M., & Mehl-Madrona, L. (2013). Relationships between level of spiritual transformation and medical outcome. *Advances in Mind-Body Medicine*, 27(1), 4–11. [https://www.researchgate.net/publication/235363777\\_Relationships\\_between\\_level\\_of\\_spiritual\\_transformation\\_and\\_medical\\_outcome](https://www.researchgate.net/publication/235363777_Relationships_between_level_of_spiritual_transformation_and_medical_outcome)
- Marsh, T.N., Young, N. L., Meek, S. C., Najavits, L. M., & Toulouse, P. (2016). Impact of Indigenous healing and seeking safety on intergenerational trauma and substance use in an Aboriginal sample. *Journal of Addiction Research & Therapy*, 7(3), 284. <https://doi.org/10.4172/2155-6105.1000284>
- McLaughlin, S. (2010). Traditions and diabetes prevention: A healthy path for Native Americans. *Diabetes Spectrum*, 23(4), 272-277. <https://spectrum.diabetesjournals.org/content/23/4/272>
- Meyer, A. M., Evenson, K. R., Morimoto, L., Siscovick, D., & White, E. (2009). Test-retest reliability of the Women's Health Initiative physical activity questionnaire. *Medicine and Science in Sports and Exercise*, 41(3), 530–538. <https://doi.org/10.1249/MSS.0b013e31818ace55>
- Mitchell F. (2012). Reframing diabetes in American Indian communities: A social determinants of health perspective. *Health & Social Work*, 37(2), 71–79. <https://doi.org/10.1093/hsw/hls013>

- McTiernan, A., Kooperberg, C., White, E., Wilcox, S., Coates, R., Adams-Campbell, L. L., Woods, N., & Ockene, J. (2003). Recreational physical activity and the risk of breast cancer in postmenopausal women: The Women's health initiative cohort study. *JAMA*, *290*(10), 1331–1336. <https://doi.org/10.1001/jama.290.10.1331>
- Nguyen, Q. B., & Zhu, S. H. (2009). Intermittent smokers who used to smoke daily: A preliminary study on smoking situations. *Nicotine & Tobacco Research*, *11*(2), 164–170. <https://doi.org/10.1093/ntr/ntp012>
- Pan, L., Sherry, B., Njai, R., & Blanck, H. M. (2012). Food insecurity is associated with obesity among US adults in 12 states. *Journal of the Academy of Nutrition and Dietetics*, *112*(9), 1403–1409. <https://doi.org/10.1016/j.jand.2012.06.011>
- Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin*, *135*(4), 531–554. <https://doi.org/10.1037/a0016059>
- Peterson, N. (2006). Culture. In Hunter B. (Ed.), *Assessing the evidence on Indigenous socioeconomic outcomes: A focus on the 2002 NATSISS* (pp. 269-278). ANU Press. <http://www.jstor.org/stable/j.ctt2jbj3f.28>
- Phinney, J. S. (1992). The multigroup ethnic identity measure: A new scale for use with diverse groups. *Journal of Adolescent Research*, *7*(2), 156–176. <https://doi.org/10.1177/074355489272003>
- Physical Activity Guidelines Advisory Committee. (2018). *2018 physical activity guidelines advisory committee scientific report*. To the Secretary of Health and Human Services, Part A: Executive summary. [https://health.gov/sites/default/files/2019-09/02\\_A\\_Executive\\_Summary.pdf](https://health.gov/sites/default/files/2019-09/02_A_Executive_Summary.pdf)
- Rosas, L. G., Vasquez, J. J., Hedlin, H. K., Qin, F. F., Lv, N., Xiao, L., Kendrick, A., Atencio, D., & Stafford, R. S. (2020). Comparing enhanced versus standard Diabetes Prevention Program among Indigenous adults in an urban setting: A randomized controlled trial. *BMC Public Health*, *20*(139). <https://doi.org/10.1186/s12889-020-8250-7>
- Rosas, L. G., Vasquez, J. J., Naderi, R., Jeffery, N., Hedlin, H., Qin, F., LaFromboise, T., Megginson, N., Pasqua, C., Flores, O., McClinton-Brown, R., Evans, J., & Stafford, R. S. (2016). Development and evaluation of an enhanced Diabetes Prevention Program with psychosocial support for urban American Indians and Alaska Natives: A randomized controlled trial. *Contemporary Clinical Trials*, *50*, 28–36. <https://doi.org/10.1016/j.cct.2016.06.015>
- Satterfield, D., DeBruyn, L., Santos, M., Alonso, L., & Frank, M. (2016). Health promotion and diabetes prevention in American Indian and Alaska Native communities--Traditional Foods Project, 2008-2014. *MMWR Supplements*, *65*(1), 4–10. <https://doi.org/10.15585/mmwr.su6501a3>

- Scarton, L., & de Groot, M. (2016). Emotional and behavioral aspects of diabetes in American Indians/Alaska Natives: A systematic literature review. *Health Education & Behavior, 44*(1), 70-82. <https://doi.org/10.1177/1090198116639289>
- Seidel, M. C., Powell, R. O., Zgibor, J. C., Siminerio, L. M., & Piatt, G. A. (2008). Translating the Diabetes Prevention Program into an urban medically underserved community: A nonrandomized prospective intervention study. *Diabetes Care, 31*(4), 684–689. <https://doi.org/10.2337/dc07-1869>
- Shaw, J., Brown, J., Khan, B., Mau, M., & Dillard, D. (2013). Resources, roadblocks and turning points: A qualitative study of American Indian/Alaska Native adults with type 2 diabetes. *Journal of Community Health, 38*(1), 86–94. <https://doi.org/10.1007/s10900-012-9585-5>
- Sotero, M. M. (2006). A conceptual model of historical trauma: Implications for public health practice and research. *Journal of Health Disparities Research and Practice, 1*(1), 93-108.
- Spencer Bonilla, G., Rodriguez-Gutierrez, R., & M. Montori, V. (2016). What we don't talk about when we talk about preventing type 2 diabetes—Addressing socioeconomic disadvantage. *JAMA Internal Medicine, 176*(8), 1053–1054. <https://doi.org/10.1001/jamainternmed.2016.2952>
- Stefanick, M. L., King, A. C., Mackey, S., Tinker, L. F., Hlatky, M. A., LaMonte, M. J., Bellettiere, J., Larson, J. C., Anderson, G., Kooperberg, C. L., & LaCroix, A. Z. (2021). Women's health initiative strong and healthy pragmatic physical activity intervention trial for cardiovascular disease prevention: Design and baseline characteristics. *The Journals of Gerontology: Series A, 76*(4), 725-734. <https://doi.org/10.1093/gerona/glaa325>
- Teufel-Shone, N. I., Jiang, L., Beals, J., Henderson, W. G., Zhang, L., Acton, K. J., Roubideaux, Y., & Manson, S. M. (2015). Demographic characteristics and food choices of participants in the Special Diabetes Program for American Indians Diabetes Prevention Demonstration Project. *Ethnicity & Health, 20*(4), 327–340. <https://doi.org/10.1080/13557858.2014.921890>
- To, Q. G., Frongillo, E. A., Gallegos, D., & Moore, J. B. (2014). Household food insecurity is associated with less physical activity among children and adults in the U.S. population. *The Journal of Nutrition, 144*(11), 1797–1802. <https://doi.org/10.3945/jn.114.198184>
- Tucker, R. P., Wingate, L. R., & O'Keefe, V. M. (2016). Historical loss thinking and symptoms of depression are influenced by ethnic experience in American Indian college students. *Cultural Diversity & Ethnic Minority Psychology, 22*(3), 350–358. <https://doi.org/10.1037/cdp0000055>
- Walters, K. L., Beltran, R., Huh, D., & Evans-Campbell, T. (2011) Dis-placement and Dis-ease: Land, place, and health among American Indians and Alaska Natives. In L. Burton, S. Matthews, M. Leung, S. Kemp, & D. Takeuchi (Eds.), *Communities, Neighborhoods, and Health* (vol 1, pp. 163-199). Springer, New York: NY. [https://doi-org/10.1007/978-1-4419-7482-2\\_10](https://doi-org/10.1007/978-1-4419-7482-2_10)

- Walters, K. L., Mohammed, S. A., Evans-Campbell, T., Beltrán, R. E., Chae, D. H., & Duran, B. (2011). Bodies don't just tell stories, they tell histories: Embodiment of historical trauma among American Indians and Alaska Natives. *Du Bois Review: Social Science Research on Race*, 8(01), 179-189. <http://dx.doi.org/10.1017/S1742058X1100018X>
- Wesner, C. (2015). Part IV: Traditional foods in Native America: A compendium of stories from the indigenous food sovereignty movement in American Indian and Alaska Native Communities. *Native Diabetes Wellness Program, Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/diabetes/ndwp/traditional-foods/index.html>
- Whitbeck, L. B., Adams, G. W., Hoyt, D. R., & Chen, X. (2004). Conceptualizing and measuring historical trauma among American Indian people. *American Journal of Community Psychology*, 33(3-4), 119–130. <https://doi.org/10.1023/b:ajcp.0000027000.77357.31>
- Whitbeck, L. B., Walls, M. L., Johnson, K. D., Morrisseau, A. D., & McDougall, C. M. (2009). Depressed affect and historical loss among North American Indigenous adolescents. *American Indian and Alaska Native Mental Health Research*, 16(3), 16–41. <https://doi.org/10.5820/aian.1603.2009.16>

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### CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.



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## APPENDIX

**Table A1**  
***Frequencies of historical losses among Indigenous persons from the US and Canada (n = 126)***

	Never, Yearly, Only special times (%)	Monthly (%)	Weekly, Daily, Several times a day (%)
The loss of our land	66.7	13.3	20.0
The loss of our Indigenous language	67.5	15.5	17.0
Losing our traditional spiritual ways	59.4	19.5	21.1
The loss of our family ties because of boarding or residential schools	73.0	13.9	13.1
The loss of families from the reservation to government relocation	76.9	10.7	12.4
The loss of self-respect from poor treatment by government officials	71.5	11.4	17.1
The loss of trust in whites from broken treaties	68.6	12.4	19.0
Losing our culture	60.7	15.5	23.8
The losses from the effects of alcoholism on our people	53.7	17.1	29.2
The losses from the effects of drugs on our people	54.6	14.0	31.4
Loss of respect by our children and grandchildren for elders	54.0	17.0	29.0
Loss of our Indigenous people through early death	62.3	15.6	22.1
Loss of respect by our children for traditional ways	58.2	18.8	23.0

**Table A2**  
***Frequencies of Historical Losses Among Indigenous Persons from Mexico and Central and South America***  
***(n = 67)***

	Never, Yearly, Only special times (%)	Monthly (%)	Weekly, Daily, Several times a day (%)
The loss of our land due to the Spanish conquest or colonization	79.5	6.9	13.7
The loss of our land due to immigration or migration to the US	78.7	9.3	12.0
The loss of our land due to being a refugee	91.7	5.6	2.8
The loss of our Indigenous language due to the Spanish conquest or colonization	82.2	11.0	6.8
The loss of our Indigenous language due to immigration or migration to the US	83.6	6.9	9.6
The loss of our Indigenous language due to being a refugee	94.3	4.3	1.4
Losing our traditional spiritual ways due to the Spanish conquest or colonization	82.4	9.5	8.1
Losing our traditional spiritual ways due to immigration or migration to the US	87.8	6.8	5.4
Losing our traditional spiritual ways due to being a refugee	92.9	5.7	1.4
The loss of our family ties because of boarding or residential schools	87.3	7.0	5.6
The loss of families from the reservation to government relocation	91.4	5.7	2.9
The loss of self-respect from poor treatment by government officials due to the Spanish conquest or colonization	86.0	7.0	7.0
The loss of self-respect from poor treatment by government officials due to immigration or migration to the US	88.7	7.0	4.2
The loss of self-respect from poor treatment by government officials due to being a refugee	92.9	5.7	1.4
The loss of trust in whites from broken treaties	86.3	11.0	2.7
Losing our culture	70.7	18.7	10.7
The losses from the effects of alcoholism on our people	78.4	9.5	12.2
The losses from the effects of drugs on our people	77.0	10.8	12.2
Loss of respect by our children and grandchildren for elders	60.5	19.7	19.7
Loss of our Indigenous people through early death	73.7	14.5	11.8
Loss of respect by our children for traditional ways	69.3	12.0	18.7

**Table A3**  
***Frequencies of emotional responses to historical losses (n = 205)<sup>1</sup>***

	Never (%)	Seldom (%)	Sometimes (%)	Often (%)	Always (%)
How often do you feel sadness or depression?	31.9	22.9	34.6	7.9	2.7
How often do you feel anger?	37.6	24.3	26.9	7.9	3.2
How often do you feel like you are remembering these losses when you don't want to?	44.1	25.8	20.9	4.3	4.8
How often do you feel anxiety or nervousness?	54.7	16.3	23.2	3.7	2.1
How often do you feel uncomfortable around white people when you think about these losses?	56.6	20.6	15.3	4.8	2.7
How often do you feel shame when you think of these losses?	66.7	15.9	10.6	4.8	2.1
How often do you feel a sense of weakness or helplessness?	58.7	14.8	19.6	4.2	2.7
How often do you feel a loss of concentration?	64.6	17.5	12.2	5.3	0.5
How often do you have bad dreams or nightmares?	66.7	17.5	12.7	3.2	0.0
How often do you feel isolated or distant from other people when you think of these losses?	62.8	16.5	14.4	3.7	2.7
How often do you have a loss of sleep?	62.6	18.4	14.2	4.2	0.5
How often do you feel the need to drink or take drugs when you think of these losses?	87.4	8.4	3.1	1.1	0.0
How often do you feel rage?	78.0	11.0	8.4	2.6	0.0
How often do you feel fearful or distrustful of the intentions of white people?	62.9	13.8	16.9	3.7	2.7
How often do you feel there is no point in thinking about the future?	74.7	14.7	7.4	1.6	1.6
How often do you feel like it is happening again?	63.5	15.3	17.5	2.7	1.1
How often do you feel like avoiding places or people that remind you of these losses?	69.8	13.8	7.9	5.8	2.7

<sup>1</sup> Some participants completed this questionnaire, but not the HLS scale reported in Tables A1 and A2. Both Indigenous participants to the US or Canada or to Mexico, South, or Central America completed the same HLAS scale reported here.