

Racial and Socioeconomic Considerations for Concussion Evaluation and Management

University of Michigan Concussion Center, Ann Arbor, MI
July 2022

CONTENTS

- 1 Background
- 2 Social Determinants of Health
- 3 Ramifications of SES and Race on Concussion Evaluation and Care
- 4 Influences of SES on Concussion Recovery
- 4 Improving Post-Concussion Procedures
- 6 Conclusion
- 7 References

BACKGROUND

Concussions are a heterogeneous injury¹ best framed as a biopsychosocial injury to optimize clinical care.² Beyond the injury's underlying pathophysiology, concussion risk³⁻⁵, clinical presentation⁶, and recovery trajectories⁷⁻⁹ are all known to be influenced by psychological and social factors. However, research on the intersectionality of biopsychosocial influences of concussion are limited.⁶

Of particular importance is the social pillar of the biopsychosocial model, which can be stratified into several subcomponents including diversity, equity, inclusion, and social justice (DEIJ). The University of Michigan (U-M) Concussion Center recognizes and is strongly committed to concussion related DEIJ initiatives through collaborative efforts among internal and external stakeholders, as well as by providing DEIJ-related professional development opportunities for its members:

Concussion Center Statement on Diversity, Equity, Inclusion, and Justice

The Center shall seek a diverse membership with broad representation of individuals from a myriad of backgrounds who will provide multiple perspectives to advance the Center's mission. The Center is committed to a policy of equal opportunity for all persons without discrimination on basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity and expression, disability, religion, height, weight, or veteran status. The Center shall strive for all participants to feel a sense of belonging and inclusion.

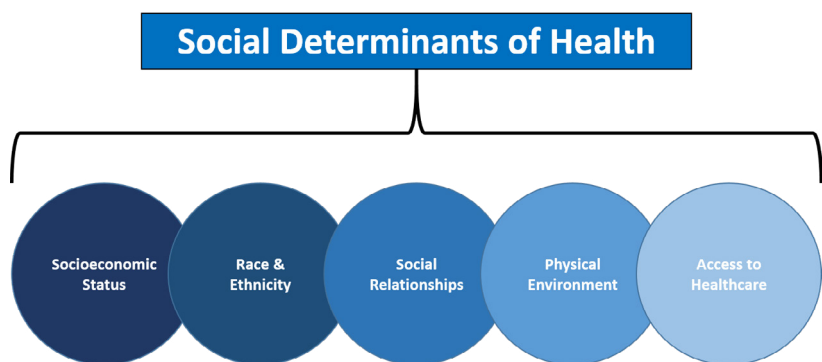
“ The biggest issue is that there is an intersection of several factors, including environmental, biological, and social, but a lot of what we see happening is specifically [related to] race, ethnicity, and socioeconomic status.
-Dr. T. Hunt ”

To better understand the complexity of DEIJ intersectionality and its relation to concussion, the U-M Concussion Center invited Dr. Tamerah Hunt, associate professor of Athletic Training at Georgia Southern University, to present her DEIJ-related work on [Examining Socioeconomic Status and Racial Disparities in Concussion Evaluation and Management](#). Throughout her talk, Dr. Hunt described the influence of socioeconomic status (SES) and race on concussion evaluation and assessments, barriers to healthcare access in low SES and minority neighborhoods, and the need for improved communication among community members and medical providers to address hesitations in seeking medical care following concussion.

Additionally, Dr. Jessica Wallace, assistant professor of Athletic Training at the University of Alabama, joined a roundtable discussion about [Social and Cultural Disparities of Sport Concussion](#). Dr. Wallace’s research complements Dr. Hunt’s work by assessing the social determinants of health (SDOH) relative to concussion. Importantly, both researchers highlighted the socio-cultural influences of patient-provider and subject-researcher relationships in relation to concussion disclosure and management.

SOCIAL DETERMINANTS OF HEALTH

Under the umbrella of the biopsychosocial model lies several SDOH. Dr. Wallace outlined five major factors of SDOH: 1) SES; 2) race and ethnicity; 3) social relationships; 4) physical environment; and 5) access to healthcare. Similarly, Dr. Hunt defined SDOH as, “...a public health model and coming from the economic and social conditions that influence individual and group differences in health status.”



Socioeconomic Status

Socioeconomic Status (SES) has been defined, and subsequently assessed, in a number of ways within the medical literature. It is defined as a “social standing” based on an individual’s education, occupation, and income.¹⁰ Yet, Dr. Wallace makes the argument that SES may be defined through additional factors: “Income captures

what is in the home [such as] resources, as well as social and cultural capital such as furniture, decorations, books, technology, and internet services... but can also include food and nutrients, as well as modes of transportation.” Researchers and policy makers have used a number of variables within the SES construct, including, but not limited to: insurance status, whether a primary/secondary school is considered Title I (free/reduced lunches), and zip code.

While it is important to note that race and SES are correlated, they are not causal. Dr. Hunt was clear in stating that “...race does not equal SES,” as anyone, from any background can fall into a high or low SES category. However, a disproportionate number of individuals from minority backgrounds are low SES, placing them at a distinct disadvantage for concussion identification and care.

RAMIFICATIONS OF SES AND RACE ON CONCUSSION EVALUATION AND CARE

While race and SES are complex social issues, the medical curricula under which health care providers are trained must include cultural competence in order to deliver the best care. Dr. Hunt emphasized this further stating, “We must acknowledge differences in SES and race during concussion assessment, management, and recovery. As healthcare providers, we must be aware and adjust for the population in which we are working, and utilize the most appropriate assessment tools for that respective populations, including bedside manner.”

Dr. Wallace discussed historical instances of racial disparities within the healthcare system. She defined race as, “...a social and political classification that has stratified people...which has led to subsequent social inequalities and inequities. There have been several instances of medical malpractice among the Black community that has led to mistrust in healthcare resources.” Dr. Wallace further indicated, “Many of the racial disparities (...) can be credited to residential segregation, as a result of redlining, [as well as] both systemic and institutional racism and discrimination. Within concussion, health place truly does matter.” Indeed, her previous work demonstrates racial disparities in concussion knowledge regarding common signs and symptoms¹¹ and concussion reporting intentions/behaviors.^{12,13} All of which may result from lower access to healthcare and/or resources within low SES neighborhoods.

However, Dr. Wallace’s recent work assessing differences in healthcare navigation among Black and White adolescents after concussion provides a path forward.¹⁴ Her work concluded there were no racial disparities in concussion management between Black and White adolescents when they were treated through an established

“ Place-based (i.e., physical environment) disparities are the driver to disparities in access to opportunities and quality of resources tied to concussion. ”
-Dr. J. Wallace

referral network and/or a multidisciplinary team facilitated recovery.¹⁴ Further, previous work suggests additional training in cultural competency among healthcare providers is significantly associated with greater patient satisfaction¹⁵ and improved healthcare outcomes.¹⁶ Therefore, standardizing the process of obtaining and utilizing healthcare, as well as building culturally competent rapport with patients can decrease racial disparities in healthcare.

Lastly, both researchers highlighted the need for concussion databases to include normative data from racially and socioeconomically diverse patient populations. Specifically including typical ranges on assessments (i.e., computer based assessments, sideline evaluations, etc.) for use by clinicians who do not have a baseline assessment but need to compare their post-injury assessment results.

“ [Those who are of low SES background] are more likely to have public insurance and seek care at the emergency department, with a lower proportion [sic] receiving specialty care for concussion. ”
-Dr. J. Wallace

INFLUENCES OF SES ON CONCUSSION RECOVERY

SES factors that facilitate or inhibit concussion recovery have yet to be fully understood. Initial symptom burden,¹⁷ sex,^{8,18,19} age,^{20,21} and concussion history^{7,8} have all been substantially researched, with little work addressing how SES interplays with these and other factors. Dr. Hunt highlighted the need to consider influences of race and/or SES on concussion recovery. There is a known relationship between care-seeking behavior and recovery duration,²² but low SES families may be hesitant to seek healthcare, prolonging recovery. When they do decide to seek out medical help, the uninsured or under-insured face several barriers: their location may have a considerably smaller healthcare network that limits their options (i.e., no specialty clinic); less than optimal insurance policies may have high deductibles and/or copays; hourly employees may not be able to take the time off of work to travel with a child for care; transportation may not be available to get to an appointment; and many more. Conversely, high SES athletes may seek initial medical care from an athletic trainer at their school and follow-up care through specialty clinics and/or physicians (e.g., psychologist, neuropsychologist, etc.), all of which may further influence recovery trajectories.

IMPROVING POST-CONCUSSION PROCEDURES

Beyond race and SES, Dr. Hunt discussed the behavioral benefits of participating in sports and why these may be appealing to adolescent athletes. In particular, she highlighted work investigating perceptions of boys participating in football. She found a majority of athletes endorsed perspectives of “comradery” and “brotherhood,” as well as a “physical outlet.” However, concussed athletes who are removed

“ We have to acknowledge differences in SES and race during our concussion assessment, management and recovery. As healthcare providers, we want to be aware and adjust for the population in which we are working [with], and utilize the most appropriate assessment tools for that respective population. ”
-Dr. T. Hunt

from their sport and social network for an extended period of time may have negative effects to their mental health due to the social isolation that can result from being away from team-based activities.

Dr. Hunt described her findings from interviews with high school athletes after they sustained a concussion. Regardless of SES status, she found all high school athletes were “frustrated with being told what they could and couldn’t do.” She further reported that “high and low SES students all experienced phases of grief after being removed from their sport,” reiterating, “I think that’s really important for us to understand [how this affects our students] because when you take them away from what they love, they don’t necessarily always know what to do.” She advocated for improved communication between the student, parents/guardians, and school and athletic staff to dissuade unnecessary frustrations regarding removal from sport participation following suspected concussion.

Perhaps more important than returning the athlete to their sport is the return to learn (RTL) process. Dr. Hunt noted educators in secondary education are rarely, if ever, involved in the athlete’s medical plan. She added, “[we] were seeing ineffective communication [in addition to] inappropriate teacher expectations [while students were recovering from concussion].” She further argued that including educators reduces additional stress on the athlete who is returning to the classroom. Specifically, she concluded students “feel overburdened” with trying to recover from their concussion and trying to keep up with their academics. Yet, a lack of education among instructors regarding how concussion influences academics may result in decreasing grades for students. Indeed, Dr. Hunt highlighted “declining grades lead to [further] frustration,” which may propagate a cycle that “consistently gets worse and worse” over time. Ultimately, educators, parents/guardians, and medical providers should develop a centralized team in order to work collaboratively to support students throughout their recoveries.

CONCLUSION

Summary

There are several pillars of SDOH, including race and SES, which significantly influence concussion care. To optimize clinical care, healthcare providers should consider these factors and their influence on: concussion risk, diagnosis, as well as management strategies. The University of Michigan Concussion Center continues to lead the country in improving the health and safety of all patients through outreach/education efforts as well as high-quality research and clinical care.

Future Directions

These discussions highlight the need for additional research on the influences of race, SES, and other social determinants of health on concussion risk and recovery. Healthcare providers should consider how these and other factors influence care-seeking behaviors from patients, and discordant patient-provider interactions. We therefore recommend:

- Routinely revising medical curricula to incorporate cultural competence training
- The addition of continuing education on addressing implicit and explicit biases among marginalized patient populations to medical licensure policies
- Hospitals, schools, and other healthcare-related facilities should prioritize hiring and retaining diverse medical and administrative teams to decrease the risk of biases in concussion management strategies
- Research dedicated at clearly understanding how race, SES, and other SDOH factors influence concussion incidence, reporting, and management for informed policy making

University of Michigan Concussion Center

The University of Michigan Concussion Center maximizes societal and individual health through the relentless pursuit of concussion knowledge. The Concussion Center amplifies its impact by facilitating the development and sharing of groundbreaking ideas that translate laboratory, clinic, and community observations into interventions that reduce concussion risk and improve outcomes in those affected by the injury. Learn more about the Concussion Center at: concussion.umich.edu.

REFERENCES

1. Kenzie et al. Wakeland W. Concussion As a Multi-Scale Complex System: An Interdisciplinary Synthesis of Current Knowledge. *Front Neurol*. 2017;8:513.
2. Gagnon I. Determining Outcome in Children and Adolescents After Concussion: Viewing Things More Holistically. *J Orthop Sports Phys Ther*. 2019;49(11):855-863.
3. Tsushima et al. Incidence and Risk of Concussions in Youth Athletes: Comparisons of Age, Sex, Concussion History, Sport, and Football Position. *Archives of Clinical Neuropsychology*. 2019;34(1):60-69.
4. Alosco et al. Attention deficit hyperactivity disorder as a risk factor for concussions in NCAA division-I athletes. *Brain Inj*. 2014;28(4):472-474.
5. Shrier et al. First concussion did not increase the risk of subsequent concussion when patients were managed appropriately. *Br J Sports Med*. 2019;53(7):389-390.
6. Register-Mihalik et al. Utilizing the Biopsychosocial Model in Concussion Treatment: Post-Traumatic Headache and beyond. *Curr Pain Headache Rep*. 2020;24(8):44.
7. Broglio et al. The Natural History of Sport-Related Concussion in Collegiate Athletes: Findings from the NCAA-DoD CARE Consortium. *Sports Med*. 2022;52(2):403-415.
8. Aggarwal et al. Sex, race, ADHD, and prior concussions as predictors of concussion recovery in adolescents. *Brain Inj*. 2020;34(6):809-817.
9. Iverson et al. Predictors of clinical recovery from concussion: a systematic review. *Br J Sports Med*. 2017;51(12):941-948.
10. American Psychological Association: Socioeconomic Status. <https://www.apa.org/topics/socioeconomic-status>. Published 2022. Accessed June 6, 2022.
11. Wallace J et al. Racial Disparities in Concussion Knowledge and Symptom Recognition in American Adolescent Athletes. *Journal of Racial and Ethnic Health Disparities*. 2018;5(1):221-228.
12. Wallace et al. The Underreporting of Concussion: Differences Between Black and White High School Athletes Likely Stemming from Inequities. *Journal of Racial and Ethnic Health Disparities*. 2021;8(4).
13. Wallace et al. Knowledge of concussion and reporting behaviors in high school athletes with or without access to an athletic trainer. *Journal of Athletic Training*. 2017;52(3):228-235.
14. Wallace et al. Health Care Navigation of Black and White Adolescents After Sport-Related Concussion: A Path Toward Health Equity. *Journal of Athletic Training*. 2022;57(4):352-359.
15. Govere L, Govere EM. How Effective is Cultural Competence Training of Healthcare Providers on Improving Patient Satisfaction of Minority Groups? A Systematic Review of Literature. *Worldviews Evid Based Nurs*. 2016;13(6):402-410.
16. Truong et al. Interventions to improve cultural competency in healthcare: a systematic review of reviews. *BMC Health Services Research*. 2014;14(1):99.
17. Meehan et al. Initial symptom burden predicts duration of symptoms after concussion. *J Sci Med Sport*. 2016;19(9):722-725.
18. Churchill NW, Hutchison MG, Graham SJ, Schweizer TA. Sex differences in acute and long-term brain recovery after concussion. *Human Brain Mapping*. 2021;42(18):5814-5826.
19. Master et al. Differences in sport-related concussion for female and male athletes in comparable collegiate sports: a study from the NCAA-DoD Concussion Assessment, Research and Education (CARE) Consortium. *Br J Sports Med*. 2021;55(24):1387-1394.
20. Williams et al. Concussion recovery time among high school and collegiate athletes: a systematic review and meta-analysis. *Sports Med*. 2015;45(6):893-903.
21. Zuckerman et al. Recovery from sports-related concussion: days to return to neurocognitive baseline in adolescents versus young adults. *Surgical Neurology International*. 2012;3.
22. Barnhart et al. The Influence of Timing of Reporting and Clinic Presentation on Concussion Recovery Outcomes: A Systematic Review and Meta-Analysis. *Sports Medicine*. 2021;51(7):1491-1508.