Dementia and sport:
research priorities for the future

Alzheimer's Research UK

The Health Policy Partnership
[research, people, action]

Dementia and sport: research priorities for the future

A growing body of evidence shows physical activity and exercise have a beneficial impact on cognition, brain health and even the risk of developing dementia.[1-4] Approximately 2% of dementia cases could be eliminated with improved uptake of physical activity.[1]

However, the nature of certain sports increases the likelihood of experiencing a traumatic brain injury (TBI) and the risk of long-term neurological disorders such as Alzheimer's disease. Head impacts, head acceleration events and TBIs (historically known as concussions) are frequent in many sports. Despite numerous studies showing links between past TBIs and the development of Alzheimer's disease, other diseases that cause dementia and other neurological disorders,[5-12] how and why this occurs is still poorly understood.

To reduce the future burden of dementia, we must find out how physical activity and exercise protect against dementia, as well as how brain injuries are linked to neurodegeneration and dementia. This could have major implications for preventing Alzheimer's disease and other types of dementia and might even lead to the development of new tests and treatments.

To understand research priorities in this area, Alzheimer's Research UK and The Health Policy Partnership hosted a prioritisation workshop with leading researchers, clinicians, advocates and public health experts. **The participants stated the need to:**

1. **Establish** an international research consortium with research teams and funders from around the world.
2. **Develop** a varied panel of biomarkers that could help detect and manage both TBI and the risk of neurodegeneration.
3. **Conduct** long-term studies that monitor specific populations for several decades and look holistically at the factors that may influence neurodegeneration.
4. **Explore** TBI outside of elite sports and understand risks in underrepresented groups such as children, females and people playing grassroots sports.

1. Establish an international research consortium with research teams and funders from around the world

Why is this helpful?

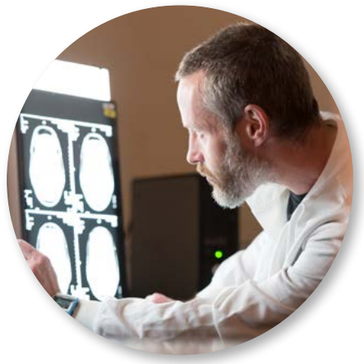
There are many limits to existing research that make it difficult to compare data and draw overarching conclusions. Studies are often not comparable, with different methodologies and definitions used for key measures; methods of assessment and the duration of follow-ups also vary considerably.[3 13 14]

What could this do?

An international research consortium could help to coordinate research efforts and ensure consistent methodologies and definitions across different studies. This could improve the comparability of data and facilitate large-scale multi-year research projects, which can be more difficult to set up in isolation. It could also encourage long-term data collection, which is essential to help us understand changes happening in the brain over the decades between a TBI and dementia diagnosis. A consortium could also continue to highlight and address evidence gaps, promote consistency in data collection and facilitate data sharing across different research groups and funders, ultimately providing a rich database for further analysis.

2. Develop a varied panel of biomarkers that could help detect and manage both TBI and the risk of neurodegeneration

Why is this helpful?



We do not currently have an empirical way of measuring damage in the brain from a TBI or the diseases that drive dementia. Brain injuries are currently diagnosed through symptom reporting and identification, and dementia is diagnosed after months of observations to check for changes in cognition.[15 16] Some biomarkers[i] can detect cellular-level changes in the brain's activity and health, helping to establish a disease diagnosis or monitor changes over time.[1] However, most biomarkers are currently only being evaluated in small trials; we need to scale up both studies and infrastructure to prepare them for widespread use in order to determine someone's risk of developing dementia and inform decisions about how to manage that risk.

What could this do?

Different biomarkers may be identifiable by magnetic resonance imaging (MRI), positron emission tomography (PET) scans, and analyses of cerebrospinal fluid, blood, saliva or other measures. Tests for a wide range of biomarkers could provide a very detailed picture of a person's brain health, from the moment of a TBI through to later-life investigations of the causes of dementia. Understanding these signals may also yield information about how and why dementia develops. In the future, biomarkers could allow us to identify each person's individual risk factors and track their brain health throughout their life.

[i] Naturally occurring molecules or biological chemicals which can indicate a condition, a response or a state of normalcy in the body.[17]

3. Conduct long-term studies that monitor specific populations for several decades and look holistically at the factors that may influence neurodegeneration

Why is this helpful?

Decades may pass between a TBI and a dementia diagnosis, and little is understood about what is happening to the brain during this time. Some large studies may only last a few years, which may not be long enough to detect changes in brain health or clarify any potential cause-and-effect relationship between a person's physical activity, exercise, cognition and their risk of developing dementia.

What could this do?

Longer-term studies are important to better understand the effects of being physically active, having a TBI and developing cognitive decline or dementia. Increasing the size and duration of both observational and intervention studies will yield more meaningful results that better capture the lifelong changes in question. This in turn will provide greater confidence in our understanding of these effects and support impactful policies that can help to improve brain health.

4. Explore TBI outside of elite sports and understand risks in underrepresented groups such as children, females and people playing grassroots sports

Why is this helpful?

Millions of people around the world are actively involved in sports, yet much of the existing research on brain injury and dementia has focused only on elite male athletes. Other groups are also at risk of long-term neurological damage. It is increasingly clear that children, adolescents, females and people playing grassroots sports display different risk, injury and recovery patterns to adult, male, elite athletes.[18-28]

What could this do?

We want to understand every person's protective and risk factors for dementia. Collaborative, creative and multidisciplinary research spanning different ages and a wider range of sports and countries will help us get there. Groups beyond elite males require dedicated research, support and policy interventions. Investigations into the risks and benefits of participation in youth sport, understanding of parent and child risk perceptions, and why age- and sex-related differences in brain injury occur would help to better inform educational initiatives, policies and post-injury care in the future.

Finding a way forward

Encouraging greater physical activity and exercise, while reducing the risk of brain injury and impacts in certain sports, could reduce some of the future burden of dementia. New research will help governing bodies to shape their policies in an informed manner and support all people to manage their risk of dementia while enjoying the many physical, social and mental health benefits that exercise and sport can bring. While there are other causes of TBI beyond sport, efforts to better understand and reduce brain injuries in athletes will still be beneficial. The findings could be applied to support other people with an elevated risk of brain injury, including survivors of interpersonal violence, people involved in traffic collisions, and military personnel.

We need to identify effective ways to reduce the risk of developing dementia and find treatments for people living with the condition. Conducting research into dementia, physical activity, exercise and brain injury is challenging but essential. Alzheimer's Research UK wants to bring new and existing funders and researchers together to make these ambitions a reality. Interest in the links between being physically active, participating in sport and being at risk of dementia is at an all-time high.

We must seize the moment to deliver new, coordinated research that addresses the gaps in our understanding of these modifiable prevention and risk factors, and give every person the best possible chance of living a dementia-free life.

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