Baseline Testing

I have played sports my whole life and I sustained multiple concussions. I always wondered how my twin although we are different genders did not get any concussions even though we played the same sports. More importantly how my teammates that headed the ball everyday in soccer practice did not have a concussion. So I researched how sex differences affect the likelihood of a concussion and the severity of concussion and I found after reading multiple studies, females have higher concussion rates and worse symptoms than males (Lariviere et al., 2020; Mollayeva et al., 2018; Covassin et al., 2016). Not a lot of people know that concussions are serious, especially for females. Concussions, mild traumatic brain injuries (TBI), are the “largest epidemic of any neurological disease” (Henry, 2018, para. 42). Concussions often cannot be seen by the average person but the brain goes through a metabolic crisis where nerve cells “are not getting the energy they need, ‘the brain is starving’” (LeBlanc, 2012, para. 15).

Many people ignore concussions, so what can be done and for who?

First of all through three different studies, Lariviere et al. (2020), Mollayeva et al. (2018), and Covassin et al. (2016), all found that females have a higher rate of concussions than males. Additionally, Covassin et al. (2016) found through their study of NCAA athletes over 5 years that “female soccer players (mean = 9.33 ± 8.54 days) took longer to return to participation than male soccer players (6.14 ± 6.15 days)” (p. 192). And then Lariviere et al. (2020) found through their study that “75% of male athletes showed a full recovery from their concussion by 3 weeks compared with 42% of females” (para. 3). So what does this mean? Although prevention is key,
this information regarding females and concussions may persuade school districts to use baseline concussion tests for all middle to high school age athletes. Baseline testing can help athletes take concussions seriously and focus on problematic concussion symptoms. Yes, these studies point out that females have higher concussion rates and worse symptoms than males, but I think all middle to high school age athletes should undergo baseline testing -- a computerized cognitive test that tests an athlete’s brain function--as youth brains are still developing and vulnerable. I agree that females may need a more specialized, detailed treatment plan than males but baseline testing should be used on all middle to high school age athletes.

Athletes take the test once before the season starts, to set a baseline of their brain function and then if an athlete sustains a head injury they can compare pre and post injury data. An example of a baseline test is the “ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) test is a computerized test that measures memory, attention span, visual and verbal problem solving, and multi-tasking ability” (Baseline and Post-Injury, 2020). The ImPACT test’s first section shows a person a series of words, then the person is shown an individual word and asked to click yes or no if it was one of the original words they saw. The person then completes the 4 other sections which can take 30 to 40 minutes. The final part of the test retests section 1; a person is shown an individual word and clicks yes or no depending on if it was an original word they saw. However, baseline concussion testing is not a one stop solution to concussions; it is a tool that can greatly help doctors manage concussions and evaluate when an athlete can return to play after a concussion. So if baseline testing is a concrete way to obtain brain function data pre and post injury, why haven't more people heard about it? Is baseline testing reliable?
The ImpACT concussion test “is the only FDA-approved tool for concussion assessment” (Baseline and Post-Injury, 2020). There also have been outside studies done to determine the reliability of computerized neurocognitive testing like the ImPACT test. Elbin et al. (2011) studied baseline cognitive testing in athletes, in a study called, “One-Year Test-Retest Reliability of the Online Version of ImPACT in High school Athletes”. In this study “participants took 2 baseline ImPACT assessments where verbal memory, design memory, motor processing speed, reaction time, and impulse control was measured” (Elbin et al., p. 2321, 2011). Elbin et al. (2011) found that “motor processing speed scores showed the most stability followed by reaction time, visual memory, verbal memory” (p. 2321). The results of this study show that the ImPACT baseline test is stable and reliable over a 1 year period in high school athletes. These results are not unique as other researchers have come to the same result; baseline testing is reliable. Womble et al. (2016) conducted a study to determine the test-retest reliability of the ImPACT test in youth ice hockey players in, “Test-Retest Reliability of Computerized Neurocognitive Testing in Youth Ice Hockey Players” (2016). The results were similar to Elbin’s study with “visual motor speed and reaction time being the most reliable” (p. 306, 2016). Now that we know baseline testing is reliable how can it be used in practice?

I most likely would not have heard of the ImPACT test if it were not for my school district. My school district requires students participating in school sports from 7th to 12th grade to take the ImPACT baseline cognitive test each year before starting game play. I ended up taking the ImPACT test 6 times and every year my team was scheduled to take the test the athletic trainer and coaches reminded us to take the test seriously and to not purposely fail the test. As the ImPACT test has the ability to tell when a person clicks random buttons purposely or not purposely, making the test invalid. The last concussion I had was severe and the second one
in a short amount of time so the athletic trainers recommend I obtain my ImPACT data and bring it to my concussion specialist. From my understanding the ImPACT test can be used in two ways, an athlete can sustain concussion and within days retake the ImPACT test to compare data, or a doctor can conduct their own tests and compare their evaluation to the baseline test. In my case I did not retake the ImPACT test within days of my injury because I had an abnormal concussion/recovery. My doctors did conduct their own evaluations and compare that to my baseline ImPACT test.

An example where the ImPACT test helped another individual was Madison. Madison participated in a video interview about her concussion and ImPACT story. Madison, a high school athlete, started having some concussion symptoms during her soccer season but did not think much of it and went on to her basketball season. Madison got tested for mononucleosis for the fatigue she was having and then got tested to see if swelling of her blood vessels was causing her migraines and headaches. Everything came back negative, Madison's family and her did not know what was the problem. Madison’s mom was very afraid for her and asked to have a CAT scan done, but that too came back negative. Madison’s mom said “there was nothing else the doctors could do for us, and thank goodness we had the ImPACT test” (ImPACT Applications, 2018). Madison took her post-concussive ImPACT test, and immediately her doctors took her right out of school and sports because of her results. Madison went on to say “I think it’s important that there is a test, an actual, physical, scientific data to show that these athletes are injured, because with a concussion the person looks fine. It’s a metabolic injury, so you can’t see it from the outside” (ImPACT Applications, 2018). I agree with Madison that scientific data is needed, because it can sometimes undisputable. Also, I know when I was shown how much my
brain function was affected by my injury and shown the changes others saw in me, I was persuaded to take my injury more seriously.

Baseline cognitive testing not only can help athletes but researchers as well. Having more concrete data that can be used in studies will help the validity of studies and perhaps persuade large professional sports organizations to change. This research on baseline testing may provoke youth leagues to start to implement it. If concussion researchers used ImPACT data, they could compare it to self reported symptoms. Not just relying on self reported symptoms will help the credibility of concussion studies. Having scientific data also can help researchers find new trends in which brain function’s are most affected regarding age, sex, and other aspects. Baseline testing helps athletes and then in turn gives researchers data so logically it makes sense to use baseline testing on all middle to high school athletes.

Females have higher concussion rates and worse symptoms, but what does that mean? Should only females use baseline testing? No, I think all middle to high school athletes should use baseline testing. But implementing baseline testing might have some challenges. One of the major things that need to be addressed is how does the cost of baseline testing affect the use of it? How can we make baseline testing available to all schools? Are there or what grants can be used for obtaining baseline cognitive testing for schools? Also that brings up the question will private sports organizations at the middle to high school level be able to afford baseline testing? However, with the increasing awareness around concussions I believe that baseline testing could be available to all middle to high school athletes in future.
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