



**Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury
Webinar Series**

“Unique Perspective for Women with Traumatic Brain Injury: Gender Differences and Coping Strategies”

October 13, 2016 1-2:30 p.m. (ET)

Operator: Welcome and thank you for standing by. At this time, all participants are in the listen only mode. Today's conference is being recorded. If you have any objections, you may disconnect at this time. Now I would like to turn the meeting over to Felicia Johnson. Thank you, you may begin.

F. Johnson: Good day and thank you for joining us for the DCoE Traumatic Brain Injury October webinar, “Unique Perspective for Women with Traumatic Brain Injury: Gender Differences and Coping Strategies”. My name is Felicia Johnson. I'm a neuroscience clinician in the Clinical Affairs Division providing contract support for the Defense and Veterans Brain Injury Center. I will be your moderator for today's webinar. Before we begin, let us review some webinar details. If you experience technical difficulties, please visit dcoe.mil/webinars to access webinar troubleshooting tips. Please feel free to identify yourself to other attendees via the chat box but refrain from marketing your organization or product. Today's presentation is available for download from the files pod and will be archived in the online education section of the DVBIC website.

Please note, due to data and Dr. Odette Harris' presentation not being published, her presentation slides will not be available for download. All who wish to obtain continuing education credits or certificate of attendance and who meet eligibility requirements, must complete the online CE evaluation. After the webinar, please visit dcoe.cds.pesgce.com to complete the online CE evaluation and download or print you CE certificate or certificate of attendance. The evaluation will open through Thursday, October 27, 2016. Throughout the webinar, you are welcome technical or content-related questions via the Q&A pod located on the screen. All questions will be anonymous. Please do not submit technical or content-related questions via the chat pod.

I will now move to today's webinar, Unique Perspective for Women with Traumatic Brain Injury: Gender Differences and Coping Strategies. The data regarding active duty servicewomen who have sustained a traumatic brain injury suggests their experiences, after effects, and outcomes differ from servicemen. This presentation will integrate current research and clinical expertise to advance healthcare awareness of TBI among women serving in the military. The speakers will present current evidence comparing female athletes and active duty service members with a TBI history as well as data about servicewomen with and without symptoms

from co-occurring conditions such as posttraumatic stress disorder, anxiety, and chronic pain. The presenters will also address the gap in the present knowledge base concerning gender differences and TBI.

At the conclusion of the webinar, participants will be able to describe three ways in which brain injury in women including concussion and TBI are unique, articulate factors that may account for gender differences in TBI incidences, severity, and recover, apply best practices in the education of women who have TBI to facilitate recovery.

Dr. Odette Harris is the Associate Chief of Staff of Rehabilitation which includes TBI polytrauma, spinal cord injury, blind rehabilitation services, and physical medicine and rehabilitation in the Veterans Affairs Palo Alto Healthcare System. In addition, she is the Associate Professor of Neurosurgery at Stanford University and Director of Brain Injury at the Stanford University School of Medicine. She also serves as Director and principal investigator in the Defense and Veterans Brain Injury Center in the Veterans Affairs Palo Alto Healthcare System.

Ms. Katherine Snedeker is the Executive Director of PINK Concussions, a nonprofit focused on female brain injuries and concussion from sports, violence, accidents, and military service. She is a licensed clinical social worker who was inspired to go to graduate school after volunteering in the Times Square Vet Center in the early 1990s. She has presented on female brain injuries throughout the US and in Europe. She is personally acquainted with TBI as she has three sons of which two have multiple concussions. One son had post concussive syndrome. She herself has the same multiple concussions over a 30-year span and is currently a participant in the Boston University Veterans Affairs Legacy Chronic Traumatic Encephalopathy Study.

O. Harris:

Hi, good afternoon or good morning where I am. This is Odette Harris. Thank you for that introduction, I appreciate it. I am going to talk to you today about gender and the effects of polytrauma. Thank you so much for joining us. I understand that there almost a couple hundred people online so far. It's wonderful that so many people are interested in this topic and have taken the time to participate in this webinar. I'm also really grateful that I'm being partnered with Katherine Snedeker who exemplifies passion on this subject and her presentation will follow mine. Again, thank you to DCoE for inviting us and for recognizing the significance of this topic and giving us a forum and the resources in which to share our work.

Again, my name is Odette Harris. My clinical and research areas are both focused on traumatic brain injury. I am co-located at the Palo Alto VA where I am as you noted, an Associate Chief of Staff for rehabilitation with a focus on brain injury. Much of research is funded and supported through DVBIC, the Defense and Veterans Brain Injury Center. Then I'm also at Stanford where I am a neurosurgeon focusing on acute traumatic brain injury, so lots of focus on brain injury. My presentation today is focused on gender and the effects of polytrauma. I have no disclosures

other than the views I am expressing today are not official policy of the US government or the Department of VA or DVBIC. No financially relevant disclosures and I don't intend to discuss any devices, products, or procedures that are off label, unlabeled, experimental, investigational, or not FDA approved.

As an overview of what we're hoping to cover today is familiarizing those of you on the line who are not familiar with the polytrauma system of care and its significance in the realm and management of traumatic brain injury and then talking specifically about gender and the effects of polytrauma and trying to touch on three issues within there that are noted on the slide.

My experience and practice is unique and I think advantageous in this realm in that I cover both the acute management of traumatic brain injury, the rehabilitation, and then all the way to re-integration and so sort of the whole spectrum and gamut of TBI. I have a perspective that is shaped by those experiences.

As we look at polytrauma, I have this picture of my version of the map of the United States in regard to our understanding of blast exposure and TBI at the time of the initial conflict. As you can see, it's a fairly blank map so very little understanding. Our general rehabilitation units were set up with specific areas of focus. When we looked at brain injury, it was very much an isolated component of our general rehabilitation unit and we focused symptom specific or disease specific diagnoses. As many of you are aware, there was a conflict whether OEF, OIF, or Operation New Dawn and as a result many individuals suffered traumatic brain injury many secondary to blasting but there were other mechanisms of injury as well. Our responsiveness or our lack of responsiveness at that time or lack of being prepared rather, was headline making. There was a lot of attention focused on what was happening to these individuals and it became coined as the invisible wound of these conflicts and then of course, the signature wound of these conflicts.

I think that it's appropriate to say that the government responded in a very swift way and a very comprehensive way and set up a whole system of care that was focused on addressing and managing these patients and it was established in a way that used all of our best resources and expertise both in rehabilitation and in traumatic brain injury. The mission and the focus became specific to restoring the physical, intellectual, psychological, psychosocial components of those who had been injured and doing it in this systematic way through what we all the polytrauma system of care.

The term polytrauma was not new to our lexicon but what we did in the context of this was co-opt a term that had previously been used to be anybody with multiple injuries and in this context it was specifically used and applied to those who had a brain injury in the context of these conflicts with plus or minus other systemic and concomitant injuries. The

key to this was that the brain injury was the defining or driving component of the rehabilitation because many had both identified and unidentified TBI.

We evolved and I hope the animation from my slide is preserved and it doesn't look like it is. We evolved from this to a situation and again, it wasn't preserved. The slide that didn't come up here is a whole constellation of networked clinics and points of contact throughout the United States, all established under the umbrella of what we call the polytrauma system of care. These range from clinics to comprehensive inpatient units and those units are as you can see, encompass and show the evolution of our previous understanding of rehabilitation units where now we have this whole constellation of offerings. We have not only our traditional comprehensive rehabilitation centers but we also recognize the need for transitional programs, the need for injury such as amputation and the need for integrating technology within our efforts in taking care of these patients.

From this, a whole body of literature arose. Again, the animation is not preserved here but if you look at the backdrop of this slide, you'll see several excerpts from literature throughout the time of the, from the inception of the polytrauma conflicts to date. You'll see that there's an incredible focus and interest in understanding what's happening to our servicemen and women who suffered these injuries. What we also now is that this body literature began shape our understanding, shape our management strategies, ultimately shape decisions regarding funding, and decisions regarding research direction. This was a very powerful thing that was happening.

From this literature, we understood some of the key demographics in terms of the percent of individuals who we thought were injured returning from deployment and how many individuals we were able to chronicle within the Defense and Veterans Brain Injury Center Comprehensive Registry. Since 2000, we have over 300, almost 352 individuals who suffered TBI. Again, it still supports the signature of the OEF/OIF/OND conflicts and those numbers are rising in terms of the percent of service members who have been injured ranging between 12-20%. We also know from the literature some of the more detailed demographics in terms of mechanisms of injury and the characterizations of injury and the categorizations of injuries as well in terms of severe, moderate, mild, and so on. There have been a lot that's been published as the previously slides have demonstrated.

What we also know or what also came to light was that 95% of those represented in the literature were male. We learned that the prevalence of TBI outcomes. We also learned its association with other comorbidities. The literature itself definitely provided a broad description of this cohort. Nonetheless, the question then became are these conclusions valid to everyone given that women represented such a small cohort in the literature and are the conclusions specifically applicable to women?

There are a lot of reasons for asking that questions and it's not necessarily gender specific. For those of you who are practicing clinicians or physicians or anyone within the realm of medicine or epidemiology, you'll understand that this is well known. In the 1940s and 1950s, there was a project that was initiated called the Framingham Heart Study. It is the longest running longitudinal study in our history. It started in 1948 with over 5,000 participants. The study was set up to basically better understand the epidemiology of cardiovascular disease. At the time, Framingham Massachusetts was selected because it was thought to be representative of the United States. It was thought to be the ideal cohort of individuals, the ideal study. We have been following these individuals since 1948. Everything we know about epidemiology and even the term risk factor was coined as a result of this study. Everything we know and a lot of our recommendations regarding antihypertensive and cardiovascular disease management comes from this particular study.

What was interesting about the Framingham study which makes it sort of the foundation for our concerns about gender in the context of polytrauma is that although everyone is familiar with the study, clinicians clearly use a lot of the recommendations coming out of the study, what is interesting is about Framingham Massachusetts and the study itself is that the study was completely unrepresentative of America today and potentially America then. It is an entirely white, middle class, euro-American population. Despite its impulse to be completely universal and comprehensively capturing an entire community, the study significantly lacked diversity. There were no African-Americans, Latinos, or Asians captured in the study so very different than the America that we live in today. As a result, the recommendations that have been extracted from the Framingham study are not all necessarily applicable to the general cohort.

As an example, some antihypertensive medications that were recommended heavily from the Framingham study are not applicable to the African-American community and can in fact be detrimental and/or delay the appropriate treatment interventions. This is important because this was a very comprehensive effort with a lot of positive impact but that intent at universality was unsuccessful despite good intentions.

Since then, there have been a lot of attempts to wrong that historical overlap or that historical gap rather and as an example, there has been what's called the Jackson Heart Study which was an attempt to focus on African-Americans. Again, trying to make up for that historical lapse. Just like anything that's published on the front page and then we put a retraction in a couple of days later, many people don't actually read those or see that and it's never cited or rarely cited and it becomes a problem.

I believe that a similar situation or I had a concern that a similar situation was occurring when we looked at traumatic brain injury specific to subpopulations, specific to gender disparities. The question was, are all the body of literature that we have come to depend to outline our

understanding of TBI polytrauma and to outline and to frame our treatment algorithms and management strategies, are we going down that historical rabbit hole again and further creating a historical lapse that we look back on and say, oh my goodness why didn't we look specifically at subpopulations? Our questions were, how valid were these data sets and were there potential gender biases and given that women were such a small population, were they noise in the data sets that were being examined? We know that women represent a growing percentage of all living veterans and we also know that more and more women are experiencing combat with over a quarter of a million women deployed from records in 2013. We know that women are going to enter the VA systems at much higher rates and that they have unique structures associated with being a woman.

Again, we know that these are only going to increase in numbers over time. The percentage nationally is about 3-5%. At our institution, those numbers are about 6% and we believe that this is an issue. This concern was further supported at our institution where we tried to look at referral biases in our system and thought that there were some biases with women who were not accepted into our program. When we did further subanalyses, what we learned was that because there were such small percentages of women and we were using such naïve methodologies that in fact there were no biases that were being introduced but we were not applying the correct methodologies. This further spurred our interest and supported our need for looking more closely at the literature as it pertained to women in the context of polytrauma.

We looked at the literature and we really realized that although there's a lot of information there, the impact on women on TBI specifically, was largely unknown. We set out with some very important support for this project. The Claymon Institute for the Study of Gender Research which is the largest freestanding institution focusing on gender research and it happens to be based at Stanford University. We got the support of the VA Palo Alto Healthcare System and the DVBIC as well to further explore this topic.

Our hypothesis was just simply put that could the general polytrauma literature not reflect the specific experiences of women and that published data that we're using to drive decision making might in fact not comprehensively capture the female experience. We designed a study that captured the retrospective analysis of all the women coming through our system of care, all the patients as well to the greater cohort as well as the gender specific cohort. We collected all of the routine data. Our outcomes that we focused on, however, were very specifically aligned to reflect what was represented in the literature. This was not a primary research project, it was a retrospective analysis. We tried to mirror apples to apples what the literature was focusing on. Specific psychiatric diagnoses, postconcussive symptoms, and neurobehavioral symptoms that were already represented.

What we found, and again I apologize that this slide is not animated and at least my view of it shows some cutoffs. What you can see is that in green education, you'll see that women, sorry. In your first column is just participants and then demographics specific to the entire OEF/OIF cohort. The next column is specific to the VA Palo Alto and it's specific to women in our cohort. The last column is looking at the statistical significance of those comparisons. You'll see that women tend to be better educated than the general cohort comprised largely of men and that is to statistical significance. You'll also see, however, depicted in red that they tend to be less likely to be working, more likely to be unemployed, and more likely to be homeless, again to statistical significance.

If you look at the next slide, you'll see a lot of red which again, it's the women with TBI compared to the general cohort. What you'll see is that women have very high frequencies of all of those psychiatric diagnoses including PTSD, depression, anxiety, substance abuse, and so on and so forth. As depicted in these numbers, the statistical significance are attributed to the column on the right. You'll also notice that the numbers for women are very high, much higher than for men. You'll see that depression for example, is incredibly high, much higher than in the male cohort. We know that to already be the case in terms of gender disparities in mental health diagnoses but what I bring to your attention is the fact that much of what we hear about TBI is with concomitant PTSD versus depression and that represents some bias in our management.

In terms of postconcussive symptoms, you'll see in red women have higher incidences of chronic pain, chronic headaches and again, this is in comparison to the general cohort. When we look at neurobehavioral symptom indices, you'll see that women have much higher somatosensory and vestibular complaints than the general cohort which is largely male.

As a summary of those results, you'll see that women are more often diagnosed with depression, PTSD, anxiety, substance abuse, and that women are more likely to report chronic pain, chronic headaches, sleep disturbances, and suffer from severe somatosensory and vestibular symptoms. The other interesting component that I draw your attention again is in terms of reintegration, back to work, back to life, back to duty women have a lower percentage of working, higher percentages of homelessness and this is despite higher achievements in education. It's kind of the converse of what we see in the male cohort.

This is something that has been a focus. The IOM report released in 2013 has called attention to the fact that this is something that is of concern that women now constitute 14% of all those deployed. These findings sort of attest to the fact that there are unique stressors for women and that we need to pay attention to this when we examine the outcomes and recommendations for gender. They also sort of underscore some of the points that I've tried to make in terms of the nuances and methodology

that need to be applied when you're working with such small subsets in the population in comparison to the greater cohort.

This is just to point out that this is becoming increasing focus both to the NIH and to the European Commission that our research methodologies and our research strategies need to increasingly and now mandated include gender as a subpopulation and as a focus so that we can better understand these and not have to go back and do retrospective analyses. I call your attention to that first slide where we had just a plethora of research.

For those of you who do do research, you know that research begets research. If our research never stopped to focus on these genders, it's going to be harder and harder for us to advocate for more funding in this area and to have more foundational research to support an ongoing interest in this. It is rather important, not just now but for the future in securing and establishing research portfolios that focus on gender in this context. This is just sort of underscoring that funding is currently preserved but there is no doubt that we're going to see other cuts in funding and if we don't advocate for this, it's going to go away.

This slide is really also to say that the data that I am presenting is only a part of the pie and I'm happy to be partnered with Katherine Snedeker because she will talk much more about the sort of less quantitative and much more qualitative component of this story. We recognize that a phenomenological approach to this is quite important and as a partner to our project, we've captured the voices of women in video storytelling as well because we recognize that the data itself does not tell the full story. We also encourage anyone out there who is doing this to partner both the data with the voices of those who they are studying because I think that's an important caveat.

In summary, I think it's important to understand that this is an issue that subpopulation studying and partitioning of data is quite important. We are doing it in retrospect but thanks to the efforts of the NIH, there's much more of a drive to do this right from the onset so that these are integrated into the methodologies themselves and are prospective components of the data. We also recognize that the methodologies that we apply to the existing literature need to be evaluated on an ongoing basis because sometimes the nuances are lacking and as a result, we're not getting to the crux of the questions that we need to answer.

I think that's sort of the end of my presentation. I thank you for listening and I ask that all of you who have this interest, continue the effort because I don't want us to look back and have to write a historical lapse in that we studied this population and we have failed to capture its impact on this growing, and I think all would agree, significant subcohort of female soldiers. Thank you so much.

K. Snedeker:

Hi, Katherine Snedeker here. Thank you, Odette for that great talk. I learn all the time from Odette. I chased her down and found her about three years ago to try to get out of the sports concussion loop I was in to try and find out what was going on in the military and she's been a great asset. I want to thank the Defense Center of Excellence of Psychological Health and TBI, Odette, and everybody who contributed to this workshop today. It's just incredibly exciting to have this many people signed. I'm almost 50 next year so I'm not totally comfortable with video cam but we'll see how we go here.

My name is Katherine Snedeker. I'm a clinical social worker. I started an organization called PINK Concussions and I'm the Executive Director and the founder of PINK Concussions. I have no disclosures. The data is emerging. I'm hoping that a year from now, two years from now that this slide deck will be much more robust and filled out. If you take everything with this is emerging, this is the first time you looked at stuff.

To start out, how do we view TBI? Concussion and TBI or brain injury is long viewed through a male perspective. It's the football player, it's the warrior. We do know that TBI in general occurs about twice as often in males than it does in females. That also has an age group component. I don't have that chart up but in the age 5 to age 23 is when the males are twice as many as the females and then once you get to the 40s or the 50s, they're getting a little closer and by the time you get to 70, it's about the same range.

Why are there twice as many concussions in males as females? We have a video here to explain. This is kind of why. There is a risk taking aspect of teenage boys and young men. I didn't set this up quite right but they're going to be jumping off the roof. I went through YouTube videos and essentially for every 100 or 150 videos of boys jumping off roofs, there is one girl jumping off a roof. This is typically part of the make risky thing, in front of their peers they're going to jump off the roof. Sorry, it's taking a little long. There they go. Male risk taking. Not to say that there aren't females that take risks but they do so in so much of a higher level. I have three boys so I'm very aware of the risk taking of young men.

The riskiest sports for concussion are often male dominated. Ice hockey although there are a great number of girls that are starting to play, boxing, combat sports. Women are starting to get into football. There is actually a female tackle football league for girls out in Utah and Rugby which is having a strong call to bring women in as it expands across this country. However, in multiple studies they found that sports with similar rules, in particular soccer, basketball, and baseball. Lacrosse wouldn't be one with similar rules because with similar rules in lacrosse, it's a different game. Men have a different set of rules than the females.

In sports, there are still more male concussions than there are female concussions. Female athletes report nearly twice as many concussions. Female athletes report a greater severity of symptoms and female

athletes report a longer duration of recovery. The rate can be, depending on the sport two or three, four times that of men and then greater number of symptoms, not different symptoms than the men but maybe four or five symptoms where men will only have one or two and female athletes take twice as long to recover. In the sports world, all of this data has been known since about 2009 but the sports doctors honestly weren't acting on it and changing their clinical care for women around this. When I would talk to them, they would be like, why do we need to tell women this? Why is this important?

That's when I reached out to the military, to Odette and two other people I found, Tim Kelly the athletic trainer at West Point. His female cadets take twice as long to come back as his male cadets. You can't say a woman at West Point, a female cadet is just seeking more attention or is not strong. I see the female athletes be undercut by sort of a gender discrimination. Going to the military I was able to find the same data, the same recovery rates and yet if you compare female soldiers to male soldiers it's just a stronger connection. Despite the facts of what I call pink TBI, why don't sports academics, military, medical communities have any female specific guidelines? Return to work, return to play, return to duty. Why aren't we educating females to begin with? Why are they rarely educated about the differences which leave them ill-prepared to cope with the more severe symptoms and their unrealistic expectations of their recovery?

My story, I have three sons. Both the boy on the left and the middle child have had a number of concussions. I don't have girls but then working in two concussion clinics, I kept seeing over and over again, our female patients were taking longer to recover and had more severe symptoms. At the time, I was doing teen concussion which was used for education and I was involved with the NFL. We were doing educational programs across the northeast. I just kept seeing the female piece stick out more and more.

In 2013, I had breast cancer and suddenly couldn't work with teens, couldn't work in schools, and started this website. It originally started as defining concussions by sport, that was where I was from. By violence, domestic violence, interpersonal violence, family violence, by accidents and trauma, and military service. I think this was one of the first organizations to cross all those lines. People were like, why are mixing those all up? To me, it was about the female brain being injured, the brain doesn't care why it was injured and there's so much strength. I've been able to expand out and have been on ESPN. Various people, Chris Nowinski, various people have helped me and it has been really exciting because we were the first nonprofit in the history of the world that we know of in female TBI.

The website started seeking and we did our first concussion conference in Georgetown and I think you'll see Odette in the picture. Where are you Odette? Odette was there speaking. We had the Deputy Army Surgeon General speak. That was at Georgetown. In the end, we had about 60

speakers over an entire day period, 29 papers, 40 posters, and close to 250 people attend. That was the first standalone meeting on female concussion as far as the history of Google says. That was pretty exciting.

The term pink TBI, I get a flack sometimes for using that but the nice thing about pink TBI it's a concise term to use on social media to educate and advocate and that covers the sports, violence, accidents, military service. If you're on Twitter or you're on Facebook and you put hashtag pink TBI, you'll bring up our conferences. We just had a conference thanks to Odette at the Palo Alto VA and we had close to 30 speakers, 29 speakers, 130 participants over two days and a number of posters. Again, a huge influx of people from the Bay area and from the west coast talking about female concussion.

What does all this mean to your female patient? You can learn all these statistics and facts but how does this help you when you go back? I mostly deal with teenagers so I use boys and girls here but you could put men and women in there. Your female patient will know more males that have had concussion than she will females just from the pure number. Any one female probably could come up with five or six males they know that got concussion but they may not know another female. That female is automatically judging her own recovery by the male experience. She also may judge the higher number of symptoms and the severe symptoms against the men or the boys that she knows. Wow, my concussion is not like theirs. She may have a longer duration of recovery. Wow, everybody else I knew is already better so there must be something wrong with me. I get calls every single week of females calling me up saying, I'm two months out, what's wrong with me? I'm three months out, what's wrong with me? Why am I not doing this right? Why am I not better?

It's just a tragedy to me that women aren't given the runway, the longer runway to say, hey it may take six months or seven months. When that recovery spans more than a few weeks and women aren't prepared for it, then you get the depression, isolation, self-doubt, anxiety. Then you start to get the work and the family questioning you that you're malingering. I had breast cancer in 2013, nobody ever said to me, are you sure you have cancer? Could that just be a lump? With brain injury and concussion, people are always questioning, how do you know it's a concussion? There are a lot of jokes about it. It's just a very different experience between cancer where everybody immediately drops to one knee. What can I do for you? Can I bring you food? Concussion is not a casserole event. You don't get casseroles, you don't get help when you have a concussion. When you have cancer, I was still going to the gym and I had piles of food in my kitchen.

This is an example and if there's one thing you take away from talk it's the couch example. Let's say that you have a couch that you love and suddenly it's ruined and you need to get a new couch. You go out and you buy a couch. The sales guy says to you, okay the couch is going to come in 7-10 days. You're really excited, you go home, and the couch

doesn't come. It doesn't come for two weeks, the couch doesn't come in three weeks, four weeks. It's really a problem. Did you go to the wrong store? What's wrong with your couch? Are they lying to you? You wanted to have a party, you've got to have a couch. It's just a complete disaster.

In the same situation, if you go to buy a couch and the salesperson says it's going to take about six months, you can plan around that. You can get fold up chairs, you can go to Ikea and get pillows. You can plan to not have a party or let people know, you're going to come to my house, there isn't a couch. The difference between those two examples is expectation. I think we set women up by not explaining. The medical community has no doubt that women take longer to recover. We don't know why but they do know that that is what's happening. Again, it's setting expectations.

One of the cases that I deal with in my private practice was a sophomore with her fifth concussion. She had three concussions from volleyball, two from at home, top grades, advanced placement classes, and she returned to school after two weeks and slowly was doing half days. At week five, the mom called to say she was crying and anxious about school. She had a 504 plan and the teachers were supposed to be accommodating her. The teachers decided at one month out, she should be better. They were actually bullying her in front of the other students and saying to her, why haven't you made up the work. We can't give the test back because the other kids are waiting for you and there was no expectation on the school. That also can be seen in the workplace. It can be seen in families. Hey, you were supposed to get better in 7-10 days. It's a month out and you're still not cooking dinner or you're still not working full shifts.

Again, it's up to the woman to explain to family, employers, school why she's not better because we don't have education on how long recover takes. We do know that there's a component between age and sex. Following concussion, adolescent girls demonstrate a significantly exertional response rating a worsening of their symptoms and cognitive activity. That's significantly different between males and females. You don't see that before women have gone through puberty. After puberty, a teenager will walk into a classroom, seem fine, laughing with her friends. Then start a task, 20 minutes into the task will suddenly get a headache and ask to leave and the teacher will be judgmental saying, well yeah you were fine when you walked in, what's wrong now? That exertional response is not seen in males the way it is in females. Again, it's part of the educational process.

Why pink TBI? Dawn Comstock who is actually in the hotel with me now is presenting her data on athletes. In 2009, we knew that women concussed at a higher rate. We've been doing study after study in military and in the civilian world that they concussed at a higher rate but still the congressional committee asked do we need more money to study this? We don't need more money to study the rates, we need to do the research to figure out why. There are a couple of factors. There's neck strength versus head strength. The neck is a component a lot of people

talk about and it may be a factor but if you think of football players, some of them don't even have necks. They're completely a head to a shoulder and they still get concussion.

Reporting styles is often, and I'll talk about that a little later, that women report more. Hormones is the key one I personally feel. There's some great VA data coming out of the Boston VA on the hormones. Where you are in your cycle of the month, whether you're in the first two weeks of the cycle or the second two weeks of the cycle will determine how your outcome is. Female culture test bias, are our tests set up right away that there are differences between males and females pre-injury that are going to show up post injury. Then sex versus gender.

I just want to talk about this for a quick minute, the definition of sex. Scientifically the sex may be defined as the biological differences between male and female, the genetic, the hormonal, the psychological, and the physiological. The gender is thought of as a social construct based upon interpersonal roles or personal identification not always coordinating with biological sex. I always thought of myself as a tomboy growing up and my children tell me today that that term doesn't exist anymore. It's complicated now to talk about gender but you try to use those two words separately as we move forward. The sex difference would be the neck strength versus the size of the head and the hormones. The gender would be this myth that women are more likely to report and then the female culture of seeking health care and test bias would be gender differences.

Who gets TBI and I think slides I have picked here are slight sexist but that's what was available in clip art that I could use. As you see, we have and I was using the term today shaken baby but inflicted trauma all the way through elder abuse. Let's go look at that. We have infant inflicted trauma, the old term shaken baby. Toddlers starting to walk, playground injuries, car accidents, and then you have this middle segment which may be going out you may have trauma from dating assaults, driving, living on one's own, different risk factors, playing with toddlers, back on the playground, and that's also the period of time where you meet military service. Then in the elder years, osteoporosis, getting older trips and falls, and then the final stage is living alone elder abuse. These are all different causes of TBI throughout the lifespan of a woman. What if you have a TBI as a toddler? How does that affect the rest of your development if you have a brain injury at a certain point? These are all questions we want to ask in TBI.

How does she get TBI? We just discussed this is sports, violence, other domestic interpersonal, family. There are many difference for violence, accidents. I know the CDC doesn't like that term but trauma, motor vehicles, falls, and military service which can be in combat or in barracks, not in combat. Concussions from my world we look at the NCAA numbers where you have football with the largest number but if you look women's soccer is picking up and they're seeing these rates at the NCAA level. We

have contact and collision sports of which would field hockey, rugby, skiing, soccer and then contact ones where you don't mean to run into each and then limited contact ones. We have sports that we don't even consider on those like synchronized swimming. I recent study just came out that a high percentage of water polo and synchronized swimming concussions. There are the ones that we think about and the ones that we don't.

Again, another concussions in NCAA sports where women's field hockey, women's soccer, ice hockey, and lacrosse. We'll talk a little about reporting those. This is a study that I'm doing. I really encourage other people in other areas to do these kinds of studies. These are concussions reported to the school nurse. This is our third year for 11,000 students in my school district. What we found, this were our 2014-2015 year is we had 111 concussions over the 11,000 students. We broke that down to being sports and non-sports concussions. We so focus on the sports concussions in the civilian world. Those are the ones that interest us. We looked at primary school, middle school, and high school. Those numbers are interesting but they tell us deeper.

If we break it down even further, if you look at the concussions boys to girls, they look like they're sort of even but then let's go back down to the primary school boys and girls. I don't know if I have a pointer here. The bottom two numbers, if you see the total concussions between boys and girls, you have 15 for boys and 4 for girls. This happened in the second year that we did the study and now also in the third. Boys have more concussions in the primary levels and then in middle school the girls start to tick up, 14-15. That's where we start to see girls go through puberty and girls start to pick up in the sports. If you look at the high school boys to girls, 39 girl concussions to 24 boy concussions. They're really picking up at that point. Then you look up top and they look like they're kind of even but now we see that it's a different age range and that this happens over the three years that we've done this.

High school teen sport concussions, we'll look at this and say 18 males and 16 females but then we actually had 27 that were from the school nurse and then 34 the athletic trainers. The athletic trainers are starting to manage the concussions, not involving school nurses, we need to work on. If you look at this, this is really small, I have to get a little closer. Girls volleyball had four concussions, boys football had seven concussions. If you just look at those statistics, boys football we expect more but what's hidden here is out of the boys, there's 110 boys playing football right there and seven have reported concussions. Girls volleyball was close to 24 students and four reported concussions. We don't look at the number of men to women that are playing.

Cheer in California was just made a sport, it's not in Connecticut. We had two concussions. This year we had four color guard concussions, both sports not even considered. If you look at the enrollment versus the concussions in the sports, there are more boys playing sports and you

divide the fewer female concussions by the fewer females playing, last year we also got a 4% increase.

Here are some statistics. I'm getting close on time so I want to make sure I go a little ahead. There's 1.6 to 3.8 million sports concussions. We don't really know. A lot of people are presenting in this conference I'm in right now at NIH and it's rough numbers, it's very rough. There's an estimated, it's sort of underneath the iceberg of these sports injuries are domestic violence. There's an estimated 3.1 million women could sustain TBIs due to domestic violence, 3 to 10 million children could be exposed to domestic violence. We do know that around half of perpetrators in intimate partner violence do also abuse the children. If you look at these statistics, what they found is 67% of women seeking medical services related to domestic violence had symptoms associated with TBI. Again, we're interested in the sports. People are patient when you talk about military service. Nobody wants to talk about the TBI numbers that are domestic violence or violence.

Because of time, I'm going to go a little ahead. In the timeline, chronic traumatic encephalopathy, CTE there are two studies out there and one I nicknamed Lucy and the other one Wilma. They were both in 1990 and one was an autistic woman and another one was a woman of domestic violence and they called her the punch drunk wife. I've spoken to one of the two authors who is still living and they pretty much believe that both cases were CTE. Those women were only studied because of other ... The punch drunk wife had cauliflower ears looking like a boxer. Lucy who was the autistic woman that died, they looked at her brain because she was autistic. They aren't looking for CTE in women yet. These just happened to be cases that those brains were passed along for other reasons and they found what we know call CTE.

PINK Concussions was started in 2013 and what we do is we create international medical summits like the one we just had at the Palo Alto VA thanks to Odette and her team out there to bring world class experts together, publicize current research, stimulate more studies, develop educational resources, share the female experience, and try to create online communities. There's a picture of the Georgetown one. The NCAA DOD is ongoing and they're in year two of their study. I think they're up to 800 female concussions but unfortunately, they aren't taking the samples of women's hormones at the time so I'm kind of frustrated about that because the time of a woman's cycle when she has a concussion is really important, not only when they're injured but also later on. If you're doing cognitive testing, you should also know what cycle she's in.

There was a briefing in 2016 in June, it was a not a hearing but a briefing in front of Congress which was really great and that was exciting for the first time to have female brain injury as its own topic on capitol hill. There's just a couple of little statistics I'm going to go through in the few minutes we have left. This is in the civilian world which matches the findings that Odette found in her presentation that women with TBI are

more likely to experience social, financial, and structural barriers to the needed services. They're more likely to be affected by poverty, social isolation, lack of family support, lack of transportation, community resources. That's mirroring what's happening with female soldiers. Women with disabilities are more significantly likely to be victims of violence and abuse and regardless of disability status are more likely to be victims of interpartner violence which lead to potential TBI and often repeat injuries.

Specific guidelines, screenings, and treatments are needed for these situations. It's actually amazing to me that I've talked to a number of domestic violence clinics and they don't screen for TBI. There aren't any TBI questions. They have other safety interests. There's only so much they can do in that initial interview but that TBI thing that's really important. If that situation where a woman with a TBI is then put in front of a judge and she's confused, has the issues that you would see in an athlete after they have a concussion, she won't make a reliable witness for herself. I think that's really important for domestic violence to have a bead on that. They're less likely to return to work, less likely to receive vocational rehab, significantly lower rates of returning to work, need for feminine role in child rearing and household management to be part of rehab goals. Again, mirroring the study Odette talked about. Less sexual and reproductive health, higher rates of menstrual cycle and endocrine dysfunction. Again, a huge part of the menstrual cycle. Fatigue, cognitive functional difficulties representing strong obstacles. Again, mirroring the other study.

I'm just going to do my study really quickly. What I wanted to look at was this, oh women just report more. If you look in the literature, it goes back to cardiac studies where it says women are more articulate about their pain and I would agree that women are probably more articulate about their pain. Just because we're more articulate doesn't mean more of us are reporting. This study we call No Guts, No Glory but this is a picture of a student athlete who has got sort of like tampon-like things in her nose to stop the bleeding. She has an ice pack on and I know her and she was asking to go back in the game if they could clean up the blood.

This was a representation of that women don't just, you know. Women are expected to get back in the game. This was looking at the ... We know about concussion from the media reports but there weren't a lot of reports looking at [inaudible 00:58:52]. We wanted to know why do athletes continue to play after concussive syndrome. Do they hide their concussions less than males and why do they hide? This is a problem which we had already talked about that female athletes receive nearly twice as many concussions as males and more severe symptoms.

Our study we used snowball sampling. We used social media, Twitter, Facebook, Instagram, 40 questions. What was really amazing that in one month I had 800 women write me and of those 800 women that wrote, I think we probably approved 600 and of those 600, 529 finished the entire

40-question questionnaire. It took me a lot longer to get the males but in the end we had over 800 and they answered online questions about their athletic experiences. Again, this is them reporting their experience. The average age of the women at the time of the incident was 19 1/2 years in a variety of sports. It had to be a sport and it had to be a concussion that they had.

The average was four concussions diagnosed by an athletic trainer which is actually pretty amazing because a lot of females don't even have athletic trainers there, especially not at the volleyball game. The athletic trainer is more likely to be at the football game. Six concussions included adding the hidden concussions they didn't report. At the time of the survey, they were 29 or 30 years old. It's a different realm, I'd really like to do this study again with the under 18. Two concussions outside of sports. 47% of the female athletes continued to concuss outside of sports. I have to go closer because this is a little small. What the statistics showed is that suffering more concussions playing sports diagnosed by a physician was pretty close, 84% of females, 80% of the males. Have you suffered any other head injuries, things you wouldn't call a concussion because maybe the definition. That was pretty close.

Suffered a concussion but continued to play without recording. This is the meat of the study for me. Yes, women reported, 70% of the women hid a concussion, 79% of the men. Yes we were a little more honest but still we had 70% of our athletes and higher hiding concussions. Yes, we did report a little more but the entire group is hiding concussions. We hope this statistic doesn't exist in the youth of today is that 33-36% of men and women went back after reporting concussion. Hopefully, we're beyond that point. Did you suffer any serious head injuries other than organized sports. For females 47% and for males 36%. The women were significantly higher in continuing to concuss. They also felt that they were experiencing signs of memory loss. It was a more of a concern for them than it was for the men.

This is recurring symptoms. This follows basically every study that shows that headache is number one. Then slow thinking and then other and foginess and women feel it more intensely than men. That would follow the other studies. This is the part that I actually thought was exciting and this needs to be done at the military level, domestic violence, all the different groups is why did you not report? We had a 95% level of significance that these percentages were accurate. For the women, it was a lack of awareness. They didn't know what a concussion was. Then it was they wanted to keep playing. Then it was a lack of resources. For the men, start from the bottom up. It was the allegiance to the team, leave no brother behind. Then, I know it was a concussion but it wasn't severe and then down to a lack of resources. The men and the women had very different reasons for hiding their concussion.

Why is that important? Because if you're trying to educate them, the women you have to design concussion education around gender. The

female athlete needs to create awareness of what concussion is, increase the resources of having people, athletic trainers and coaches be aware of it and then wanting to keep playing. For the male, it's what's best for the team. If you're out there playing with a concussion, you're letting your band of brothers down and explain the severity of concussion. Again, this would change how we're teaching about concussion. Teaching communication skills, how to advocate for one's health, how to report early signs, and how to report [inaudible 01:03:23]. That will happen also in the military population. I want to stay out with my patrol, my platoon, I don't want to go back to base. If you're putting people in danger because you're going to make mistakes ... In the end, all athletes need acceptable, trustable, proper medical care and we need to educate, advocate, and support females with TBI.

There's my contact information. I just want to thank Odette again for the Palo Alto conference we just had last week. Our future event is going to be at NIH next year March 2 and 3. Thank you all for your attention and I hope some of the stuff that we're looking at in athletes and teenagers gives us some suggestions about education and how we could apply that to women in the military.

F. Johnson:

Thank you Dr. Harris and Ms. Snedeker for your presentation. If you have any questions for our presenters, please submit them now via the Q&A pod located on the screen. As we await for the arrival of the questions, I would like to tell you about an article published in the July 1, 2016 e-publication of the Journal of Neurotrauma entitled, Female Service Members and Symptom Reporting Following Combat and Noncombat-Related Mild Traumatic Brain Injury. A team of researchers at the DVBIC undertook a clinical study to address the concerns that females are often excluded from military-related TBI research because of their relatively low prevalence in this population. The goal of this study was to focus on outcomes from mild TBI in female service members compared with males. Participants were 172 US service members selected from a large sample that had sustained a mild TBI and were evaluated within 24 months of the injury at one of the six military medical centers. 86 women were matched with 86 men on nine key variables, TBI severity, mechanism of injury, bodily injury severity, days post injury, age, number of deployments, theater where wounded, branch of service and length.

Participants completed the neurobehavioral symptom inventory and the posttraumatic stress disorder checklist. There were no meaningful gender differences across all demographics and injury-related variables. There were significant differences between the two groups on the neurobehavioral symptom inventory total score and all four neurobehavioral symptom inventory cluster scores. Symptoms reported that were most effected related to nausea, sensitivity to light, change in taste or smell, change in appetite, fatigue, and poor sleep. There were significant differences between the two groups for the posttraumatic stress disorder checklist total score and two of the three posttraumatic stress disorder checklist cluster scores. Symptoms most effected were

related to poor concentration, trouble remembering a stressful event, and disturbing memories, thoughts, and images. Females consistently experienced more symptoms than males. In sum, self-report postconcussion and PTSD symptoms were significantly influenced by gender although this effect was most prominent for postconcussion symptoms.

It is possible that gender differences in the military setting may be associated with one, additional interpersonal stressors faced by female service members during deployment such as physical assault, sexual assault, sexual harassment, gender harassment, and victimization. Two, the tendency for female services to more likely have a history of pre-military trauma such as childhood physical or sexual abuse or intimate partner violence. Three, other unknown factors related to mild TBI. Nevertheless, as females become more active in combat-related deployment, it is critical that future studies place more emphasis on the important military population and prepare for the growing TBI-related healthcare needs among female service members and veterans.

Portions of this data were presented at the International Brain Injury Association annual conference in San Francisco in March 2014. The views, opinions, and/or findings obtained in this articles are those of the authors and should not be construed as an official Department of Defense position, policy, or decision unless so designated by another official documentation. Inquiries should be addressed to the study team's POE, Dr. Tracy Porkel at tporkel@DVBIC.org. Please allow up to five business days for a reply in the event case consultation with the larger study team is required. This article description and full reference information can be downloaded now from the pod on the left hand side of your screen.

It is now time to answer questions from the audience. If you have not already done so, you may submit questions now via the question pod located on the screen. We will respond to as many questions as time permits. First question, what did you mean when you said that the time of the menstrual cycle can indicate recover? Do you mean at what point you are in?

K. Snedeker: Could you give me the question one more time?

F. Johnson: Just a second. I'm going to go to another question. What did you mean when you said that in time in a menstrual cycle can indicate recovery? Do you mean at what point you are in the cycle when the injury occurred?

K. Snedeker: Jess Bazarian from Rochester has done this work right now along with another. It's when the progesterone level is high and then there is a TBI, the progesterone level drops off and it is that drop from being at a high level to a low level that was thought to cause the core outcome and the longer outcomes in women. Women on birth control who have a straight level of progesterone because they're taking it in a pill form, don't have that fall off. You have to very careful saying birth control is a protective

but they don't see the outcomes with women on birth control in that study that they did. Again, it's an issue of progesterone. After TBI, a number of women have cycle that are thrown off after that. All of this connects with the hormone piece. Again, we need to study it more. There's some great work by Ann Rasmusen up at the VA in Boston and there's also a whole other webinar on the connection between PTSD and TBI and hormones. It's what level you are and where you're injured and then how your body responds to that afterwards. Honestly, I think that that is the piece. If we can crack the code there, we can apply those findings to men and actually help men.

F. Johnson: Okay, our next questions is, is recover time data available on pink concussions based on development ranges throughout the lifespan?

K. Snedeker: Great study, love to know that. We do know that once a woman goes through puberty and during her, I think the term is, childbearing years have the longer recoveries. After menopause, there is a very small study but it looks like it isn't different. I tell you one of the dangers though in that after menopause senior years is a lot of times when women fall with a TBI and they have a hip injury at the same time, they'll be written up as senile or early dementia when it's really a TBI and not be given TBI rehabilitation but then start down the path of early Alzheimer's. We need to educate the doctors looking at seniors as well. There's just different risk factors at all different ages based on the age of the female.

F. Johnson: The next question. Given that TBI can often be misdiagnosed would either of you put the likely rate of TBI at a higher number than 12-20%?

O. Harris: This is Odette Harris. I suppose from the question that you're referring to the published literature that says that the range of those returning from deployment is 12-20% and so I'll answer it in that context. I think the range could definitely be higher. I think one of the things to understand from the context of the military and how the VA has handled TBI and TBI diagnosis and then subsequent placement in the polytrauma system of care and then management is that we have erred on the side of sensitivity over specificity. In an attempt to make sure that the capture is as comprehensive as possible, the questions and frameworks for diagnosing have been tailored to that.

For example, the idea is that we would rather throw a wide net and catch individuals for which there is uncertainty about the diagnosis of TBI than narrow that net and be certain that they have that diagnosis but miss other individuals for which the tools that we're using might not be sensitive enough. That's a long way to answer your question in saying that I believe that that range is as good as we could possibly get in that cohort but nobody is arguing that it is perfect. Again, higher sensitivity, lower specificity with an attempt to not exclude anyone but a true understanding that it is not a perfect number.

K. Snedeker: Katherine here. I agree so strongly with Odette that you have to have a wide net. I'm currently at the NIH Pediatric Workshop where there are 60 experts sitting around talking about that there are 40 definitions of concussion. We almost have a different definition of concussion for every member at this workshop. We don't have one perfect scale. We don't have one perfect test. It's a mixture of clinical. It's a mixture of tests. It's a very wide number of tools in your toolbox. Again, I always make sure I bring a migraine specialist to my conferences to talk about the fact that as women age, migraines increase in female population. Barring you have not had a brain injury, a knock to the head, a knock to body, not all headaches are representation of concussion but if you have a blow of some type and then you have concussion resulting, it's better to treat it as a concussion and get that care than wait three months and then find out it's concussion, so wide net.

F. Johnson: The role of hormones was mentioned. Can you say more about the potential role of hormones in the development of TBI? Has research been conducted in this area?

K. Snedeker: Yes there has. Jess Bazarian on our website, PINK Concussions, we have a couple of the studies up. I'm putting some more up. I can refer if anybody wants to write to me, katherine@pinkconcussion I can refer you to a number of different studies that again, are finding these differences. We still haven't teased it out in large enough samples but we do know that it exists. Again, it doesn't surprise us. You look at other sports injuries, the triad, the ACL injuries, I can't say the word where you lose your period when you are an athlete and you exercise too much, whatever that word is, I can't say it. Female athletes have hormonal issues with the whole triad component.

Putting TBI in that is just more of the same and the awareness of gynecologists and the issues of putting women on hormones for birth control and how that affects risk of TBI, risk of depression, and risk of recovery. It's all areas that we need to expand. That's one of my biggest funding desires is we have money to put into this. I think that's the real difference men and women. If we can find it in the women, we can apply what we know to the men and help them too.

F. Johnson: Are there any plans for intensive outpatient programs like the NICO for just female patients that have suffered TBI with comorbidity conditions.

O. Harris: This is Odette and I'll also let Katherine answer as well. There are no plans that we know of but I think that this is becoming an increasing focus and I can absolutely see our developing something like that, particularly in the transitional setting. I think on the outpatient, there might be clinics focused and I'll defer to Katherine. In terms of the NICO format, inpatient research, etc., I am not aware of any that exist at the moment but absolutely a brilliant idea and hopefully that will be something we can work toward.

K. Snedeker: Katherine here. I have been contacted by a group that I met at the VA brain trust in Washington last April where we did hackathons around TBI and they're wanting to put a female unit in. Again, we talk about fight or flight as a response. If you look at the research, fight or flight is a male response in general. Again, I probably have more male characteristics than female. I just started wearing pink when I started PINK Concussions. I think I'm more of a male type of person but the fight or flight is a male theory of how you deal with stress. Women congregate and bond. There is the sewing circle. If you're out in the fields and something attacks you, women binding together.

These concussions, brain injuries really divides women up and isolates them. Very simply, when a teenager or a parent calls me about a depressed girl who is home with a TBI, the first thing I do is invite her to be an intern. I have to tell you, you bring women together and that's why I think it's so brilliant about the workshop that Odette was talking about. You bring women together and they share their stories. I had interns Odette met last week. They get together and it's like a sisterhood they've never known.

I think of clinicians if you have a couple of women with concussions, get them together, let them share their experiences, know that they're not alone, that they're not isolated. Again, that community is so strengthening from dealing with depression, from dealing with isolation, education and get them involved in some project. That to me has been the miracle cure if there's one out there, is that community of women can be so strong and so supportive. I'd really like to see more women groups pull together whether in the clinic or in advocacy to have that foundation where women can find support from one another.

F. Johnson: Even though we know the recovery is longer, what are the rehab differences and treatment modalities for women?

K. Snedeker: Currently, there aren't any. I've talked to some really excellent doctors who I say, well how do you manage women differently? The response is, one of the popular ones is that every concussion is like a snowflake, they're all individual. Everyone gets individual treatment. There's no reason for an overall female protocol versus male protocol. I really disagree with that. Again, I think if a torn ACL of a man took four times as long as a woman's torn ACL, the men would be told. You get into the gender of most of the men, the sports doctors are men. I don't know where it comes from but there's a patronizing tone in there that women don't need to know these differences, that women don't need to be educated. I think you're a lot stronger when you know. It might be six months, it might be two months, it sure ain't going to be 7-10 days.

That's where this longer recovery is just if women are educated. If you're telling your boss, I have a concussion, it could be six months, I've to pace myself. Again, I think if you're forewarned, a lot of these issues like with that couch example, a lot of these issues can be dealt with with a social

worker, a nurse working with the patient. Again, that's why I feel so strongly about patient advocacy. Literally, that's what I've done with hundreds of families is just give them a little more information. Doctors have a tight schedule, you have 8-12 minutes to see a client. You can't find out all about their life and how to apply this. That's where I really think the social worker component, the person that has more time to spend with the patient and work out some of these difficulties.

O. Harris: This is Odette. I agree with Katherine entirely. I think that's sort of the point of much of our work is that the treatments that are available are not tailored gender specifically and yet we tailor them per patient but that aggregate information that we're using to guide our management strategies now don't reflect that experience.

K. Snedeker: I totally agree with that. We don't know are women taking longer because women's brains take longer to heal or are they talking longer because we're not giving them the right management strategies. I was talking to Bennett Amalu about this who was represented by Will Smith in the movie concussion and I asked him how many female brains he had looked at and he said, none. I was talking about this issue and he said well maybe women's brains take longer to heal because they're healing more efficiently. Maybe you guys are just doing a better job of it.

It was Bennett's off the cuff response but I kind of like that one. In the end, if we find out that we are doing a better job, it's slower but in the end we have a better product going forward that our brains are better healed, if the answers come out that we're superior, I have no problem with that. It's just that I know that we're different. It's the cohort that falls out in general is gender and we really need to look at that along with age, socioeconomic status. I haven't seen particularly any data on race yet but that may just be because we haven't done the research.

O. Harris: Agree.

F. Johnson: At this time, I'd like to thank our presenters for their wonderful presentation. This presentation has provided us with information on gender differences and asks the question, where do we go from here with research regarding females with TBI and comorbidities? What is the impact of TBI in women and how do we make sure women have a full recovery?

After the webinar, please visit dcoe.cds.pesgce.com to complete the online CE evaluation and download or print your CE certificate or certificate of attendance. The online CE evaluation will be open through Thursday, October 27, 2016. To help us improve further webinars, we encourage you to complete the feedback tool that will open in a separate browser on our computer. You may download today's presentation from the files pod on the screen or at the DVBIC website, dvbic.dcoe.mil/education. An audio recording and edited transcript of the closed captioning will be posted to the link in approximately one week.

Please note, due to the data in Dr. Odette Harris' presentation not being published, her presentation slides will not be available for download. The chat function will remain open for an additional ten minutes after the conclusion of the webinar to permit attendees to continue to network with each other. The next DCoE TBI webinar, Review of Advances in TBI and Traumatic Brain Injury research is scheduled for November 16, 2016 from 12:00 to 1:30 pm eastern time. Please note the change in time for this webinar only. The next DCoE Psychological Health Webinar, Post-deployment Gender Differences in PTSD and Unhealthy Drinking is scheduled for October 27, 2016 from 1:00 to 2:30 pm eastern time. Thank you again for your attendance. Have a great day.

Operator:

This concludes today's conference call. Thank you for participating. You may disconnect at this time.