University of Pittsburgh National Sports Brain Bank: An overview of data collected during the first 6 months

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BACKGROUND

Contact sports players are exposed to repetitive head impacts (RHIs) throughout their careers[1]. Professional American football players are at increased risk for changes in cognition, mood, behavior, and motor functioning as well as neurodegenerative disease mortality[2-3].

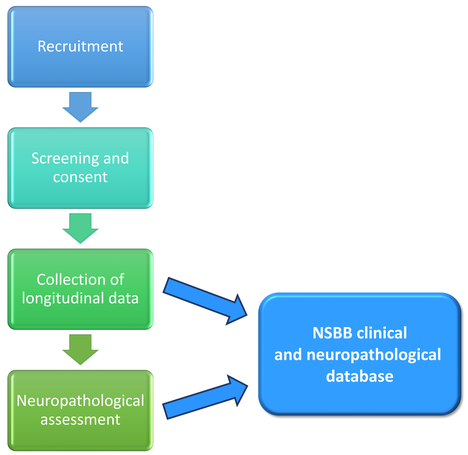
In many of these affected individuals, postmortem examination reveals a unique pattern of tau pathology[4-5], the signature of **Chronic Traumatic Encephalopathy (CTE)**.

To date, the study of CTE has been limited by **small sample size, significant selection bias for symptomatic individuals, and second-hand collection of head injury exposure.**

OBJECTIVES

1. Set up a brain bank focused on a non-selective cohort of contact sport participants **with and without cognitive and psychological symptoms**.
2. Participants will be followed **longitudinally and prospectively** to obtain clinical data.
3. Establish a rich clinical and neuropathological database that will allow us to examine the natural history of cognitive deficits in retired contact sport participants and their corresponding brain lesions at autopsy.

METHODS



Recruitment: Website with public interest form, University Press Conference, Pitt+Me Participant Registry

Screening: 18 years old, History of contact sport participation and/or history of concussion, Modified Telephone Interview for Cognitive Status (mTICS)

Consent: e-Consent Framework in REDCap

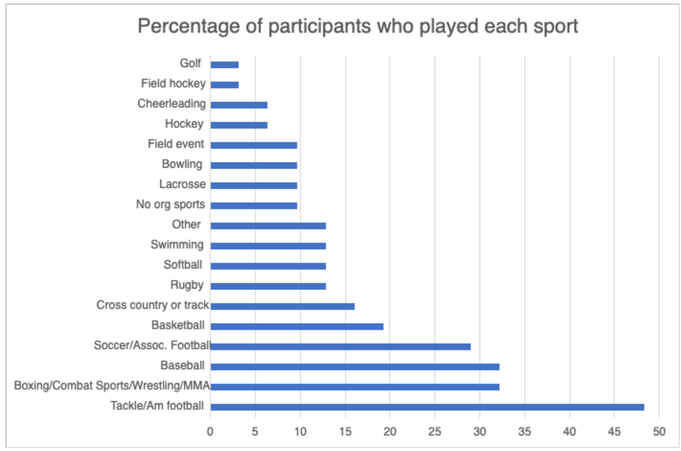
Collection of longitudinal data: REDCap-based questionnaires

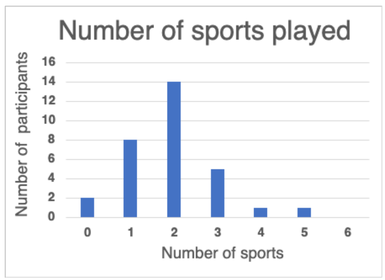
PRELIMINARY RESULTS

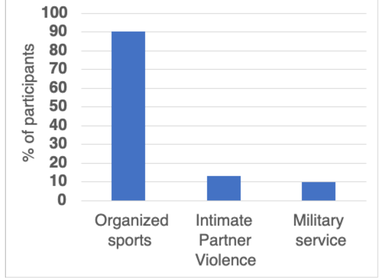
Table 1 – Sociodemographic characteristics of NSBB participants

	n	%
Sex		
Female	12	34.3
Male	23	65.7
Marital status		
Single	3	9.1
Married/partnered	26	74.3
Divorced	4	12.1
Highest educational level		
Highschool/some college	4	11.4
Associate degree	3	8.6
Bachelor's degree	10	28.6
Postgraduate degree	18	51.4
Employment		
Unemployed	1	2.9
Disabled before retirement	3	8.6
Part-time work	1	2.9
Full-time work	21	60
Retired	9	25.7
Ethnic Background		
Hispanic or Latino	0	0
Not Hispanic or Latino	35	100
Race*		
White	34	97.1
Other	2	5.7

*Option to select up to 2 categories







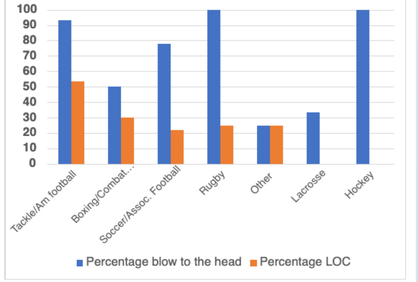


Table 2 – An overview of cognitive, mood and behavioral outcomes of NSBB participants

Instrument	Brief Description	Scoring	Number Responded	Minimum Score	Maximum Score	Mean Score	Median Score	% of Respondents with Symptomology
Modified Telephone Interview for Cognitive Status (TICS)[6]	Cognitive screening test for dementia. Domains: orientation, attention/executive functioning (backwards counting, serial 7s, opposites), immediate memory, and language (sentence repetition, auditory naming, following directions)	33-41 Nonimpaired 26-32 Ambiguous -- MCI 21-25 Mildly Impaired – mild dementia </= 20 Moderately to Severely Impaired (not able to provide consent)	33	30	39	35.27	35	0%
Center for Epidemiologic Studies Depression Scale[7]	20-item questionnaire	0 (no symptoms) - 60 (most) Cutoff of possible symptoms > 16	33	0	51	12.88	10	21.2%
Instrumental Activities of Daily Living (Self)[8]	Brief IADL	Brief IADL: 0 (dependent) - 5 (most independent)	33	1	5	4.42	5	
Instrumental Activities of Daily Living (Study Partner)[8]	Brief IADL	Brief IADL: 0 (dependent) - 5 (most independent)	27	0	5	4.26	5	
Everyday Cognition (Self)[9]	Everyday functional abilities in older adults: memory, language, visuospatial abilities executive domains (planning, organization , divided attention)	1 = Better or no change 4 = consistently much worse than in the past	33	1	3.34	1.52	1.29	
Everyday Cognition (Study Partner)[9]	Everyday functional abilities in older adults: memory, language, visuospatial abilities executive domains (planning, organization , divided attention)	1 = Better or no change 4 = consistently much worse than in the past	24	1	3.2	1.32	1.1	
Quick Dementia Rating System[10]	Dementia staging tool, 10-item questionnaire	Total Score Range: 0 to 30 with higher scores representing greater cognitive impairment	27	0	12	1.96	0.5	
Neuropsychiatric Inventory Brief Questionnaire[11]	Assesses neuropsychiatric symptomatology along 12 domains	total NPI-Q severity score represents the sum of individual symptom scores, ranges from 0-36	24	0	12	1.79	0.5	

CONCLUSIONS

1. The current NSBB Cohort is 65% male, predominantly white and well-educated
2. A majority of participants have played more than 1 contact sports and have reported blows to the head
3. According to participants, American Football was the most commonly played sport, followed by combat sports, baseball, soccer and basketball.
4. Compared to other sports, loss of consciousness was more commonly reported in American football, rugby, soccer and combat sports
5. Exposure to repetitive head trauma is not limited to contact sports participation but can also result from other sources such as military service and intimate partner violence
6. In terms of clinical symptomology, depressive symptoms have been reported by approximately 21% of participants

FUTURE DIRECTIONS

1. Expand outreach and enrollment: Targeted outreach to increase the representation of minority racial and ethnic groups, with specific importance to the African American population

2. Incorporate an extensive cognitive assessment: A validated remote digital cognitive assessment to classify the cognitive status of study participants.

3. Explore sex differences: It is important to understand the impact of biological sex on exposure as well as outcomes as it can differ between males and females

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