DARS Community Based Brain Injury Screening Initiative

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Introduction

Identifying symptoms of traumatic brain injury (TBI) or acquired brain injury (ABI) in individuals accessing care through community agencies can be a critical component of providing needed care. According to Dams-O'Connor and colleagues, "identification of TBI is particularly important when the injury results in continuing symptoms (chronic TBI) that can lead to reduced productivity, poor community integration, and other social problems" (p.480). Symptoms of TBI or ABI may be misattributed to other etiologies or may be interpreted by health care providers as evidence of non-compliance or lack of cooperation with treatment. In addition, appropriate services and/or treatments are not provided to those with TBI/ABI when the history of these is not queried.

Purpose of the Project

- Why did we attempt to identify or develop a TBI/ABI screening measure (PURPOSE)?
    - To help community health services agencies identify clients with self-reported history of TBI/ABI
    - To provide some information regarding whether the history of TBI/ABI might be contributing to current challenges.
    - To provide information on resources for staff to provide to identified clients.

- What should the TBI/ABI screening measure look like (UTILITY)?
    - Brief, easy to administer
    - Should not require extensive training
    - Provides the following information:
        - Determination of whether a client has a TBI/ABI history
        - Information about the severity of the TBI
        - Symptoms related to the TBI/ABI
        - General diagnostic information to guide referrals

Method

- A literature review was conducted using Ovid Medline and Pub Med search engines to identify existing methods of retrospectively identifying a history of TBI and/or ABI:
    - 124,107 brain injury citations
    - 109,860 community mass screening citations
    - 83,234 TBI citations
    - 76,746 ABI citations
    - 136 Combination citations (Combining either Brain Injury, TBI, or ABI "AND" community mass screening
    - 12 relevant screening articles were identified and reviewed

- A total of 26 screening instruments were reviewed and evaluated based on these variables:
    - Source of instrument
    - TBI and/or ABI focus/inclusion

- Description
  - Checklist
  - Interview format
  - Mental status or neuropsychological measure
- Number of items
- Intended population
- Administration time
- Advantages of the instrument
- Disadvantages of the instrument

- Two instruments were reviewed in greater detail and evaluated for this project:
  - Ohio State University TBI Identification Method (Corrigan et al.)
    - Interview Form
    - 20-30 minute administration time
  - Brain Injury Screening Questionnaire (Dams-O'Connor et al., Icahn School of Medicine at Mount Sinai; personal communication with Dr. Wayne Gordon)
    - 10-15 minute administration
  - Both have many advantages
    - Provide rich clinical detail
    - TBI specific
  - Too unwieldy and/or time consuming for use by non-brain injury services providers

- DARS personnel (Ms. Cantrell & Ms. Goodall) identified potential community agencies that might participate and included at least one from each agency type:
  - Area Agency on Aging
  - Center for Independent Living
  - Community Services Board
  - Free and Charitable Clinic

- The project was submitted for review to the University of Virginia Institutional Review Board for Social and Behavioral Sciences and the study was approved (Protocol # 2018-0168). The UVA IRB-SBS approved the letter for recruiting community agencies and allowed a verbal consent process for agency clients to participate in the study.

- To meet the purpose and utility goals of this project, the study team developed questions to screen for TBI and ABI to:
  - Help community health services agencies identify clients with TBI/ABI diagnoses
  - To provide some information regarding whether the TBI/ABI diagnosis might be contributing to current challenges.
  - To provide information on resources for staff to provide to identified clients.
  - The measure needed to be:
    - Brief, easy to administer
    - Not require extensive training

- The measure needed to provide the following information:
    - Determination of whether a client self-reports a TBI/ABI diagnosis
    - Information about the severity of the TBI
    - Current symptoms related to the TBI/ABI
    - General diagnostic information to guide referrals

- The Virginia Brain Injury Screening Tool (VBIST) was developed as a result of this process.
    - Determined additional questions to identify potential persisting TBI/ABI related symptoms
    - Received feedback from participating agencies on demographic questions and phrasing of items
    - Revised the VBIST based on agency feedback

- The VBIST was reviewed by brain injury experts and revised based on their input.
    - Anthony Giuliano, PhD, U Mass Medical School
    - Austin Errico, PhD, Qualified Brain Injury Support Provider
    - After ten revisions, the current VBIST was finalized.

- Participating agencies were identified and conference calls and webinars were held to discuss the project goals, consent process, administration process, and to answer questions.
    - Agencies were offered two options for entering data:
        - Electronically through the Qualtrics electronic survey system
        - Paper copies that could then be faxed, scanned or mailed to UVA for data entry

- Data collection began on August 8, 2018
    - Data collection ended on February 7, 2019

- After completion of the VBIST data collection period, a separate survey was conducted of staff at participating agencies to investigate whether the VBIST was efficient and user-friendly.
    - Staff survey was conducted via the Qualtrics system.
    - Staff responses were confidential.

- A recorded webinar on the development and use of the VBIST as a screening tool for community agencies was presented on May 14, 2019 in collaboration with the Brain Injury Association of Virginia.

Number of Participants:

- 542 total entries/responses for the VBIST survey
- Number of entries/responses per agency type:
    - AAA n = 42
    - CIL n = 12
    - CSB n = 444
    - FCC n = 44
- Agency clients who agreed to participate in the VBIST study = 409*
    - 133 declined participation
    - *not all participants answered all questions

Demographic Data:

Gender:

- 57% of the sample self-identified as female and 41% as male
- 6 participants self-identified as "Other"
- 2 participants self-identified as Transgender Male and 1 as Transgender Female
- 1 participant self-identified as Non-binary

Age:

- Age ranged from 18-95
- As expected, the oldest participants were from the AAA with a mean age of 77 years.
- The mean age for the other agencies ranged from 35 to 48.

Summary of Key Project Findings:

- Of those who consented to participate:
    - 25% reported a TBI history (n = 104)
    - 75% did not report a TBI history (n = 304)
        - 15 of 37 AAA participants reported a TBI
        - 1 of 12 CIL participants reported a TBI
        - 75 of 322 CSB participants reported a TBI
        - 13 of 37 FCC participants reported a TBI

- Of those who reported a history of TBI:
    - 64% endorsed a loss of consciousness (LOC) or coma
        - 46% reported an LOC of 1-30 minutes
        - 7% reported an LOC of 31-60 minutes
        - 46% reported an LOC/coma of greater than 60 min
    - 36% did not report a history of loss of consciousness

- The majority of TBI occurred from motor vehicle collisions, followed by falls, "other," and blunt trauma.
- The vast majority (82%) of participants denied any other brain condition, event, or disorder.
    - Of those responding yes to this question, most were diagnosed with either seizures, stroke, or dementia:
    - Seizures = 8.33%, n = 34
    - Stroke = 4.17%, n = 17
    - Dementia/Alzheimer's = 3.19%, n = 13
    - Hypoxia/anoxia = 0.98%, n = 4
    - Brain tumor = 0.74%, n = 3
    - Brain infections = 0%, n = 0
    - Other = 0.74%, n = 3
        - Loss of oxygen and dementia
        - Concussion
        - Narcolepsy with cataplexy
    - Most respondents who endorsed dementia were from an AAA, while the majority of those reporting seizures and stroke were CSB clients.

- Participants who identified current problems or issues with their <u>thinking</u> from this brain injury/condition/event/disorder?
    - 51% said yes
    - 49% denied persisting thinking difficulties
    - If yes, reported the following symptoms:
        - Memory = 68 (93.15%)
        - Other = 5 (6.85%)
        - Other responses listed were:
            - Vertigo
            - Space out
            - Racing thoughts
            - Headaches
            - Controlling emotions

- Participants who identified current <u>physical</u> problems or issues from this brain injury/condition/event/disorder?
    - 38% said yes
    - 62% denied persisting physical challenges
    - If yes, reported the following symptoms:
        - Nausea = 51 (92.73%)
        - Other = 4 (7.27%)
        - Other responses listed were:

- Weakness over right eye
- Speech
- Neuropathy
- Eyesight worse

- Participants who identified current <u>emotional</u> problems or issues that they attribute to the brain injury/condition/event/disorder?
  - 40% said yes
  - 60% denied persisting emotional problems
  - If yes, symptom reported:
    - Depression = 53 (96.36%)
    - Other = 2 (3.64%)
    - Other responses listed were:
      - Afraid to sexually interact with other women
      - Use to be depressed, but not anymore

- Results of the staff survey conducted to investigate the utility of the VBIST revealed the following responses:
  - "The VBIST is easy to use."
    - Strongly Agree 36%
    - Agree 55%
    - Neutral 9%
    - Disagree/Strongly Disagree 0
  - "The VBIST is quick to administer."
    - Strongly Agree 27%
    - Agree 45%
    - Neutral 27%
    - Disagree/Strongly Disagree 0
  - "The VBIST will be easy to incorporate into the standard intake evaluation."
    - Strongly Agree 18%
    - Agree 45%
    - Neutral 27%
    - Disagree 9%
    - Strongly Disagree 0
  - "The VBIST is a good way to gather & organize brain injury intake information."
    - Strongly Agree 18%
    - Agree 64%
    - Neutral 9%
    - Disagree 9%
    - Strongly Disagree 0

- "The VBIST will provide information which will help me consider additional brain injury services for my clients."
  - Strongly Agree 27%
  - Agree 36%
  - Neutral 36%
  - Disagree/Strongly Disagree 0

- Additional comments:
  - "I love this survey!"
  - "I was glad to participate in this trial, prior to it being instituted."
  - "Our intake process of clients is lengthy and health coaches sometimes feel overwhelmed with paperwork. Adding this extra component provided some pushback from employees."

Data Tables:

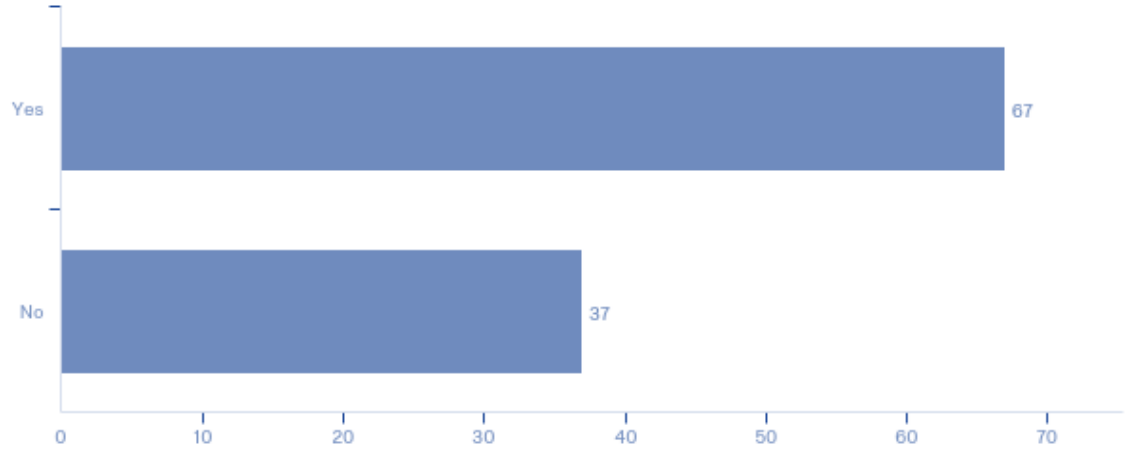
Client Self-Identified Gender by Agency Type

Gender	AAA	N	CIL	N	CSB	N	FCC	N	Total	N
Female	14.29%	33	2.16%	5	73.16%	169	10.39%	24	56.62%	231
Male	2.40%	4	3.59%	6	89.22%	149	4.79%	8	40.93%	167
Transgender Female	0%	0	0%	0	0%	0	100%	1	0.25%	1
Transgender Male	0%	0	0%	0	0%	0	100%	2	0.49%	2
Non-binary	0%	0	0%	0	0%	0	100%	1	0.25%	1
Other	0%	0	16.67%	1	66.67%	4	16.67%	1	1.47%	6

Client Age by Total Sample and Agency Type

Agency Type:	Mean	Std. Deviation	Minimum	Maximum
Total Sample	18	17.831	18	95
AAA	76.78	13.119	34	95
CIL	48.00	20.580	21	71
CSB	41.86	14.129	18	82
FCC	34.85	15.226	20	86
Total	44.76	17.831	18	95

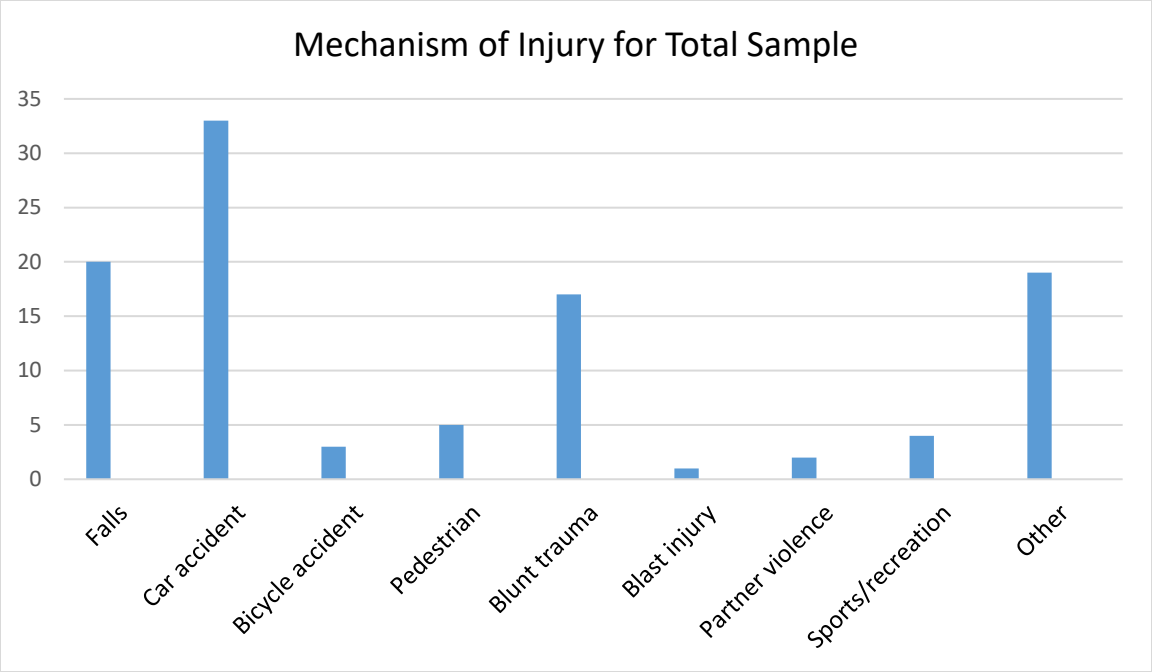
Of those who reported a history of TBI, those who endorsed being knocked out (loss of consciousness/LOC) or in a coma:



- AAA: reported LOC n = 9 (out of 15 with TBI)
- CIL: reported LOC n = 1 (out of 1 with TBI)
- CSB: reported LOC n = 48 (out of 75 with TBI)
- FCC: reported LOC n = 9 (out of 13 with TBI)

Length of LOC by Agency Type and Total Sample:

LOC by Agency	**AAA**	**CIL**	**CSB**	**FCC**	**Total**
1-30 min	2	1	74	4	31 (46%)
31-60 min	1	0	3	1	5 (7%)
> 60 min	6	0	21	4	31 (46%)

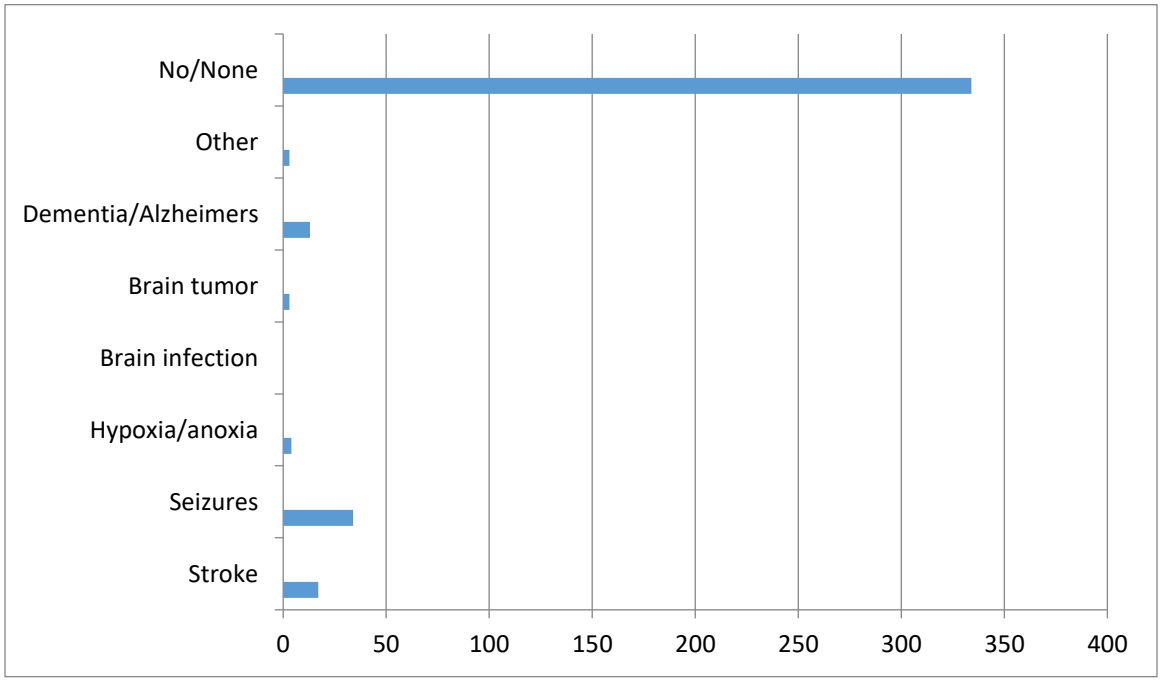


Mechanism of Injury by Agency Type	AAA		CIL		CSB		FCC		Total
Falls	30%	6	0%	0	60%	12	10%	2	20
Car accident	15.15%	5	3.03%	1	72.73%	24	9.09%	3	33
Bicycle accident	33.33%	1	0%	0	66.67%	2	0%	0	3
Hit by a vehicle while crossing or standing near a street (pedestrian)	0%	0	0%	0	80%	4	20%	1	5
Hit in the head with a heavy object (blunt trauma)	5.88%	1	0%	0	82.35%	14	11.76%	2	17
Exposed to blast forces in the military (blast injury)	0%	0	0%	0	100%	1	0%	0	1
Partner violence	50%	1	0%	0	50%	1	0%	0	2
Sports or recreational activity (sports team or activities like skiing, skateboarding, riding a horse	0%	0	0%	0	100%	4	0%	0	4
Other	5.26%	1	0%	0	68.42%	13	26.32%	5	19

Other mechanisms of injury provided by participants (some list multiple mechanisms of injury; responses are verbatim):

Angry Dad, Fighting
Beaten with a broom
Bleeding on the brain when he was born
Car accident, bike accident, and hit in the head with heavy object
Chiari Malformation
Falls and hit and head with heavy object
Falls, bicycle accident, and hit in the head with heavy object (blunt trauma)
Fell down steps at school and got a concussion.
Fight
Hit in the head with heavy object, falls, & sports/recreational
Mini Strokes
STROKE
Thrown down and hit head on concrete; thrown down stairs and hit head on metal object.
case 24oz beer fell on head
fell out of baby-crib at 7 months
hit by vehicle as a pedestrian, sports/recreational activity
stroke

Participants reporting any other kind of brain condition, event, or disorder diagnosed by a doctor:



Diagnosis	AAA		CIL		CSB		FCC		Total
Stroke	29.41%	5	11.76%	2	47.06%	8	11.76%	2	17
Seizures	0%	0	0%	0	91.18%	31	8.82%	3	34
Hypoxia/anoxia	0%	0	0%	0	100%	4	0%	0	4
Brain Infections	0%	0	0%	0	0%	0	0%	0	0
Brain Tumor	66.67%	2	0%	0	0%	0	33.33%	1	3
Alzheimer's and other types of dementia	69.23%	9	0%	0	30.77%	4	0%	0	13
Other	33.33%	1	0%	0	66.67%	2	0%	0	3
No diagnosis	5.99%	20	2.99%	10	81.74%	273	9.28%	31	334

Participants who identified current problems or issues with their thinking from this brain injury/condition/event/disorder?

Cognitive Symptom	AAA		CIL		CSB		FCC		Total
Memory	26.47%	18	1.47%	1	61.76%	42	10.29%	7	68
Attention/Concentration	0%	0	0%	0	0%	0	0%	0	0
Language/Speech	0%	0	0%	0	0%	0	0%	0	0
Problem-Solving/Thinking	0%	0	0%	0	0%	0	0%	0	0
Multi-tasking	0%	0	0%	0	0%	0	0%	0	0
Other	0%	0	0%	0	80%	4	20%	1	5

Participants who identified current physical problems or issues from this brain injury/condition/event/disorder?

Physical Symptom	AAA		CIL		CSB		FCC		
Nausea	33.33%	17	3.92%	2	50.98%	26	11.76%	6	51
Fatigue	0%	0	0%	0	0%	0	0%	0	0
Balance/dizziness/walking	0%	0	0%	0	0%	0	0%	0	0
Weakness or numbness in hands, arms, or feet	0%	0	0%	0	0%	0	0%	0	0
Trouble with vision or hearing	0%	0	0%	0	0%	0	0%	0	0
Pain, including headaches, neck pain, and/or body pain	0%	0	0%	0	0%	0	0%	0	0
Sensitivity to light and/or sound	0%	0	0%	0	0%	0	0%	0	0
Excessive or insufficient sleep	0%	0	0%	0	0%	0	0%	0	0
Other	25.00%	1	0%	0	50%	2	25.00%	1	4

Participants who identified current emotional problems or issues that they attribute to the brain injury/condition/event/disorder?

Emotional Symptom	AAA		CIL		CSB		FCC		Total
Depression	28.30%	15	1.89%	1	58.49%	31	11.32%	6	53
Suicidal ideation/ attempts	0%	0	0%	0	0%	0	0%	0	0
Anxiety	0%	0	0%	0	0%	0	0%	0	0
PTSD	0%	0	0%	0	0%	0	0%	0	0
More emotional, "short fuse", easily irritated, or more tearful	0%	0	0%	0	0%	0	0%	0	0
Hallucinations	0%	0	0%	0	0%	0	0%	0	0
Difficulty trusting others/suspicious	0%	0	0%	0	0%	0	0%	0	0
Other	50%	1	0%	0	50%	1	0%	0	2

Participating Agencies:

Area Agencies on Aging:

- (102) Jefferson Area Board on Aging, Charlottesville
- (103) Bay Aging, Urbanna

Center for Independent Living:

- (201) Resources for Independent Living, Richmond

Community Services Board:

- (301) Southside Community Services, Clarksville
- (302) Middle Peninsula-Northern Neck CSB, Saluda
- (303) Western Tidewater CSB, Suffolk

Free and Charitable Clinic:

- (401) Health Brigade (Fan Free), Richmond

Supplementary Data by each Participating Agency:

Gender by each Participating Agency:

Gender	102 N	103 N	201 N	301 N	302 N	303 N	401 N	Total
Female	12	21	5	28	105	36	24	231
Male	0	4	6	19	95	35	8	167
Trans Female	0	0	0	0	0	0	1	1
Trans Male	0	0	0	0	0	0	2	2
Non-binary	0	0	0	0	0	0	1	1
Other	0	0	1	0	4	0	1	6

TBI History by each Participating Agency:

TBI	102	103	201	301	302	303	401
Yes	6	9	1	15	43	17	13
No	6	16	11	32	161	54	24
% of Agency Sample	50%	36%	8%	40%	21%	24%	35%

Positive LOC/Coma for those with TBI by each Participating Agency:

TBI with LOC/Coma	102	103	201	301	302	303	401
Yes	2	7	1	9	29	10	9
No	4	2	0	6	14	7	4
% of Agency Sample	33%	78%	100%	60%	67%	59%	69%

Length of LOC/Coma by each Participating Agency:

Length of LOC/Coma	102	103	201	301	302	303	401
1 to 30 minutes	0	2	1	7	9	8	4
31 to 60 minutes	1	0	0	0	3	0	1
More than 60 minutes	1	5	0	2	17	2	4

Mechanism of Injury (TBI) by each Participating Agency:

Injury	102		103		201		301		302		303		401		Total
Falls	10%	2	20%	4	0%	0	20.%	4	35%	7	5%	1	10%	2	20
MVC	6.1%	2	9.1%	3	3%	1	9.1%	3	57.6%	19	6.1%	2	9.1%	3	33
Bicycle accident	33.3%	1	0%	0	0%	0	0%	0	66.7%	2	0%	0	0%	0	3
Hit by car walking/ standing	0%	0	0%	0	0%	0	20%	1	40%	2	20%	1	20%	1	5
Blunt trauma	0%	0	5.9%	1	0%	0	17.7%	3	17.7%	3	47.1%	8	11.8%	2	17
Blast injury	0%	0	0%	0	0%	0	0%	0	100%	1	0%	0	0%	0	1
Partner violence	50%	1	0%	0	0%	0	0%	0	50%	1	0%	0	0%	0	2
Sports/ recreation	0%	0	0%	0	0%	0	0%	0	75%	3	25%	1	0%	0	4
Other	0%	0	5.3%	1	0%	0	21.1%	4	26.3%	5	21%	4	26.3%	5	19

Other Kind of Condition, Event, or Disorder Diagnosed by a Doctor:

ABI	102		103		201		301		302		303		401		Total
Stroke	5.88 %	1	23.53 %	4	11.76 %	2	11.76 %	2	23.53 %	4	11.76 %	2	11.76 %	2	17
Seizures	0%	0	0%	0	0%	0	8.82 %	3	70.59 %	24	11.76 %	4	8.82 %	3	34
Hypoxia/ anoxia	0%	0	0%	0	0%	0	50%	2	50%	2	0%	0	0%	0	4
Brain Infections	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Brain Tumor	33.3 3%	1	33.33 %	1	0%	0	0%	0	0%	0	0%	0	33.33 %	1	3
Dementia	0%	0	69.23 %	9	0%	0	7.69 %	1	23.08 %	3	0%	0	0%	0	13
Other	0%	0	33.33 %	1	0%	0	33.33 %	1	33.33 %	1	0%	0	0%	0	3
No	2.99 %	10	2.99 %	10	2.99 %	10	11.38 %	38	50.90 %	170	19.46 %	65	9.28 %	31	334

Participants who Identified Current Problems or Issues with their Thinking from this Brain Injury/Condition/Even/Disorder:

Cognitive Symptom	102		103		201		301		302		303		401		Total
Memory	1.5%	1	25%	17	1.5%	1	16%	11	40%	27	6%	4	10%	7	68
Attention/ Concentration	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Language/Speech	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Problem-Solving	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Multi-tasking	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Other	0%	0	0%	0	0%	0	40%	2	20%	1	20%	1	20%	1	5

Participants who Identified Current Problems or Issues with Physical Problems from this Brain Injury/Condition/Even/Disorder:

Physical Symptom	102		103		201		301		302		303		401		Total
Nausea	4%	2	29%	15	4%	2	4%	2	35%	18	12%	6	12%	6	51
Fatigue	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Balance/dizziness/ walking	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Weakness or numbness in hands, arms, feet	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Vision or hearing	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Pain	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Light and/or sound sensitivity	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Sleep problems	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Other	0%	0	25%	1	0%	0	0%	0	50%	2	0%	0	25%	1	4

Participants who Identified Current Problems or Issues that they Attribute to the Brain Injury/Condition/Even/Disorder:

Mood Symptom	102		103		201		301		302		303		401		Total
Depression	4%	2	25%	13	2%	1	11%	6	42%	22	6%	3	11%	6	53
Suicidal ideation/ attempt	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Anxiety	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
PTSD	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
More emotional/ irritable	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Hallucination	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Difficulty trusting/ suspicious	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Other	0%	0	50%	1	0%	0	0%	0	0%	0	50%	1	0%	0	2

Other Project Deliverables:

- Webinar presented via BIAV on May 14, 2019 and now available on the BIAV website
- Individual data reports for each participating agency with summary data for their site
- Information sheet on resources for individuals with brain injury available through DARS
- Referral sheet for agency personnel that can guide next steps for agency clients with identified TBI/ABI symptoms.

Supplementary Information on Data Analysis:

- Twenty age responses below age 18 were identified and determined to be data entry errors or reflect participants who did not wish to answer. The identified centers were contacted centers to confirm all participants met age requirements (age 18 or older).
- For those agencies who submitted responses on paper, missing age data was coded as “99” and these were also removed from the age data field. The electronic survey did not allow the age field to be skipped.

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Reference:

Dams-O'Connor K, Cantor JB, Brown M, Dijkers MP, Spielman LA, Gordon WA. (2014). Screening for traumatic brain injury: Findings and public health implications. J Head Trauma Rehabil, 29 (6), 479-489.