

Emergency Department and Psychology Care Patterns That Develop Following a Traumatic Brain Injury in Children and Young Adults

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Background/Objective

- Traumatic Brain Injury (TBI) is the leading cause of morbidity and mortality in individuals under the age of 45 years old globally.
- TBI is associated with a high prevalence of learning disorders, ADHD, speech/language problems, developmental delay, bone or muscle problems.
- TBI is a risk factor for a variety of neurological illnesses like epilepsy, stroke and neurodegenerative disease
- 48.3% of individuals with TBI develop a psychiatric disorder within 30 years, the most common of these being major depression, alcohol abuse, panic disorder, or specific phobias. 35% of these new diagnoses occur in the first year after a TBI
- Rates of depression ranged from 24.8-28.1% and suicidal ideation ranged from 7-10.1% after TBI
- There is also an increase in risk of sustaining a low extremity injury with each multiple concussion or mild TBI
- Objective:** The purpose of this study is to characterize the follow-up patterns following a TBI with a focus on emergency department visits and psychology visits.

Subjects

- Data was extracted from the electronic health records at Cincinnati Children's Hospital Medical Center
- Inclusion Criteria:
 - Clinical visit to one of Cincinnati Children's Hospital Medical Center's locations.
 - Diagnosis of a TBI (all severity types)
 - 21 years of age or younger when they first presented with a TBI diagnosis
- Demographic Data
 - Age at time of injury
 - Gender
 - Ethnicity
 - Race
 - Diagnosis code at time of injury (ICD-10 code or equivalent)

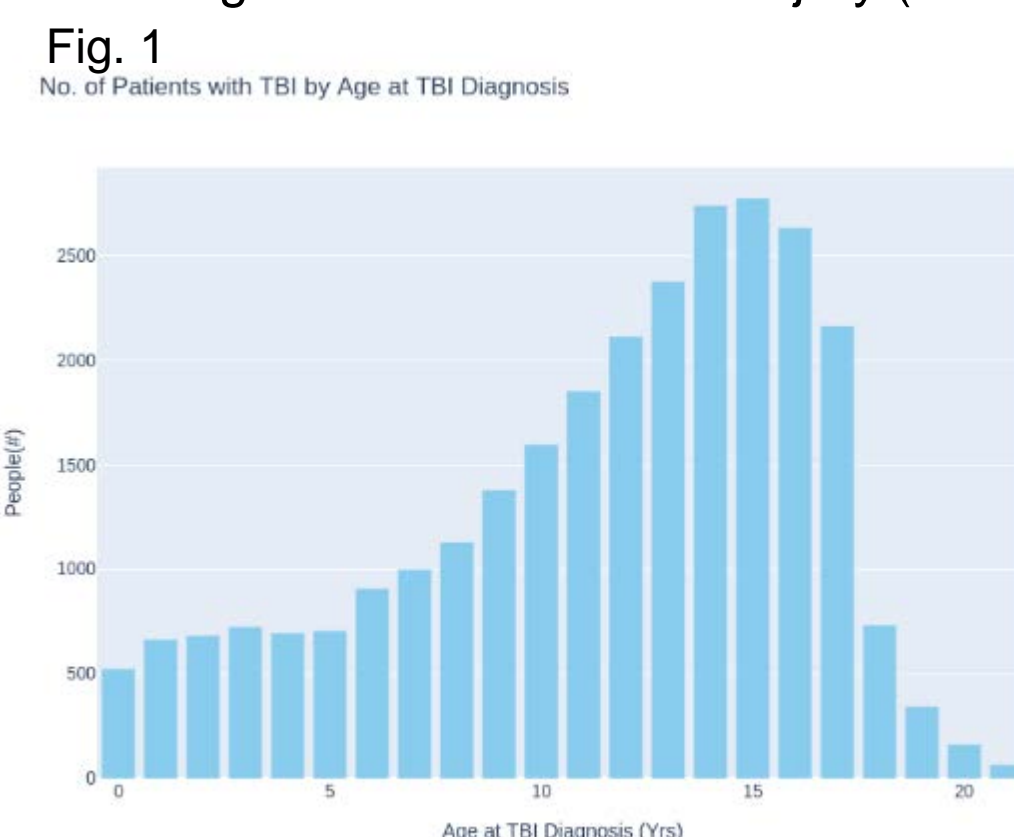


Fig. 1: Age of patient at time of TBI diagnosis

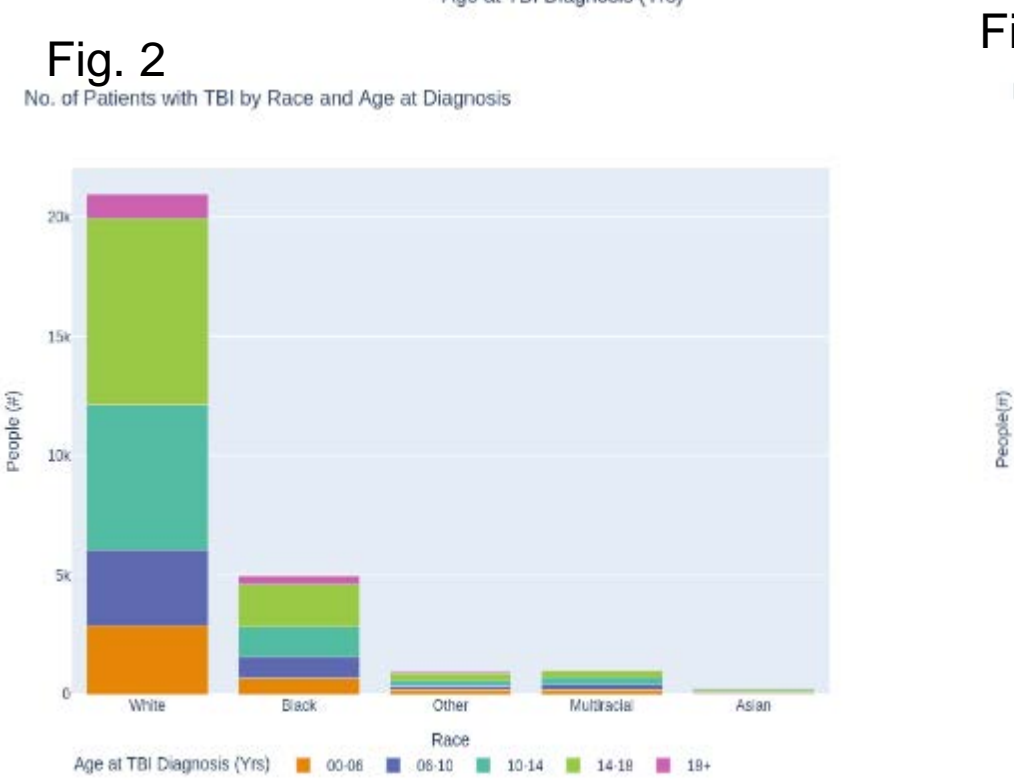


Fig. 2: No. of patients with TBI by Race and Age at Diagnosis

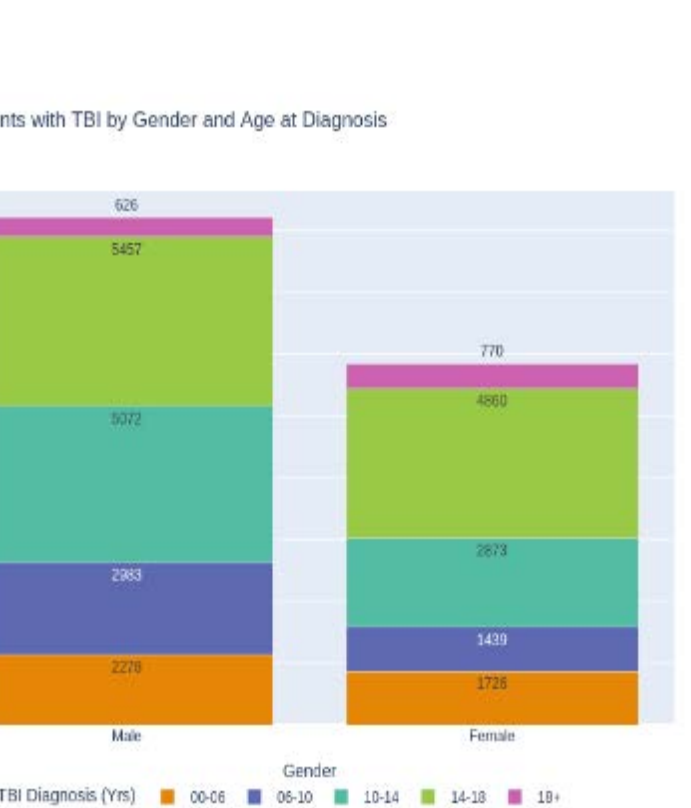


Fig. 3: No. of patients with TBI by Gender and Age at Diagnosis

Methods

- Using Alteryx, data were parsed through in order to find the appropriate information.
- For each patient, the number of visits to the emergency department and to psychology appointments prior to the injury were counted and averaged.
- Averages were used to ensure population size
- This was separated into the first two years prior to the injury
- This was compared to the 7 years after a traumatic brain injury.
- This data was separated into the number of years prior to/after injury.

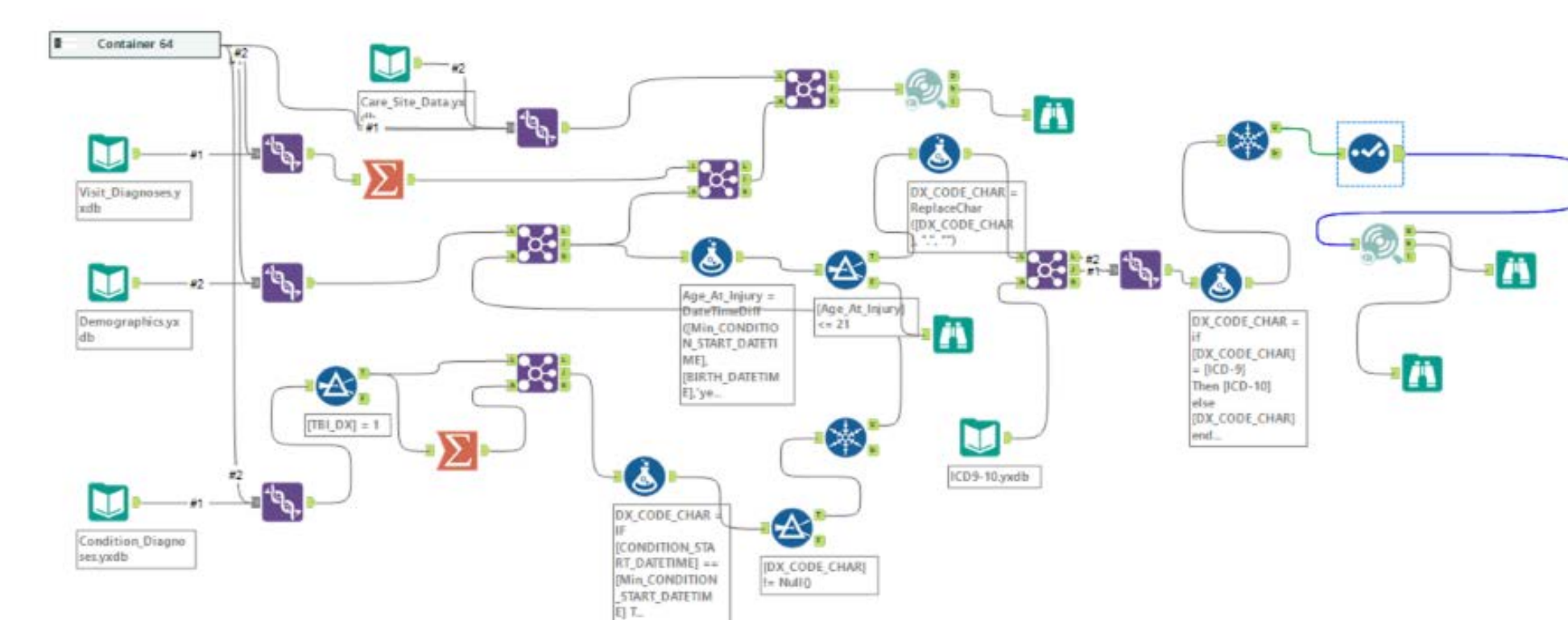


Fig 4. Alteryx Workflow to obtain Demographic Information

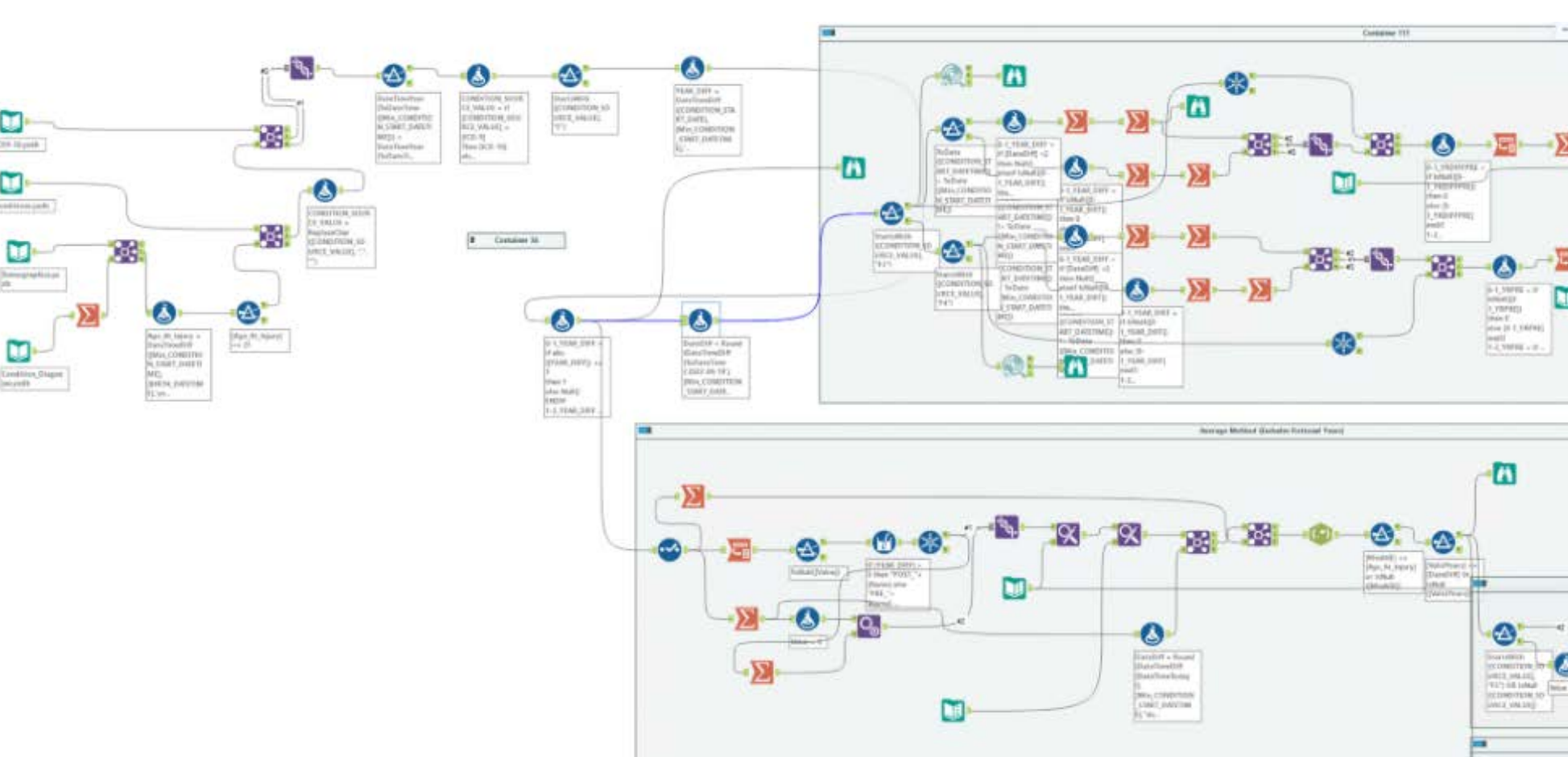


Fig 5. Alteryx Workflow to obtain Diagnosis Information

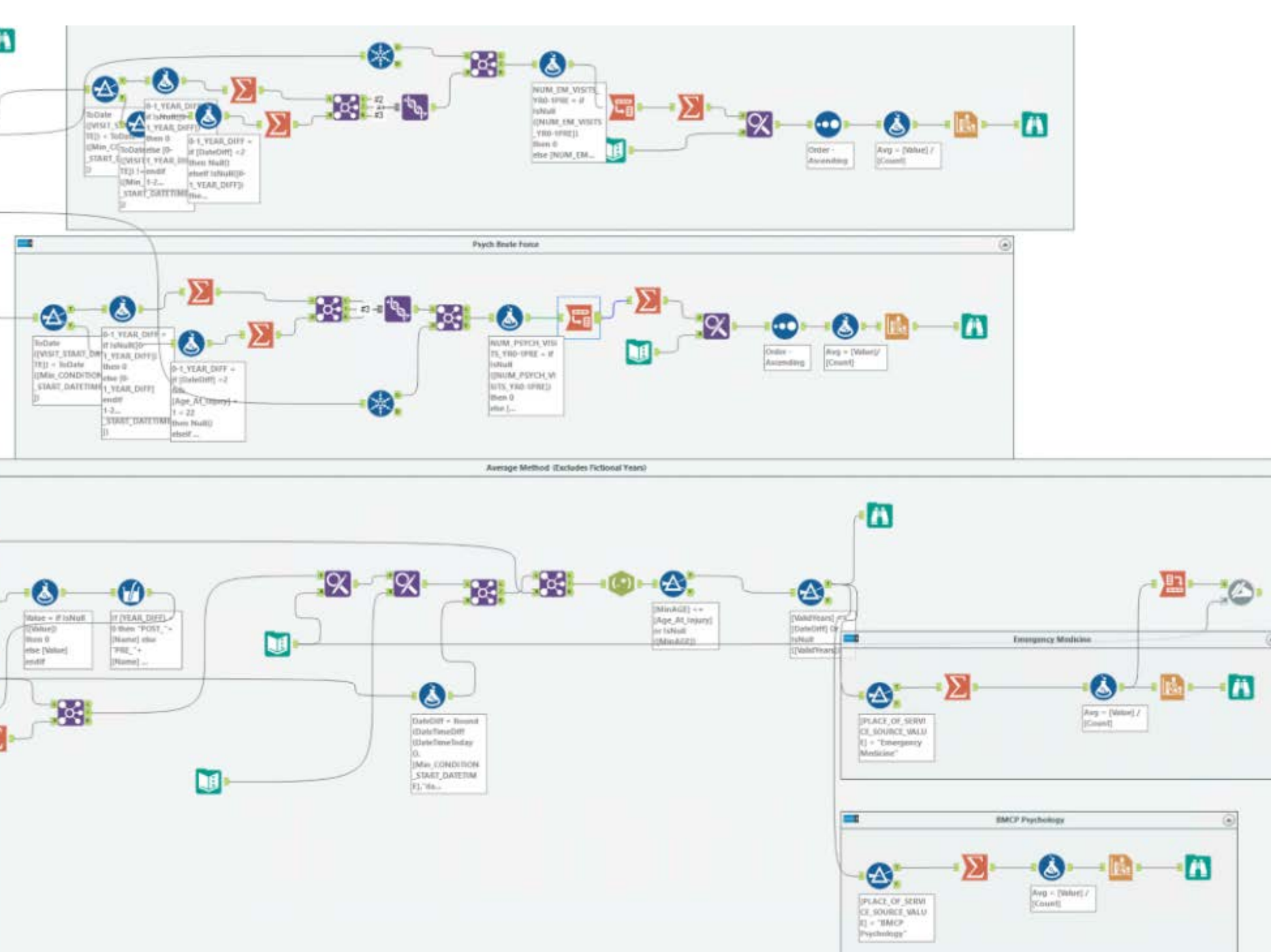


Fig 6. Alteryx Workflow to obtain Follow-Up Information

Results

Demographics

- 43,173 patients were in the database including patients who have had any Neurological diagnosis that has ever presented to Cincinnati Children's Hospital Medical Center from 2010-2023
- 27,675 of these patients have experienced a traumatic brain injury at some point during their care
- Filtering out patients who initially presented with a traumatic brain injury older than 21 years of age led to a final patient count of 27,485 patients
- 58% of patients were male, 42% were female
- Race: 75% of patients were white, 18% were Black or African American, 3% Multiracial, 1.4% identified as a non-listed race
- 96% identified as non-Hispanic and only 2.4% identified as Hispanic
- The most common age at time of their traumatic brain injury was 15 years of age (9.9%)
- 65.2% were in their early to mid teenage years (10-17 years of age)
- Most common diagnosis code was the ICD-10 code for a concussion without loss of consciousness (S06.0X0A), at the initial encounter (74.77%)

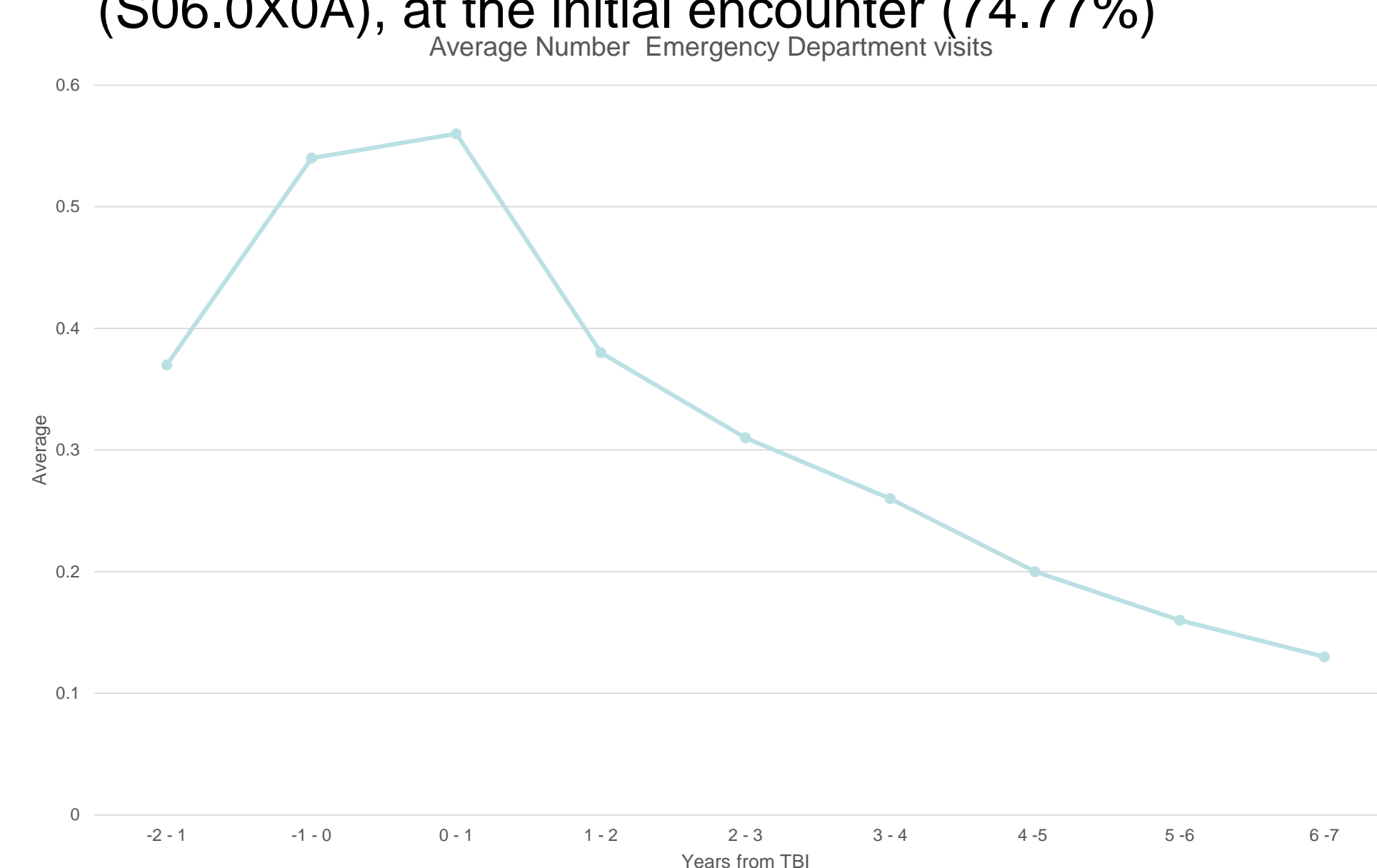


Fig 7. Avg. Number of Emergency Department visits pre and post Traumatic Brain Injury

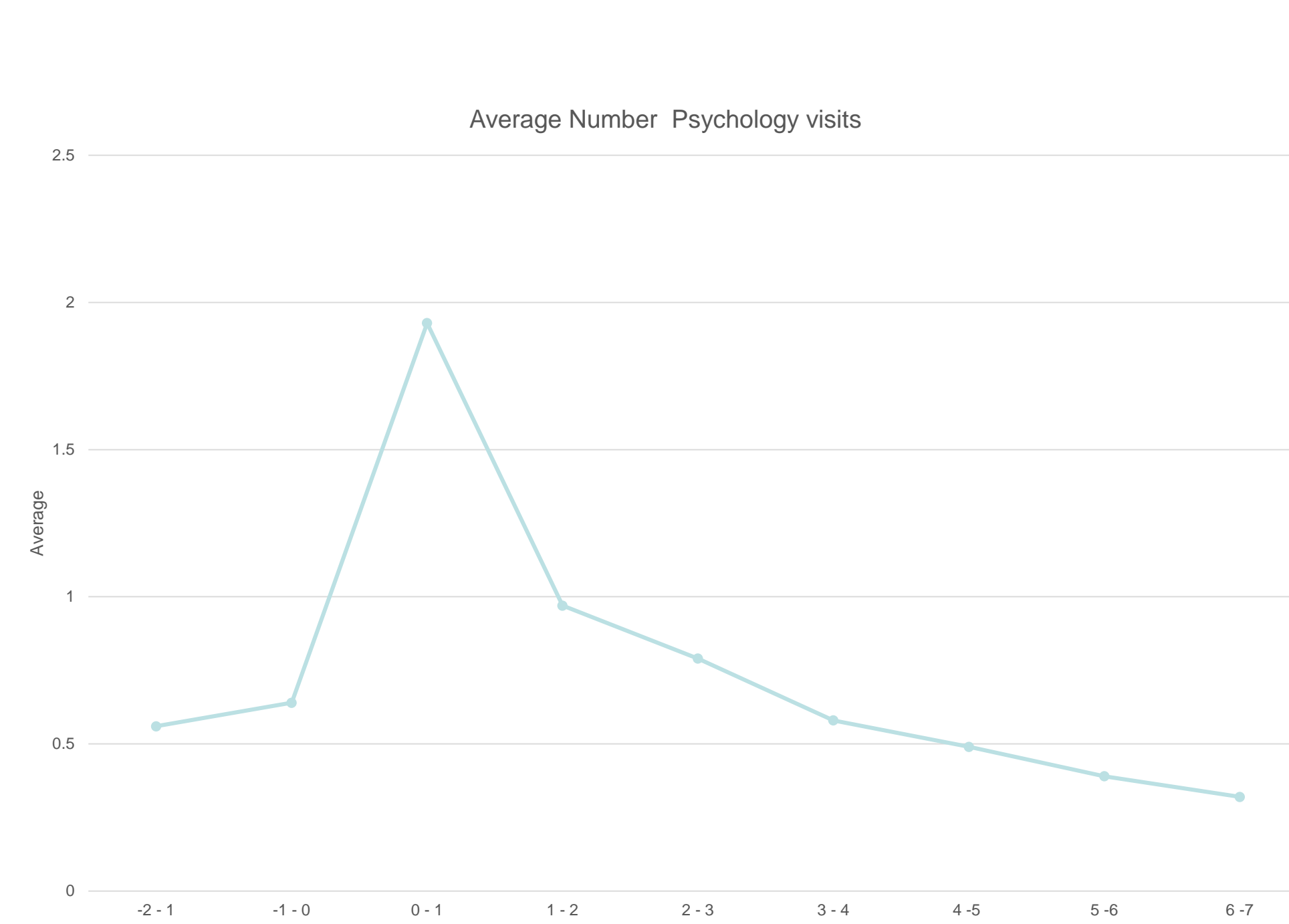


Fig 8. Avg. Number of Psychology visits pre and post Traumatic Brain Injury

Results

Visits

- There were a total number of 93,610 Emergency Department visits among 18,530 unique patients the two years prior to the TBI and 7 years after the TBI, not including the day of the injury
- 67% of all patients had visits to the Emergency Department
- The Average Number of ED visits peaks at 0.56 visits in the year immediately following Traumatic Brain Injury
- There were a total number of 48,337 Psychology service visits among 6,217 patients in the 2 years prior to the TBI and 7 years after the TBI, not including the day of the injury
- 23% of this patient group had visits to Psychology during this time period
- The average number of psychology visits peaks at 1.93 1 year post Traumatic Brain Injury
- There were large increases in the number of visits in the initial year following TBI to both the Emergency Department and Psychology
- The number of Emergency Department visits returned to pre-injury levels 1 year after injury
- The number of Psychology visits returned to pre-injury levels after 3 years

Conclusion

- TBIs in children are associated with an initial increase of visits to the Emergency Department and Psychology appointments, with the number of visits returning to baseline levels one year after injury and 3 years after injury, respectively.
- The spike seen in Psychology emphasizes the importance of mental health support following a Traumatic Brain Injury
- Future research should further delineate the nature of these visits and consider ways to optimize care for these individuals, especially during the initial years after injury
- There should be more research focused on the future of mental health in relation to brain injuries

Resources

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