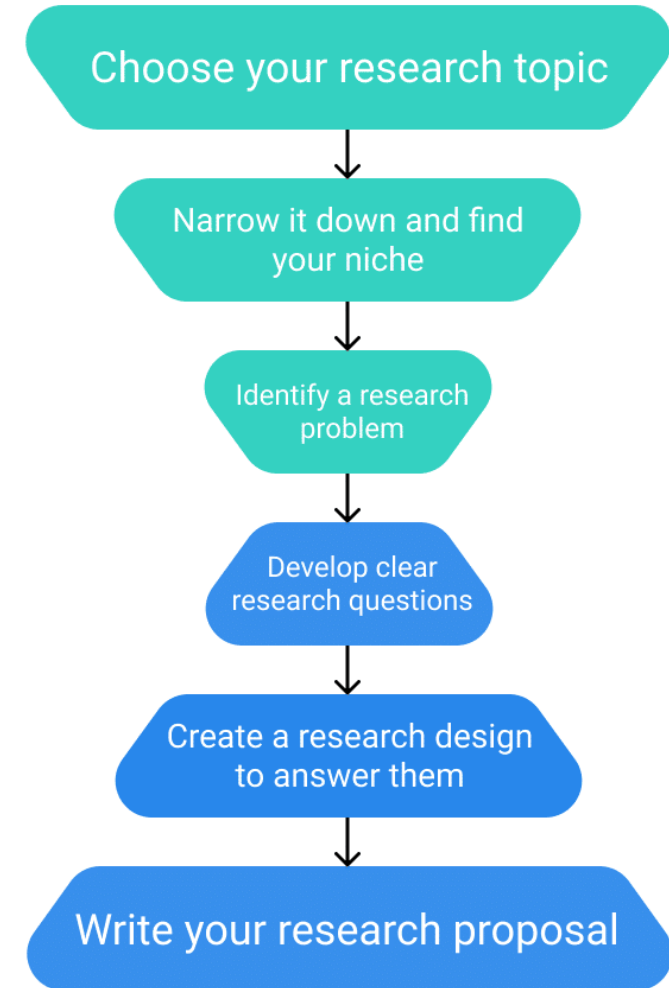


Introduction

- The first step of writing a research proposal ?
- How to choose a topic?
 - Hard for junior researchers



Data Acquisition

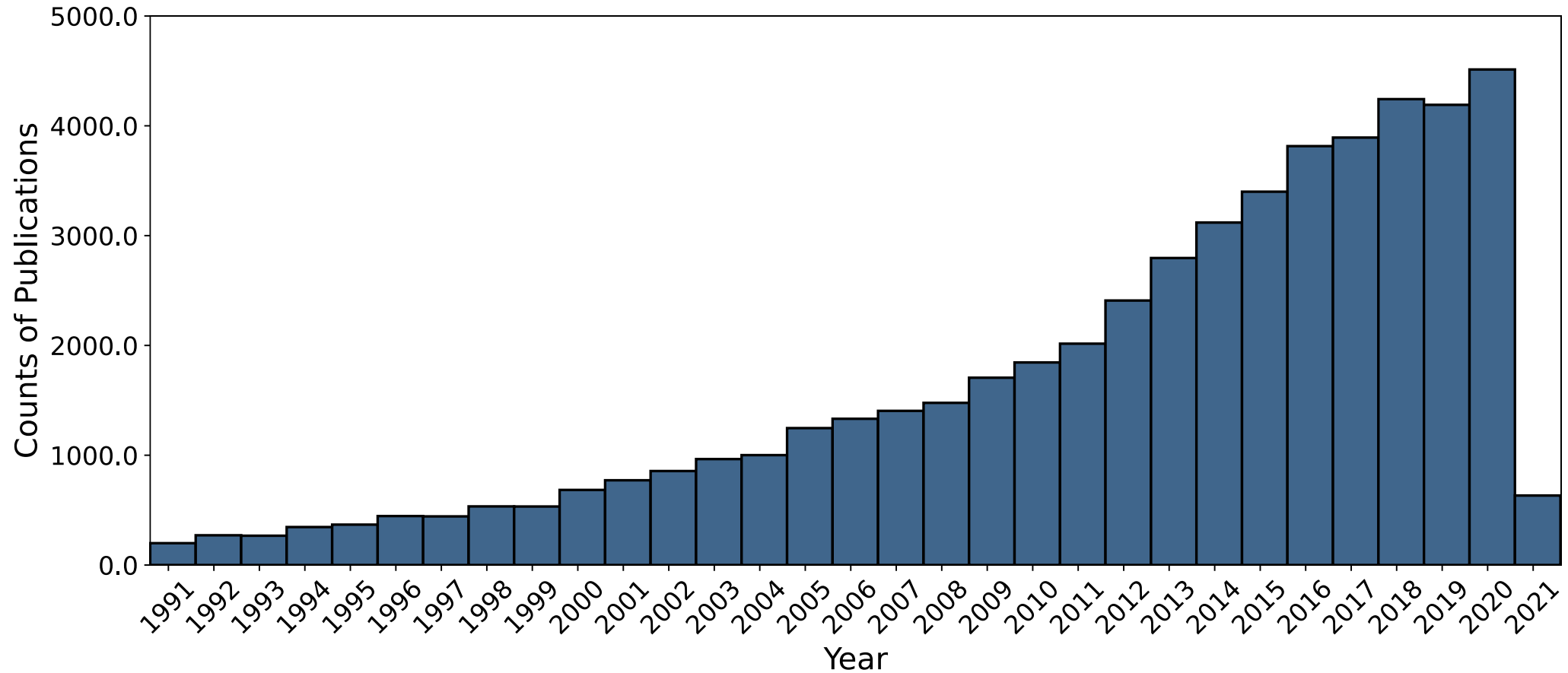


Query with pymed (51724 docs):

- Keywords:
 - Traumatic brain injury
 - Brain biomechanics
 - Concussion
- Period:
 - 1991–2021
- Language:
 - English
- Content:
 - Title
 - Abstract
 - Journal

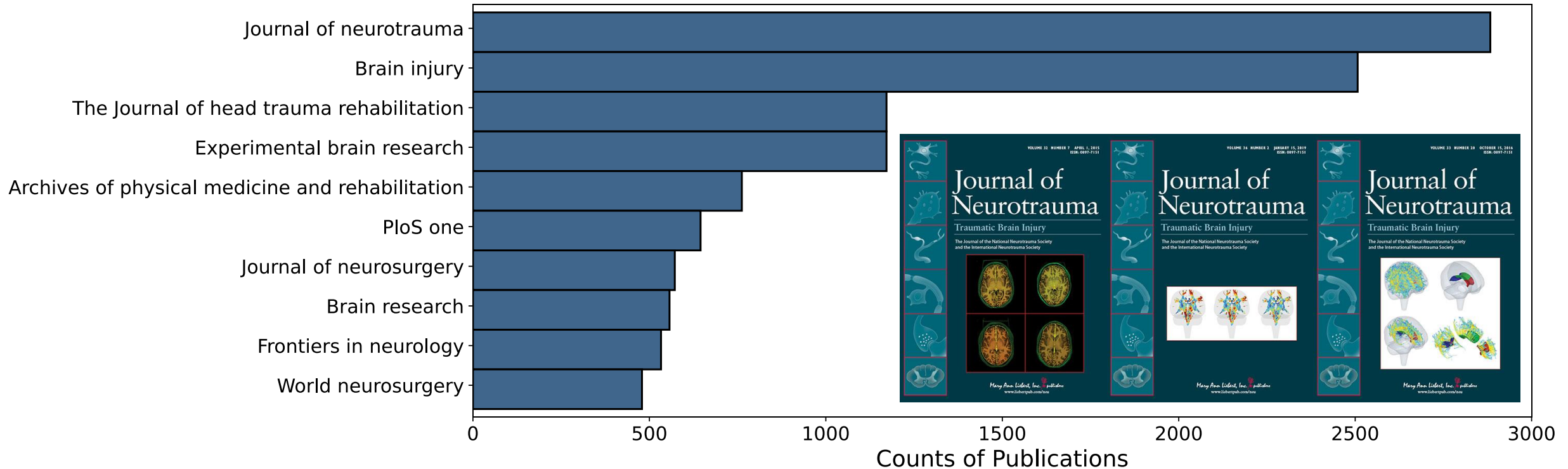
Yearly Total Numbers of Publications

The field is expanding

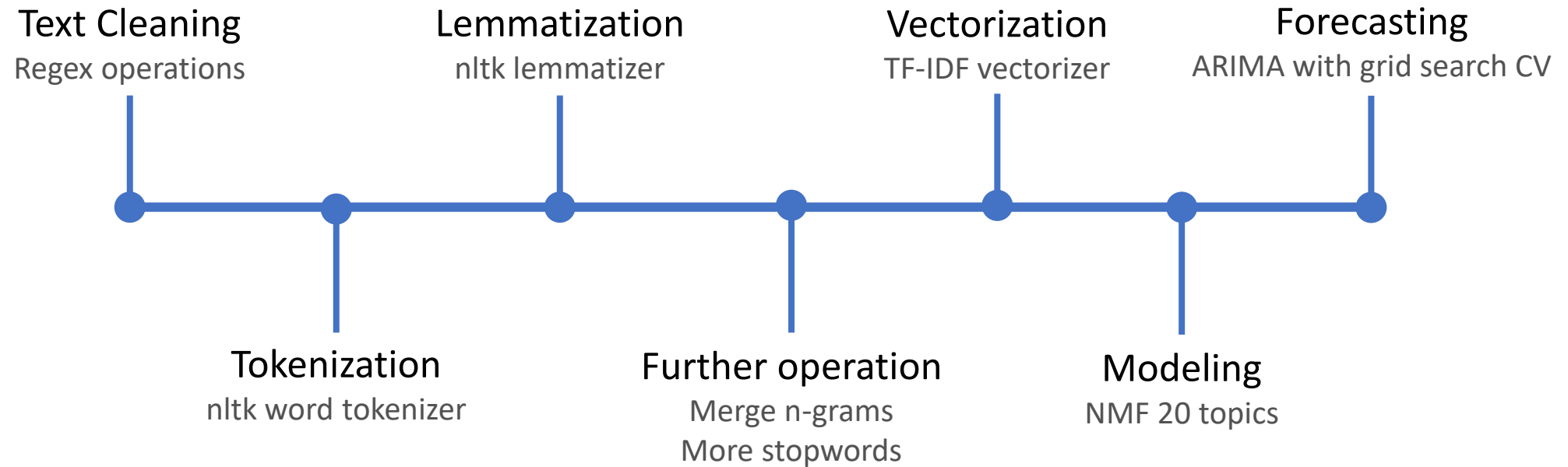


Top 10 Most Popular Journals

J Neurotrauma most popular: IF of 4.056

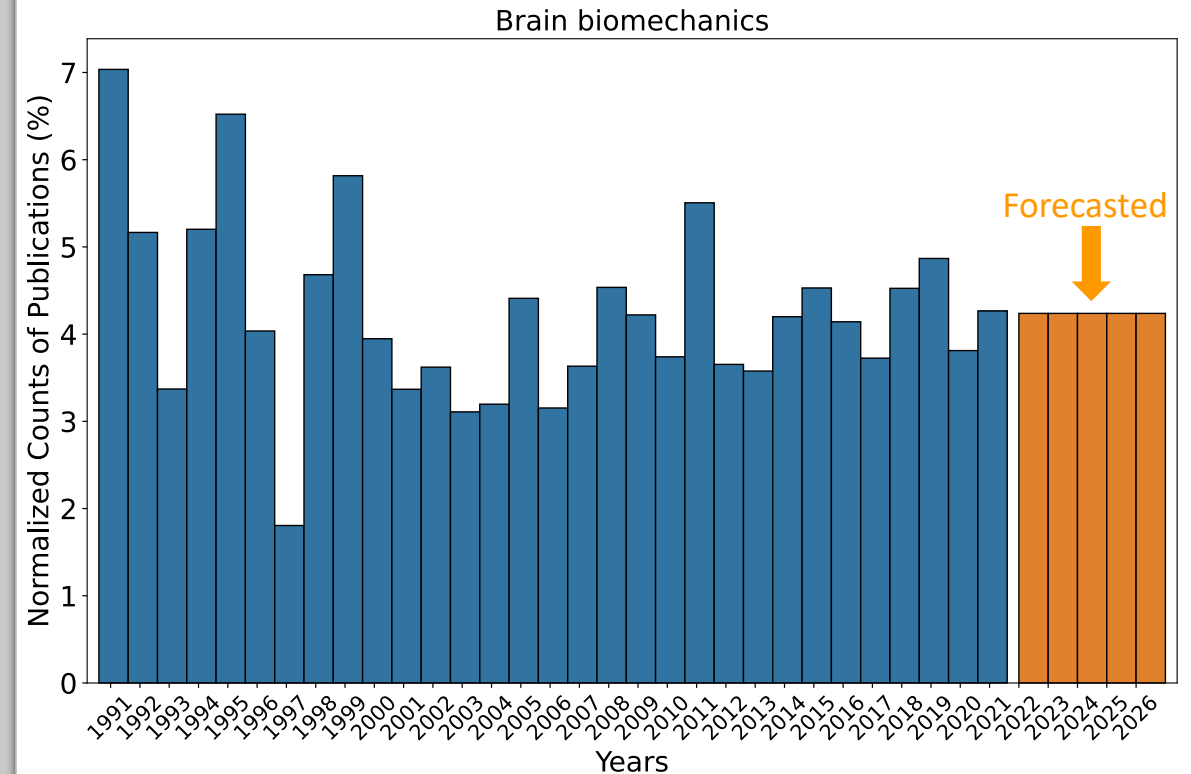
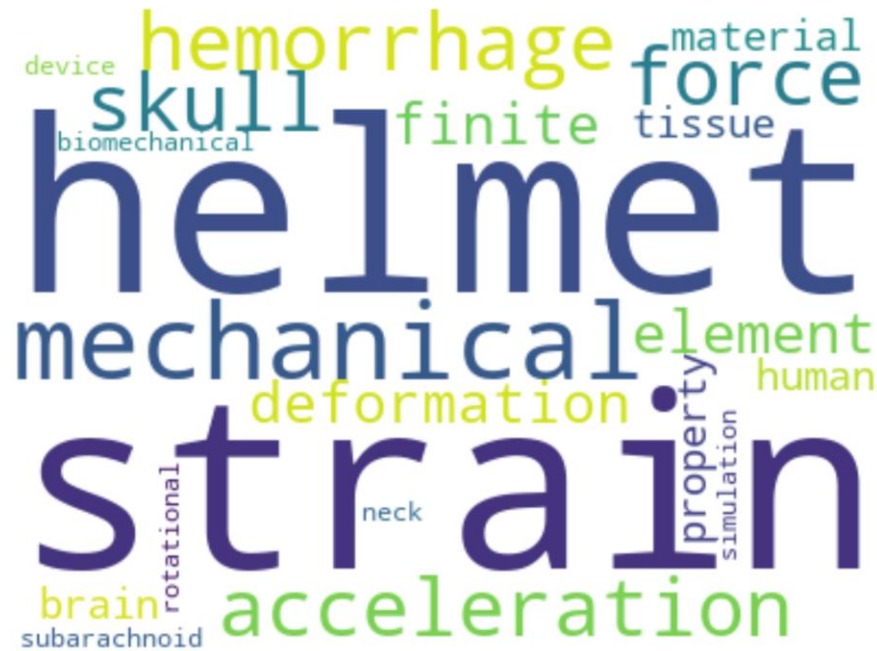


Topic Modeling & Development Forecasting



Brain Biomechanics

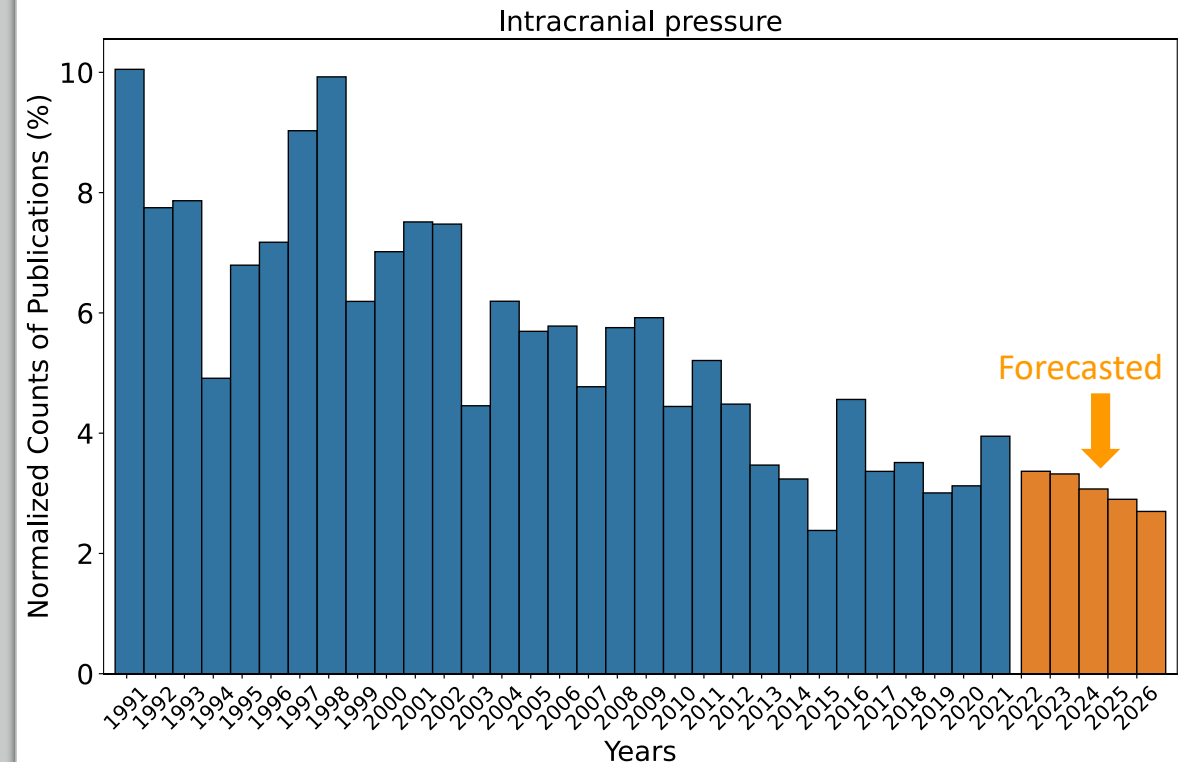
- Not as hot as before, but remains stable



Intracranial Pressure

- Hot topic ~25 years ago
 - Pressure: the outcome of TBI, not the cause
 - Pressure less important; brain is nearly incompressible.

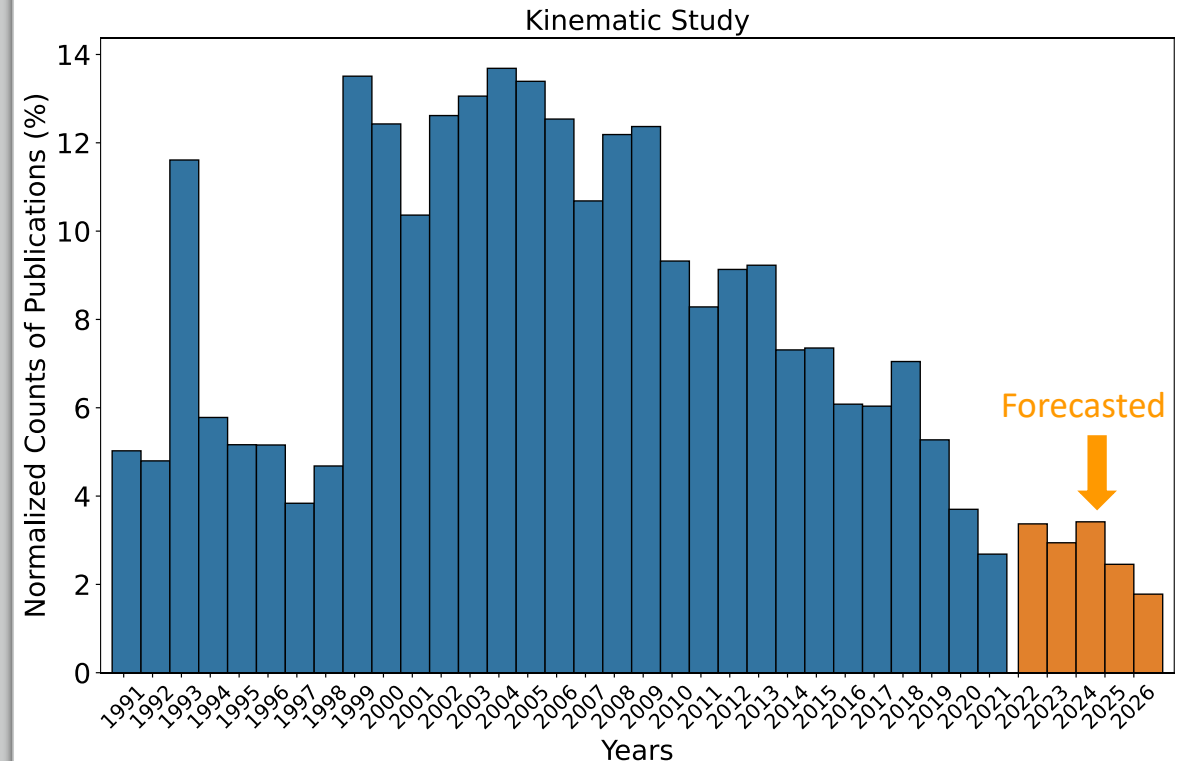
A word cloud of terms related to intracranial pressure research. The most prominent words are 'intracranial', 'pressure', 'cerebral', and 'monitoring'. Other visible terms include 'oxygen', 'perfusion', 'lactate', 'tissue reactivity', 'autoregulation', 'metabolic', 'microdialysis', 'measurement', 'hypoxia', 'glucose', 'arterial', 'blood', 'oxygenation', 'brain', 'metabolism', 'cbb', 'eeg', 'flow', 'metabolic', 'perfusion', 'autoregulation', 'microdialysis', 'measurement', 'hypoxia', 'glucose', 'arterial', 'blood', 'oxygenation', 'brain', 'metabolism', 'cbb', 'eeg', 'flow'.



Kinematic Study

- Hot topic ~10 years ago
 - Head kinematics do not directly inform brain deformation
 - More and more studies in sports concussion

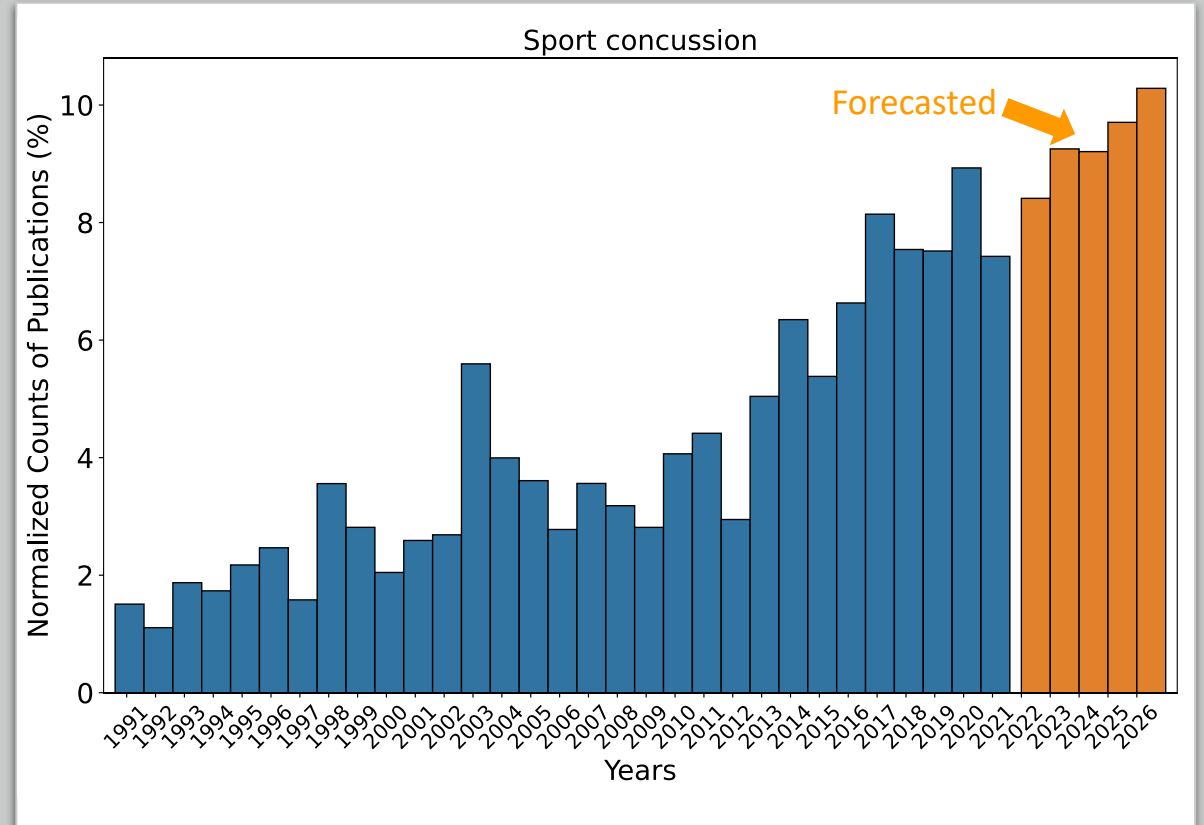
stimulation stimulus
velocity sensory
movement target
action gait finger
motion arm
dynamic force postural
kinematic
joint motor neural
visual



Sports Concussion

- Hot topic now
 - Huge amount of funding opportunities
 - NIH, NSF, and NFL
 - More research findings offer more research opportunities

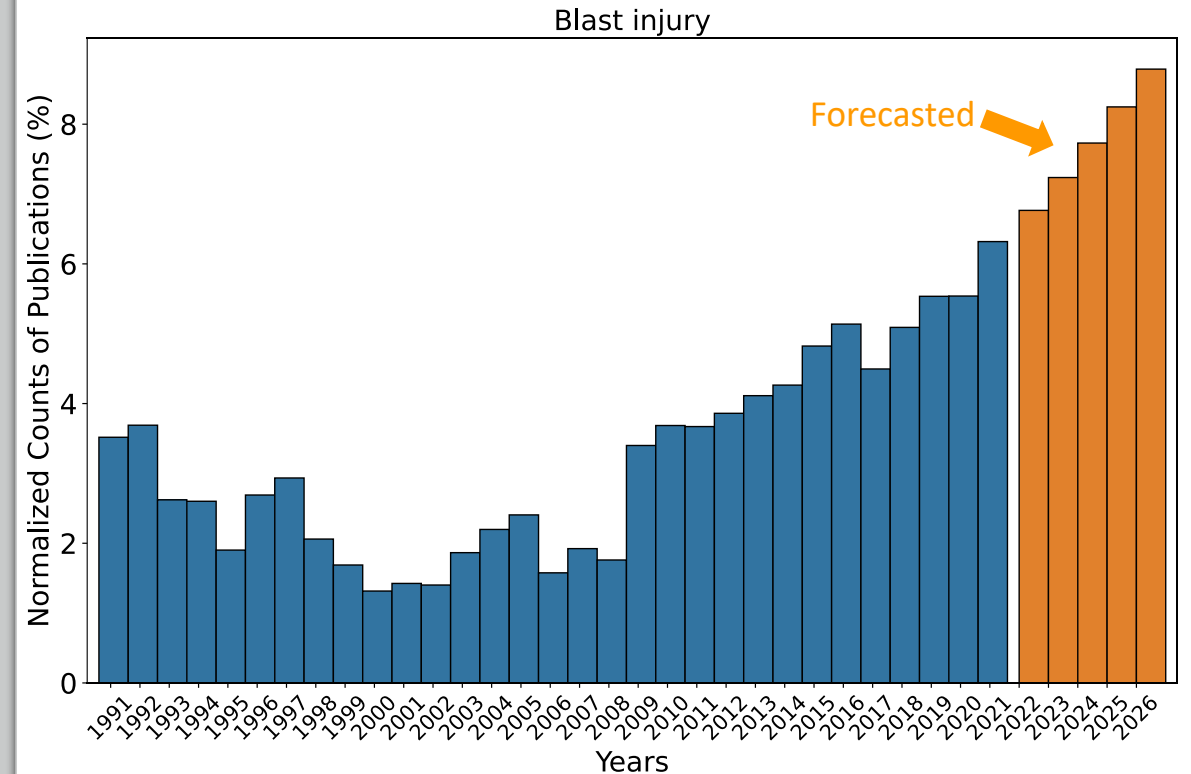
A word cloud visualization of terms related to sports concussion research. The most prominent words are 'athlete', 'player', 'concussion', 'sport', 'high', 'youth', 'assessment', 'head', 'athletic', 'game', 'balance', 'impact', 'neurocognitive', 'school', 'src', 'football', 'hockey', 'soccer', 'season', 'contact', 'return', 'collegiate', and 'rugby'. The words are arranged in a dense, overlapping manner, with 'athlete' and 'player' being the largest and most central.



Blast Injury

- Hot topic now
 - More funding opportunities from the US army

A word cloud of terms related to blast injury. The most prominent words are 'blast', 'symptom', 'exercise', 'headache', 'concussion', 'exposure', 'post', 'dizziness', 'recovery', 'vestibular', 'concussive', 'btbi', 'mild', 'postconcussive', 'visual', 'postconcussion', 'rest', 'military', 'wave', 'physical', 'syndrome', and 'concussion'.



Summary & Future Work

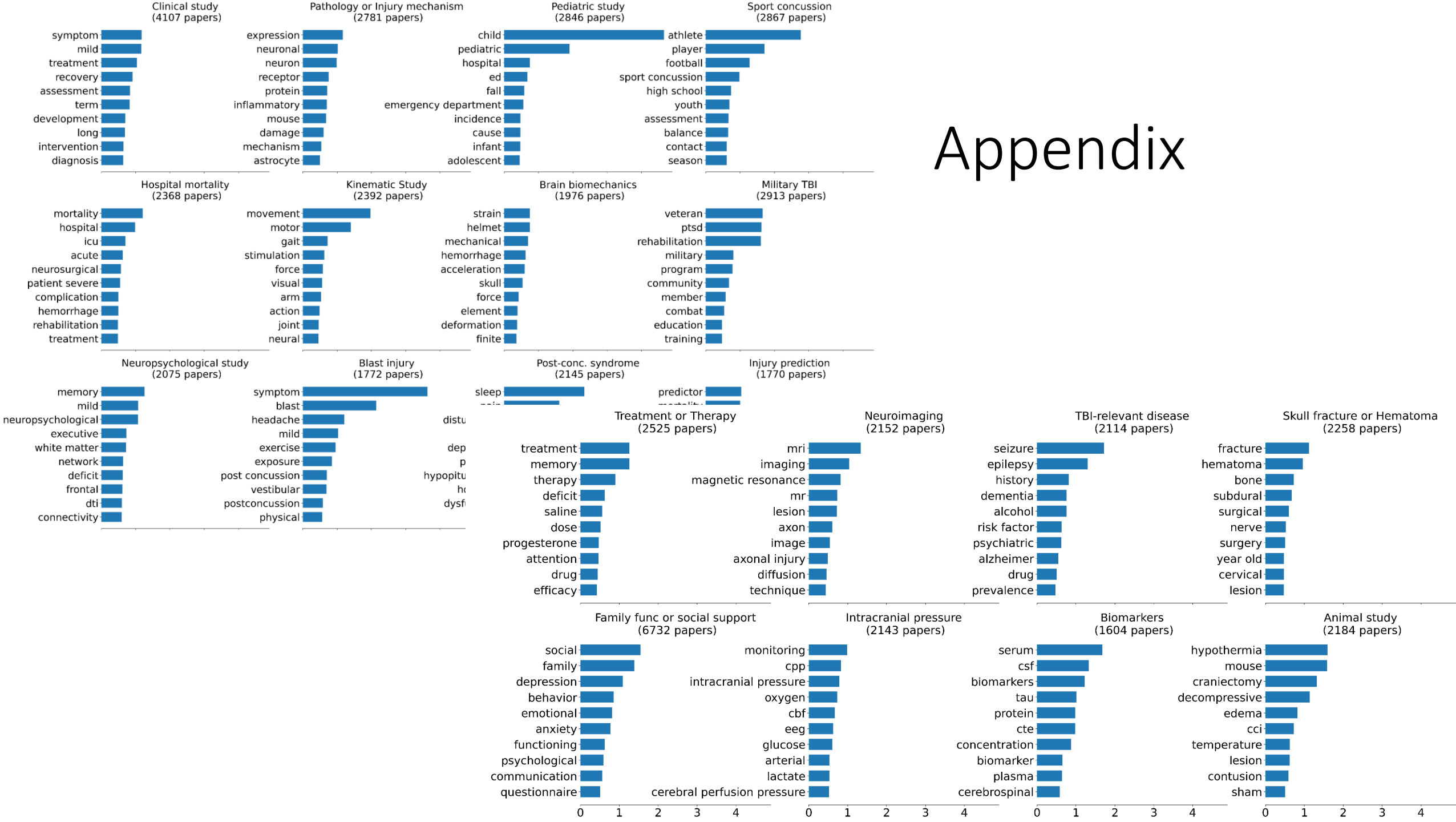
- Demonstrated a topic modeling to find a research topic
- We have known:
 - Research field expanding
 - Most popular journal: J Neurotrauma
 - Past, current and future hot research topics
- Future work
 - Transformer-based machine learning to forecast future hot research topics



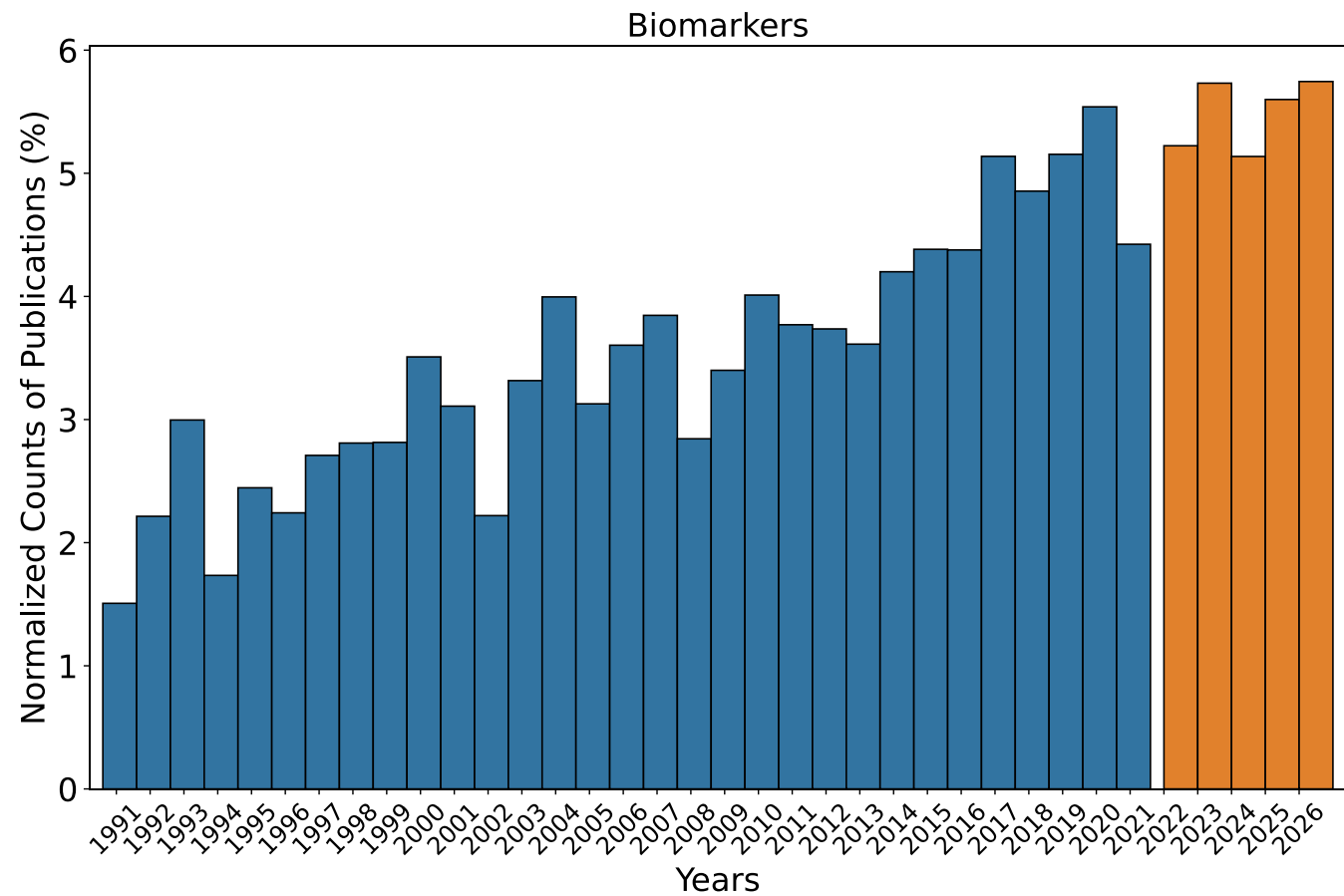
Appendix

- Best configuration of ARIMA parameters identified from cross validations

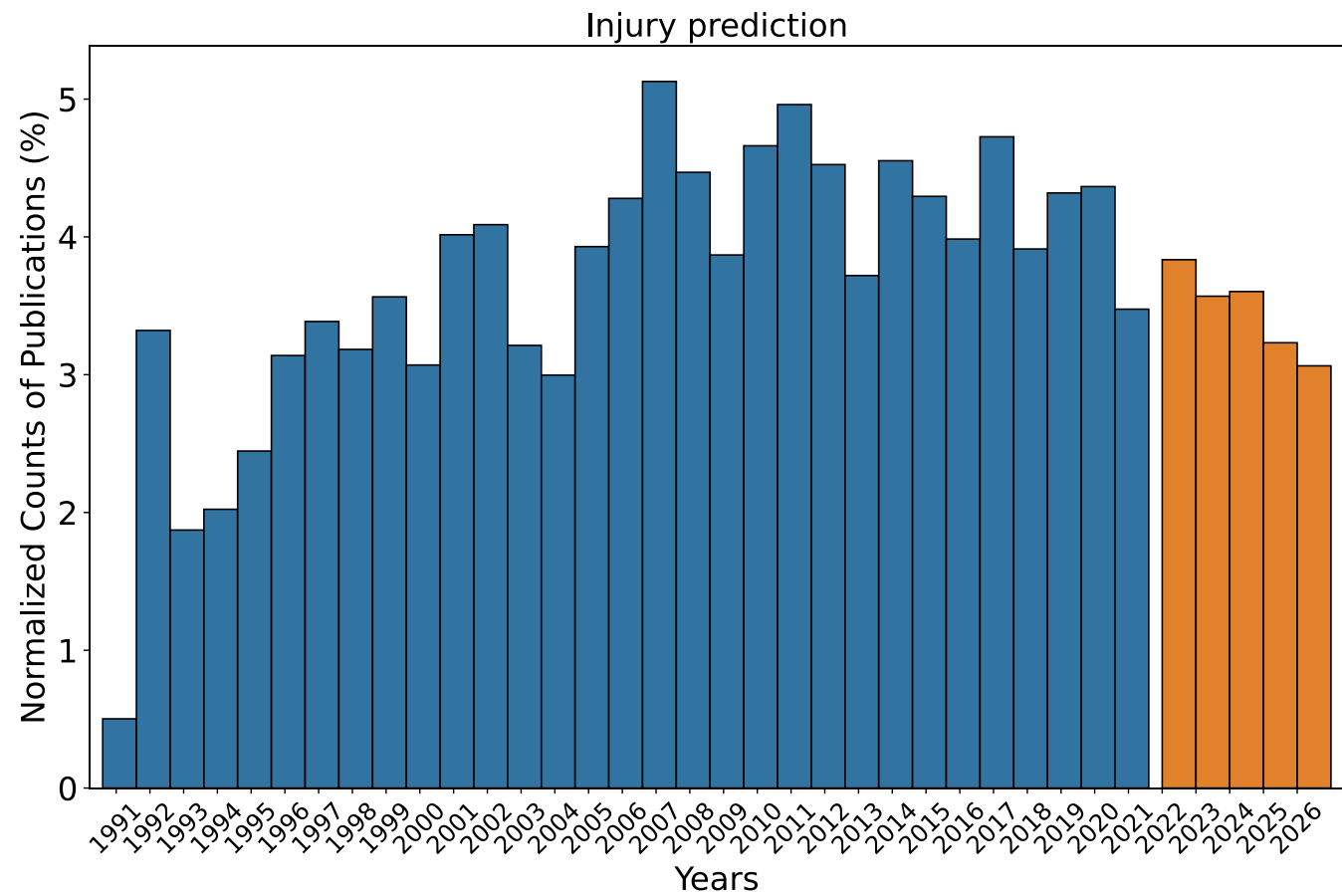
Best ARIMA(0, 0, 0) RMSE=0.410
Best ARIMA(10, 1, 2) RMSE=1.052
Best ARIMA(1, 2, 1) RMSE=0.532
Best ARIMA(2, 2, 1) RMSE=1.096
Best ARIMA(1, 1, 0) RMSE=0.920
Best ARIMA(8, 2, 0) RMSE=0.990
Best ARIMA(0, 0, 0) RMSE=0.569
Best ARIMA(2, 1, 0) RMSE=0.698
Best ARIMA(4, 2, 0) RMSE=0.465
Best ARIMA(0, 2, 1) RMSE=0.397
Best ARIMA(1, 0, 1) RMSE=0.662
Best ARIMA(6, 0, 2) RMSE=0.439
Best ARIMA(1, 2, 1) RMSE=0.529
Best ARIMA(0, 0, 2) RMSE=0.360
Best ARIMA(1, 1, 0) RMSE=0.353
Best ARIMA(6, 1, 0) RMSE=0.268
Best ARIMA(0, 1, 2) RMSE=0.468
Best ARIMA(1, 1, 0) RMSE=0.850
Best ARIMA(4, 2, 1) RMSE=0.440
Best ARIMA(0, 1, 0) RMSE=0.458



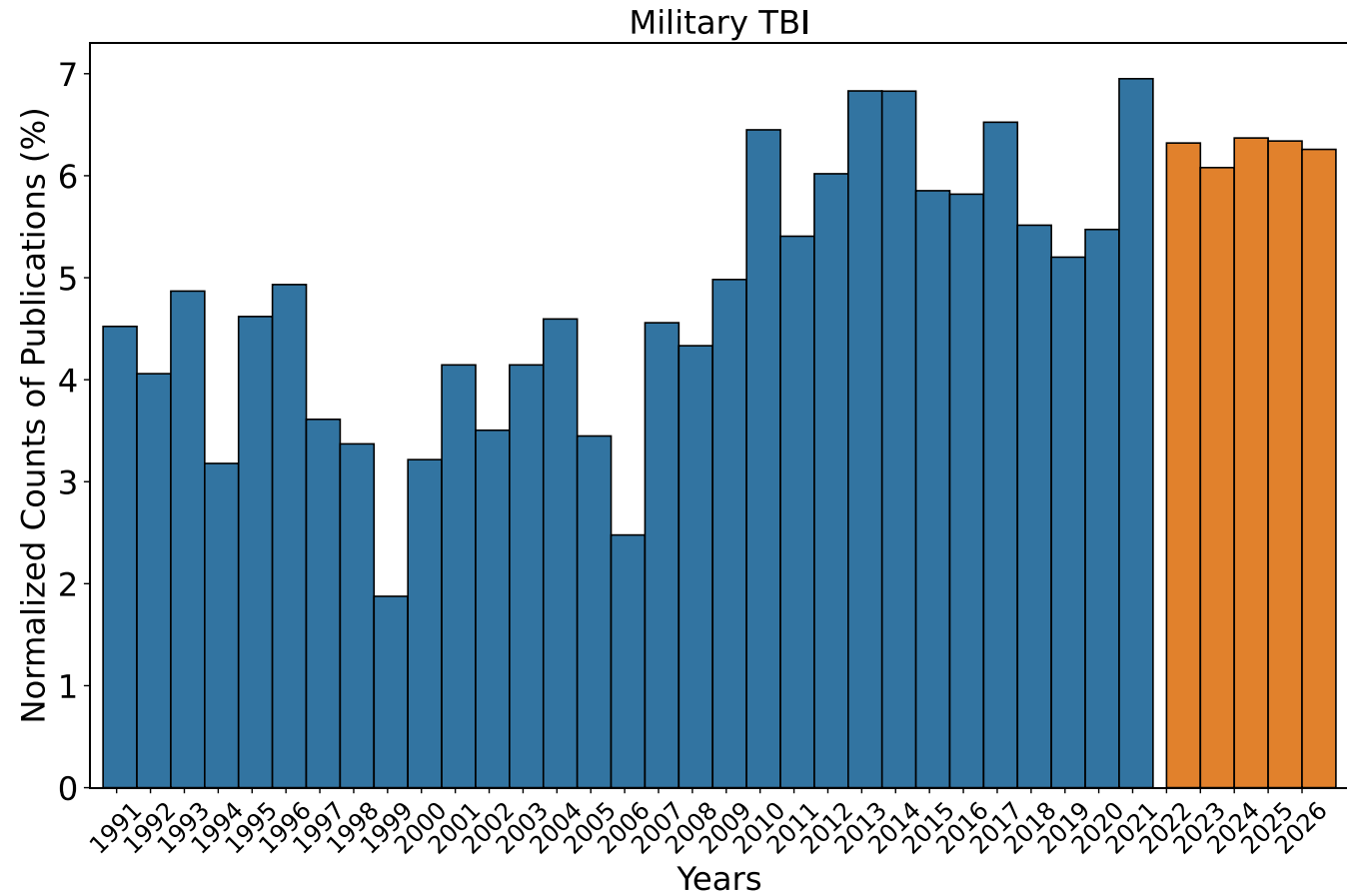
Appendix



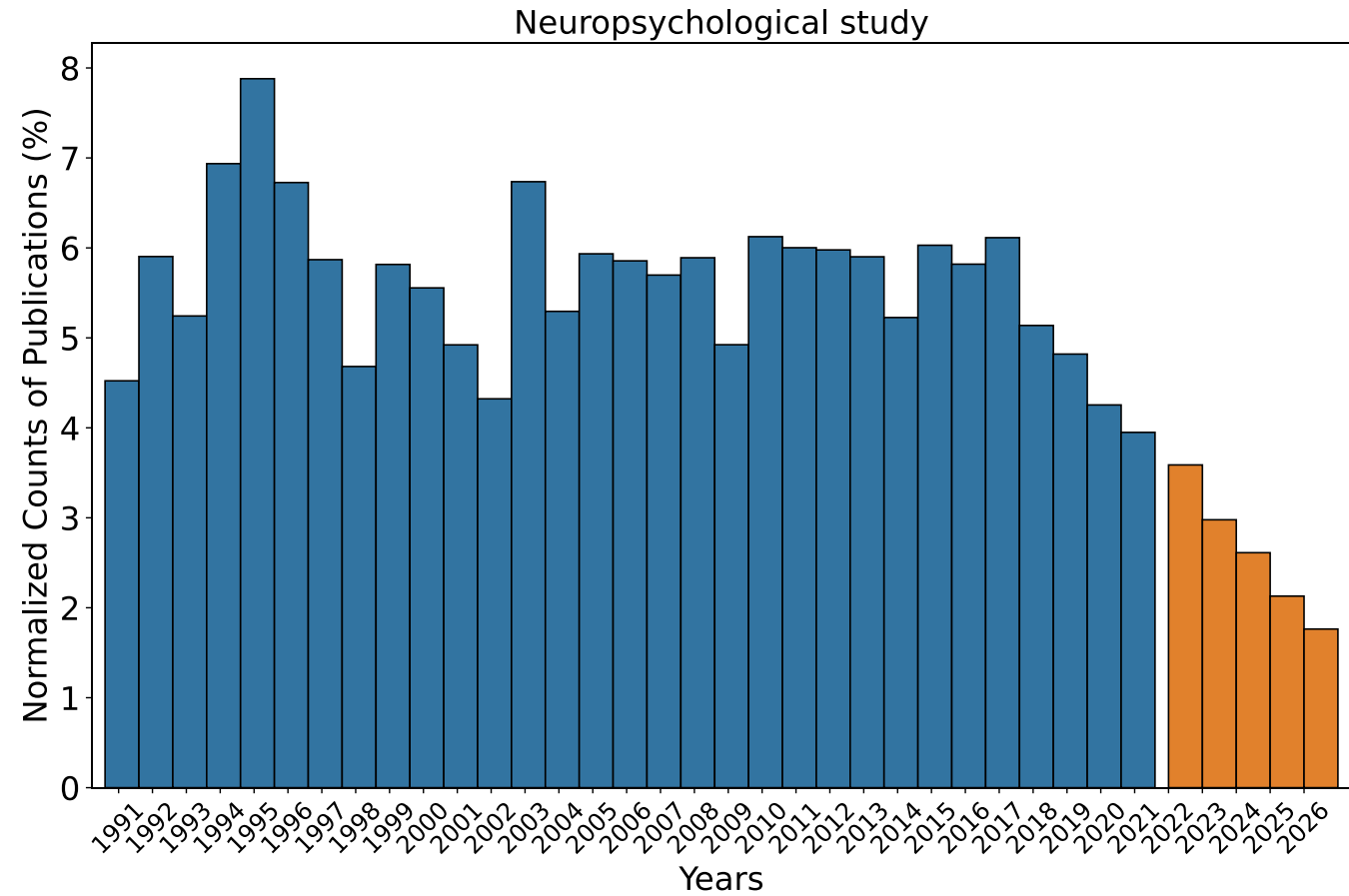
Appendix



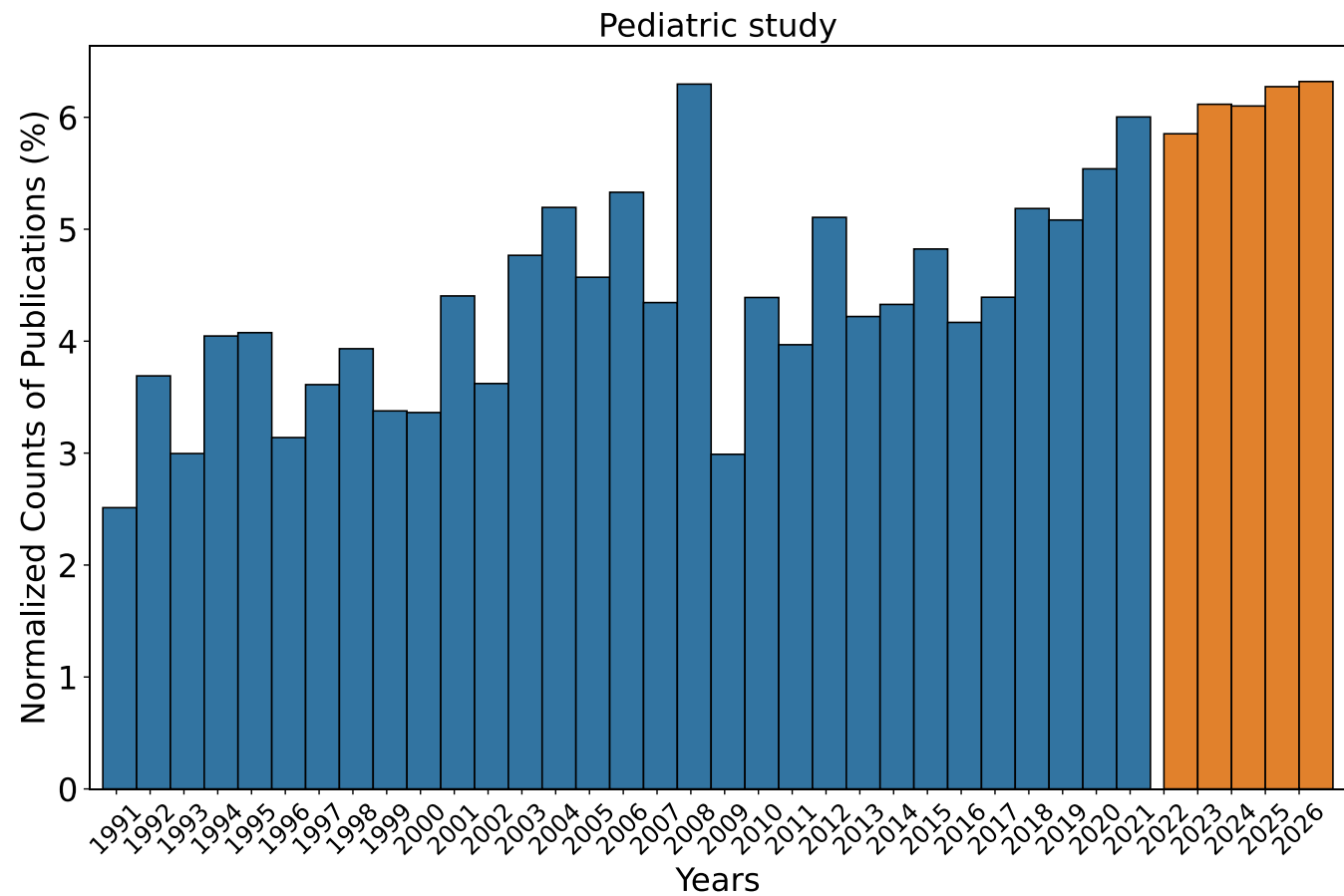
Appendix



Appendix



Appendix



Appendix

