***eLife’s* transparent reporting form**

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* You should state whether an appropriate sample size was computed when the study was being designed
* You should state the statistical method of sample size computation and any required assumptions
* If no explicit power analysis was used, you should describe how you decided what sample (replicate) size (number) to use

Please outline where this information can be found within the submission (e.g., sections or figure legends), or explain why this information doesn’t apply to your submission:

This study was performed on an openly-available dataset, the ABCD Study. Participants with a history of mild TBI within this dataset were identified retrospectively, as such, no power calculations relevant to the present analyses could be performed before the acquisition of this dataset.

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* You should include a definition of biological versus technical replication
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* If you encountered any outliers, you should describe how these were handled
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Information on participant selection and exclusion is provided in the following sections of the manuscript:

Materials and Methods – Participants

Materials and Methods – History of concussion

Figure 1

Information on experiments and replication is provided in the following sections of the manuscript:

Results – Prediction of clinical outcome

Results – Sensitivity analyses

Materials and Methods – Prediction of clinical outcome

**Statistical reporting**

* Statistical analysis methods should be described and justified
* Raw data should be presented in figures whenever informative to do so (typically when N per group is less than 10)
* For each experiment, you should identify the statistical tests used, exact values of N, definitions of center, methods of multiple test correction, and dispersion and precision measures (e.g., mean, median, SD, SEM, confidence intervals; and, for the major substantive results, a measure of effect size (e.g., Pearson's r, Cohen's d)
* Report exact p-values wherever possible alongside the summary statistics and 95% confidence intervals. These should be reported for all key questions and not only when the p-value is less than 0.05.

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Materials and Methods – Pattern-learning pipeline

Materials and Methods – Selection and interpretation of multi-tract multi-symptom pairs

Materials and Methods – Comparison of multivariate against univariate approaches

Materials and Methods – Prediction of clinical outcome

Materials and Methods – Additional data transformations

Results – Multivariate vs univariate approaches

Results – Prediction of clinical outcome

Results – Sensitivity analyses

Table 1

Figure 3

Figure S1

Figure S2

Figure S3

Table S2

(For large datasets, or papers with a very large number of statistical tests, you may upload a single table file with tests, Ns, etc., with reference to sections in the manuscript.)

**Group allocation**

* Indicate how samples were allocated into experimental groups (in the case of clinical studies, please specify allocation to treatment method); if randomization was used, please also state if restricted randomization was applied
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Materials and Methods – History of concussion

Materials and Methods – Connectivity matrices

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Please indicate the figures or tables for which source data files have been provided:

The data for this study was obtained from the ABCD Study, a freely-available, open-source dataset.