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Public Attention to Athlete Mental Health: An Exploratory Google Trends Analysis of Seasonal Patterns and High-Profile Events, 2019-2025

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Short Report

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Abstract

Objective

Public attention to athlete mental health has grown, yet its timing and drivers are not well characterized at the population level. This exploratory infodemiology study used Google Trends Relative Search Volume (RSV) to examine (1) the temporal relationship between search interest in sports injury and search interest in athlete mental health topics, and (2) how athlete mental health search interest changed from 2019 to 2025, including seasonal patterns and responses to two high-profile athlete withdrawals (Naomi Osaka, French Open, May 2021; Simone Biles, Tokyo Olympics, July 2021).

Results

Search interest in “Athlete Mental Health” rose from 2019 to 2025 ($\beta = +9.21$ RSV points/year, $r^2 = 0.945$, $p < 0.001$), while injury-related search interest remained stable. Injury and athlete mental health searches peaked concurrently during football season (September–November), with the strongest cross-correlation at lag = 0 ($r = 0.634$, $p < 0.05$) in 2023 weekly data. The Biles withdrawal was associated with increases in Athlete Mental Health ($p = 0.044$) and Sport Psychology ($p < 0.001$) searches over a 13-week window; the Osaka withdrawal was not, despite peak search interest in her name. These findings describe patterns of public search attention — not psychological distress or help-seeking — and should be interpreted as exploratory.

Introduction

In July 2021, Simone Biles withdrew from the team final of the Tokyo Olympics, citing mental health concerns, and a measurable increase in Google search activity related to athlete mental health followed. This suggests that shifts in public attention to athlete mental health may be observable in internet search behavior. Clinical research indicates that psychological distress may develop within approximately three months of physical injury [3]. Whether public attention to sports injury and to athlete mental health follows a similar lagged pattern at the population level has not been examined.

Survey-based studies of athlete mental health face well-documented limitations: collegiate athletes report symptoms and diagnoses at lower rates than non-athletes despite comparable willingness to consider treatment [4], and elite sport culture frames psychological difficulty as weakness, suppressing self-report [5]. These limitations motivate complementary, non-survey measures of population-level attention — with the caveat that search data measure public interest, not symptoms, distress, or help-seeking.

Infodemiology analyzes internet search behavior as a proxy for population-level interest in health topics [1]. Google Trends [2] quantifies Relative Search Volume (RSV) for terms and topics; search volumes have been found to reflect patterns established in clinical research [6], but the tool has not previously been applied to the timing of injury and athlete mental health search interest. This exploratory study

asked: (1) What is the temporal relationship between public search interest in athletic injury and in athlete mental health topics, 2019–2025? (2) How has athlete mental health search interest changed over this period, including seasonal patterns and responses to high-profile events? It was hypothesized that athlete mental health searches would peak at a lag following seasonal injury-search peaks, and that high-profile disclosures would be followed by sustained increases in athlete mental health search interest.

Main Test

Method

Design and data source.

This retrospective observational study analyzed publicly available, aggregate, de-identified RSV data from Google Trends [2]. RSV is the proportion of searches for a term relative to all Google searches in the selected region and period, normalized 0–100 within each export window (100 = peak interest in that window). No human subjects were involved. Monthly United States RSV was collected for 24 search variables (Table 1) from January 2019 through December 2025 (2,016 values), exported through a single seven-year window so that values within each series are internally consistent. Data were downloaded on February 12–27, 2026. Because Google Trends aggregates windows longer than five years to monthly granularity, weekly data were exported separately as full-year windows for 2021 (event analyses) and 2023 (cross-correlation); weekly analyses were conducted within single calendar years only. Series obtained in separate queries are each normalized to their own 0–100 scale, so analyses emphasize within-series patterns rather than cross-variable magnitude comparisons.

Variables.

Variables included Google Trends Topics (concept-level groupings of related searches) and Search Terms (exact phrases as typed). The 24 variables were identified using key terms from prior literature, related-query exploration on Google Trends, and input from mentors, and were all specified before analysis. The primary injury variable was the Concussion Topic, selected for its strong seasonal signal; the primary mental health variable was the “Athlete Mental Health” Term. The Mental Health Topic served as a comparison series for general interest, and event-specific Topics (Naomi Osaka; Simone Biles; Olympic Games Tokyo 2020) verified event timing.

Ethical considerations.

This study used only publicly available, aggregate, de-identified data; no personally identifiable information was collected or analyzed. The study was reviewed and approved by the Northern Valley Regional High School Institutional Review Board in December 2025. This board does not assign approval numbers, and is not formally associated with any government agency or higher education institution.

Analysis.

Three complementary exploratory analyses were performed in Google Sheets. First, linear regression of annual mean RSV (seven means per variable) on year estimated longitudinal trends (slope β, RSV points/year). Second, weekly 2023 RSV for Concussion and Athlete Mental Health were cross-correlated at lags of − 12 to + 12 weeks. Third, for Naomi Osaka's French Open withdrawal (May 31, 2021) and Simone Biles' Tokyo Olympics withdrawal (July 27, 2021), two-tailed Welch's t-tests compared weekly RSV in the pre-event window (all 2021 weeks preceding the event week) and post-event window (event week plus 12 subsequent weeks) for Athlete Mental Health, Sport Psychology, Mental Health, and Concussion. Figures were generated with assistance from Claude [7].

Results

Athlete mental health-related search interest rose while injury search interest remained stable.

Annual mean RSV for "Athlete Mental Health" increased from 2019 to 2025 ($\beta = +9.21$ RSV points/year, $r^2 = 0.945$, $p < 0.001$), with upward trends also for "Athlete Burnout", the Mental Health Topic, and the Sport Psychology Topic ($\beta = +4.74$ to $+ 5.61$/year, all $p \leq 0.014$) (Fig. 1). Injury-related variables showed no significant trends (Concussion: $\beta = +1.67$/year, $r^2 = 0.294$, $p = 0.209$). Each regression rests on seven annual observations, so these trends are exploratory.

Injury and athlete mental health searches peaked concurrently by season.

Averaged across the seven years, Concussion searches peaked in October (mean RSV = 71.3) and were lowest in June (49.9); Athlete Mental Health peaked in October–November (44.6–45.7) and was lowest in June (17.6) (Fig. 2). Within each series, Concussion rose approximately 43% during football season (September–November) relative to summer, and Athlete Mental Health rose approximately 2.5-fold. In 2023 weekly data, the strongest cross-correlation between Concussion and Athlete Mental Health occurred at lag = 0 ($r = 0.634$, $p < 0.05$): the two series moved together within the same weeks rather than sequentially. This concurrency was not universal — ACL Injury and Sport Psychology showed an approximately 2-week lag — and the lag-0 finding rests on one year and one variable pair.

The two 2021 withdrawals were associated with different search responses.

In the week of Osaka's withdrawal, the Naomi Osaka Topic reached RSV = 100 — peak interest for 2021 — yet Athlete Mental Health ($p = 0.438$) and Sport Psychology ($p = 0.098$) showed no significant pre–post change. In the week of Biles' withdrawal, both the Simone Biles Topic and the Athlete Mental Health Term reached 100, and pre–post comparisons showed increases in Athlete Mental Health (3.7 to 27.8, $p = 0.044$) and Sport Psychology (67.0 to 86.2, $p < 0.001$), while Mental Health ($p = 0.866$) and Concussion ($p = 0.638$) were unchanged (Fig. 3), suggesting a change specific to athlete-related terms. The Osaka result is itself informative: peak interest in an athlete's name without change in athlete mental health

terms indicates that general event attention and topic-specific attention are distinguishable in search data.

Discussion

Contrary to the original hypothesis, no lag was observed. Instead, attention to the two topics was concurrent: both rose together during football season in all seven years, suggesting that sports injury and athlete mental health are temporally associated in public attention. Second, athlete mental health search interest rose steadily and independently of injury-related search interest — a sustained increase in public attention, though whether it reflects changes in athlete mental health itself, media coverage, or help-seeking cannot be determined from search data. Third, the Biles–Osaka contrast is consistent with the hypothesis that public framing shapes topic-specific attention: Osaka's withdrawal was initially framed as a rules dispute [8], while Biles' was introduced with mental health language and covered with themes of agency [9, 10]. Framing was not measured, and the events differed in sport, audience, and timing, so framing is one candidate explanation to be tested in future work combining search data with media-content analysis.

For sports on the American football calendar, public attention to injury and athlete mental health predictably peaks in September–November. Whether search attention corresponds to clinical need is unknown; validation against service-utilization data would be required before search data could inform resource planning. Other future directions include normalizing multi-year weekly exports, geographic analyses, and detrended or differenced sensitivity analyses of the concurrent relationship.

Limitations

- RSV is relative, not absolute; series obtained in separate queries are each normalized to their own 0–100 scale, limiting cross-variable magnitude comparisons. Findings emphasize within-series patterns.
- Search interest measures public attention, not psychological distress, symptoms, diagnosis, or help-seeking, and cannot distinguish media-driven curiosity from personal concern.
- Weekly observations are temporally autocorrelated; independent-samples t-tests do not account for autocorrelation, pre-existing trends, or seasonality. The post-Osaka window overlaps the Biles event, and the post-Biles window overlaps the Olympics and the start of football season. Event results are exploratory associations, not causal effects; interrupted time-series designs are a direction for future work.
- Longitudinal regressions were fit to seven annual means per variable; monthly models incorporating seasonality and autocorrelation would be more informative.
- Weekly RSV for low-volume terms such as "Athlete Mental Health" was frequently zero between spikes; post-event means partly reflect a small number of large intermittent increases.

- The cross-correlation used raw weekly series; shared seasonality may inflate the lag-0 correlation, and the finding is based on one year and one variable pair.
- The study window includes the COVID-19 pandemic (2020–2021), which disrupted sports schedules and search behavior.
- Data are limited to United States Google users and exclude other search engines and populations with limited internet access.
- Correlation does not establish causation for any reported association.

Table 1
Google Trends search topics and terms included in this study (n = 24).

1	Category	Term/Topic	Type	Rationale
	Physical Injury	**Anterior Cruciate Ligament Injury**	**Topic**	**Major seasonal injury**
2	Physical Injury	Concussion	Topic	Common and well-known seasonal injury - primary injury variable
3	Mental Health	Mental Health	Topic	Broad control, for baseline to compare athlete-specific
4	Event	Naomi Osaka	Topic	Natural Experiment French Open Withdrawal due to mental health
5	Event	Olympic Games Tokyo 2020	Topic	Variable for 2021 experiment, baseline broad topic interest
6	Physical Injury	Running Injuries	Topic	Seasonal topic
7	Event	Simone Biles	Topic	Natural experiment, Olympics withdrawal due to mental health
8	Physical Injury	Sports Injury	Topic	Broad control variable
9	Mental Health	Sport Psychology	Topic	Seeking Help, specific to athletes
10	Physical Injury	Traumatic Brain Injury	Topic	Specific and clinical interest
11	Mental Health	Athlete Burnout	Term	Athlete language, stress but related to sports
12	Mental Health	Athlete Mental Health	Term	Primary mental health variable
13	Mental Health	Brain Fog	Term	Post-concussion and post-COVID, combines physical and mental
14	Mental Health	Burnout	Term	General term, potential baseline for Athlete Burnout
15	Physical Injury	Concussion	Term	Exact term of topic
16	Mental Health	Counselor Near Me	Term	Actively seeking help
17	Physical Injury	Ligament Injury	Term	Broader than ACL, covers other ligament injuries
18	Physical Injury	Ligament Tear	Term	Like above, more specific

1	Category	Term/Topic	Type	Rationale
	Physical Injury	**Anterior Cruciate Ligament Injury**	**Topic**	**Major seasonal injury**
19	Mental Health	Mental Block	Term	Psychological term related to performance
20	Physical Injury	Running Injury	Term	Exact term version of topic
21	Mental Health	Sports Counseling	Term	Seeking help - searching, but less clinical
22	Mental Health	Sports Psychotherapy	Term	Seeking help - searches for specific provider
23	Mental Health	Sports Therapist	Term	Seeking help - Searches for specific provider
24	Physical Injury	Traumatic Brain Injury	Term	Exact term version of topic, clinically different from concussion in medical terminology

Abbreviations

IRB
institutional review board
RSV
relative search volume
ACL
anterior cruciate ligament

Declarations

Ethics approval and consent to participate

This study analyzed only publicly available, aggregate, de-identified search data; no human participants were involved and no personally identifiable information was collected. The study was reviewed and approved by the Northern Valley Regional High School Institutional Review Board in December 2025. Consent to participate: not applicable.

Consent for publication

Not applicable.

Availability of data and materials

All data are publicly available from Google Trends (https://trends.google.com). The search terms, topics, time windows, and geographic filters are described in the Methods and Table 1. The raw exported datasets and analysis spreadsheets supporting the findings are provided as supplementary files.

Competing interests

The author declares no competing interests.

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No funding was received for this study.

Authors' contributions

CK conceived the study, collected and analyzed all data, interpreted the findings, and drafted and revised the manuscript.

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References

1. Alibudbud R. Google Trends for health research: Its advantages, application, methodological considerations, and limitations in psychiatric and mental health infodemiology. Front Big Data. 2023;6. doi:10.3389/fdata.2023.1132764
2. Google Trends [Internet]. Google LLC; 2025 [February 12–27, 2026]. Available from: https://trends.google.com
3. Richardson AE, Derrett S, Samaranayaka A, Wyeth EH. Prevalence and predictors of psychological distress following injury: Findings from a prospective cohort study. Inj Epidemiol. 2021;8(1). doi:10.1186/s40621-021-00337-7
4. Edwards B, Froehle AW, Fagan SE. Trends in collegiate student-athlete mental health in the National College Health Assessment, 2011–2019. J Athl Train. 2023;58(4):361–373. doi:10.4085/1062-6050-0586.21
5. Bauman NJ. The stigma of mental health in athletes: Are mental toughness and mental health seen as contradictory in elite sport? Br J Sports Med. 2016;50(3):135–136. doi:10.1136/bjsports-2015-095570
6. Ghosh A, George BB, Malav P, Choudhury S, Goel S. Mapping the landscape of mental health research through Google Trends: Bibliometric and thematic insights. Psychiatry Clin Neurosci Rep.

2025;4(2). doi:10.1002/pcn5.70101

7. Anthropic. Claude (claude-sonnet-4-5) [Large language model]. 2025. https://claude.ai
8. Gutsche RE Jr, Coche R, D'Angelo P, Ferrucci P. "Part of the gig:" Negotiating the press conference rite surrounding Naomi Osaka's "bombshell" decision. Journalism. 2024. doi:10.1177/14648849241275754
9. McDermott V. Framing, agency, and athlete activism: The case of Simone Biles at the 2020 Olympics. Public Relat Rev. 2024;50(2). doi:10.1016/j.pubrev.2024.102457
10. Thompson KG, Carter G, Lee ES, Alshamrani T, Billings AC. "We're human too": Media coverage of Simone Biles's mental health disclosure during the 2020 Tokyo Olympics. Electron News. 2022;16(3):187–201. doi:10.1177/19312431221095207

Figures

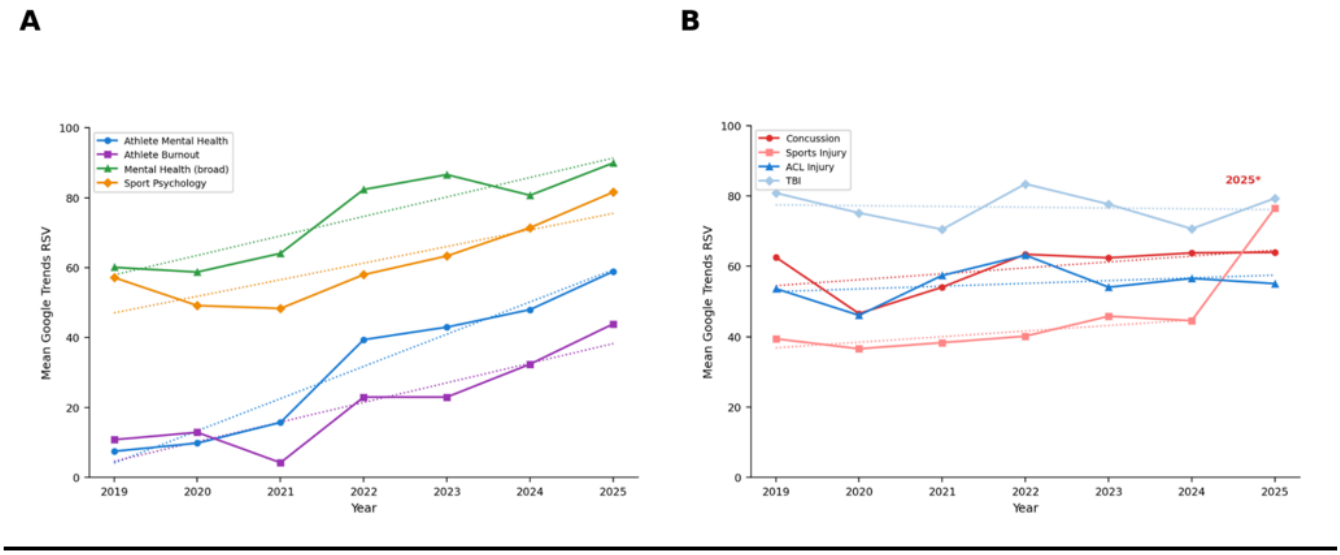

Figure 1

Annual mean RSV for mental health and injury search variables, 2019–2025, with linear trends. Linear trend for Sports Injury fitted to 2019–2024 due to an anomalous elevation in 2025; the 2025 value is shown for reference.

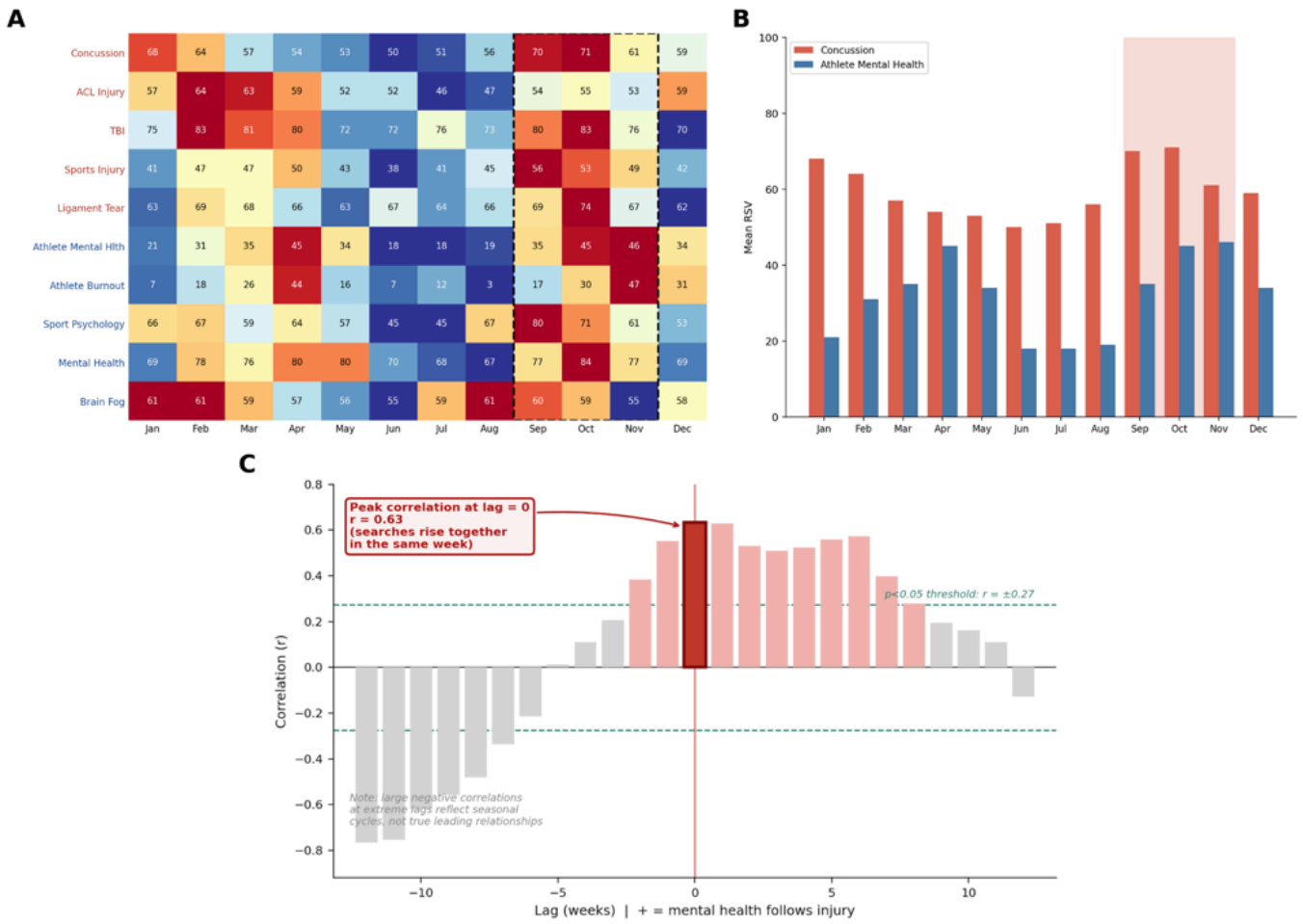

Figure 2

Seasonal and weekly concurrence of injury and athlete mental health search interest: (A) heatmap of mean monthly RSV, 2019–2025, football season (September–November) outlined; (B) mean monthly RSV for Concussion and Athlete Mental Health; (C) cross-correlation of weekly 2023 Concussion and Athlete Mental Health RSV across lags of −12 to +12 weeks, peak at lag = 0.

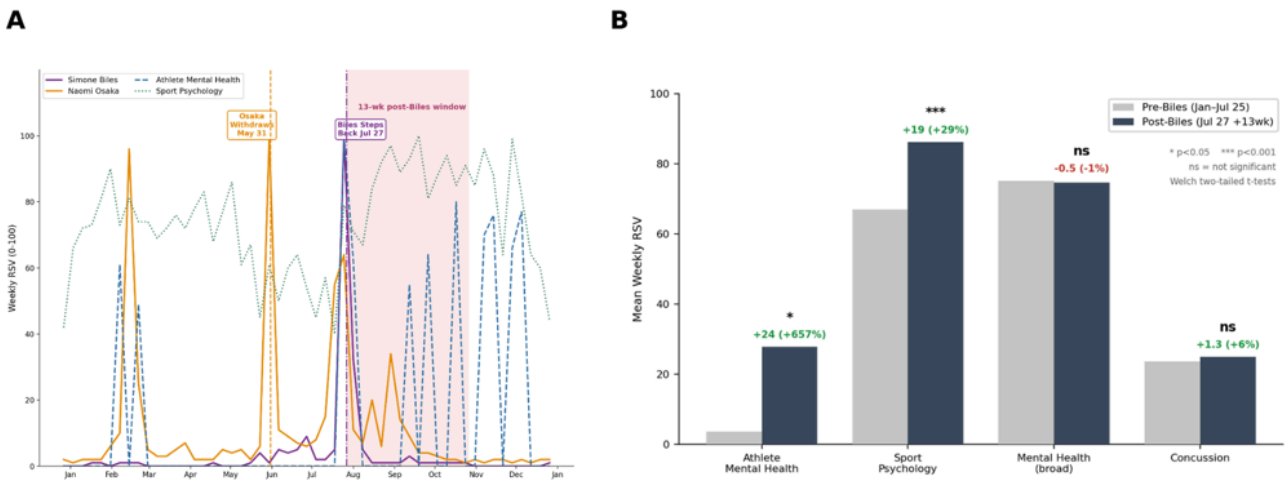

Figure 3

Weekly 2021 RSV surrounding the Osaka (May 31) and Biles (July 27) withdrawals. (A) Full-year series for both athletes' name Topics, Athlete Mental Health, and Sport Psychology. (B) Pre- vs post-event mean weekly RSV across four search variables (Athlete Mental Health, Sport Psychology, Mental Health [broad], and Concussion); comparisons use the event week plus 12 subsequent weeks (Welch two-tailed t-tests). Elevated Athlete Mental Health values contributing to the post-Biles mean occur in the weeks following the ±6-week display window in panel A.