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Injury risk and prevention research in sports: Are the titles delivering on their promises or just a sales pitch to capitalize on a hot topic? A systematic scoping review including 1,390 studies
(Version 1)

Supplementary materials: After the references and in links cited within the manuscript

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ABSTRACT

Background: Injury risk and prevention are hot topics, leading to authors using "catchy" titles to grab the readers' attention.

Objectives: To assess if empirical studies with titles containing "injury risk" or "injury prevention" deliver injury data.

Methods: Scoping review of injury risk or prevention studies with athletes and para-athletes. Databases included CINAHL, EMBASE, PubMed, Scopus, SPORTDiscus, Web of Science (no date or language limits). Matching of titles to injury data used a two-layer system.

Results: Of 147,125 records screened, 1,390 studies were included. Nearly one-third of empirical studies with "injury prevention" or "injury risk" in their title failed to provide injury data. Almost 40% of titles using "injury prevention" provided no injury data, and ~25% had injury data that were unrelated to any prevention measure. Titles could include qualifiers to denote that their goal was not to assess injuries, but related topics (e.g., adherence to an injury prevention program). Considering only titles with no such qualifiers, injury data were still absent in ~20% of the studies and this omission has been increasing consistently over time (e.g., 10% from 1984-2000, 22% from 2016-onwards).

Conclusions: A growing percentage of empirical studies with titles about "injury risk" and "injury prevention" do not report injury data, potentially leading to wasted research effort and misguided practical applications. Authors, reviewers, and editors share responsibility for accurate portrayal of injury studies. We propose a ruleset for more transparent reporting in future studies.

Registration: Open Science Framework public project (https://osf.io/5ybvc/) and registration (https://osf.io/atx5j).

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What is already known?

- Injury risk and injury prevention are hot topics with great traction among researchers, practitioners and general readers.
- Findings from studies on these topics help to guide decision-making processes regarding interventions focused on reducing injury risk.
- Empirical studies about injury risk or prevention have a great impact on investment policies, and accuracy of their titles is essential to make the best of limited resources (e.g., time, money, personnel).

What are the new findings?

- About 30% of empirical studies including "injury risk" or "injury prevention" in their title do not report nor analyse injury data. For titles with no qualifiers (e.g., compliance, suggestions), absence of injury data represents ~20% of publications.
- The number and proportion of studies with "injury risk" or "injury prevention" in their title that fail to provide injury data is increasing over time (e.g., 9.7% from 1984-2000 versus 32.6% from 2016-onwards, for all titles).
- The growing mismatch between the "sales pitch" (i.e., the title) and the data being provided may result in wasting of resources, biasing the research field, and misguiding readers and practitioners.

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1. Introduction

Injury prevention is an essential element of science and medicine in sports and garners attention from stakeholders focused on minimizing the athlete's injury risk. Catchy titles including "injury risk" or "injury prevention" are more likely to grab the readers' attention. Studies on injury prevention might assess the impact of interventions on mitigating injury risk *factors* (e.g., strength, range of motion [ROM][1]) but fail to report and analyse injury data (e.g., incidence).[2-4] Likewise, observational studies may include "injury risk" in their title (without mentioning the qualifier "risk *factors*", which would more clearly denote a surrogate-based approach), but also fail to provide injury data.[5] Without injury data, authors may engage in spurious associations and misconceptions based solely on surrogate outcomes which can misdirect clinical and field-based practices.[3 6-8]

Surrogate outcomes (risk factors) may serve as proxies for an endpoint or target outcome (e.g., injury rate), and are usually easier to assess, under shorter timeframes, and with smaller financial costs.[9 10] However, the validity of surrogates should be first demonstrated for each specific population and context,[6 7 9-12] as they may not be directly linked to the desired outcome of decreased injury risk. Several issues, including direct and indirect effects, uncontrolled confounding factors, and lack of transitivity may interplay to explain why interventions aimed at improving the surrogate outcomes may induce a neutral (or even detrimental) effect on the endpoint outcome.[8 9 11 13] A surrogate outcome should therefore be the cause or in the causal path of the intended endpoint[7-11 14] to yield an impact on injury risk. Otherwise, the observed relationships may not be consistently reproduced, or be limited to specific populations and/or contexts and not generalizable.[8 12 13]

For most applications, endpoints are preferable to surrogates for clinical decision-making.[6-8 11-14] When the target outcomes are difficult, costly, and/or risky to assess, surrogate outcomes may provide a practical alternative.[6 8 10 11] In contrast to assessing discrete injury

events (real-world game and training data), surrogate outcomes commonly utilize laboratory or field tests of continuous variables, which requires smaller sample sizes for achieving sufficient statistical power.[6 12 13 15] However, over-reliance on surrogate outcomes may detract from a deeper understanding of how interventions affect injury risk.

Titles that accurately reflect the study findings and eschew from unsubstantiated claims are important to allow readers a quick and proper identification of studies that are relevant for their purpose. Therefore, we conducted a systematic scoping review to assess whether sport-related empirical studies whose titles refer to "injury risk" or "injury prevention" deliver injury data or if they are delivering a "sales pitch" to capitalize on a hot topic without appropriate data to back their claims up. Our goal was to launch a timely and much-needed debate on the appropriateness of titles using "injury prevention" or "injury risk" in empirical studies that do not report or analyse injury data.

2. Methods

We followed the PRISMA 2020,[16] the PERSiST,[17] and the PRISMA extension for Scoping Reviews (PRISMA-ScR)[18] for the design and reporting of our scoping review. Open Science Framework (OSF) project (https://osf.io/5ybvc/) and registration (https://osf.io/atx5j) were both made public on September 29, 2023, prior to the database searches.

2.1. Eligibility criteria

Empirical studies were eligible if published full-form in peer-reviewed journals (abstract-only publications were excluded), regardless of date or language. The title needed to contain the terms "injury risk" and/or "injury prevention" to be eligible for inclusion. Other eligibility criteria followed the Participants, Intervention/Exposure, Comparators, Outcomes and Study Design (PICOS/PECOS) framework: (P) Athletes (i.e., minimum Tier 2 of the

Participant Classification Framework [PCF][19]) of any sport, sex, age, or health status; (I/E) Any intervention or exposure (acute or chronic) which the title explicitly linked to injury risk and/or prevention; (C) Optional; (O) Existence of surrogate (e.g., strength, ROM) or endpoint of injury-related data (e.g., incidence), and/or data referring to the implementation of programs or analysis of the stakeholders' perceptions; (S) Observational or intervention studies. Further details are available in the Electronic Supplementary Material 1.1. (ESM 1.1.).

2.2. Information sources and search strategy

We searched six databases on October 2nd, 2023: CINAHL, EMBASE, PubMed, Scopus, SPORTDiscus (via EBSCO), and Web of Science (core collection). We did not conduct additional searches because the criterion of having ≥250 eligible studies was largely surpassed. The broadband search strategy used free text terms: *[Title]: injur* AND [Title]: risk* OR prevent* OR prevalen* OR incidence OR burden.*

2.3. Selection process

Automated removal of duplicates was performed using EndNote™ 21 for Mac (Clarivate™), but further manual removal of duplicates was required. Three authors (JA, AP, SRR) independently screened all records. Disagreements were resolved by engaging in multiple rounds of discussion. When consensus was not achieved, the study advanced to the full text analysis. The same authors independently performed the full text analysis stage. Disagreements were resolved by multiple discussion rounds (details in the ESM 1.2.).

2.4. Data collection process

Ten authors (AP, FMC, AFS, ZA, RC, RKT, JRS, HS, RA, SRR) extracted relevant data. The leading author (JA) independently analysed all included studies to ensure data quality

and completeness. Disagreements were discussed until consensus was achieved. Details provided in the data extraction file publicly available on OSF (https://osf.io/d8fgv).

2.5. Data items and management

Given that 1,390 studies were included in the review (higher than anticipated), we deviated from our original protocol (https://osf.io/gte7s) and narrowed the focus on the most relevant items. For each study, we collected general data including publication year, sample size, sex, and whether the participants were athletes or para-athletes.

Studies titles were first categorized into three groups (layer 1): "injury prevention", "injury risk", or "both". Studies were then further grouped (layer 2) depending on the presence of a qualifier of what would actually be measured (Figure 1). Titles with no qualifiers were presumed to focus on assessing injury data denoted by the use of the terms "injury risk" and/or "injury prevention" in the title (e.g., "efficacy of an injury prevention program in soccer"). Titles could provide additional information based on their goals, such as investigating the awareness of stakeholders about injury risk factors. Titles with qualifiers were labelled according to an *ad hoc* classification system (reasons in ESM 1.3.) established after the study selection phase, but before data extraction. Figure 1 maps the title groupings (layers 1 and 2) and Table 1 provides selected illustrative examples of title analysis (based on studies included in this review).

The inclusion of injury data (e.g., incidence, relative risk, odds ratio) in the original publication was coded as "Yes", "No", or "Yes, but unrelated to any prevention strategy or program") (also Figure 1). The latter category was applied when the study (i) presented injury data but there was no prevention measure, or (ii) presented injury data as well as data concerning prevention procedures, but the two were independent, with no statistical association provided (i.e., no indication of those who performed certain prevention procedures had more

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or less injuries). If there were no injuries during the interventions and this was explicitly reported by the authors, we classified them as providing injury data. When no injury data were available, we checked whether studies reported any surrogate outcomes (e.g., ROM, strength, asymmetry).

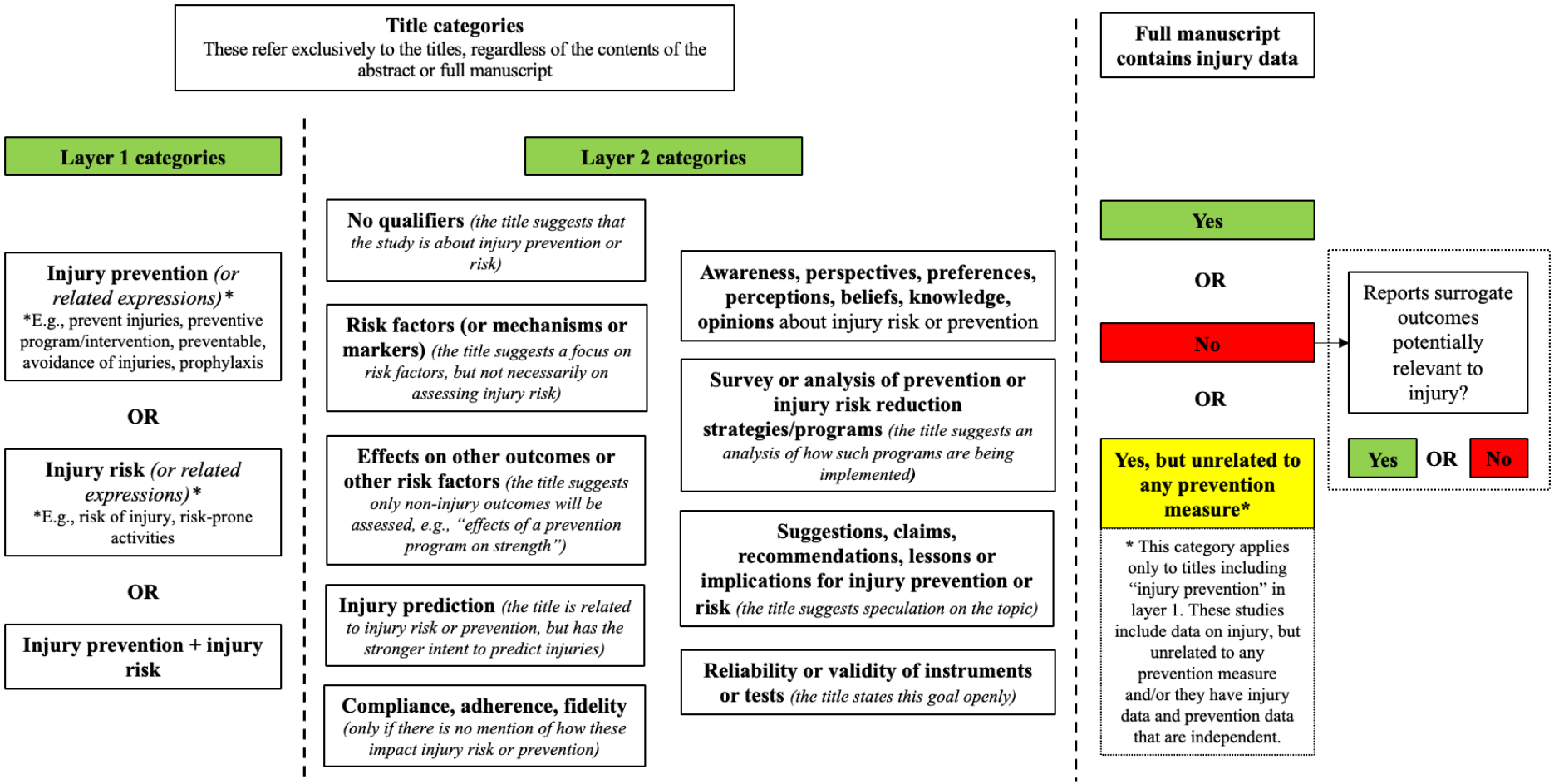

Figure 1. Map of studies titles categorization (layers 1 and 2) and reporting of injury data.

182 **Table 1.** Title categorization: examples using studies included in this review.

Reference	Title	Layer 1	Layer 2	Commentary
Al Attar, et al. [20] (2023)	The FIFA 11+ Kids Injury Prevention Program Reduces Injury Rates Among Male Children Soccer Players: A Clustered Randomized Controlled Trial.	Injury prevention	No qualifiers	The title mentions an injury prevention program and is suggestive that injury data will be provided.
Kolodziej and Jaitner [21] (2018)	Single Functional Movement Screen items as main predictors of injury risk in amateur male soccer players.	Injury risk	Injury prediction	The title mentions injury risk prediction and should therefore provide injury data.
Collings, et al. [22] (2022)	Strength and Biomechanical Risk Factors for Noncontact ACL Injury in Elite Female Footballers: A Prospective Study.	Injury risk	Risk factors (or mechanisms, or markers)	The title suggests the aim is to focus on the analysis of risk factors and should thereby provide injury data.
Brownbridge and Fogel [23] (2022)	Athletes' Perceptions of Physical Contact and Injury Risk in Football and Rugby in Canada.	Injury risk	Awareness, perspectives, preferences, perceptions, beliefs, knowledge, opinions about injury risk or prevention	The title suggests analysis of perceptions and may not provide injury data.
Gawrys, et al. [24] (2023)	Educational intervention promotes injury prevention adherence in club collegiate men's lacrosse athletes.	Injury prevention	Compliance, adherence, fidelity	The title suggests that their sole focus of analysis will be adherence and may not provide injury data.

Corrigan, et al. [25] (2023)	Barriers and facilitators to injury prevention in ladies Gaelic football: A qualitative study.	Injury prevention	Survey or analysis of prevention or injury risk reduction strategies/programs (i.e., what and how is being implemented)	The title suggests analysis of how injury prevention is being implemented and may not provide injury data.
Owaid, et al. [26] (2022)	The effect of a preventive training program on some kinetic variables of the anterior and posterior thigh muscles to reduce sports injuries for fencing players.	Injury prevention	Effects on other outcomes or other risk factors	The title suggests that only the effects on other outcomes (in this case, kinetic variables) will be assessed and may not provide injury data.
Harnett, et al. [27] (2022)	Validating an inertial measurement unit for cricket fast bowling: a first step in assessing the feasibility of diagnosing back injury risk in cricket fast bowlers during a tele-sport-and-exercise medicine consultation.	Injury risk	Reliability or validity of instruments and tests	The title suggests a focus on the validation of an inertial measurement unit and may not provide injury data.
Blach, et al. [28] (2022)	Diagnostics of tissue involved injury occurrence of top-level judokas during the competition: suggestion for prevention.	Injury prevention	Suggestions, claims, recommendations, lessons or implications for injury prevention of risk	The expression “suggestion for prevention” suggests a speculation based on study findings that are independent of any preventive measure.

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2.6.Data synthesis methods

Summary data were provided based on the frequency of each variable (count and percentages). Where applicable, summary data were plotted into figures. Time trends were assessed for the reporting of injury data, and the remaining analyses are summarized as narrative synthesis.

2.7. Equity, Diversity, and Inclusion statement

This review included athletes and para-athletes of all competitive levels of play (Tiers 2 to 5 of the PCF[19]), regardless of age, gender, socioeconomic level, or race/ethnicity/culture. The lack of language restrictions was designed to avoid language bias (typical of many reviews, usually limited to publications in English language) and resulted in the inclusion of studies in 21 different languages (ESM 2.2). The research team is composed of 14 authors (four women; one junior researcher) from seven countries across four continents. Equity, diversity, and inclusion concerns do not apply to data interpretation, given the nature of the topic being analysed.

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3. Results

3.1. Study selection

Of 147,125 records screened, 1,390 studies were included in our review (Figure 2), and errata were available for 12 studies. Further details on study selection are provided in ESM 2.1., and a table with decisions taken during full text analysis is available elsewhere: https://osf.io/sar39.

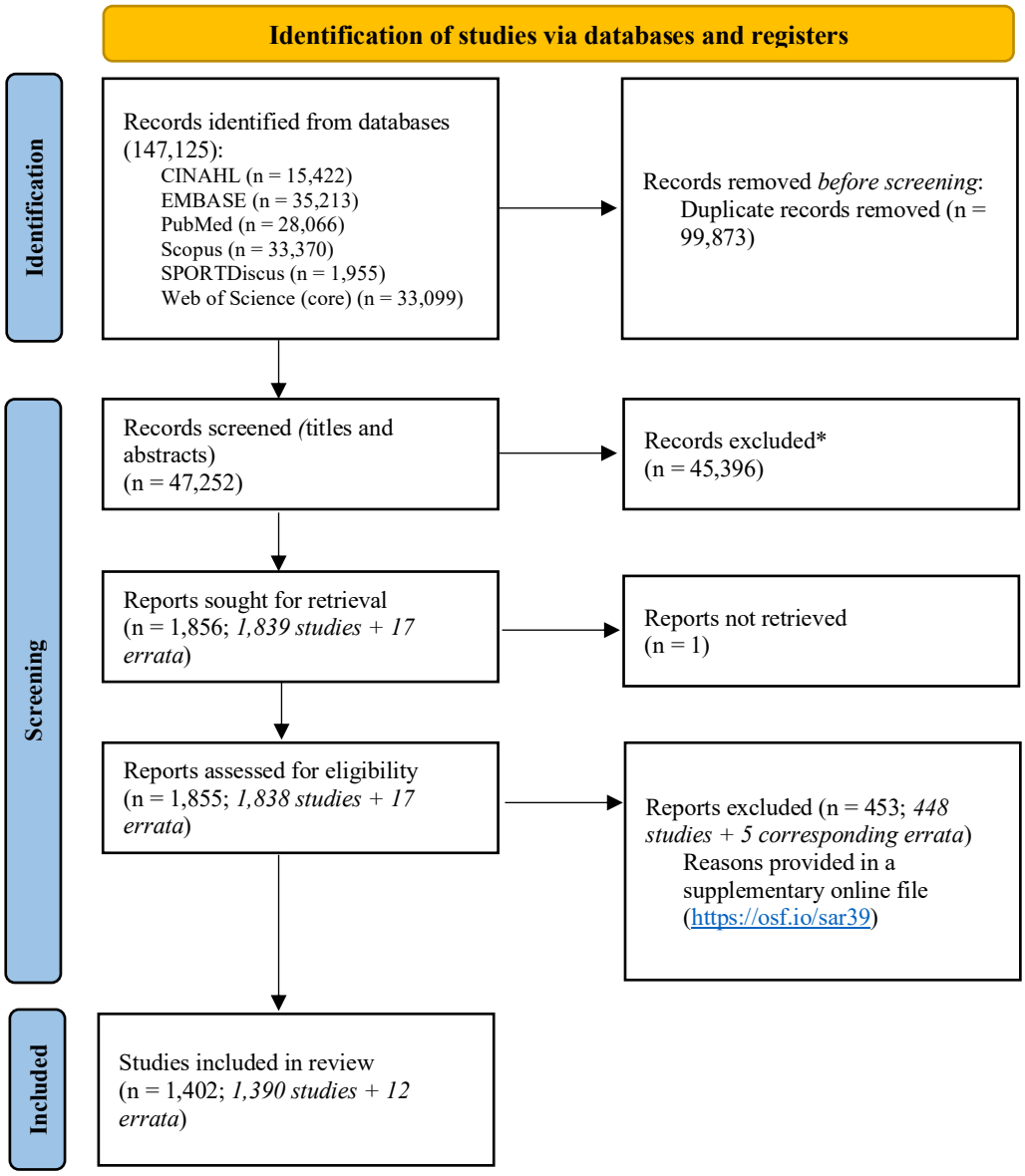

Figure 2. PRISMA 2020 flowchart.

* Mainly due to article type (e.g., conference abstracts, reviews) or non-Tier 2 populations, but also retracted studies.

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3.2. Brief description of studies

The full data extracted from the studies can be consulted in a public repository (https://osf.io/d8fgv). Studies were published from year 1954 onwards, with almost two-thirds of research (*k*= 875, 62.9%) published from 2016 onwards (detailed data available in ESM 2.2). Most studies were published in English (*k*=1,289, 92.7%), followed by Spanish (*k*=28, 2.0%) and German (*k*=21, 1.5%). A full dispersion figure is available in ESM 2.2.

A pooled sample size of 167,649,232 participants was included (1,275 studies reporting sample size). This number excludes the sample size from 31 studies (2.2%) with unclear reporting (e.g., overlap of players across multiple seasons) and 84 studies (8.3%) with unreported sample sizes (often, the number of injuries, the number of teams/schools or the number of game actions or matches were reported). In studies reporting the sample size, the minimum was one and the maximum was 163,125,092 participants. The central tendency metrics show a more accurate picture with a median of 96 participants per study (interquartile range [IQR]: 32-324) and a mode of 20. Two studies reported huge sample sizes: 163,125,092[29] and 2,248,080.[30] The largest study[29] assessed catastrophic head and spine injuries in reference to all registered athletes from 20 different sports in the United States of America, at high-school and college levels, for seasons separated by roughly two decades. The second largest study[30] used data from the Little League Baseball compensated insurance claims. From the 1,275 studies reporting sample size, the 1% (*k*=13) with most participants comprised 99.8% of the total sample size. Removing these 13 studies resulted in 1,262 studies reporting a pooled sample size of 415,322 (median and IQR: 95 [32-317], mode: 20).

Studies included exclusively females (*k*=267, 19.2%), exclusively males (*k*=426, 30.6%), or females and males (*k*=444, 31.9%); 253 studies (18.2%) did not report sex/gender. Most studies (*k*=1,374, 98.8%) focused on athletes, with only 15 studies (1.1%) on para-athletes, and one study (0.1%) including both athletes and para-athletes.

3.3. Title categories

Layer 1 grouping: there were 858 titles (61.7%) about "injury risk", 508 (36.5%) about "injury prevention", and 24 (1.7%) including both.

Layer 2 grouping: titles with no qualifiers represented around half of published studies (*k*=719, 51.7%), followed by titles about risk factors (*k*=303, 21.8%). All other categories were represented in less than 10% of studies each. ESM 2.3. provides a figure synthesizing layers 1 and 2 groupings.

3.4. Manuscript analysis: reporting of injury data

This section focuses entirely on reporting of injury data related to layer 2 groupings. The proportion of studies reporting injury data for categories (qualifiers or absence thereof) that should provide injury data are presented in Figure 3A. Within the category "no qualifiers" (titles that are about injury risk or prevention and should provide injury data), only 533 (74.1%) studies presented injury data, while 131 (18.2%) did not, and 55 (7.6%) had injury data unrelated to any prevention measure, despite the title mentioning injury prevention. Most titles mentioning injury prediction (*k*=42, 82.4%) reported injury data, but eight (15.7%) failed to do so, and one (2.0%) presented data that were unrelated to any prevention measure. Although titles about risk factors suggest a focus on surrogate outcomes, these studies should present injury data to ascertain that they are, indeed, risk factors. While 247 (81.5%) studies presented injury data, 53 studies (17.5%) did not, and three (1.0%) presented data unrelated to prevention measures. Information on reporting of surrogate outcomes is provided in the ESM 2.4. and 2.5.

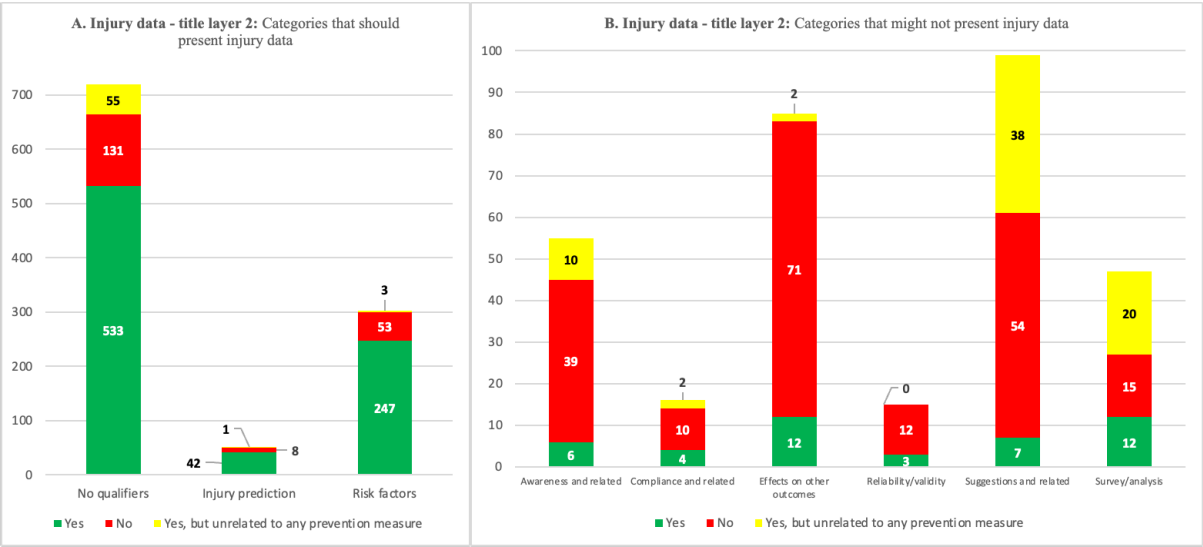

Figure 3. Reporting of injury data in included studies. (A) Considering layer 2 categories that should present injury data. (B) Considering layer 2 categories that might not present injury data.

Most studies with titles falling into categories where injury data are less relevant and may not be required (Figure 3B) did not present injury data (*k*=201 of 317, 63.4%).

3.5. Special note on injury prevention titles

The match (or mismatch) between titles and reporting of injury data largely depends on the layer 2 groupings. However, for all titles about injury prevention (layer 1) only 193 (38.0%) presented injury data, 192 (37.8%) did not, and 123 (24.2%) had injury data that were unrelated to any prevention measure. When considering layer 2 grouping, more than half of injury prevention titles (*k*=269, 53.0%) had no qualifiers, but less than 40% actually presented injury data.

3.6. Temporal trends in reporting injury data

From 1954 (oldest included study) through to 1983, all studies reported injury data. Therefore, 1954 to 1983 was defined as the 1st period and the subsequent periods were defined as follows: 1984 to 2000, 2001 to 2015, and from 2016 onwards. The percentage of studies

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with “injury risk” or “injury prevention” in the title that failed to report injury data increased progressively across the four periods (Figure 4). This increasing trend occurred for all studies (as per layer 1 grouping; Figure 4A) and for titles with no qualifiers (as per layer 2 grouping; Figure 4B). The percentage of injury prevention studies reporting injury data that are unrelated to any prevention measure has been progressively decreasing from the 1984-2000 period to 2016-onwards.

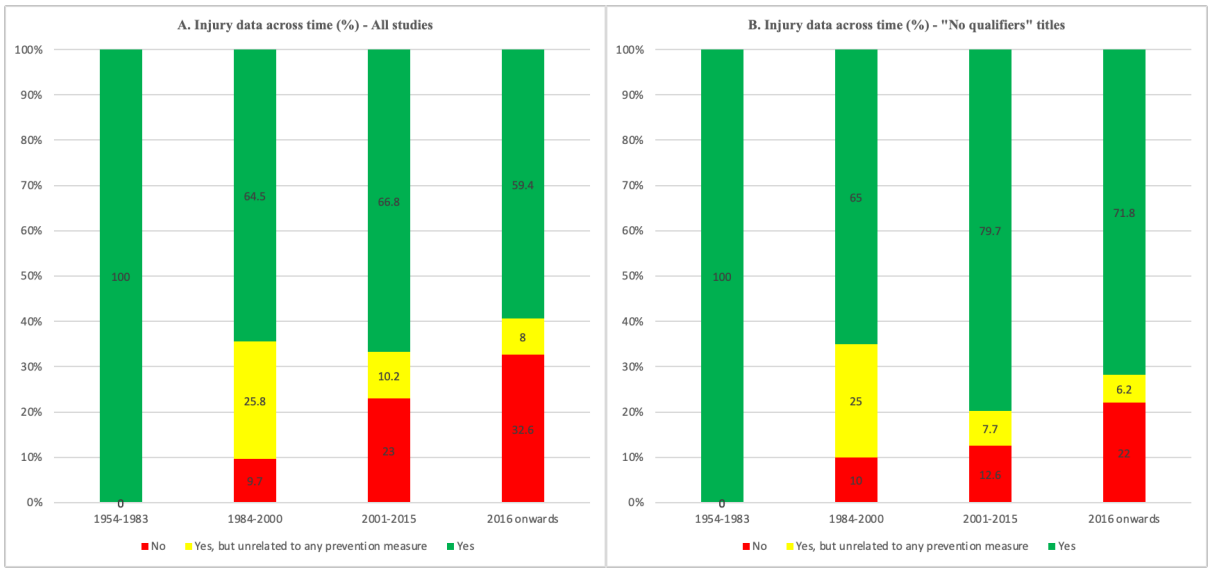

Figure 4. Temporal trends in reporting injury data. (A) Considering all title categories (layer 1). (B) Considering only the “no qualifiers” category (from layer 2).

4. Discussion

Injury risk and prevention are hot topics, and research titles including these expressions are more likely to capture a great deal of attention. However, injury risk and prevention research often does not provide injury data,[2 3] perpetuating claims based exclusively on surrogate outcomes.[3 6-8] Regarding layer 1 grouping, almost 80% of study titles about injury risk presented injury data, which reflects positively on the appropriateness of the “sales pitch” in their title. A major concern was identified in study titles about injury prevention, where ~40% had no injury data and ~25% had injury data that was unrelated to any prevention measure.

Readers and practitioners should therefore be aware that less than half of empirical studies about injury prevention provide injury data, which may ignite inadequate conclusions and bias the expectations surrounding prevention interventions.

Regarding layer 2 grouping, i.e., presence or absence of qualifiers, nearly 75% of titles with no qualifiers and over 80% of titles concerning injury prediction (e.g., "prediction of injury risk") presented injury data. At face value, the numbers are apparently positive, but these categories should all have 100% reporting rate, as their titles induce the readers into believing that injury data will be presented. Likewise, over 80% of titles focusing on risk *factors* had injury data, meaning that in ~20% of cases the outcomes were assumed to be risk factors, but it might not be the case because no injury data were provided. Indeed, surrogate measures, such as risk factors, are not necessarily consistently reproduced and may not be generalizable,[8 12 13] as risk factors may be highly specific to a particular sample and/or context.[31-33]

For layer 2 categories where injury data is not necessarily expected to be presented within the manuscript, less than 40% of studies presented injury data. This may be anticipated, as these studies focused on perceptions, suggestions, compliance, among other outcomes that do not necessarily require injury data. However, this finding strengthens the argument that many studies with titles including "injury risk" and "injury prevention" are not at all focused on collecting injury data. Although these studies provide relevant insights into the phenomenon of injury risk and prevention, readers and practitioners are advised to understand that they are not based on injury data.

4.1. Research is headed the wrong way: worrisome temporal trends

Until 1983, studies with titles incorporating "injury prevention" or "injury risk" (layer 1) included injury data. Subsequently, the percentage of studies with "injury risk" or "injury prevention" in their title that do not report injury data steadily increased (e.g., 23.0% between

2001 and 2015 versus 32.6% from 2016 onwards), even for titles with no qualifiers in layer 2 (from 12.6% to 22.0% for the same two periods). Thus, the mismatch between the "sales pitch" in the title and the study content is increasing not only in proportion, but also in the absolute number of published studies.

The increase in the number and proportion of studies not reporting injury data would be understandable if there was greater representation of studies focusing on the barriers and opportunities to deliver interventions, how this is perceived by the practitioners, or if prevention programs may result in benefits on outcomes other than injury risk. However, this increase also occurred for titles with no additional qualifiers: there was a growing proportion of titles inducing the reader into thinking that injury data would be presented, thus failing to deliver on their "sales pitch". With more and more studies failing to present the expected injury data as hinted at by their titles, researchers and practitioners are at risk of wasting their valuable, and often limited, time in search for relevant data amidst a large pool of studies that result from their database searches.

The increasing trend on the lack of transparency in titles – "selling" injury risk or prevention but failing to deliver injury data – might be related to growing research competitiveness and to the "publish or perish" phenomenon.[34-36] Authors may be tempted to use catchy titles to overcome initial barriers, to avoid the dreaded "desk rejection"[37] and to capture the editors' and readers' attention amidst an ocean of available publications.[35 38] Authors may fall prey to temptation and associate their studies to topics that attract widespread attention, adding a spin to increase the potential for future citations.[38 39] Associated with the "publish or perish" phenomenon, more and more authors submit manuscripts at exponentially increasing rates, and journals may struggle to find expert reviewers available.[35 40] The difficulty, costs and time required to properly assess injury data may result in greater focus on surrogate outcomes, leading to authors being genuinely convinced that these outcomes accurately depict

injury risk. Combined, these factors may explain the worrisome trend in our findings and should raise alertness for the exercise and sports medicine communities, from readers to authors, reviewers, and editors.

4.2. Honesty over hype: a call for greater transparency in study titles

The accuracy of research titles is of utmost importance to avoid misleading readers and potentially making their search for relevant information more daunting, thus wasting precious research time and efforts. Inaccurate titles magnify the problem of health and science misinformation.[41-44] Titles of empirical studies including "injury risk" and/or "injury prevention" should deliver on their promises and present injury data, with a few selected exceptions that will be discussed below. In the case of injury prevention, injury data must be related to prevention measures (e.g., intervention, equipment, rules); this is especially true for titles with no qualifiers in layer 2, that provide no indication that the study may not be about injuries. Titles including terms that are related to injury prediction should also be mandated to report injury data, which should probably also be the case for titles about risk factors, for reasons previously explained. Even when these studies have small samples and/or short timeframes, injuries occurred, or their absence, during the intervention should be explicitly reported. Otherwise, studies may be compounding the problem of misinformation regarding injury risk and prevention, especially for sports professionals that act in a fast-moving environment where time to absorb and digest information is very limited.[43 44]

If the study is unrelated to injury risk or prevention, authors should refrain from adding qualifiers such as "suggestions for injury risk" or "implications for injury prevention" to the title, as these terms can mislead the readers and potentially bias their interpretation of the data. Such expressions could potentially fit the discussion within the manuscript but are probably best left off the titles. If the goal is to assess the effects of an injury prevention program on

other outcomes (surrogates, e.g., strength, balance), we suggest that the title should replace "injury prevention program" with the name of the specific program (e.g., FIFA 11+) or specific strategy implemented, in case there is no readily available name, attempting to remove "injury prevention" from the title.

There are, however, titles that are not misleading despite the studies having no injury data. There will always be a place and a need for studies focusing on awareness, barriers to implementation, and many other relevant injury-related topics. These studies should still refer to "injury risk" or "injury prevention" in the title but add qualifiers that clearly denote what will be, in fact, measured, such as compliance. We propose a ruleset to guide the assessment of title appropriateness in the context of injury risk or prevention (Figure 5).

Study titles	Injury data should be	Commentary
No qualifiers	Mandatory	Otherwise, the title is false.
Qualifiers		
Injury prediction	Mandatory	Otherwise, the title is false.
Risk factors (or mechanisms, or markers)	Likely mandatory	Otherwise, the title is misleading (putative risk factors may not be real risk factors).
Awareness, perspectives, preferences, perceptions, beliefs, knowledge, opinions about injury risk or prevention	Optional	Phrase the title clearly so that readers easily understand this is the goal.
Compliance, adherence, fidelity		
Survey or analysis of prevention or injury risk reduction strategies/programs (i.e., what and how is being implemented)		
Effects on other outcomes or other risk factors	Optional, but…	If there is no intention to assess injuries, we strongly suggest using the specific name of the intervention (e.g., FIFA 11+) and eschew using "injury prevention" or "injury risk" in the title.
Reliability or validity of instruments and tests	Optional, but…	Unless the reliability and validity refer to injury data (which is often not the case), name the tests and refrain from using "injury prevention" or "injury risk" in the title.
Suggestions, claims, recommendations, lessons or implications for injury prevention of risk	Optional, but…	If there is no intention to assess injuries, we strongly suggest refraining from using "injury prevention" or "injury risk" in the title. These speculations may be incorporated into the manuscript but should have no place in the title.

Figure 5. Proposed ruleset for empirical studies whose titles mention "injury prevention" and/or "injury risk".

[Escreva aqui]

Ultimately, the responsibility of delivering more transparent study titles falls upon the authors but should also be a concern for reviewers and editors. Failure to reform and invert the current growing temporal trend of non-reporting of injury data will likely result in a perpetuating misinterpretation of injury risk factors, wasting time, effort, money, and other resources into potentially ineffective prevention measures. For now, stakeholders (clinicians and other practitioners, patients, funding agencies, policymakers, researchers) should be aware that not all empirical studies whose titles include "injury risk" or "injury prevention" provide injury data, reinforcing the need for careful reading of the full manuscript to avoid leapfrogging to unsubstantiated and spurious conclusions. This problem may be exponentiated as many research consumers do not have free access to the full manuscript and so conclusions might be based on incomplete title and abstract information.

4.3. Limitations

This scoping review is not without limitations, namely the lack of assessment of risk of bias in studies and certainty of evidence, which would be expected in a traditional systematic review. However, our goal was to map the alignment between titles and study contents, not to ascertain the efficacy or effectiveness of interventions. Given the very large number of included studies, we could not provide more in-depth information regarding the use of surrogate outcomes (e.g., the specific qualities assessed, or the tests used). Moreover, we focused on titles including "injury risk" or "injury prevention", but it is possible that titles with more specific terms (e.g., "injury incidence") may also fail to report injury data. Regardless, we believe that our eligibility criteria were aligned with our goal and that the 1,390 included studies provide a trustworthy perspective of the literature as a whole.

[Escreva aqui]

5. Conclusions

The hype surrounding the topics of injury prevention and injury risk may induce researchers to adopt appealing research titles to immediately capture the readers' attention. This competitive pressure results in nearly a third of empirical studies titles that include "injury risk" or "injury prevention" failing to deliver injury data. In injury prevention studies, less than half presented injury data related to some prevention measure. Considering only the studies with titles without qualifiers to suggest other research focuses (e.g., compliance, perceptions), injury data is absent in one-fifth of published studies, a trend that has consistently increased over time. The literature is being plagued with a growing absolute and relative number of empirical studies that provide no injury data, despite their titles including "injury prevention" and/or "injury risk". This unsettling scenario will only improve if authors provide titles that privilege accuracy over hype, and reviewers and editors take the effort to ensure that the title accurately reflects the study contents.

Contributions: JA conceived the initial idea. All authors contributed significantly to conceive, write, and revise the initial drafts, as well as the current version of the article. All authors read and reviewed the manuscript critically for important intellectual content and approved the final version to be submitted. All authors agreed to upload to *SportRxiv.*

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[Escreva aqui]

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439

440 **Data and supplementary material accessibility**

441 Electronic Supplementary Material provided after the references. In the manuscript, multiple
442 links are provided to access relevant material (e.g., data extraction sheet).

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[Escreva aqui]

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Electronic Supplementary Material

1. Methods

1.1. Eligibility criteria

(P) Participants in the context of Physical Education classes, dancing (except if competitive in nature) or security forces special training (e.g., military) were not considered; studies with coaches and/or medical staff were considered only if providing data pertaining the athletes.

(I/E) Either traumatic (e.g., ankle sprains) or non-traumatic (e.g., chronic tendinopathies).

(S) Regardless of the number of participants, number of groups, or randomization.

1.2. Selection process

Disagreements during full text analysis.

(i) JA vs. AP, after independent assessments: 194 disagreements (i.e., 89.6% agreement rate). After discussions: 2 disagreements (i.e., 99.9% agreement rate). SRR participated in some of these meetings and therefore had a chance to revise some of her initial assessments.

(ii) JA vs SRR, initial comparison: 42 disagreements (i.e., 97.7% agreement rate). After discussions: 2 disagreements (i.e., 99.9% agreement rate), not coincidental with disagreements with AP.

Therefore, decisions by unanimity in 1853 studies (99.8%) and by majority in 4 studies (0.2%).

[Escreva aqui]

1.3.Data items and management

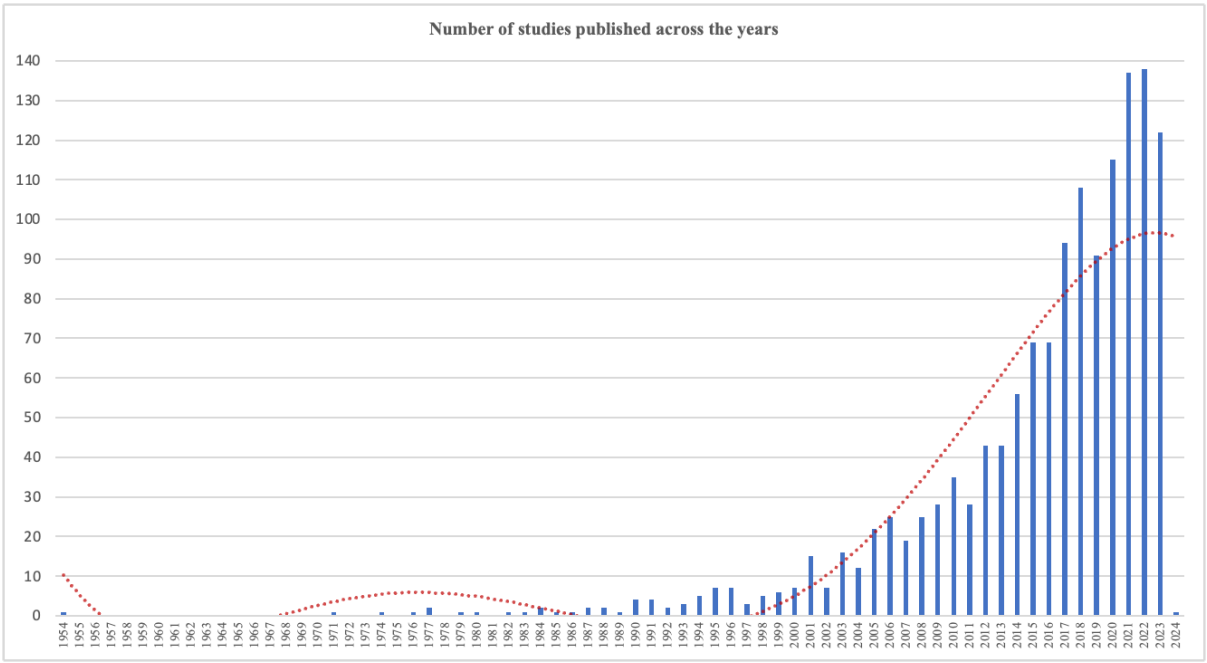
Appropriateness of the titles regarding injury risk or prevention. The richness and diversity of titles emerging during the searches suggested that the originally proposed classification system established in the protocol would be too simplistic and often unjust for the authors. Therefore, we used a richer, *ad hoc* classification system based on analyzing the included titles.

2. Results

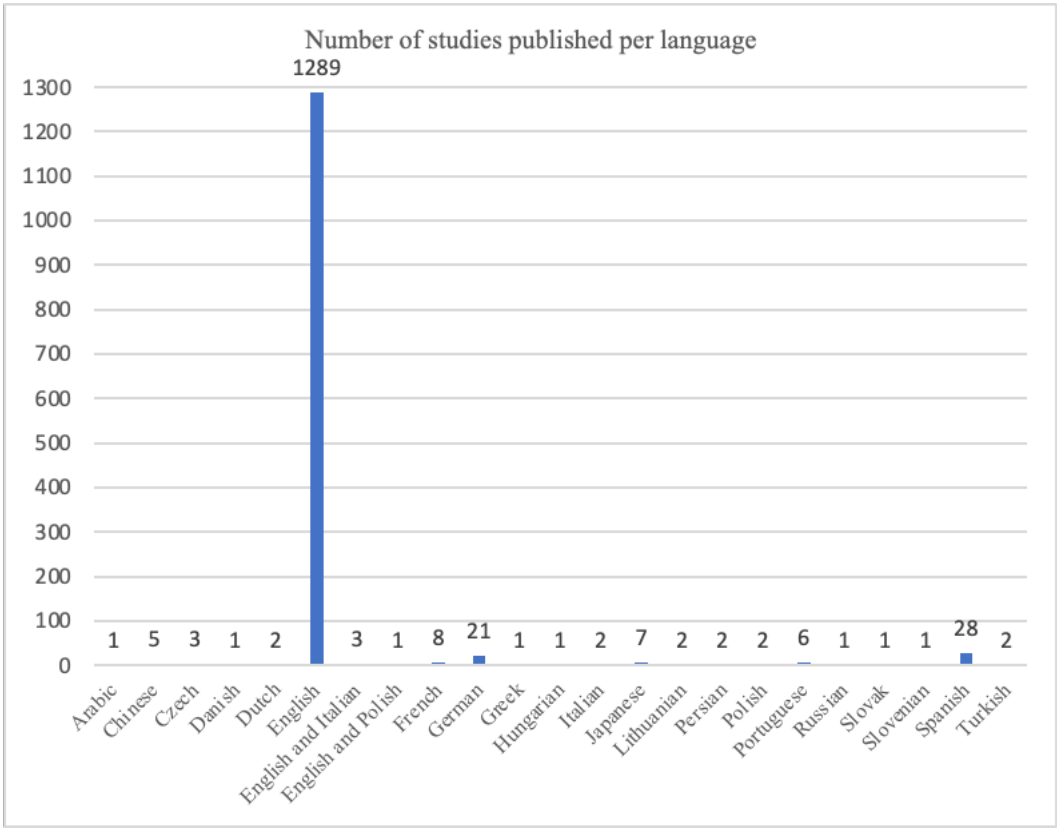
2.1. Study selection

Database searches on October 2, 2023, resulted in 147,125 records, of which 99,872 were duplicates. Of the 47,253 records screened (titles and abstracts), 45,396 were excluded (unfitting article type, PICOS/PECOS criteria unmet, retractions). Therefore, 1,857 records were eligible for full-text analysis (1,840 studies plus 17 errata). Given the huge numbers reported here, no in-text citations will be provided. A table with full citations of all 1,857 records (along with decisions regarding their inclusion or exclusion) is provided online (https://osf.io/sar39). Overall, 447 studies (plus five corresponding errata) were excluded, while 1,392 studies (plus 12 corresponding errata) were included in this review. One study was not retrieved, despite our best efforts to obtain the full text. One additional study was excluded during data extraction, as it did not fit the participants and outcomes criteria, and another study was found to be a duplicate at this stage (it had an incomplete set of authors), resulting in 1,390 studies being included in the analyses.

2.2.Brief description of studies

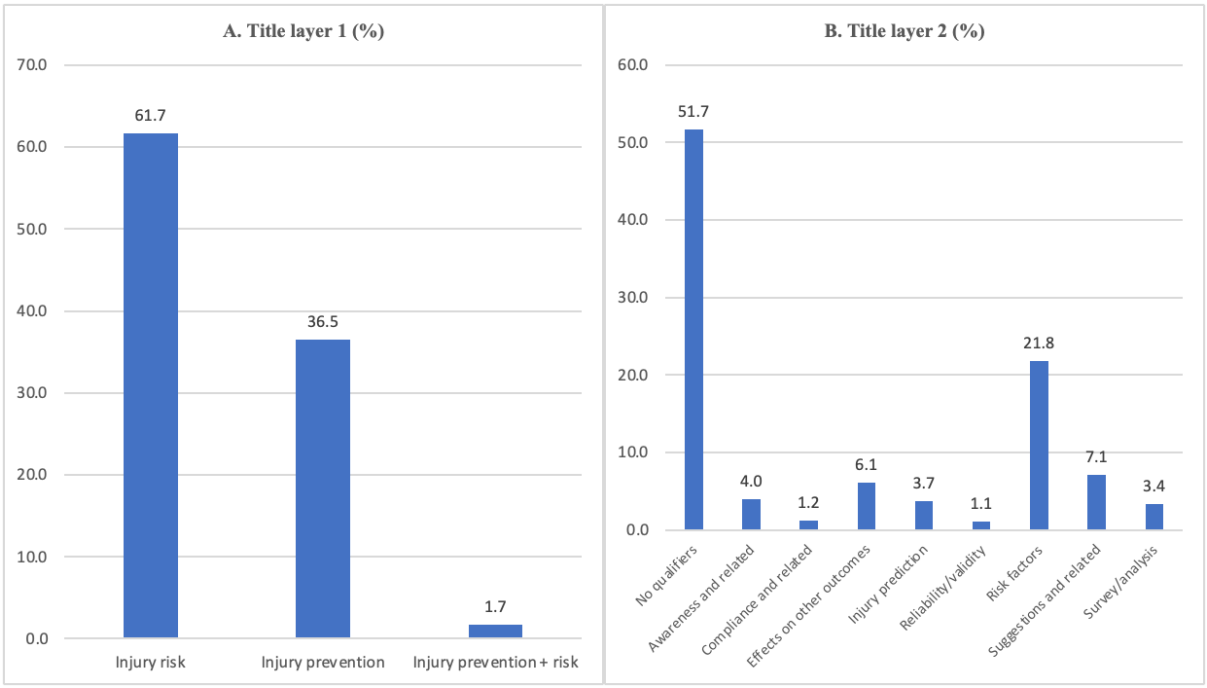


Supplementary figure 1. Number of studies published across the years. The red dotted line is a 5th degree polynomial to illustrate the non-linear evolution of published studies on the topic.



Supplementary figure 2. Publication language.

2.3. Title categories



Supplementary figure 3. Distribution of title classifications per layer (in percentage). (A) Considering title layer 1. (B) Considering title layer 2.

2.4. Reporting of surrogate outcomes – layer 1 analysis

Since 393 studies did not provide injury data, we report whether they presented data for surrogate outcomes. Of the studies without injury data, 193 were about injury risk, and 172 (89.1%) reported surrogate outcomes, while 21 (10.9%) did not. Another 193 studies were about injury prevention: 132 (68.4%) reported surrogate outcomes and 61 (31.6%) did not. Finally, for the seven mixed titles (i.e., injury prevention + risk), 4 (57.1%) presented surrogate data, and 3 (42.9%) did not.

2.5. Reporting of surrogate outcomes – layer 2 analysis

Supplementary table 1 presents the reporting of surrogate outcomes for the 393 studies that did not have injury data. The presentation is according to layer 2 title analysis.

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660 **Supplementary table 1.** Reporting of surrogate outcomes for the 393 studies that did not have
661 injury data (layer 2 analysis).

Category	Surrogates reported n (%)	Surrogates unreported n (%)
Awareness, perspectives, opinions, preferences, beliefs, perceptions, knowledge about injury risk, injury risk factors, or injury prevention	1 (2.6)	**38 (97.4)**
Compliance, adherence and/or fidelity	1 (10.0)	**9 (90.0)**
Effects on other outcomes or other risk factors	**70 (98.6)**	1 (1.4)
Injury prediction	**8 (100.0)**	0 (0.0)
No qualifiers	**115 (88.5)**	15 (11.5)
Reliability and/or validity of instruments/tests	**10 (83.3)**	2 (16.7)
Risk factors (or mechanisms, markers)	**52 (98.1)**	1 (1.9)
Suggestions, claims, recommendations, lessons or implications for injury prevention or risk	**46 (85.2)**	8 (14.8)
Survey or analysis of prevention or risk reduction strategies/programs	5 (31.3)	**11 (68.8)**

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