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Traumatic and gradual-onset injuries in competitive and recreational surfers: a comparative retrospective study and systematic review

Manuel João Martins Campanário

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Traumatic and gradual-onset injuries in competitive and recreational surfers: a comparative retrospective study and systematic review

Artigo original

Dissertação de candidatura ao grau de Mestre em Medicina, submetida ao Instituto de Ciências Biomédicas Abel Salazar – Universidade do Porto

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Porto, junho de 2025

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Abstract

Introduction: Surfing has undergone a global expansion in recent decades, with an estimated 37 million participants worldwide and significant growth observed in Portugal. Despite its increasing popularity, scientific literature on surfing injuries remains limited, particularly regarding adult surfers and the distinction between traumatic and gradual-onset injuries.

Objectives: This study aimed to characterise and compare traumatic and gradual-onset injuries in adult surfers, differentiating between competitive and recreational participants. A further objective was to identify predictors of injury occurrence and examine contextual factors associated with injury type and onset.

Methodology: A two-part design was adopted. First, a systematic review was conducted in MEDLINE/PubMed, Scopus, and Web of Science following PRISMA guidelines. Only studies involving adult surfers and distinguishing between traumatic and gradual-onset injuries were included. Second, a retrospective cross-sectional study was conducted using an online survey made available to surfers aged ≥18 years with ≥12 months of experience. Injury definitions were standardised, and data were analysed using descriptive statistics, group comparisons, and regression models.

Results: Eight studies were included in the review, predominantly focused on traumatic injuries. The retrospective study gathered valid responses from 213 surfers (192 recreational, 21 competitive), reporting 114 injuries, of which 112 were classified by onset (49.1% traumatic; 50.9% gradual-onset). No significant group differences were found in the number of injuries per surfer ($p = 0.570$). However, competitive surfers were significantly younger, surfed more hours annually ($p < 0.001$), used shorter boards ($p = 0.003$), and practised more additional sports ($p = 0.014$).

Traumatic injuries had an overall IR of 1.68 per 1000 hours and 3.07 per 1000 days of surfing, predominantly affecting the lower limbs. The IR of traumatic injuries was higher among recreational surfers (1.85 per 1000 hours) than among competitive surfers (0.87 per 1000 hours). Gradual-onset injuries, commonly linked to prolonged paddling, mainly affected upper limbs, particularly, the shoulder. Injury onset was significantly associated with anatomical region ($p = 0.004$) and injury type ($p = 0.003$). Gradual-onset injuries were more likely to involve the trunk or upper limbs and affect joints or ligaments. New insights emerged regarding healthcare-seeking behaviour, injury context, and perceived impact.

Conclusion: This study is the first, to the best of our knowledge, to combine a systematic review with retrospective data to examine traumatic and gradual-onset injuries in adult surfers by competitive status. Although overall injury occurrence did not differ significantly between groups, competitive and recreational surfers exhibited distinct exposure profiles. The most relevant differences emerged between injury onsets: traumatic injuries primarily affected the lower limbs and resulted from acute impacts, while gradual-onset injuries, often related to prolonged paddling, mainly involved the shoulder and upper limbs. These findings underscore the need for standardised definitions and a greater focus on gradual-onset mechanisms and contextual risk factors to optimise injury prevention in surfing.

Key-words: Surfers; Injuries; Competitive; Recreational; Surfing; Incidence; Traumatic; Acute; Overuse; Slow-onset; Performance; Athletes; Risk Factors; Sports Medicine; Water Sports; Male; Female; Leisure Activities; Professional

Resumo

Introdução: O surf tem registado uma expansão global nas últimas décadas, com uma estimativa de 37 milhões de praticantes em todo o mundo e um crescimento significativo observado em Portugal. Apesar da crescente popularidade, a literatura científica sobre lesões no surf continua limitada, sobretudo no que diz respeito a surfistas adultos e à distinção entre lesões traumáticas e de início gradual.

Objetivos: Este estudo teve como objetivo caracterizar e comparar as lesões traumáticas e de início gradual em surfistas adultos, distinguindo entre praticantes competitivos e recreativos. Um objetivo adicional foi identificar preditores da ocorrência de lesões e analisar fatores contextuais associados ao tipo e ao modo de início das lesões.

Metodologia: Foi adotado um método de investigação em duas partes. Em primeiro lugar, foi realizada uma revisão sistemática da literatura nas bases de dados MEDLINE/PubMed, Scopus e Web of Science, seguindo as diretrizes PRISMA. Foram incluídos apenas estudos com surfistas adultos que distinguissem entre lesões traumáticas e de início gradual. Em segundo lugar, foi realizado um estudo transversal retrospetivo com recurso a um questionário online, disponibilizado a surfistas com idade igual ou superior a 18 anos e com, pelo menos, 12 meses de experiência. As definições de lesão foram padronizadas e os dados foram analisados com recurso a estatísticas descritivas, comparações entre grupos e modelos de regressão.

Resultados: Foram incluídos oito estudos na revisão, centrados predominantemente em lesões traumáticas. O estudo retrospetivo obteve respostas válidas de 213 surfistas (192 recreativos e 21 competitivos), que reportaram 114 lesões, das quais 112 foram classificadas quanto à natureza da instalação (49,1% traumáticas; 50,9% de início gradual). Não se verificaram diferenças estatisticamente significativas no número de lesões por surfista entre grupos ($p = 0,570$). Contudo, os surfistas competitivos eram significativamente mais jovens, surfavam mais horas por ano ($p < 0,001$), utilizavam pranchas mais curtas ($p = 0,003$) e praticavam mais modalidades desportivas adicionais ($p = 0,014$).

As lesões traumáticas apresentaram uma taxa de incidência global (IR) de 1,68 por 1000 horas e 3,07 por 1000 dias de surf, afetando sobretudo os membros inferiores. A taxa de incidência (IR) de lesões traumáticas foi superior entre os surfistas recreativos (1,85 por 1000 horas) em comparação com os surfistas competitivos (0,87 por 1000 horas). As lesões de início gradual, frequentemente associadas remada prolongada, afetaram principalmente os membros superiores, em especial o ombro. O modo de início da lesão associou-se significativamente à região anatómica ($p = 0,004$) e ao tipo de lesão ($p = 0,003$). Lesões de início gradual ocorreram com maior frequência no tronco ou membros superiores e afetaram sobretudo articulações e ligamentos. Surgiram novos dados relativamente aos comportamentos de procura de cuidados de saúde, ao contexto das lesões e à perceção do impacto.

Conclusão: Este estudo é o primeiro, tanto quanto é do nosso conhecimento, a combinar uma revisão sistemática com dados retrospetivos para examinar lesões traumáticas e de início gradual em surfistas adultos, de acordo com o estatuto competitivo. Embora a ocorrência global de lesões não tenha diferido significativamente entre os grupos, os surfistas competitivos e recreativos apresentaram perfis de exposição distintos. As diferenças mais relevantes emergiram entre os tipos de início da lesão: as lesões traumáticas afetaram sobretudo os membros inferiores e resultaram de

impactos agudos, enquanto as lesões de início gradual, frequentemente associadas a remada prolongada, envolveram principalmente o ombro e os membros superiores. Estes resultados sublinham a necessidade de definições padronizadas e de uma maior atenção aos mecanismos de início gradual e aos fatores contextuais, de forma a otimizar a prevenção das lesões no surf.

Palavras-chave: Surfistas; Lesões; Competitivo; Recreativo; Surfing; Incidência; Traumática; Aguda; Sobrecarga; Início Gradual; Desempenho; Atletas; Fatores de Risco; Medicina Desportiva; Desportos Aquáticos; Masculino; Feminino; Atividades de Lazer; Profissional.

List of abbreviations

AD - Anno Domini

BC - Before Christ

bpm – beats per minute

CEBM - Centre for Evidence-Based Medicine

EAE - external auditory exostosis

ED - Emergency Department

FPS - Portuguese Surfing Federation

IP – incidence proportion

IR – incidence rate

ISA - International Surfing Association

PICO - Population, Intervention, Comparison, and Outcomes

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

SD - standard deviation

STROBE – Strengthening the reporting of observational studies in epidemiology

WSL - World Surf League

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1. Introduction

Surfing is traditionally considered a sport originating from Hawaii (AD 300), but archaeological and historical evidence suggests that its roots may trace back to the ancient Peruvian civilisation (3000 BC). Nevertheless, the lack of conclusive evidence regarding the development of surfing in Peru as a recreational practice prevents definitive claims about its true origin. In the 19th century, surfing in Hawaii faced a significant decline. Despite nearing extinction, it persisted within small communities, laying the groundwork for its revival in the 20th century. By the 1990s and 2000s, surfing had evolved into a highly commercialised global phenomenon. This widespread popularity, however, led to tensions between authenticity and commodification, simultaneously preserving its rebellious roots and facilitating its integration into mainstream culture.[1]

It is estimated that there are approximately 37 million surfers globally.[2] Reflecting its growing international recognition, surfing was included in the Olympic Games for the first time at Tokyo 2020, held in 2021, with both the men's and women's events featuring 20 competitors each.[3] During the Paris Games, its second Olympic appearance, surfing was among the sports that drew significant attention from spectators.[4] The inclusion of surfing in the Olympics, first in 2021 and then in 2024, is expected to have contributed to a global increase in participation in the sport.

This expansion is also evident in Portugal, where the number of surfers has grown exponentially. In 1990, there were 1,000 surfers, a number that surged to 70,000 by 2009 and 200,000 by 2011, largely driven by the emergence of surf schools.[5] Although no official data are available for more recent years, estimates from 2018 place the number of surfers in Portugal between 500,000 and 700,000, reflecting the sport's continued expansion.[6]

Despite its growing popularity, surfing remains a small segment within the overall landscape of federated sports in Portugal. According to Pordata, the number of athletes registered with the FPS increased from 1,026 in 1997 to 2,621 in 2023.[7] However, in comparison to the total number of federated athletes in Portugal (773,845), surfers represent only 0.34% of the total.[7] Regarding the number of registered surf schools and federated clubs in the FPS, there are currently 300 schools and 79 clubs.[8,9] This represents an increase compared to 2020, when there were 259 schools and 73 clubs.[10]

From a performance perspective, surfing takes place on waves that must be caught at their breaking point, known as the peak. To catch a wave, the surfer paddles out to the peak, selects a suitable wave considering its speed and breaking direction, then faces the shore and paddles forward, trying to match the wave's speed to successfully enter it and ride along its face.[11] Over time, advancements in surfboard design have enhanced this process, with boards becoming progressively smaller, lighter, and more manoeuvrable.[12]

Concerning the physical demands of surfing, a surfer's activity profile varies between competitive and recreational settings. When analysing surfing heats (competitions), surfers spend an average of 51% of their total activity time paddling, 42% stationary, and only 3.8% riding waves, with the remaining time dedicated to other activities.[13] In competitions, male surfers can reach speeds of up to 45 kilometres per hour, with an average maximum speed of 33.4 kilometres per hour, covering an average distance of 1,605 metres per heat. Their heart rate averages 139 bpm, reaching a maximum of 190 bpm. Additionally, competitive surfing involves bursts of high-intensity paddling, followed by short recovery periods, extended phases of low-intensity paddling, and intermittent breath-holding.[14] Similarly, recreational surfers spend approximately 44% of their session paddling, 35% stationary, and 5% riding waves, with the remaining time dedicated to other

activities.[15] While competition heats last between 15 and 45 minutes, according to ISA rules, a surf session can last up to 4 hours, or even longer.[16,17] Surfing is inherently intermittent, relying on both the aerobic and anaerobic energy systems. As a result, surfers must possess a highly developed ability to recover physiologically during brief rest intervals before engaging in high-intensity paddling again.[18]

Beyond its physical demands, surfing is also influenced by environmental factors. The sport is affected by a wide range of meteorological and geological conditions, including wind, wave conditions, tides, currents, seafloor characteristics, and accessibility to surf spots.[10] Additionally, as with all sports, surfing carries an inherent risk of injury, regardless of whether it is practised at a competitive or recreational level.[19]

Despite these challenges, surfing is widely associated with health and well-being benefits. Those who surf more frequently report greater physical health and mental well-being. After surfing, participants describe feelings of rejuvenation, tranquillity, and positive engagement, while also experiencing moderate physical fatigue and reduced anxiety levels. The primary motivations for surfing include enjoyment, performance improvement, and mental well-being, alongside the connection with nature and social interaction.[20]

Despite the growing popularity of surfing, existing scientific literature on surfing injuries remains limited, particularly concerning the adult population. Many studies combine data from children, adolescents, and adults without conducting separate analyses, which makes it difficult to draw specific conclusions about adult surfers.[2,11,17,21–25] Furthermore, much of the research focuses exclusively on traumatic injuries or relies on broad classifications, such as acute versus chronic, often neglecting a clear distinction between traumatic and gradual-onset injuries.[26] To date, and to the best of our knowledge, only two studies (Remnant et al.[26] and Furness et al.[27]) have specifically focused on gradual-onset injuries in surfing and their associated mechanisms. In this context, the present study aims to characterise and compare the occurrence of traumatic and gradual-onset injuries in adult surfers, distinguishing between recreational and competitive participants.

2. Methods

This study comprises two parts: a systematic review of the existing literature and a cross-sectional retrospective cohort. This study was conducted in compliance with ethical and data protection regulations, as authorised by the FPS.

2.1 Systematic review

The methodological framework of this systematic literature review adhered to the guidelines outlined in the PRISMA statement.[28] The present review examined both traumatic and gradual-onset injuries (without strictly adhering to acute and chronic injury classifications), included only adult participants, and applied a restrictive definition of surfing, encompassing only surfing, longboarding, and tow-in/tow-out, while excluding bodyboarding, skimboarding, stand-up-paddling, bodysurfing and kneeboarding. These refinements were made in order to ensure that the studies included were as comparable as possible to the original study conducted.

2.1.1 Literature Search Approach

A search was conducted in three databases — MEDLINE/PubMed, Scopus, and Web of Science — in November 2024 in order to identify studies analysing injuries in recreational and/or competitive surfers, which could therefore be considered relevant within the scope of this systematic review.

The selection of articles for this systematic review was conducted following the PICO framework.[29] Accordingly, the central research question guiding this systematic review was formulated as: “Do surfers aged 18 years or older (P) who participate in recreational surfing (I), compared to competitive surfers (C), exhibit a higher incidence and more severe injuries (O)?”.

The search strategy incorporated key terms derived from the PICO framework. The selected keywords included concepts related to surfing, levels of participation, and injury-related outcomes. The following search string was used in all the databases: ("wave riding" OR "wave-riding" OR "surfing" OR "surfer" OR "surf" OR "surfers" OR "surfboard-riding") AND ("competitive" OR "athlete" OR "athletes" OR "contest" OR "contests" OR "competition" OR "competitions" OR "professional" OR "professionals" OR "amateur" OR "amateurs" OR "leisure" OR "recreative" OR "recreational") AND ("pathological processes" OR "body regions" OR "musculoskeletal" OR "non-musculoskeletal" OR "signs" OR "symptoms" OR "injuries" OR "injury" OR "condition" OR "conditions" OR "wounds" OR "trauma" OR "acute" OR "chronic" OR "gradual-onset" OR "gradual onset" OR "overuse"). The use of quotation marks in the search terms was intended to ensure that specific phrases were searched as exact word combinations, preventing databases from splitting them into separate terms or retrieving irrelevant results based on partial matches. Zotero® was used to manage the retrieved citations, and Microsoft Excel® was employed to assist with data organisation.

2.1.2 Selection of Eligible Studies

The inclusion and exclusion criteria applied during the selection process are listed in Table I. All citations retrieved from the database searches were imported into Zotero®, where the software's automatic tool was used to identify and remove duplicate records.

The initial screening of titles and abstracts was conducted within Zotero®, where irrelevant studies were excluded based on the predefined criteria. For the remaining articles, full texts were retrieved where available. These studies constituted the reports assessed for eligibility.

Subsequently, the titles of these eligible reports were exported to Microsoft Excel® to facilitate further organisation. In Microsoft Excel®, decisions regarding inclusion or exclusion were systematically recorded, with justifications documented for each study, whether positively selected or excluded.

Additionally, the reference lists of all studies assessed for eligibility were manually screened (citation screening) to identify any potentially relevant articles not captured in the initial search. These additional studies underwent the same selection process described above, including title and abstract screening, full-text assessment, and documentation of decisions.

2.1.3 Evaluation of Methodological Quality and Level of Evidence

The methodological quality and evidence level of the included studies were critically appraised using the STROBE checklist and the CEBM guidelines.[30,31] As in previous research, the included studies were classified according to the proportion of STROBE checklist items they met.[10,32,33] Specifically, studies meeting less than 50% of the items were considered to be of poor quality, those fulfilling between 50% and 80% were deemed of moderate quality, and studies with more than 80% compliance were regarded as having good quality.

2.1.4 Data Collection from Included Studies

Data from the included studies were extracted directly into the present review, without the use of additional software or spreadsheets. Relevant information was organised manually, including details on study design, sample characteristics, injury definitions, and main findings.

2.1.5 Data analysis

All data were manually extracted from the included studies. When the information of interest was not explicitly reported, we calculated the required values based on the data available in the articles, whenever possible. In cases where studies provided separate results for competitive and recreational surfers, these data were extracted independently and analysed separately, in order to enable direct comparison with our original study.

Given the heterogeneity in the classification systems used across studies for both the anatomical location and type of injuries, we reorganised the reported injury data into standardised categories to facilitate comparability. To ensure transparency and preserve the integrity of the original data, the three most frequent anatomical locations and the three most frequent injury types were presented as originally reported in each study. In parallel, all injury data were also reclassified into common categories. Anatomical locations were grouped into four main regions: head and neck, torso (including pelvis), upper limbs, and lower limbs. Similarly, injury types were categorised into five groups: bone; joint/ligament; muscle/tendon; skin; and other (including non-specified). The descriptions provided in some of the included studies suggest that the “Other” injury category may encompass a range of injuries such as corneal burns, broken teeth, dental injuries, meniscal injuries, tympanic membrane perforations, weever fish stings, and ear injuries (e.g. infections), among other non-specified injuries.

In studies where injury types were reported using compound categories (e.g., "muscle and ligament"), and no further breakdown was provided, values were evenly split between the relevant predefined categories (i.e., "joint and ligament" and "muscle and tendon"). This decision was made to ensure consistency in data synthesis while minimising bias.

Descriptive statistics (relative frequencies, %) were used to summarise the distribution of injury locations and types across studies and to support comparison with our original findings.

2.2 Cross-sectional retrospective cohort

2.2.1 Study Design and Data Collection Tool

A cross-sectional descriptive online survey was implemented to collect data about traumatic and gradual-onset surfing-related injuries. Google Forms® was the tool utilized to implement the survey. The survey was only available in European Portuguese and was available online for completion from 16 December 2024 until 22 March 2025.

2.2.2 Injury Reporting and Definitions

Surfing-related injury data was obtained by asking each participant to retrospectively recall any traumatic or gradual-onset injury that occurred while surfing or related to surfing within the previous 12 months. After determining the number of injuries sustained over the past 12 months, participants were asked to individually characterise each injury. If a surfer had experienced more than three injuries, they were instructed to characterise only the three injuries they considered most severe (those that resulted in the longest periods of inactivity or the greatest impact on normal activity).[11] Clear descriptions of surfing injury, traumatic injury and gradual-onset injury were given to exclude injuries not caused from or related to surfing. Injury was defined as any condition that resulted in one of the following situations: 1. Interruption of surfing practice for at least one day; 2. No interruption of surfing practice, but modifications to it were required; 3. Sought advice and/or treatment from healthcare professionals. This definition was used in a previous retrospective epidemiological study.[25] Traumatic injury was defined as symptoms (e.g., pain or discomfort) that had a sudden onset and were caused by a specific event during surfing activity. Gradual-onset injury was defined as symptoms (e.g., pain or discomfort) that developed gradually over time, with no specific event causing the injury; this type of injury was aggravated by surfing, could fluctuate in severity, and could be influenced by the amount of surfing performed. The definition of gradual-onset injury employed in this study was also utilised in a previous retrospective epidemiological study.[26]

2.2.3 Recall Period and Eligibility Criteria

A 12-month period has been utilised in prior surfing-specific studies.[2,23,25,26,34–36] The ability of patients to recall whether an injury occurred within the previous 12 months has been shown to be 100%.[25,37] However, the accuracy of recall diminishes as the specificity of the questions increases.[25,37] To take part in the online survey, participants had to have at least 12 months of experience, a timeframe also used in other surfing-specific studies.[2,25–27,35,36,38]

2.2.4 Participant Recruitment

Several recruitment strategies were utilized to help ensure adequate participant recruitment and the recruitment was made in 3 phases. The first recruitment phase began with sending the study overview and the survey link via email to all the surfing schools registered in the FPS.[39] In the second phase, the survey link was published on social media (Instagram® and Facebook®). Finally, in the third phase, the survey was shared on the Surftotal® website, an information portal dedicated to

surfing.[40] Whenever shared through any channel, the survey link was accompanied by a brief description and an explanation of its purpose, highlighting the inclusion criteria: being a recreational or competitive surfer, at least 18 years old, and having a minimum of 12 months of surfing experience.

2.2.5 Pilot Testing

After initial development of the survey, it was pilot tested with 3 surfers, one (recreational) with one-year experience, another (recreational) with four-year experience and, lastly, one (competitive) with twenty-year experience. This pilot test involved surfers of different surfing levels to assess the suitability of each question for participants at varying levels. This led to minor adjustments to the questionnaire to enhance the clarity of certain questions.

2.2.6 Survey Structure and Content

The questionnaire consisted of three main sections: A. Sociodemographic Characterisation; B. Surfing and Other Sports Participation; C. Injuries. In Section A, participants were asked about their date of birth, the gender they identify with, approximate weight (in kilograms), height (in centimetres), nationality, and country of residence. In Section B, participants were asked how long they had been surfing, whether they competed in surfing events, their preferred stance on the surfboard (regular, goofy, or "no preference"), the size and material of the surfboard they used most frequently, their surfing frequency, the duration of each session, and whether they regularly engaged in other sports (including which sport, the number of weekly training hours, and whether they were affiliated with a sports federation). Competitive surfers were asked which types of competitions they had participated in: club-level, regional, national, international (excluding competitions organised by the WSL and the ISA), WSL-organised competitions, and ISA-organised competitions. In Section C, participants were asked about any surfing-related injuries sustained over the past 12 months, including the number of injuries and a detailed characterisation of up to three injuries, as previously mentioned. This section included questions on the anatomical location of the injury and its type, followed by a classification of whether the injury was traumatic or gradual-onset, with the questionnaire being tailored accordingly. To define the anatomical location of each injury, five broader categories were used: Head and neck, Trunk, Upper limbs, Lower limbs, and Unable to specify, with further details provided for each category. This classification was adapted from the International Olympic Committee consensus statement on methods for recording epidemiological data on injuries and illnesses in sport.[41] To define the type of injury, seven broader categories were used: Bone, Joint and Ligament, Muscle and Tendon, Skin, Central and Peripheral Nervous System, Other, and Unable to specify, with further details provided for each category. This classification was adapted from the Rugby Consensus Statement on injury definitions and data collection procedures for studies of injuries in rugby union.[42]

2.2.7 Injury Classification and Characterisation

If the injury was traumatic, participants were asked about the injury mechanism, whether they were surfing in a familiar location, the sea conditions at the time of the injury, whether they received

assistance on-site, whether they sought professional healthcare, attended an ED, underwent surgery, experienced any impact on daily activities, the injury duration, and whether it prevented them from surfing. The duration of each injury was categorised as either less than three months or equal to or greater than three months, in order to distinguish between acute and chronic injuries. This approach was previously adopted in a retrospective epidemiological study.[26] For traumatic injuries, 22 response options were provided to characterise the injury mechanism as precisely as possible. This classification was adapted from other retrospective epidemiological studies and was further modified following the pilot test to encompass a wider range of injury mechanisms.[2,24] If the injury was gradual-onset, participants were asked about the injury mechanism, whether they sought professional healthcare, underwent surgery, experienced any impact on daily activities, the injury duration, and whether it prevented them from surfing. For gradual-onset injuries, 18 response options were provided to characterise the injury mechanism as precisely as possible. It is important to note that these options differed from those used for traumatic injuries, as different injury mechanisms may be involved. This classification was adapted from other retrospective epidemiological studies on gradual-onset and chronic injuries.[26,27]

2.2.8 Injury Incidence Measures

In this study, injury incidence is defined as the number of new injury cases occurring within a defined time period.[26] Two related epidemiological measures were used to quantify injury incidence: the IP and the IR. In addition to IP and IR, the average number of injuries per surfer was also calculated.

Injury risk, or IP, was calculated as the number of injured athletes divided by the number of athletes at risk over a 12-month period. This measure represents the probability that an individual athlete sustains at least one injury during the specified timeframe.[26]

The IR was defined as the total number of injuries divided by the total exposure time (in hours) for all athletes and expressed per 1,000 hours of exposure and per 1,000 days of exposure. This measure answers the question: “What is the rate of injury per unit of exposure time?”.[26] The IR was calculated only for traumatic injuries, as precise exposure times were not available for gradual-onset injuries.

2.2.9 Statistical Analysis

Categorical variables were described using absolute frequencies (n) and relative frequencies (%). Numerical variables were summarised using means, standard deviations and ranges. Group comparisons were conducted to examine statistically significant differences ($p < 0.05$) between competitive and recreational surfers, as well as between traumatic and gradual-onset injuries.

Independent samples *t*-tests were used to compare continuous variables between two groups, while Mann–Whitney *U* tests were applied in cases where group sizes were markedly unequal and/or when the assumption of normality was not met. For categorical variables, Pearson’s chi-square test of independence was used. When expected cell counts were low or group sizes were highly unbalanced, the Monte Carlo method or Fisher’s exact test was employed as appropriate.

Regression analyses, including linear, binary logistic, and multinomial logistic models, were conducted to examine potential associations between various predictors and injury outcomes.

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 30.0 for Windows (IBM Corp., Armonk, NY, USA).

3. Results

3.1 Systematic review

3.1.1 Selection process

A total of 1088 records were identified through database searching, including 218 from MEDLINE/PubMed, 138 from Scopus, and 732 from Web of Science. Using Zotero®'s automatic duplicate detection tool, 188 duplicate records were removed. The remaining 906 records were screened by title and abstract within Zotero®, resulting in 48 articles selected for full-text retrieval. Of these, 44 full-text articles were available and subsequently organised in Microsoft Excel® for eligibility assessment based on the criteria illustrated in Figure 1. Following this process, 4 studies met the inclusion criteria.

Subsequently, citation screening of these 44 studies assessed for eligibility identified an additional 33 records. Of these, 31 full-text articles were accessible and assessed for eligibility, resulting in 4 further studies being included. Therefore, a total of 8 studies were included in the final review.

3.1.2 Evaluation of Methodological Quality and Level of Evidence

Across all studies, methodological quality ranged from moderate to good, with STROBE scores between 73% and 91%, and all studies were classified as level 3b evidence.[30]

The study by Oliveira et al.[34] demonstrated good methodological quality, fulfilling 91% of the STROBE items. Similar results were observed in the works by Simas et al.[43] and Burgess et al.[44], both classified as good quality with 86% compliance. The studies by de Moraes et al.[45], Almeida et al.[46] and Foo al.[47] were rated as moderate quality, each fulfilling 77% of the checklist. Similarly, the study by Base et al.[48] also fell within the moderate category, with 73% of the items met. Finally, Bazanella et al.[49] achieved a good methodological rating, fulfilling 91% of the STROBE criteria.

3.1.3 Overview of study characteristics

Among the eight studies included in the review, seven[34,44–49] were classified as retrospective cross-sectional cohorts, while one study[43] was classified as a cross-sectional observational study. Further details regarding each study's author, year of publication, data collection method, setting and study population, sample size, and data collection period are summarised in Table II.

A variety of data collection methods were employed across studies, including paper-based surveys (either administered in person or sent via surface mail), interview-based questionnaires, anthropometric assessments, web-based surveys, and clinical otoscopic examination. Sample sizes

varied considerably, ranging from 32 to 1,342 participants. The study by Oliveira et al.[34] included a total of 1,829 participants; however, only the 1,342 adults (aged 18 years or older) were considered in the present analysis, with surfers younger than 18 years excluded. The study by Burgess et al.[44] included a total of 227 participants; however, the 62 bodyboarders were excluded from the present analysis, resulting in a final sample of 165 participants. The data collection periods ranged from two days to six months.

All included studies were published between 2004 and 2024. Each study sampled surfers from a single country: four from Brazil, one from Portugal, and three from Australia.

Demographic characteristics of participants are detailed, whenever possible and applicable, in Table III. These include the proportion of competitive and recreational surfers, mean age by group and overall, and gender distribution by group and overall. In the case of the study by Oliveira et al.[34], no data were included in Table III, as none of the variables could be isolated for analysis in the adult population only. However, the study reported that 830 (45.4%) participants were aged between 20–29 years, 403 (22.0%) between 30–39 years, 93 (5.1%) between 40–49 years, and 16 (0.9%) were over 50 years. The remaining 26.6% were aged 12–19 years and were therefore excluded from analysis due to the age eligibility criteria. Regarding gender, the total sample comprised 84.2% male and 15.8% female participants, with no age or competitive status stratification. As for skill level, the sample included both recreational and competitive surfers, distributed as 35.6% beginners, 49.3% intermediates, 14.6% advanced, and 0.5% professionals. In the study by Burgess et al.[44], no information was included in this table, as it was not possible to separate the mean age and gender distribution of surfers from that of bodyboarders. However, the overall mean age was 35.0 ± 13.2 years, and the gender distribution for the total sample was 77% male and 23% female.

Out of the eight included studies, five[34,43,45,46,49] included both recreational and competitive surfers, two[44,48] focused exclusively on competitive surfers, and one[47] focused exclusively on recreational surfers. Notably, none of the five studies that included both competitive and recreational participants provided enough information to complete Table III in full. In every case, at least one key variable was either not stratified by competitive status or not reported overall.

3.1.4 Injury Characteristics Across Included Studies

3.1.4.1 Summary of Extracted Injury Data

Table IV presents a synthesis of the injury characteristics reported in the included studies, namely: injury definition and period of analysis, number of injuries per surfer, IR, IP, severity, anatomical location, and injury mechanism. Whenever possible, data were disaggregated by competitive status.

In the case of Simas et al.[43], the categories "injury type" and "anatomical location" were not included, as the study focused exclusively on EAE.

In the study conducted by Moraes et al.[45], it was not possible to calculate the injury type and mechanism percentages for competitive surfers, since amateur and professional athletes were presented separately without absolute values.

Almeida et al.[46] and Bazanella et al.[49] also included both competitive and recreational surfers; however, neither study stratified injury-related data by competitive status.

According to Oliveira et al.[34], injury type was not reported, and neither severity nor injury mechanisms could be stratified due to the absence of age-based subgroup analysis. Only participants aged 19 years or older were considered in the present review, as individuals aged 18 were grouped together with younger participants (12–18 years) in the original study.

Although anatomical location was reported by injury type, Foo et al.[47] did not provide a global anatomical distribution across all injuries. As a result, it was not possible to calculate the overall percentage of injuries by anatomical region.

Several studies included a category labelled "Other" without specifying what was included. In these cases, the data were retained under the same heading in the present analysis. It is worth noting that some injuries classified as "Other" could have been reallocated if more detailed information had been provided. Bazanella et al.[49] included neck injuries under "torso", and these were maintained as such due to the lack of further detail. In the same study, integumentary injuries were grouped and classified under "skin" to ensure comparability across studies. Almeida et al.[46] reported anatomical locations in detail for most injuries; however, 9.43% were listed under "Other" without further specification, and were thus categorised as "Not classifiable" in the present review.

3.1.4.2 Descriptive and Statistical Findings from Individual Studies

In the study by Moraes et al.[45], overall, the three most frequent injury types were contusion (29%), burn (23%), and laceration (23%). Regarding anatomical location, the most affected areas were legs (26%), arms (22%), and feet (20%). Among recreational surfers, the most frequent injury types were contusion (29%), laceration (25%), and burn (23%). No statistical analyses were conducted to compare groups.

According to Almeida et al.[46], the most common injuries overall were to the face and foot (both 25%), followed by the hip/leg (11.5%). No statistically significant difference was found in the number of lacerations in relation to other injury types across different seabed types. No group comparisons between recreational and competitive surfers were conducted. The study reported that surfers with lower frequency of practice sustained more acute injuries ($p = 0.02$), while those with more years of experience had fewer ($p = 0.004$). Surfers injured in larger wave conditions were 2.13 times more likely to require hospital care (OR = 2.13, $p = 0.006$).

Bazanella et al.[49] reported that the most frequent injury types overall were integumentary (46.6%), muscle (28.1%), and ligament (14.6%). Regarding anatomical location, lower limbs were the most affected (44.9%), followed by upper limbs (20.2%) and the head (18.5%). Federated surfers sustained 58.4% more injuries on average than non-federated surfers ($p = 0.008$). Surfers who had undergone surgery reported a 56.9% higher mean number of injuries compared to those who had not ($p = 0.012$). For each additional year of surfing experience, the estimated average number of injuries increased by 2.5% ($p = 0.012$).

According to Base et al.[48], among competitive surfers, the three most frequent injury types were cut-contusion (33.9%), sprain (25.9%), and contusion (14.3%). Anatomical locations most affected were the lower limbs (57.6%), head (20.5%), and upper limbs (11.7%). No statistical comparisons were conducted.

The findings reported by Burgess et al.[44] indicated that among competitive surfers, the most common injury types were abrasion (15.9%), laceration (15.2%), and cramping (12.6%). The most affected anatomical regions were the lower back (15.6%), knee (11.7%), and foot (11.7%). No statistical analyses were reported.

According to Foo et al.[47], among recreational surfers, the three most frequent injury types were lacerations (52%), contusions (36%), followed by muscle, fractures, and joint injuries (each 4%). Anatomical regions most affected were the foot (32.8%), leg below the knee (20.7%), and leg above the knee (10.2%). No statistical comparisons were reported.

Simas et al.[43] found no significant differences in the number of EAE diagnoses between recreational and competitive surfers. However, grade 3 EAE was significantly more prevalent in the professional group ($p < 0.05$), while grade 1 was more common in recreational surfers ($p < 0.05$). Bilateral EAE was significantly more frequent among professionals (94.7%) compared to recreational surfers (58.4%; $p < 0.05$).

In the study by Oliveira et al.[34], the most commonly affected anatomical areas were the knee (20.9%), shoulder (20.4%), and spine/trunk (16.6%). The study found that higher skill level, more experience, and older age were significantly associated with reporting one to three injuries in the past 12 months ($p < 0.001$ for all comparisons), except for the 12–19 age group. However, because data were not stratified by age, and minors were included, results should be interpreted with caution.

3.2 Cross-sectional retrospective cohort

A total of 223 responses were collected. However, 10 responses were excluded from the analysis. Four participants were excluded for being bodyboarders, as inferred from their responses, particularly regarding the board size and material. An additional six participants were excluded for not meeting the age criteria, as they were under 18 years old. As such, the final sample comprised 213 participants.

During the data cleaning phase, one response was identified with a date of birth occurring after the data collection period. As this was considered a clear error and the correct date could not be reliably inferred, the value was coded as missing. This decision was made to preserve data integrity and minimise potential bias in the statistical analyses.

It was not possible to estimate the response rate, given the variability in the questionnaire dissemination methods, as previously described.

3.2.1 Population Characteristics

Table V provides an overview of the sociodemographic and anthropometric characteristics of the total sample, as well as comparisons between competitive and recreational surfers. Of the 213 participants, only 9.9% (n = 21) reported engaging in competitive surfing, while the remaining 90.1% (n = 192) were classified as recreational surfers.

As shown in Table V, participants had a mean age of 35.26 years (SD = 11.66). A statistically significant difference was found between groups, with competitive surfers being younger than

recreational ones (p = 0.004), with ages ranging from 18 to 58 years in the competitive group and from 18 to 71 years in the recreational group.

The sample was predominantly male (70%), with no significant difference in gender distribution between groups (p = 0.803).

No statistically significant differences were observed in weight (p = 0.951), height (p = 0.994) or BMI (p = 0.826) between competitive and recreational surfers. Among competitive surfers, weight ranged from 52.0 to 105.0 kg, height from 158 to 185 cm, and BMI from 19.1 to 31.0 kg/m²; in the recreational group, weight ranged from 45.0 to 100.0 kg, height from 150 to 200 cm, and BMI from 17.9 to 30.9 kg/m².

Similarly, no significant differences were observed between competitive and recreational surfers in terms of nationality (p = 0.633) or country of residence (p = 0.345).

3.2.2 Participation in Sports Other than Surfing

Table VI summarises the participants' involvement in sports other than surfing. A statistically significant difference was found in the number of sports practised (p = 0.014), with competitive surfers tending to engage in a greater variety of sports compared to recreational surfers.

In terms of time dedicated to other sports, the average weekly time was 5.76 hours (SD = 5.51) in the competitive group and 4.30 hours (SD = 4.17) in the recreational group. The range of weekly hours varied from 0.0 to 21.5 hours among competitive surfers and from 0.0 to 21.0 hours among recreational surfers. This difference was not statistically significant (p = 0.249).

A total of 48 different sports were reported. Given the wide variety and low frequency of many sports, only those practised by more than ten participants were described individually. These included running (n = 31), swimming (n = 31), padel (n = 15), cycling (n = 14), football (n = 12), and CrossFit® (n = 10). The remaining sports, practised by fewer than ten individuals each, were grouped under the category 'Other' (n = 52).

3.2.3 Surfing demographics

As shown in Table VII, the majority of participants in both the competitive and recreational groups reported more than 10 years of surfing experience, with 66.7% of competitive surfers and 46.9% of recreational surfers falling into this category. No statistically significant difference was found between the groups in terms of surfing experience (p = 0.103).

Regarding stance, both groups presented a similar distribution between regular and goofy stances, with a slightly higher prevalence of the regular stance in both the competitive (52.4%) and recreational (54.7%) groups. This variable did not differ significantly between groups (p = 0.242).

Most surfers in the competitive group reported using surfboards measuring between 5 and 6 feet (76.2%), while recreational surfers most frequently used boards between 6 and 7 feet (33.9%), followed by those between 5 and 6 feet (27.1%). A statistically significant difference was found between the groups regarding board size (p = 0.003), with competitive surfers tending to use shorter boards.

In terms of board material, fibreglass or epoxy boards were predominant in both groups, though slightly more common among competitive surfers (95.2%) compared to recreational surfers (87.0%). Soft-top boards were almost only used by recreational surfers (13.0%). This difference was not statistically significant ($p = 0.482$).

The majority of both competitive and recreational surfers reported that their typical surf sessions lasted between 1 and 2 hours (61.9% and 75.0%, respectively), with no significant difference observed between groups ($p = 0.121$).

Finally, competitive surfers reported a significantly greater total surfing time over the past 12 months (mean = 272.95 ± 161.73 hours; range = 18–720 hours) compared to recreational surfers (mean = 140.88 ± 141.84 hours; range = 1–1152 hours), with this difference being statistically significant ($p < 0.001$).

3.2.4 Competition status of the competitive group

The average number of competitions per year was 4.31 (SD = 2.99), ranging from 1 to 10 competitions annually. Most participants (n = 15; 71.4%) reported having taken part in at least one surfing competition within the previous 12 months. The year in which surfers first started competing ranged widely, from as early as 1984 to as recently as 2023. This suggests a high variability in competitive experience within the group, with some surfers having decades of experience and others being relatively new to competitive surfing. Participants engaged in various levels of competition. National competitions were the most frequently reported (n = 9), followed by both club-level and regional competitions (n = 7 each). A smaller number of surfers reported participation in international competitions excluding WSL and ISA events (n = 4), WSL competitions (n = 4), and ISA competitions (n = 2). Since multiple responses were allowed, total frequencies exceeded 100%.

3.2.5 Injury Incidence and Characteristics

A total of 83 participants reported sustaining at least one surfing-related injury in the previous 12 months. Across the sample, 114 injuries were reported. Of these, 112 were classified according to type (traumatic vs. gradual-onset). As previously noted, only up to three injuries per participant were classified in detail; therefore, two injuries were left unclassified due to two surfers reporting four injuries each.

Among the 112 classified injuries, 55 (49.1%) were identified as traumatic, while 57 (50.9%) were of gradual-onset. When analysed by group, competitive surfers reported 9 injuries, with 5 (55.6%) classified as traumatic and 4 (44.4%) as gradual-onset. Recreational surfers reported a total of 103 injuries, with 50 (48.5%) traumatic and 53 (51.5%) gradual-onset. No statistically significant difference was found between the groups regarding injury onset ($p = 0.740$).

In terms of incidence rates for traumatic injuries, the overall IR was 1.68 injuries per 1000 hours of surfing. Stratified by group, the IR was 0.87 per 1000 hours among competitive surfers and 1.85 per 1000 hours among recreational surfers. Overall, the IR for traumatic injuries was 3.07 per 1000 days of surfing. When stratified by group, the IR was 1.76 per 1000 days among competitive surfers and 3.32 per 1000 days among recreational surfers.

The average number of injuries (traumatic and gradual-onset combined) per surfer was 0.54 across the total sample, with 0.55 injuries per surfer in the recreational group and 0.43 in the competitive group. This difference was not statistically significant ($p = 0.570$).

Regarding injury IP, the overall value was 0.39. Group-specific proportions were 0.33 for competitive surfers and 0.40 for recreational surfers. The IP for gradual-onset injuries was 0.23 overall. When stratified by competitive status, the IP was 0.24 among competitive surfers and 0.23 among recreational surfers.

3.2.6 Comparison of Injury Outcomes Between Groups

Anatomical injury location categories stratified by competitive status are summarised in Table VIII. Overall, the most frequently affected region was the lower limbs (32.1%), followed by the head and neck (25.9%) and upper limbs (25.0%). No statistically significant difference was found between competitive and recreational surfers in terms of anatomical injury location ($p = 0.707$).

Table IX presents the anatomical location subcategories stratified by competitive status. Among competitive surfers, the two most common injury locations were the head/face and ankle (both 22.2%), whereas among recreational surfers, the most frequently affected location was the shoulder (17.5%). No statistically significant differences were found between competitive and recreational surfers ($p = 0.117$).

Table X presents the anatomical location categories of injuries stratified by injury onset. A statistically significant difference was observed between traumatic and gradual-onset injuries ($p = 0.004$). Traumatic injuries occurred most frequently in the lower limbs (45.5%), followed by the head and neck (29.1%), upper limbs (14.5%), and trunk (10.9%). In contrast, gradual-onset injuries were most common in the upper limbs (35.1%), followed by both the head and neck (22.8%) and trunk (22.8%), and finally the lower limbs (19.3%).

Table XI presents the anatomical location subcategories stratified by injury onset (traumatic or gradual-onset). Among traumatic injuries, the most common location was the knee (20.0%), whereas among gradual-onset injuries, it was the shoulder (28.1%). Statistically significant differences were found between traumatic and gradual-onset injuries ($p < 0.001$).

Regarding injury type, stratified by competitive status, Table XII shows that the most common category was joint/ligament injuries (31.3%), followed by skin injuries (17.0%) and muscle/tendon injuries (15.2%). Among both competitive and recreational surfers, joint and ligament injuries were the most frequently reported, followed by injuries affecting the skin, with no statistically significant difference between groups ($p = 0.792$).

The injury types by subcategory, stratified by competitive status, are presented in Table XIII. Among competitive surfers, the most common injury was ligament injury (44.4%), whereas among recreational surfers, it was joint dislocation/subluxation/joint instability (12.6%). No statistically significant difference was observed between groups ($p = 0.255$).

Table XIV compares injury types between traumatic and gradual-onset injuries. Among traumatic injuries, the most frequent were joint/ligament injuries (30.9%) and skin injuries (27.3%). For

gradual-onset injuries, joint/ligament (31.6%) were the most common. A statistically significant association was found between injury type and mechanism of onset ($p = 0.003$).

Table XV presents the subcategories of injury types, comparing traumatic and gradual-onset injuries. Among traumatic injuries, the most common type was joint dislocation/subluxation/joint instability (14.5%), whereas ligament injury was the most frequent among gradual-onset injuries (15.8%). A statistically significant difference was observed between traumatic and gradual-onset injuries ($p < 0.001$). It is worth noting that some injuries appear to be poorly characterised, as the reported injury type does not always align with the described onset mechanism.

3.2.7 Traumatic Injuries: Mechanism, Context and Impact

Table XVI summarises the mechanisms of traumatic injuries by competitive status. No statistically significant differences were observed between competitive and recreational surfers ($p = 0.289$). The most commonly reported mechanism was falling off or uncontrolled board exit (21.8%), followed by contact with one's own board (16.4%) and impact with the sandy bottom (14.5%). If manoeuvres are combined into a single category — as adopted in some previous studies — this mechanism would represent the fourth most common cause of traumatic injury overall, accounting for 10.9% of cases. Similarly, if contact with one's own board and contact with another board are grouped together under a general "board contact" category, this mechanism becomes the most frequently reported, representing 23.7% of all traumatic injuries.

All traumatic injuries among competitive surfers occurred in familiar surf spots, while among recreational surfers, 98.0% ($n = 49$) occurred in familiar locations and 2.0% ($n = 1$) in unfamiliar ones. This difference was not statistically significant ($p = 1.000$).

Regarding wave conditions at the time of injury by competitive status (Table XVII), most traumatic injuries in competitive surfers occurred in waves above head height (60.0%), whereas in recreational surfers they were most frequently reported in waves between waist and head height (58.0%). No statistically significant difference was found between groups ($p = 0.276$).

As shown in Table XVIII (on-site assistance by competitive status), the majority of injuries did not receive immediate on-site assistance — 60.0% among competitive surfers and 66.7% among recreational surfers.

Regarding health-seeking behaviour, all competitive surfers reported seeking professional medical assistance following their injury, whereas among recreational surfers, 46.0% ($n = 23$) sought professional help and 54.0% ($n = 27$) did not. Although this trend was notable, it did not reach statistical significance ($p = 0.051$). Among those who sought assistance (Table XIX – stratified by competitive status), the most frequently consulted professionals were medical doctors. Competitive surfers sought care exclusively from doctors and physiotherapists, while recreational surfers consulted a wider range of professionals, including doctors, nurses, pharmacists, physiotherapists, osteopaths and others. Among recreational surfers who did not seek professional help, 74.1% ($n = 20$) reported undertaking treatment (with or without support), while 25.9% ($n = 7$) did not receive any treatment.

In terms of ED use (Table XX – stratified by competitive status), the majority of injuries did not result in an ED visit (69.1%), and no statistically significant difference was found between groups (p

= 0.639). Among those who did attend the ED, 2 competitive surfers (40.0%) and 30.0% of recreational surfers (n = 15) did so, while 70.0% of recreational surfers (n = 35) did not. No statistically significant differences were observed (p = 1.000). Among ED users, all competitive surfers were discharged on the same day, while 20.0% (n = 3) of recreational surfers required hospital admission, however, no statistically significant differences were observed (p = 1.000).

No surgical interventions were required among competitive surfers. Among recreational surfers, 96.0% (n = 48) did not require surgery, while 4.0% (n = 2) did. Again, no statistically significant differences were found between groups (p = 1.000). Of the two injuries requiring surgery, one was described by the surfer as a meniscal tear and the other as an anterior shoulder dislocation.

Table XXI presents the reported impact of injuries on daily activities by competitive status. The most frequent consequence in both groups was short-term functional limitation of one to six days (40.0% of competitive and 38.0% of recreational surfers). No statistically significant difference was observed (p = 0.805).

With regard to injury duration, 80.0% (n = 4) of injuries in competitive surfers were classified as acute and 20.0% (n = 1) as chronic. Among recreational surfers, 74.0% (n = 37) were acute and 26.0% (n = 13) chronic. No significant differences were found (p = 1.000).

As shown in Table XXII (by competitive status), the majority of injuries led to interruption of surfing for a short period. Most competitive surfers (60.0%) and 28.0% of recreational surfers reported a surfing interruption of one to six days. No statistically significant differences were observed between groups (p = 0.500).

3.2.8 Gradual-onset Injuries: Mechanism, Context and Impact

Table XXIII summarises the reported mechanisms of gradual-onset injuries by competitive status. No statistically significant differences were found between competitive and recreational surfers in this regard (p = 0.221). Overall, the most commonly reported mechanism was prolonged paddling (29.8%), followed by prolonged exposure to ocean conditions (17.5%) and high-intensity paddling (10.5%).

Regarding professional health-seeking behaviour, 75.0% (n = 3) of gradual-onset injuries among competitive surfers led to consultation with a healthcare professional, compared to 69.8% (n = 37) among recreational surfers. No statistically significant difference was observed (p = 1.000). As shown in Table XXIV (by competitive status), the most commonly consulted professionals were medical doctors. Competitive surfers sought help from doctors, physiotherapists and osteopaths, while recreational surfers reported seeking assistance from a broader range of professionals, including doctors, nurses, pharmacists, physiotherapists and osteopaths.

Among surfers who did not seek professional care, the one case in the competitive group was treated (with or without external support). Among the recreational group, 56.3% (n = 9) treated the injury and 43.8% (n = 7) did not.

Regarding surgical intervention, one injury (25.0%) in the competitive group required surgery, while the remaining three (75.0%) did not. Among recreational surfers, 96.2% (n = 51) did not require surgery and 3.8% (n = 2) did. This difference was not statistically significant (p = 0.199). The

surgery reported by the competitive surfer was for EAE. Among recreational surfers, one surgery was also performed for EAE, while the other was for a knee injury, described by the participant as involving meniscal and/or articular cartilage damage.

Table XXV presents the impact of injuries on daily activities by competitive status. Overall, the most frequent responses were “no impact” (28.1%) and “impact lasting weeks” (28.3%). A statistically significant difference was observed between competitive and recreational surfers regarding the reported duration of impact on daily activities (p = 0.029).

With regard to injury duration, 50.0% (n = 2) of the injuries among competitive surfers were classified as acute and 50.0% as chronic. Among recreational surfers, 73.6% (n = 39) were acute and 26.4% (n = 14) chronic. No statistically significant difference was found (p = 0.312).

As shown in Table XXVI (interruption to surfing practice by competitive status) gradual-onset injuries produced similar patterns of interruption to surfing practice. 15 injuries (26.3%) did not prevent surfing, while 15 (26.3%) led to a break of one to six days, and 15 (26.3%) led to a break of one or more weeks. No significant differences were found between groups (p = 0.726).

3.2.9 Other statistical analysis

Age was a statistically significant predictor of the number of injuries reported in the previous 12 months ($p < 0.001$), with a slight increase in injury count associated with increasing age (0.013 injuries per additional year). However, this factor explained only a small proportion of the variance.

The number of hours surfed in the previous 12 months was significantly associated with injury count ($p = 0.023$), with an increase of 0.001 injuries for each additional hour surfed. As with age, this variable accounted for only a small proportion of the variance.

Participation in competitions did not significantly predict injury occurrence ($p = 0.335$). Although competitive surfers were slightly less likely to report injuries than recreational surfers, this difference was not statistically significant.

Surfing experience showed a stronger association with injury risk. Surfers with 3–4 years (OR = 3.00; $p = 0.005$) and 5–6 years (OR = 3.00; $p = 0.018$) of experience had significantly higher odds of reporting an injury compared to those with over 10 years of experience.

No statistically significant difference was observed between surfers with a Goofy stance and those with a Regular stance in terms of injury occurrence ($p = 0.856$; OR = 1.03).

Surfboard material emerged as a significant predictor of injury occurrence ($p = 0.035$). Surfers using fibre/epoxy boards had 1.67 times the odds of reporting an injury compared to those using foam boards (OR = 1.673).

Wave height at the time of traumatic injury was not significantly associated with the likelihood of seeking emergency care ($p = 0.165$). However, surfers injured in waves below waist height had 3.4 times the odds of seeking emergency care compared to those injured in waves above head height (OR = 3.437), although this difference was not statistically significant.

Injury onset (traumatic vs. gradual-onset) was significantly associated with anatomical location (p = 0.003). Gradual-onset injuries were more likely to affect the upper limbs (OR = 5.682; p = 0.002) and the trunk (OR = 4.930; p = 0.009), compared to the lower limbs.

Injury onset was also significantly associated with injury type (p = 0.001). Traumatic injuries were less likely to involve joints or ligaments compared to gradual-onset injuries (OR = 0.358; p = 0.020).

4. Discussion

4.1 Summary of Main Findings

This study examined and compared traumatic and gradual-onset injuries in adult surfers, distinguishing between recreational and competitive participants. It is, to our knowledge, the first to combine a systematic review with retrospective data to explore injury patterns by participation level. The sample included 213 surfers (192 recreational and 21 competitive), while the review covered eight studies from Brazil, Portugal, and Australia (2004–2024).

Of the 114 injuries reported, 112 were classified by onset, of which 49.1% were traumatic and 50.9% gradual-onset. Injuries were most frequent in the lower limbs (32.1%), followed by the head and neck (25.9%) and upper limbs (25.0%). Joint and ligament injuries were the most common type (31.3%), with no significant group (recreational and competitive) differences in injury characteristics.

However, competitive surfers reported significantly more surfing hours ($p < 0.001$), used shorter boards ($p = 0.003$), practised more other sports ($p = 0.014$), and were younger ($p = 0.004$), suggesting distinct training and exposure profiles.

Regression analyses identified age ($p < 0.001$) and hours surfed ($p = 0.023$) as predictors of injury count, though with limited explanatory power. Use of fibre/epoxy boards was also associated with higher injury odds ($p = 0.035$). Surfers with 3–4 years (OR = 3.00; $p = 0.005$) and 5–6 years (OR = 3.00; $p = 0.018$) of experience were more likely to report injuries than those with over 10 years.

Although overall injury occurrence did not differ significantly between groups ($p = 0.570$), differences in age, practicing other sports, exposure, and board type should be considered when interpreting these findings in light of previous research.

4.2 Comparison Between the Systematic Review and the Retrospective Study

Although this section focuses primarily on comparing the retrospective study with the findings of the systematic review, additional relevant studies not included in the review are also discussed where appropriate to enrich the interpretation of the results. However, it should be noted that these studies did not meet the systematic review's inclusion criteria and may differ in key methodological or population characteristics, which limits their direct comparability with both the included studies and the present cohort.

4.2.1 Injuries per Surfer, Incidence Rates and Proportions

In this study, 39% of surfers sustained at least one injury in the past 12 months (IP = 0.39), with a mean of 0.54 injuries per surfer. Incidence rates of traumatic injuries were 1.68 per 1000 hours and 3.07 per 1000 days of surfing. Stratified by group, the IR was 0.87 per 1000 hours among competitive surfers and 1.85 per 1000 hours among recreational surfers. Recreational surfers reported 0.55 injuries per surfer, slightly more than competitive surfers (0.43), though this was not statistically significant ($p = 0.570$), suggesting similar frequency across groups.

By comparison, studies with longer recall periods reported substantially higher figures. De Moraes et al.[45] and Base et al.[48] found 100% prevalence, with 6.5 and 3.5 injuries per surfer, respectively. Bazanella et al.[49] and Almeida et al.[46] reported 90.9% and 74.8%, with 2.7 and 1.63 injuries per surfer. Foo et al.[47] recorded 9.1 injuries over two years, and Burgess et al.[44] found 1.6 in a single season.

Studies using a 12-month window yielded values closer to the present data. Oliveira et al.[34] reported an IP of 0.56 and 0.95 injuries per surfer. Furness et al.[2] found an IP of 0.38 and IR of 1.79, and Minghelli et al.[25] reported an IP of 0.296 and IR of 1.23. Additionally, Furness et al.[2] also reported a higher IR among recreational surfers (2.18 injuries per 1000 hours) compared to competitive surfers (1.51 injuries per 1000 hours). Taken together, these findings suggest that traumatic injury IR may tend to be higher among recreational surfers, a pattern also observed in the present study. These results further affirm that recall period substantially affects reported injury rates and underscore the value of using standardised exposure windows for comparison.

4.2.2 Injury Onset: Traumatic and Gradual-Onset

In the retrospective cohort, injuries were evenly distributed between traumatic (49.1%) and gradual-onset (50.9%), with no statistically significant group difference ($p = 0.740$). Among competitive surfers, 55.6% were traumatic and 44.4% gradual-onset; among recreational surfers, 48.5% were traumatic and 51.5% gradual-onset.

This balanced pattern contrasts with most studies in the systematic review, where six of eight focused predominantly on traumatic injuries. Only Simas et al.[43] examined gradual-onset injuries in detail, limited to EAE. Other studies, such as de Moraes et al.[45], acknowledged both types without specifying proportions, though the inclusion of “overtraining” (14 percent in recreational surfers, 17 percent overall) suggests gradual-onset mechanisms.

Burgess et al.[44] also omitted onset classification, though reported mechanisms imply traumatic origins. Foo et al.[47] mentioned “non-specific back pain,” potentially indicating gradual-onset, while Oliveira et al.[34] provided no onset data.

These findings suggest that gradual-onset injuries may be underrepresented in the literature. Their near-equal frequency in the present study may reflect clearer survey definitions and increased recognition of gradual-onset injuries within surfing retrospective studies.

4.2.3 Anatomical Location – Categories

In the retrospective cohort, the lower limbs were the most affected region (32.1%), followed by the head and neck (25.9%) and upper limbs (25.0%). Among competitive surfers, lower limbs (44.4%) and head and neck (33.3%) were most affected, while recreational surfers reported lower limbs (31.1%), upper limbs (26.2%) and head and neck (25.2%). No statistically significant group difference was found ($p = 0.707$).

These findings align with five studies in the systematic review that also reported lower limbs as the most affected site: de Moraes et al.[45], Almeida et al.[46], Bazanella et al.[49], Base et al.[48], and Burgess et al.[44]. The frequency of head and neck injuries in the present study was also consistent with those reported by Almeida et al.[46] and Base et al.[48].

Bazanella et al.[49] and de Moraes et al.[45], whose samples were mainly recreational, presented the same top three injury locations as our recreational group. Oliveira et al.[34] reported lower and upper limbs as most affected but did not specify surfer competitive status, limiting comparison.

A significant association was found between injury onset and anatomical region ($p = 0.003$): traumatic injuries mostly affected the lower limbs (45.5%) and head and neck (29.1%), while gradual-onset injuries were more frequent in the upper limbs (35.1%) and trunk (22.8%). Regression analysis confirmed this, showing gradual-onset injuries were significantly more likely to affect the upper limbs (OR = 5.682; $p = 0.002$) and trunk (OR = 4.930; $p = 0.009$). These results underscore the importance of distinguishing between injury onset types when interpreting anatomical distribution, as the underlying mechanisms and affected regions may differ substantially.

Burgess et al.[44] identified the torso as the second most affected region, but a lack of extractable adult-specific data limits interpretation.

4.2.4 Anatomical Location – Subcategories

The shoulder (17.0%), knee (16.1%) and ears (9.8%) were the most frequently affected subcategories in the present cohort. Among competitive surfers, the most common sites were the head/face and ankle (both 22.2%), while the shoulder was most affected among recreational surfers (17.5%), though this difference was not statistically significant ($p = 0.117$).

Injury onset was significantly associated with subcategory ($p < 0.001$): traumatic injuries most frequently involved the knee (20.0%), head/face (12.7%) and neck (10.9%), whereas gradual-onset injuries primarily affected the shoulder (28.1%), highlighting its vulnerability to gradual-onset injuries from paddling.

No reviewed study reported a subcategory distribution identical to this one. De Moraes et al.[45] found the legs most affected (26%), Almeida et al.[46] reported the face and foot (both 25%), Burgess et al.[44] cited the lower back (15.6%), and Foo et al.[47] the foot (32.8%). Only Oliveira et al.[43] reported a similar pattern, identifying the knee (20.9%) and shoulder (20.4%) as the most common, though onset was unspecified.

While broader anatomical categories aligned with the literature, subcategory-level results differed, likely due to variation in injury classification, exposure, and methodology. The strong link

between onset and injury location highlights the value of distinguishing between traumatic and gradual-onset mechanisms in injury pattern interpretation.

4.2.5 Type of Injury – Categories

In the retrospective study, joint and ligament injuries were most frequently reported (31.3%), followed by skin injuries (17.0%) and muscle and tendon injuries (15.2%). This distribution was similar in both groups ($p = 0.792$). By onset, joint and ligament injuries were also most common in traumatic (30.9%) and gradual-onset cases (31.6%), while skin injuries were significantly more frequent in traumatic injuries (27.3% versus 7.0%; $p = 0.003$). Logistic regression confirmed that traumatic injuries were less likely to involve joints or ligaments (OR = 0.358; $p = 0.020$), reinforcing their association with gradual-onset mechanisms.

By contrast, the majority of reviewed studies identified skin injuries as most prevalent, including Foo et al.[47] (88%), de Moraes et al.[45] (75%), Almeida et al.[46] (70.3%), Base et al.[48] (56.2%), Bazanella et al.[49] (46.6%), and Burgess et al.[44] (40.9%). These differences likely result from broader injury definitions and a stronger focus on traumatic injuries in the reviewed literature. Six out of eight studies either excluded gradual-onset cases or did not classify by onset, potentially inflating the number of skin injuries.

Environmental factors may also contribute. In the present study, 97.2% of participants reported Portugal as their country of residence and were therefore likely to wear wetsuits, which could reduce skin injuries. However, Almeida et al.[46], also studying Portuguese surfers, still reported high skin injury rates (70.3%), challenging this explanation.

The near-equal split between traumatic (49.1%) and gradual-onset (50.9%) injuries in our study may account for the higher proportion of joint and ligament injuries observed. These findings emphasise how injury type prevalence is shaped by methodological factors and highlight the importance of distinguishing between traumatic and gradual-onset injuries in future research.

4.2.6 Type of Injury – Subcategories

In the present cohort, ligament injury was most common (14.3%), followed by joint dislocation, subluxation or instability (11.6%), and tendon rupture, tendinopathy or bursitis (8.9%). Among competitive surfers, ligament injuries predominated (44.4%), whereas joint dislocation, subluxation or instability was most frequent among recreational surfers (12.6%), though this difference was not statistically significant ($p = 0.255$).

When stratified by onset, joint dislocation, subluxation or instability was most common in traumatic cases (14.5%), while ligament injuries led gradual-onset cases (15.8%) ($p < 0.001$). This reinforces the relationship between injury type and onset mechanism, despite some inconsistencies in participant self-reporting.

In contrast, the reviewed studies predominantly reported soft tissue or superficial injuries. De Moraes et al.[45] verified contusions (29%), Bazanella et al.[49] integumentary injuries (46.6%), Base et al.[48] cut-contusions (33.9%), Burgess et al.[44] abrasions (15.9%), and Foo et al.[47] lacerations (52%).

These patterns reflect their emphasis on acute trauma and limited onset classification, likely underestimating joint-related injuries.

Taken together, these findings demonstrate how onset mechanism and classification practices shape reported injury profiles. The prominence of ligament and joint instability injuries, particularly in gradual-onset contexts, warrants greater attention in prevention and rehabilitation strategies.

4.2.7 EAE

EAE accounted for 3.6% of all injuries in the present cohort, more frequently among competitive surfers (11.1%) than recreational surfers (2.9%). Although not highly prevalent, its inclusion remains clinically relevant due to possible chronic complications and need for surgery. Within gradual-onset injuries, EAE represented 7.0% of cases.

Simas et al.[43] was the only reviewed study to focus solely on EAE, reporting much higher prevalence: 82.8% in recreational and 95.0% in competitive surfers. Grade 3 severity and bilateral cases were significantly more common among competitive surfers ($p < 0.05$), suggesting greater impact in this group.

The contrast in prevalence is likely due to methodological differences. Simas et al.[43] conducted otoscopic assessments, while the present study relied on self-reported diagnoses and included only injuries with functional limitation, potentially omitting milder or asymptomatic cases.

4.2.8 Traumatic injuries

4.2.8.1 Mechanisms of Traumatic Injuries

This section focuses on traumatic injuries, reflecting the emphasis of most studies in the systematic review. In the present cohort, the leading mechanisms were board exit or fall (21.8%), contact with one's own surfboard (16.4%), sandy bottom impact (14.5%), and manoeuvres (10.9%). When combined, board contact accounted for 23.7% of all traumatic injuries.

These findings align with studies by Burgess et al.[44] (21.5%), Base et al.[48] (47.3%), Bazanella et al.[49] (40.4%), Almeida et al.[46] (53.3%), and de Moraes et al.[45] (52%), all of which identified surfboard contact as the most common traumatic cause.

Unlike those studies, which frequently associated board contact with skin injuries, the present cohort showed a higher rate of joint and ligament injuries. This may reflect differing injury definitions, classification practices, or the protective effect of wetsuits commonly used in colder Portuguese waters. However, as such variables were not assessed, interpretations should remain cautious.

No statistically significant differences were found between competitive and recreational surfers ($p = 0.289$), indicating broadly similar risk exposures. These results highlight the need for methodological consistency in reporting surfing injury mechanisms.

4.2.8.2 Injury Context and Impact

This section focuses on traumatic injuries, the main emphasis of most reviewed studies. In the present cohort, 80.0% led to surfing interruption, comparable to the 60% "resting period" reported by de Moraes et al.[45], though their lack of a clear injury definition may explain discrepancies.

No significant group difference was found in interruption duration ($p = 0.500$), though 60.0% of competitive surfers resumed surfing within one to six days, compared to 28.0% of recreational surfers. Most injuries caused short-term daily limitations (40.0% in competitive surfers and 38.0% in recreational surfers; $p = 0.805$) and were acute (80.0% and 74.0%; $p = 1.000$).

On-site assistance was rare. All competitive surfers sought professional care, compared to 46.0% of recreational surfers ($p = 0.051$). Doctors and physiotherapists were most consulted, with recreational surfers accessing a broader range. Foo et al.[47] reported only 15% required treatment, though care-seeking was not detailed.

ED attendance occurred in 30.9% of cases, with no group difference ($p = 0.639$). Hospital admission was required for 20.0% of recreational surfers but none of the competitive group ($p = 1.000$); surgery was rare in both groups (4.0% in recreational surfers and 0% in competitive surfers; $p = 1.000$).

Wave height was not significantly associated with emergency care ($p = 0.165$), though injuries in waves below waist height had 3.4 times higher odds of leading to hospital attendance (OR = 3.437). This contrasts with Nathanson et al.[24], who reported greater injury risk in larger waves.

Injury conditions also differed slightly: 60.0% of competitive surfers were injured in waves above head height, while 58.0% of recreational surfers were injured in waist to head height waves ($p = 0.276$). Most injuries occurred in familiar surf spots (100% in competitive surfers and 98.0% in recreational surfers; $p = 1.000$).

Findings from Lowdon et al.[17] and Santos et al.[11] support that most injuries cause interruptions of up to two weeks. Hospital admission rates in Meir et al.[23] (4%) align with our sample. Although not included in the review, these studies offer valuable context.

Notably, several clinically relevant variables such as on-site care, location familiarity, and surgery were assessed only in the present study, highlighting the need for more comprehensive evaluations of surfing injuries in future research.

4.3 Gradual-Onset Injuries – Comparison with Additional Studies

Two additional studies, excluded from the systematic review due to paediatric data, provide relevant context for gradual-onset injuries in adult surfers. In the present cohort, these injuries represented 50.9% of cases, with an injury proportion of 0.23 overall and similarly distributed between competitive (0.24) and recreational (0.23) surfers. This aligns with Remnant et al.[26], who reported a 0.27 proportion, despite assessing self-perceived ability rather than competitive status.

Injuries primarily affected the upper limbs (35.1%), especially the shoulder (28.1%), followed by the lower back (17.5%) and ears (15.8%). Prolonged paddling (29.8%) was the leading mechanism, consistent with Remnant et al.[26], who found the shoulder (27%) and lower back (11%) most affected, with paddling implicated in 40% of major injuries and 79% of shoulder cases.

Tissue involvement showed partial agreement: Remnant et al.[26] reported 58% muscle and tendon injuries and 38% joint and ligament involvement; our cohort showed 31.6% joint and ligament injuries and 17.5% muscle and tendon. Injury duration differed notably, with 71.9% acute and 28.1% chronic in our sample, compared to 43.6% and 56.4% in Remnant et al.[26]. These findings challenge the common assumption that gradual-onset injuries in surfing are predominantly chronic, and suggest that a substantial proportion of such injuries may present with acute symptomatology, possibly reflecting improved awareness, earlier reporting, or different injury profiles in this sample.

Furness et al.[27] also highlighted the shoulder and lower back, and found joint and ligament injuries (43.5%) to be most prevalent.

Unlike prior studies, we explored healthcare behaviours. Most surfers sought professional care — 75.0% of competitive and 69.8% of recreational surfers ($p = 1.000$). Competitive surfers consulted mainly doctors, physiotherapists, and osteopaths; recreational surfers used a broader range. Among those not seeking care, the sole competitive surfer received treatment, while 56.3% of recreational surfers self-managed and 43.8% did not treat their injuries. Surgical intervention was rare ($p = 0.199$).

A significant group difference was found in perceived daily impact ($p = 0.029$), with recreational surfers more often reporting longer-lasting effects. However, injury duration and surfing interruption did not differ significantly between groups.

Overall, while injury patterns were consistent with previous research, this study adds novel insight into perceived impact and healthcare use, which remain underrepresented in the literature and merit further investigation to optimise its prevention and management. Furthermore, it highlights the probable underdiagnosis of other associated gradual-onset injuries, particularly osteoarticular injuries.

4.4 Limitations

Several limitations should be acknowledged. First, the inherent bias of a retrospective study. Second, the relatively small number of competitive surfers in the sample limited the statistical power for between-group comparisons. This limitation is partly explained by the fact that only adult participants were included in the study, which allowed for clearer comparisons within this specific population. However, it also meant that many younger competitive surfers — who represent a substantial proportion of the competitive surfing population — were excluded from the analysis.

Third, the study did not assess the use of protective equipment or warm-up practices, nor did it examine their possible associations with injury risk. This represents a missed opportunity, particularly as such variables may influence both injury prevention and severity.

Another challenge relates to the diversity of injury definitions used in the literature. Many studies fail to clearly define what constitutes an injury, or conflate different constructs such as traumatic, gradual-onset, acute, and chronic injuries. This methodological inconsistency complicates direct comparisons between studies and weakens the reliability of pooled interpretations.

Furthermore, our study did not collect information regarding previous symptoms or injury history. As a result, some reported injuries may in fact represent recurrences, but this distinction was not examined. In addition, the questionnaire did not explicitly specify which surfing disciplines were eligible to respond. Consequently, some responses from individuals practising other board sports (e.g., bodyboarding) had to be excluded during data cleaning.

Moreover, the very definition of "surfing" varies considerably across the literature. This inconsistency poses a broader limitation to inter-study comparability and highlights the need for standardised definitions in future research.

In addition, although the sample size was sufficient for exploratory analysis, the total number of reported injuries — particularly within specific subgroups — may have limited the statistical power of certain comparisons. Moreover, the study was not designed to ensure national representativeness within the Portuguese surfing population, despite the predominance of Portuguese participants. A sample size calculation based on national data could have enhanced the generalisability of the findings to this specific context.

Finally, there is currently no consensus regarding data collection procedures for use in epidemiological studies on surfing, unlike other sports such as athletics, rugby, football, or tennis, which benefit from well-established surveillance frameworks.[42,50–52] This lack of harmonisation hinders the reliability and comparability of findings across studies, and underscores the urgent need for standardised methodological guidelines in surfing injury research.

5. Conclusion

This study is, to the best of our knowledge, the first to integrate a systematic review with original retrospective data to characterise and compare traumatic and gradual-onset injuries in adult surfers by participation level. While no statistically significant difference was found in overall injury occurrence between competitive and recreational surfers (IP = 0.39), these groups showed markedly different exposure profiles: competitive surfers were younger, surfed significantly more hours annually, used shorter boards, and practised more other sports.

Notably, the most substantial differences observed were not between groups (competitive and recreational), but between injury onset types. Traumatic injuries — accounting for 49.1% of all cases — had an IR of 1.68 per 1000 hours and 3.07 per 1000 days of surfing, and were most commonly associated with lower limb trauma, typically caused by board contact or falls. Moreover, the IR of traumatic injuries was higher among recreational surfers (1.85 per 1000 hours) than among competitive surfers (0.87 per 1000 hours). In contrast, gradual-onset injuries (50.9%) primarily affected the upper limbs, particularly the shoulder, and were strongly linked to prolonged paddling. Injury onset was significantly associated with anatomical location ($p = 0.004$) and type of injury ($p = 0.003$), highlighting the need to distinguish clearly between traumatic and gradual-onset mechanisms in future research.

Despite comparable injury proportions between groups, competitive and recreational surfers differed in their healthcare-seeking behaviours and in the perceived impact of injuries on daily life—

variables which remain underexplored in existing literature. These contextual and behavioural insights offer novel contributions to the field.

Together, these findings underline the importance of using standardised injury definitions, recall periods, and onset classifications in surf injury research. Future studies should build on this framework by further investigating gradual-onset injuries, contextual risk factors, and long-term outcomes, in order to support the development of targeted prevention and rehabilitation strategies across different surfing populations.

6. Appendixes

Table I: Inclusion and Exclusion Criteria Applied During Study Selection

Inclusion criteria
• Studies with original data • Studies documenting and/or analysing data of traumatic and/or gradual-onset injuries • Studies including data specific to injuries sustained while surfing and/or related to surfing • Studies analysing data of surfers under 18 years old and over 18 years old separately, or studies exclusively analysing data of surfers over 18 years old • Studies that explicitly identify whether the participants were recreational or competitive surfers • Studies reporting any of the following about the injuries and/or conditions: incidence, location, type, severity, or mechanism.
Exclusion criteria
• Full-text not available • Full text not available in English or Portuguese • Case reports, case series, reviews, or secondary analyses • Studies exclusively focused on treatments or prevention without addressing injury incidence or prevalence • Studies exclusively focused on para surfing or individuals with disabilities • Surfing injury data cannot be analysed separately from injury data related to other water sports and/or other sports in general
Definitions
• Surfing: includes surfing, longboarding, tow-in, tow-out; and excludes bodyboarding/boogie boarding; skimboarding; stand-up-paddling; bodysurfing; kneeboarding. • Traumatic injury: symptoms (e.g., pain or discomfort) that had a sudden onset and were caused by a specific event during surfing activity • Gradual-onset (overuse) injury: symptoms (e.g., pain or discomfort) that developed gradually over time, with no specific event causing the injury; this type of injury was aggravated by surfing, could fluctuate in severity, and could be influenced by the amount of surfing performed

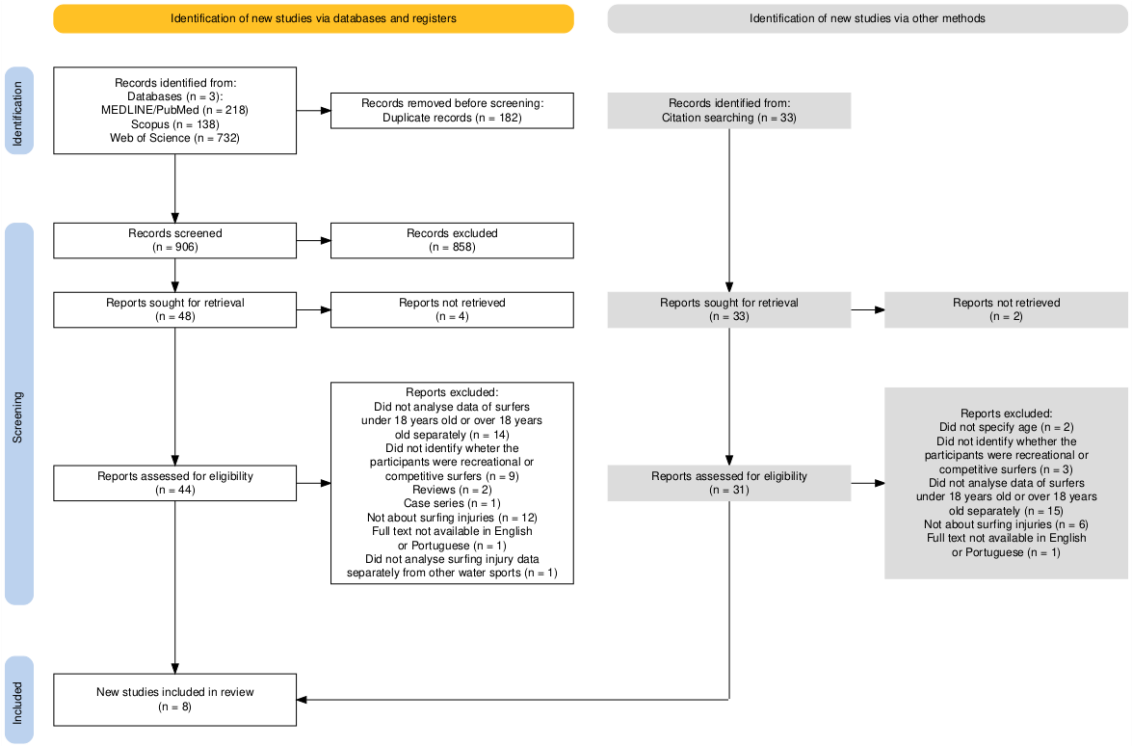


Figure 1: PRISMA[28,53] Flow Diagram of Study Selection Process

Table II: Summary of The Studies Included in The Review, With Description of Study Design, Sample, and Setting

Title	Study (Author, Year)	Data Collection	Setting and Study Population	Sample Size (n)	Data Collection Period
Analysis of Injuries' Prevalence in Surfers from Parana Seacoast[45]	de Moraes, G. C. et al. (2013)	In-person paper-based survey	Surfers from beaches of the seacoast of Paraná at the cities Guaratuba, Matinhos and Pontal do Paraná, Brazil	60	Unspecified
Contribution for the knowledge of surf acute injuries in Portugal[46]	Almeida, J. A. et al. (2009)	In-person paper-based survey	Surfers from Portuguese beaches	151	4 months of 2009
Influence of practice time on surfing injuries[49]	Bazanella, N. V. et al. (2017)	Interview-based survey and anthropometric assessment	Surfers from the Paraná Coast, Brazil	66	Unspecified
Injuries among professional surfers[48]	Base, L. H. et al. (2007)	Interview-based survey	Participants at a stage of the Brazilian Professional Surfing Championship, held at Maresias Beach, São Sebastião, São Paulo, Brazil	32	June 25 to June 26, 2005
An Australian survey on health and injuries in adult competitive surfing[44]	Burgess, A. et al. (2019)	Web-based survey	Participants at the 2014 Australian Surfing Titles (Coffs Harbour)	165	1 to 31 August 2014

Table II Cont.

Title	Study (Author, Year)	Data Collection	Setting and Study Population	Sample Size (n)	Data Collection Period
Surfing injuries in recreational surfers[47]	Foo, P. et al. (2004)	Paper-based survey sent via surface mail	Surfers of Australian surfboard riding clubs and surfers at beaches from Queensland, New South Wales, and Victoria	146	May to July 2004
Australian surfers' awareness of 'surfer's ear'[43]	Simas, V. et al. (2020)	In-person paper-based survey and otoscopic examination	Surfers recruited from Australian boardrider clubs, professional surfing organisations, and through public advertising	113	Unspecified
Descriptive characterization of Brazilian surfers and their injuries: a cross-sectional and retrospective study[34]	Oliveira, M. G. et al. (2024)	Web-based survey	Surfers from Brazil recruited through public advertising (Facebook®, Instagram®, e-mail, Whatsapp®)	1342 (adults only)	Novembre 2019 to May 2020

Table III: Demographic Characteristics of Adult Participants in The Studies Included in The Review

Study (Author, Year)	Participant Group(s) (%)	Competitive – Mean Age (±SD)	Recreational – Mean Age (±SD)	Total - Mean Age (± SD)	Competitive – Gender (♂/♀ %)	Recreational – Gender (♂/♀ %)	Gender Distribution (♂/♀ %)
de Moraes, G. C. et al. (2013)[45]	Competitive (30%) and Recreational (70%)	U	U	27 ± 6	100/0	100/0	100/0
Almeida, J. A. et al. (2009)[46]	Competitive and Recreational (Novice - 1.99%, Intermediate - 19.21%, Advanced - 39.07%, Professional - 39.74%)	U	U	31.46 ± 6.99	U	U	90/10
Bazanella, N. V. et al. (2017)[49]	Competitive (35%) and Recreational (65%)	U	U	26.16 ± 0.72	U	U	U
Base, L. H. et al. (2007)[48]	Competitive	26.5±5.11	-	26.5±5.11	100/0	-	100/0
Foo, P. et al. (2004)[47]	Recreational	-	30.05	30.05	-	84/16	84/16
Simas, V. et al. (2020)[43]	Competitive (82.3) and Recreational (17.7)	29.0±4.0	52.3±12.9	U	70.0/30.0	94.6/5.4	90.3/9.7

U – Unspecified

Table IV: Summary of Injury Characteristics Across Included Studies

Study (Year)	Traumatic / Gradual-onset / Both	Surfer Group	Injury definition (period of analysis)	% Injured	Injuries per Surfer	IR and/or IP	Severity	Injury Type (%)	Anatomical Location (%)	Injury Mechanism (%)
de Moraes, G. C. et al. (2013)[45]	Both, with emphasis on traumatic	Competitive	U (Lifetime)	100%	6.2	-	-	-	-	-
de Moraes, G. C. et al. (2013)[45]	Both, with emphasis on traumatic	Recreational	U (Lifetime)	100%	6.6	-	-	Bone (0) Joint/ligament (8) Muscle/tendon (13) Skin (77) Other (2)	-	*Contact with own board (48) Maneuvers (47) Marine animals (26) Overtraining (14) Other injuries (14)
de Moraes, G. C. et al. (2013)[45]	Both, with emphasis on traumatic	Overall	U (Lifetime)	100%	6.5	-	Period of absence from sport: None - 35% Resting period - 60% No answer - 5%	†Bone (0) Joint/ligament (8.5) Muscle/tendon (13.5) Skin (75) Other (2)	†Head and neck (16) Torso (15) Upper limbs (22) Lower limbs (46)	*Contact with own board (52) Manoeuvres (47) Marine animals (27) Overtraining (17) Other injuries (18)

Table IV Cont.

Study (Year)	Traumatic / Gradual-onset / Both	Surfer Group	Injury definition (period of analysis)	% Injured	Injuries per Surfer	IR and/or IP	Severity	Injury Type (%)	Anatomical Location (%)	Injury Mechanism (%)
Almeida, J. A. et al. (2009)[46]	Traumatic	Overall	U (Lifetime)	74.8	1.63	IR - 2.4 injuries/1000 surf sessions	-	†Bone (10.2)	†Head and neck (33.6)	Own board (53.3)
								Joint/ligament (12.2)	Torso (4.5)	Seabed/rocks (19)
								Muscle/tendon (4.5)	Upper limbs (3.7)	Body motion (16.9)
								Skin (70.3)	Lower limbs (48.9)	Other (10.8)
								Other (2.83)	Not classifiable (9.43)	
Bazanella, N. V. et al. (2017)[49]	Traumatic	Overall	U (Lifetime)	90.9	2.7	-	-	Bone (1.1)	†Head and neck (18.5)	Drop and shock (with board) (40.4)
								Joint/ligament (18.0)	Torso (16.3)	Animal (11.8)
								Muscle/tendon (28.1)	Upper limbs (20.2)	Manoeuvre (28.1)
								Skin (46.6)	Lower limbs (44.9)	Paddling/"duck dive" (19.7)
								Other (6.2)		
Base, L. H. et al. (2007)[48]	Traumatic	Competitive /Overall	U (Lifetime)	100	3.5	IR - 0.76 injuries/1000 days	-	Bone (5.4)	†Head and neck (20.5)	Contact with surfboard (47.3)
								Joint/ligament (25.9)	Torso (10.7)	Manoeuvre (37.5)
								Muscle/tendon (12.5)	Upper limbs (11.7)	Seabed (7.1)
								Skin (56.2)	Lower limbs (57.6)	Other (8.1)
								Other (0)		

Table IV Cont.

Study (Year)	Traumatic / Gradual-onset / Both	Surfer Group	Injury definition (period of analysis)	% Injured	Injuries per Surfer	IR and/or IP	Severity	Injury Type (%)	Anatomical Location (%)	Injury Mechanism (%)
Burgess, A. et al. (2019)[44]	Both, with emphasis on traumatic	Competitive/ Overall	U (Current season)	-	1.6	-	-	Bone (6.5) Joint/ligament (10.3) Muscle/tendon (27.5) Skin (40.9) Other (14.8)	Head and Neck (12.12) Torso (20.78) Upper limbs (19.91) Lower limbs (47.19)	Contact with surfboard (21.5) Underwater turbulence (13.4) Contact with reef bottom (11.5) Fin chop (8.6) Other (45.0)
Foo, P. et al. (2004)[47]	Both, with emphasis on traumatic	Recreational/ Overall	U (Past 2 years)	-	9.1	-	15% received treatment and were considered moderate/severe injuries Treatment Modality: Medical Doctor - 60.5% Physiotherapist - 16.0% Osteopath - 9.0% Other - 14.5%	Bone (4) Joint/ligament (4) Muscle/tendon (4) Skin (88) Other (0)	-	-

Table IV Cont.

Study (Year)	Traumatic / Gradual-onset / Both	Surfer Group	Injury definition (period of analysis)	% Injured	Injuries per Surfer	IR and/or IP	Severity	Injury Type (%)	Anatomical Location (%)	Injury Mechanism (%)
Simas, V. et al. (2020)[43]	Gradual-onset	Competitive	EAE (-)	95.0	-	-	†Grade 1: 21.10% Grade 2: 21.10% Grade 3: 57.90	EAE (100)	External auditory canal (100)	-
Simas, V. et al. (2020)[43]	Gradual-onset	Recreational	EAE (-)	82.8	-	-	†Grade 1: 49.40% Grade 2: 28.60% Grade 3: 22.10	EAE (100)	External auditory canal (100)	-
Simas, V. et al. (2020)[43]	Gradual-onset	Overall	EAE (-)	85.0	-	-	Grade 1: 43.75% Grade 2: 27.08% Grade 3: 29.17%	EAE (100)	External auditory canal (100)	-

Table IV Cont.

Study (Year)	Traumatic / Gradual-onset / Both	Surfer Group	Injury definition (period of analysis)	% Injured	Injuries per Surfer	IR and/or IP	Severity	Injury Type (%)	Anatomical Location (%)	Injury Mechanism (%)
Oliveira, M. G. et al. (2024)[34]	Both	Overall	Surfing-related musculoskeletal or skin pain that causes a restriction on or prevents surfing for, at least, 7 days or 3 consecutive scheduled training sessions (past 12 months)	55.5	0.95	IP – 0.56	-	-	†Head and neck (1.7) Torso (26.1) Upper limbs (28.4) Lower limbs (43.7)	-

IP – incidence proportion; IR – incidence rate; U - unspecified

*Percentages represent the proportion of surfers who reported each injury mechanism; as multiple answers were possible, values may exceed 100%

†The percentages presented in the study did not total precisely 100%.

Table V: Sociodemographic and Anthropometric Characteristics by Competitive Status

	Competitive group (n=21)	Recreational group (n=192)	Total (n=213)
Age in years (mean ± SD)	28.90 ± 12.76	35.96 ± 11.35	35.26 ± 11.66
Weight in kg (mean ± SD)	70.30 ± 12.94	69.78 ± 11.25	69.83 ± 11.39
Height in cm (mean ±SD)	173.52 ± 8.85	173.84 ± 9.08	173.81 ± 9.04
Body mass index in kg/m^2 (mean ± SD)	23.17 ± 2.59	22.96 ± 2.28	22.98 ± 2.31
Gender (n (%))			
Male	14 (66.7)	135 (70.3)	149 (70.0)
Female	7 (33.3)	57 (29.7)	64 (30.0)
Nationality (n (%))			
Portuguese	20 (95.2)	181 (94.3)	201 (94.4)
Other countries*	1 (4.8)	11 (5.7)	12 (5.6)
Country of residence (n (%))			
Portugal	20 (95.2)	187 (97.4)	207 (97.2)
Other countries*	1 (4.8)	5 (2.6)	6 (2.8)

SD - standard deviation

*In the "Nationality" category, "Other countries" includes Brazilian, Spanish, Latvian, German, French, Polish, and dual nationality. In the "Country of residence" category, "Other countries" includes Brazil, Spain, England, Switzerland, and Sweden.

Table VI: Participation in Other Sports by Competitive Status

	Competitive group (n=21)	Recreational group (n=192)	Total (n=213)
Number of sports (n (%))†			
0	4 (19.0)	44 (22.9)	48 (22.5)
1	6 (28.6)	81 (42.2)	87 (40.8)
2	8 (38.1)	47 (24.5)	55 (25.8)
3	0 (0.0)	16 (8.3)	16 (7.5)
4	2 (9.5)	2 (1.0)	4 (1.9)
5	1 (4.8)	0 (0.0)	1 (0.5)
6	0 (0.0)	2 (1.0)	2 (0.9)
Total time per week (mean ± SD)	5.76 ± 5.51	4.30 ± 4.17	4.45 ± 4.33

SD - standard deviation

†Totals may not sum to exactly 100% due to rounding.

Table VII: Surfing demographics by Competitive Status

	Competitive group (n=21)	Recreational group (n=192)	Total (n=213)
Surfing experience in years (n (%))†			
1 to 2	0 (0)	20 (10.4)	20 (9.4)
3 to 4	2 (9.5)	39 (20.3)	41 (19.2)
5 to 6	0 (0)	20 (10.4)	20 (9.4)
7 to 8	3 (14.3)	13 (6.8)	16 (7.5)
9 to 10	2 (9.5)	10 (5.2)	12 (5.6)
>10	14 (66.7)	90 (46.9)	104 (48.8)
Stance (n (%))†			
Regular	11 (52.4)	105 (54.7)	116 (54.5)
Goofy	9 (42.9)	86 (44.8)	95 (44.6)
"No preference"	1 (4.8)	1 (0.5)	2 (0.9)
Most used surfboard			
Size in feet (n (%))†			
Unknown	2 (9.5)	8 (4.2)	10 (4.7)
4 to 5	0 (0)	1 (0.5)	1 (0.5)
5 to 6	16 (76.2)	52 (27.1)	68 (31.9)
6 to 7	2 (9.5)	65 (33.9)	67 (31.5)
7 to 8	0 (0)	29 (15.1)	29 (13.6)
8 to 9	0 (0)	12 (6.3)	12 (5.6)
>9	1 (4.8)	16 (8.3)	17 (8.0)
Uses multiple board sizes	0 (0)	9 (4.7)	9 (4.2)
Material (n (%))			
Fibreglass or Epoxy	20 (95.2)	167 (87.0)	187 (87.8)
Soft-top	1 (4.8)	25 (13.0)	26 (12.2)
Total surfing time in the last 12 months in hours (mean ± SD)	272.95 ± 161.73	140.88 ± 141.84	153.90 ± 148.83
Average duration of each surf session in hours (n (%))†			
0 to 1	0 (0.0)	9 (4.7)	9 (4.2)
1 to 2	13 (61.9)	144 (75.0)	157 (73.7)
2 to 3	8 (38.1)	36 (18.8)	44 (20.7)
3 to 4	0 (0.0)	3 (1.6)	3 (1.4)

SD - standard deviation

†Totals may not sum to exactly 100% due to rounding.

Table VIII: General Anatomical Injury Location by Competitive Status

	Competitive group (n=9)	Recreational group (n=103)	Total (n=112)
Anatomical location (n (%))†			
Head and Neck	3 (33.3)	26 (25.2)	29 (25.9)
Torso	1 (11.1)	18 (17.5)	19 (17.0)
Upper Limbs	1 (11.1)	27 (26.2)	28 (25.0)
Lower limbs	4 (44.4)	32 (31.1)	36 (32.1)

†Totals may not sum to exactly 100% due to rounding.

Table IX: Anatomical Injury Location Subcategories by Competitive Status

	Competitive group (n=9)	Recreational group (n=103)	Total (n=112)
Anatomical location (n (%))†			
Head/Face	2 (22.2)	7 (6.8)	9 (8.0)
Ears	1 (11.1)	10 (9.7)	11 (9.8)
Eyes	0 (0.0)	1 (1.0)	1 (0.9)
Neck	0 (0.0)	8 (7.8)	8 (7.1)
Thorax / Chest	0 (0.0)	7 (6.8)	7 (6.3)
Thoracic spine	1 (11.1)	0 (0.0)	1 (0.9)
Lumbosacral region	0 (0.0)	10 (9.7)	10 (8.9)
Perineum/Genital region	0 (0.0)	1 (1.0)	1 (0.9)
Shoulder	1 (11.1)	18 (17.5)	19 (17.0)
Arm	0 (0.0)	3 (2.9)	3 (2.7)
Elbow	0 (0.0)	1 (1.0)	1 (0.9)
Wrist	0 (0.0)	1 (1.0)	1 (0.9)
Hand	0 (0.0)	4 (3.9)	4 (3.6)
Hip/Groin	0 (0.0)	2 (1.9)	2 (1.8)
Thigh	0 (0.0)	1 (1.0)	1 (0.9)
Knee	1 (11.1)	17 (16.5)	18 (16.1)
Leg	1 (11.1)	4 (3.9)	5 (4.5)
Ankle	2 (22.2)	2 (1.9)	4 (3.6)
Foot	0 (0.0)	6 (5.8)	6 (5.4)

†Totals may not sum to exactly 100% due to rounding.

Table X: General Anatomical Injury Location by Injury Onset (Traumatic vs Gradual-onset)

	Traumatic (n=55)	Gradual-onset (n=57)	Total (n=112)
Anatomical location (n (%))			
Head and Neck	16 (29.1)	13 (22.8)	29 (25.9)
Trunk	6 (10.9)	13 (22.8)	19 (17.0)
Upper Limbs	8 (14.5)	20 (35.1)	28 (25.0)
Lower limbs	25 (45.5)	11 (19.3)	36 (32.1)

Table XI: Anatomical Injury Location Subcategories by Injury Onset (Traumatic vs Gradual-onset)

	Traumatic (n=55)	Gradual-onset (n=57)	Total (n=112)
Anatomical location (n (%))†			
Head/Face	7 (12.7)	2 (3.5)	9 (8.0)
Ears	2 (3.6)	9 (15.8)	11 (9.8)
Eyes	1 (1.8)	0 (0.0)	1 (0.9)
Neck	6 (10.9)	2 (3.5)	8 (7.1)
Thorax / Chest	5 (9.1)	2 (3.5)	7 (6.3)
Thoracic spine	1 (1.8)	0 (0.0)	1 (0.9)
Lumbosacral region	0 (0.0)	10 (17.5)	10 (8.9)
Perineum/Genital region	0 (0.0)	1 (1.8)	1 (0.9)
Shoulder	3 (5.5)	16 (28.1)	19 (17.0)
Arm	1 (1.8)	2 (3.5)	3 (2.7)
Elbow	0 (0.0)	1 (1.8)	1 (0.9)
Wrist	0 (0.0)	1 (1.8)	1 (0.9)
Hand	4 (7.3)	0 (0.0)	4 (3.6)
Hip/Groin	2 (3.6)	0 (0.0)	2 (1.8)
Thigh	1 (1.8)	0 (0.0)	1 (0.9)
Knee	11 (20.0)	7 (12.3)	18 (16.1)
Leg	3 (5.5)	2 (3.5)	5 (4.5)
Ankle	3 (5.5)	1 (1.8)	4 (3.6)
Foot	5 (9.1)	1 (1.8)	6 (5.4)

†Totals may not sum to exactly 100% due to rounding.

Table XII: General Injury Type Categories by Competitive Status

	Competitive group (n=9)	Recreational group (n=103)	Total (n=112)
Injury type (n (%))†			
Bone	0 (0.0)	7 (6.8)	7 (6.3)
Joint/Ligament	4 (44.4)	31 (30.1)	35 (31.3)
Muscle/Tendon	1 (11.1)	16 (15.5)	17 (15.2)
Skin	2 (22.2)	17 (16.5)	19 (17.0)
Other	2 (22.2)	32 (31.1)	34 (30.4)

†Totals may not sum to exactly 100% due to rounding.

Table XIII: Injury Type Subcategories by Competitive Status

	Competitive group (n=9)	Recreational group (n=103)	Total (n=112)
Injury type (n (%))†			
Fracture	0 (0.0)	3 (2.9)	3 (2.7)
Other bone injury	0 (0.0)	4 (3.9)	4 (3.6)
Joint Dislocation / Subluxation / Joint instability	0 (0.0)	13 (12.6)	13 (11.6)
Ligament injury	4 (44.4)	12 (11.7)	16 (14.3)
Meniscal or articular cartilage injury	0 (0.0)	6 (5.8)	6 (5.4)
Muscle tear	0 (0.0)	7 (6.8)	7 (6.3)
Tendon rupture / Tendinopathy / Bursitis	1 (11.1)	9 (8.7)	10 (8.9)
Contusion	0 (0.0)	7 (6.8)	7 (6.3)
Abrasion / Graze / Laceration	0 (0.0)	5 (4.9)	5 (4.5)
Incised wound / Cut	2 (22.2)	5 (4.9)	7 (6.3)
Nerve injury	1 (11.1)	3 (2.9)	4 (3.6)
Dental injury	0 (0.0)	1 (1.0)	1 (0.9)
Other	0 (0.0)	2 (1.9)	2 (1.8)
Unspecified	0 (0.0)	16 (15.5)	16 (14.3)
EAE	1 (11.1)	3 (2.9)	4 (3.6)
Otitis	0 (0.0)	4 (3.9)	4 (3.6)
Muscle contracture	0 (0.0)	3 (2.9)	3 (2.7)

†Totals may not sum to exactly 100% due to rounding.

Table XIV: General Injury Type Categories by Onset Type (Traumatic vs Gradual-onset)

	Traumatic (n=55)	Gradual-onset (n=57)	Total (n=112)
Injury type (n (%))			
Bone	4 (7.3)	3 (5.3)	7 (6.3)
Joint/Ligament	17 (30.9)	18 (31.6)	35 (31.3)
Muscle/Tendon	7 (12.7)	10 (17.5)	17 (15.2)
Skin	15 (27.3)	4 (7.0)	19 (17.0)
Other	12 (21.8)	22 (38.6)	34 (30.4)

†Totals may not sum to exactly 100% due to rounding.

Table XV: Injury Type Subcategories by Onset Type (Traumatic vs Gradual-onset)

	Traumatic (n=55)	Gradual-onset (n=57)	Total (n=112)
Injury type (n (%))†			
Fracture	3 (5.5)	0 (0.0)	3 (2.7)
Other bone injury	1 (1.8)	3 (5.3)	4 (3.6)
Joint Dislocation / Subluxation / Joint instability	8 (14.5)	5 (8.8)	13 (11.6)
Ligament injury	7 (12.7)	9 (15.8)	16 (14.3)
Meniscal or articular cartilage injury	2 (3.6)	4 (7.0)	6 (5.4)
Muscle tear	5 (9.1)	2 (3.5)	7 (6.3)
Tendon rupture / Tendinopathy / Bursitis	2 (3.6)	8 (14.0)	10 (8.9)
Contusion	6 (10.9)	1 (1.8)	7 (6.3)
Abrasion / Graze / Laceration	5 (9.1)	0 (0.0)	5 (4.5)
Incised wound / Cut	4 (7.3)	3 (5.3)	7 (6.3)
Nerve injury	0 (0.0)	4 (7.0)	4 (3.6)
Dental injury	1 (1.8)	0 (0.0)	1 (0.9)
Other	1 (1.8)	1 (1.8)	2 (1.8)
Unspecified	10 (18.2)	6 (10.5)	16 (14.3)
EAE	0 (0.0)	4 (7.0)	4 (3.6)
Otitis	0 (0.0)	4 (7.0)	4 (3.6)
Muscle contracture	0 (0.0)	3 (5.3)	3 (2.7)

†Totals may not sum to exactly 100% due to rounding.

Table XVI: Mechanisms of Traumatic Injuries by Competitive Status

	Competitive group (n=5)	Recreational group (n=50)	Total (n=55)
Injury mechanism (n (%))†			
Paddling	0 (0.0)	3 (6.0)	3 (5.5)
Duck diving	1 (20.0)	1 (2.0)	2 (3.6)
Manoeuvre at the base of the wave	0 (0.0)	3 (6.0)	3 (5.5)
Manoeuvre in the middle of the wave	0 (0.0)	2 (4.0)	2 (3.6)
Tube/barrel riding	1 (20.0)	0 (0.0)	1 (1.8)
Board exit/fall	1 (20.0)	11 (22.0)	12 (21.8)
Contact with own board	1 (20.0)	8 (16.0)	9 (16.4)
Wave turbulence	0 (0.0)	5 (10.0)	5 (9.1)
Contact with sandy bottom	1 (20.0)	7 (14.0)	8 (14.5)
Contact with rocky bottom	0 (0.0)	1 (2.0)	1 (1.8)
Contact with other surfers	0 (0.0)	3 (6.0)	3 (5.5)
Contact with another board	0 (0.0)	4 (8.0)	4 (7.3)
Contact with boat, jet ski or other type of craft	0 (0.0)	1 (2.0)	1 (1.8)
Other	0 (0.0)	1 (2.0)	1 (1.8)

†Totals may not sum to exactly 100% due to rounding.

Note: Some predefined injury mechanisms (e.g. “take-off”, “manoeuvre on the lip/crest of the wave”, “manoeuvre above the lip/crest of the wave”, “manoeuvre, but unable to specify which”, “contact with coral bottom”, “contact with other objects”, “contact with animals”, “sun exposure”) were not reported by any participants and were therefore omitted from the table.

Table XVII: Wave Conditions at the Time of Traumatic Injury by Competitive Status

	Competitive group (n=5)	Recreational group (n=50)	Total (n=55)
Injury mechanism (n (%))†			
Waves below waist height	0 (0.0)	9 (18.0)	9 (16.4)
Waves between waist and head height	2 (40.0)	29 (58.0)	31 (56.4)
Waves above head height	3 (60.0)	12 (24.0)	15 (27.3)

†Totals may not sum to exactly 100% due to rounding.

Table XVIII: On-site Assistance Provided Following Traumatic Injury by Competitive Status

	Competitive group (n=5)	Recreational group (n=54)	Total (n=59)
On-site assistance (n) †			
None	3	36	39
Coach/instructor	0	7	7
Lifeguard	0	1	1
INEM*	0	1	1
Another surfer	1	9	10
"Other"	1	0	1

* Or applicable emergency medical service in the country where the injury occurred.

†The total count may exceed the number of participants, as multiple responses were allowed.

Table XIX: Health Professionals Consulted After Traumatic Injuries by Competitive Status

	Competitive group (n=5)	Recreational group (n=23)	Total (n=28)
Health professionals (n)†			
Doctor	4	20	24
Nurse	0	2	2
Pharmacist	0	2	2
Physiotherapist	2	6	8
Osteopath	0	3	3
"Other"	0	1	1

†The total count may exceed the number of participants, as multiple responses were allowed.

Table XX: ED Use After Traumatic Injuries by Competitive Status

	Competitive group (n=5)	Recreational group (n=50)	Total (n=55)
Attended an ED? (n(%))			
Yes	2 (40.0)	15 (30.0)	17 (30.9)
No	3 (60.0)	35 (70.0)	38 (69.1)

Table XXI: Impact of Traumatic Injuries on Daily Activities by Competitive Status

	Competitive group (n=5)	Recreational group (n=50)	Total (n=55)
Did the injury affect daily activities? (n (%))			
No	0 (0.0)	10 (20.0)	10 (18.2)
Yes; 1 to 6 days	2 (40.0)	19 (38.0)	21 (38.2)
Yes; weeks	1 (20.0)	7 (14.0)	8 (14.5)
Yes; months	2 (40.0)	11 (22.0)	13 (23.6)
Yes; permanent	0 (0.0)	3 (6.0)	3 (5.5)

Table XXII: Interruption to Surfing Practice Due to Traumatic Injury by Competitive Status

	Competitive group (n=5)	Recreational group (n=50)	Total (n=55)
Did the injury prevent surfing? (n (%))			
No	0 (0.0)	11 (22.0)	11 (20.0)
Yes; 1 to 6 days	3 (60.0)	14 (28.0)	17 (30.9)
Yes; weeks	1 (20.0)	13 (26.0)	14 (25.5)
Yes; months	1 (20.0)	12 (24.0)	13 (23.6)

Table XXIII: Mechanisms of Gradual-Onset Injuries by Competitive Status

	Competitive group (n=4)	Recreational group (n=53)	Total (n=57)
Mechanism of injury (n (%))†			
Keeping the head raised while paddling	0 (0.0)	1 (1.9)	1 (1.8)
Prolonged paddling	0 (0.0)	17 (32.1)	17 (29.8)
High-intensity paddling	1 (25.0)	5 (9.4)	6 (10.5)
Take-off (standing up)	0 (0.0)	5 (9.4)	5 (8.8)
Manoeuvre in the middle of the wave	0 (0.0)	1 (1.9)	1 (1.8)
Maneouvre on the wave lip/crest (e.g. re-entry)	0 (0.0)	2 (3.8)	2 (3.5)
Maneouvre, but cannot specify which	1 (25.0)	3 (5.7)	4 (7.0)
Board exit/fall (including controlled or wipe-out dismount)	0 (0.0)	5 (9.4)	5 (8.8)
Prolonged ocean exposure	0 (0.0)	10 (18.9)	10 (17.5)
Unknown	1 (25.0)	1 (1.9)	2 (3.5)
Other(s)	1 (25.0)	3 (5.7)	4 (7.0)

†Totals may not sum to exactly 100% due to rounding.

Note: Some predefined injury mechanisms (e.g. “Lying on the surfboard for extended periods”, “Manoeuvre at the base of the wave”, “Manoeuvre above the lip/crest of the wave”, “Tube riding / barrel riding”, “Sitting on the board for extended periods”, “Duck-diving”, “Prolonged sun exposure”) were not reported by any participants and were therefore omitted from the table.

Table XXIV: Health Professionals Consulted After Gradual-Onset Injuries by Competitive Status

	Competitive group (n=3)	Recreational group (n=37)	Total (n=40)
Health professionals (n) †			
Doctor	2	25	27
Nurse	0	3	3
Pharmacist	0	1	1
Physiotherapist	2	14	16
Osteopath	1	13	14

†The total count may exceed the number of participants, as multiple responses were allowed.

Table XXV: Duration of Impact on Daily Activities After Gradual-Onset Injuries by Competitive Status

	Competitive group (n=4)	Recreational group (n=53)	Total (n=57)
Did the injury affect daily activities? (n (%))†			
No	0 (0.0)	16 (30.2)	16 (28.1)
Yes; 1 to 6 days	1 (25.0)	10 (18.9)	11 (19.3)
Yes; weeks	0 (0.0)	15 (28.3)	15 (26.3)
Yes; months	1 (25.0)	9 (17.0)	10 (17.5)
Yes; permanent	2 (50.0)	3 (5.7)	5 (8.8)

†Totals may not sum to exactly 100% due to rounding.

Table XXVI: Interruption to Surfing Practice Due to Gradual-Onset Injury by Competitive Status

	Competitive group (n=4)	Recreational group (n=53)	Total (n=57)
Did the injury prevent surfing? (n (%))			
No	0 (0.0)	15 (28.3)	15 (26.3)
Yes; 1 to 6 days	1 (25.0)	14 (26.4)	15 (26.3)
Yes; weeks	2 (50.0)	13 (24.5)	15 (26.3)
Yes; months	1 (25.0)	11 (20.8)	12 (21.1)

Survey – European Portuguese Version

Traumatic and gradual-onset injuries in competitive and recreational surfers

Consentimento Informado

O presente estudo está a ser realizado no âmbito do Mestrado em Medicina (MIM) do Instituto de Ciências Biomédicas Abel Salazar (ICBAS), da Universidade do Porto, como parte da dissertação de Mestrado do aluno Manuel João Martins Campanário. O estudo recebeu aprovação da Federação Portuguesa de Surf (FPS), sendo que o questionário aplicado cumpriu os regulamentos de Ética e Proteção de Dados autorizados pela FPS.

Convidamos os surfistas a participar no preenchimento de um questionário, cujo objetivo é analisar a prevalência, regiões mais afetadas e tipos de lesão em surfistas (**de qualquer nacionalidade**) competitivos e em surfistas recreativos. A duração estimada para completar o questionário é de aproximadamente 5-20 minutos.

A participação está aberta a surfistas competitivos e recreativos com **pelo menos 18 anos de idade** e com **pelo menos 12 meses de experiência**.

A participação é voluntária, pelo que se quiser desistir de participar poderá fazê-lo a qualquer momento sem consequência. A recolha de dados é anónima, sem registo de informações identificativas, assegurando a confidencialidade. Os dados serão utilizados apenas no âmbito de trabalhos académicos e apresentações científicas.

Caso pretenda ter acesso aos resultados, ou contactar a equipa de investigação relativamente a este estudo, pode fazê-lo através do seguinte email: up201908024@up.pt

* Indica uma pergunta obrigatória

1. **Declaro que, depois de ler as informações prestadas, aceito participar no estudo em questão.** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 2*
- ◯ Não

A. Caracterização sociodemográfica

Survey Cont.

2. **1. Data de nascimento:** *

   _____

   Exemplo: 7 de janeiro de 2019

3. **2. Qual o género com que se identifica (a sua identidade de género)?** *

   Marcar apenas uma oval.

   - ◯ Feminino/Mulher
   - ◯ Masculino/Homem
   - ◯ Outro

4. **3. Peso aproximado (em kg):** *

   _____

5. **4. Altura (em centímetros):** *

   _____

6. **5. Nacionalidade?** *

   _____

7. **6. Em que país reside?** *

   _____

B. Prática de surf e outros desportos, parte 1

8. **1. Há quanto tempo pratica surf (anos completos)?** *

Marcar apenas uma oval.

- ◯ Entre 1 a 2 anos
- ◯ Entre 3 a 4 anos
- ◯ Entre 5 a 6 anos
- ◯ Entre 7 a 8 anos
- ◯ Entre 9 a 10 anos
- ◯ Há mais de 10 anos

9. **2. Participa em competições de surf?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 10*
- ◯ Não *Avançar para a pergunta 14*

Participa em competições de surf

10. **2.1. Desde que ano?** *

_____

11. **2.2. Com que frequência? (número competições por ano, em média)** *

_____

Survey Cont.

12. **2.3. Participou em alguma competição nos últimos 12 meses?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 13*
- ◯ Não *Avançar para a pergunta 14*

Sim, participou em alguma competição nos últimos 12 meses

13. **2.4. Qual o tipo de competição? (assinale várias opções, caso se aplique)** *

Marcar tudo o que for aplicável.

- ☐ Intersócios
- ☐ Regional
- ☐ Nacional
- ☐ Internacional (exceto competições organizadas pela WSL e pela ISA)
- ☐ Organizada pela WSL (World Surf League)
- ☐ Organizada pela ISA (International Surfing Association)

B. Prática de surf e outros desportos, parte 2

14. **3. Qual a posição preferencial na prancha?** *

Marcar apenas uma oval.

- ◯ Regular (pé direito atrás)
- ◯ Goofy (pé esquerdo atrás)
- ◯ Não tem

4. Relativamente ao tipo de prancha com que pratica surf com maior regularidade:

15. **4.1. Qual o tamanho? (em pés)** *
(Escreva "Não sei" caso não saiba)

_____

16. **4.2. Qual o material?** *

Marcar apenas uma oval.

- ◯ Rígida (fibra/epoxy) *Avançar para a pergunta 18*
- ◯ Espuma *Avançar para a pergunta 18*
- ◯ Outro *Avançar para a pergunta 17*

Qual o material? "Outro"

17. **4.2.1. Especifique o tipo de material:** *

_____

_____

_____

_____

_____

B. Prática de surf e outros desportos, parte 3

5. A frequência da sua prática de surf.

Survey Cont.

18. **5.1. <u>Nos últimos 12 meses</u>, surfou, aproximadamente, quantos meses?** *

Marcar apenas uma oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

19. **5.2. Nos meses em que surfou, surfou, em média, quantas semanas por mês?** *

Marcar apenas uma oval.

- 1
- 2
- 3
- 4

20. **5.3. Nas semanas em que surfou, surfou, em média, quantos dias por semana?** *

Marcar apenas uma oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7

21. **5.4. Nos dias em que surfou, surfou, em média, quanto tempo por dia?** *

Marcar apenas uma oval.

- 30 minutos (min)
- 1 hora (h)
- 1h30min
- 2h
- 2h30min
- 3h
- 3h30min
- 4h
- 4h30min
- 5h
- 5h30min
- 6h
- 6h30min
- 7h
- 7h30min
- 8h
- 8h30min
- 9h
- 9h30min
- 10h

22. **6. Em média, quantas horas dura cada sessão de surf?** *

Marcar apenas uma oval.

- ◯ 0-1
- ◯ 1-2
- ◯ 2-3
- ◯ 3-4
- ◯ 4-5
- ◯ 5-6
- ◯ >6

23. **7. Pratica outros desportos regularmente?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 24*
- ◯ Não *Avançar para a pergunta 39*

7.1. Pratica outros desportos regularmente? "Sim"

24. **7.1.1. Que desporto?** *

_____

_____

_____

_____

_____

25. **7.1.2. Número de horas semanais?** *

_____

Survey Cont.

26. **7.1.3. Federado?** *

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

27. **7.1.4. Pratica mais algum desporto regularmente?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 28*
- ◯ Não *Avançar para a pergunta 39*

7.2. Pratica mais algum desporto regularmente? "Sim" (segundo desporto)

28. **7.2.1. Que desporto?** *

_____

_____

_____

_____

_____

29. **7.2.2. Número de horas semanais?** *

_____

30. **7.2.3. Federado?** *

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

31. **7.2.4. Pratica mais algum desporto regularmente?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 32*
- ◯ Não *Avançar para a pergunta 39*

7.3. Pratica mais algum desporto regularmente? "Sim" (terceiro desporto)

32. **7.3.1. Que desporto?** *

_____

_____

_____

_____

_____

33. **7.3.2. Número de horas semanais?** *

_____

34. **7.3.3. Federado?** *

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

35. **7.3.4. Pratica mais algum desporto regularmente?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 36*
- ◯ Não *Avançar para a pergunta 39*

Survey Cont.

7.4. Pratica mais algum desporto regularmente? "Sim" (quarto desporto)

36. **7.4.1. Que desporto?** *

37. **7.4.2. Número de horas semanais?** *

38. **7.4.3. Federado?** *

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

C. Lesões

Para responder às questões que se seguem considere a prática de surf como **excluindo** as deslocações de e para a água. Neste âmbito, entende-se por lesão, qualquer condição que tenha implicado **uma das seguintes situações**:

- Interrupção da prática de surf por pelo menos um dia;

- Não teve de interromper a prática de surf, mas teve de adaptar a mesma;

- Procurou ajuda (aconselhamento e/ou tratamento) de profissionais de saúde.

39. **1. <u>Nos últimos 12 meses</u> sofreu alguma lesão enquanto praticava surf ou relacionada com a prática de surf?** *

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 40*
- ◯ Não

<u>Nos últimos 12 meses</u> sofreu alguma lesão enquanto praticava surf ou relacionada com a prática de surf? "Sim"

40. **1.1. Quantas vezes se lesionou (<u>nos últimos 12 meses</u>)?** *

Marcar apenas uma oval.

- ◯ 1 vez
- ◯ 2 vezes
- ◯ 3 vezes
- ◯ 4 vezes
- ◯ 5 vezes
- ◯ Mais do que 5 vezes

Atenção!

Nas próximas questões vamos caracterizar, individualmente, as lesões associadas à prática de surf que sofreu **nos últimos 12 meses**. Se referiu mais de 3 lesões na questão anterior, considere no quadro abaixo **<u>APENAS</u> as 3 lesões que para si foram mais graves** (implicaram mais tempo de inatividade ou condicionamento da atividade normal).

Lesão nº1 (1., 2.)

Atenção!

Nas próximas questões vamos caracterizar, individualmente, as lesões associadas à prática de surf que sofreu **nos últimos 12 meses**. Se referiu mais de 3 lesões na questão anterior, considere no quadro abaixo **<u>APENAS</u> as 3 lesões que para si foram mais graves** (implicaram mais tempo de inatividade ou condicionamento da atividade normal).

Survey Cont.

41. **Lesão nº1** *

1. Em que localização anatómica?

I. Cabeça e pescoço

II. Tronco

III. Membros superiores

IV. Membros inferiores

V. Não sabe especificar

Marcar apenas uma oval.

- ◯ I.I. Cabeça/Face (incluindo dentes; excluindo ouvidos e olhos)
- ◯ I.II. Ouvidos
- ◯ I.III. Olhos
- ◯ I.IV. Pescoço
- ◯ II.I. Tórax ("peito"; inclui esterno, costelas, mamas, órgãos do tórax)
- ◯ II.II. Coluna torácica (inclui coluna torácica, articulações costovertebrais)
- ◯ II.III. Região lombossagrada (inclui coluna lombar, articulações sacroilíacas, sacro, cóccix, nádegas)
- ◯ II.IV. Abdómen ("barriga"; abaixo do diafragma e acima do canal inguinal; inclui órgãos abdominais)
- ◯ II.V. Períneo/Região genital
- ◯ III.I. Ombro
- ◯ III.II. Braço
- ◯ III.III. Cotovelo
- ◯ III.IV. Antebraço
- ◯ III.V. Punho ("pulso")
- ◯ III.VI. Mão
- ◯ IV.I. Anca/Virilha
- ◯ IV.II. Coxa
- ◯ IV.III. Joelho
- ◯ IV.IV. Perna (do joelho ao tornozelo, excluindo-os; inclui tendão de Aquiles)
- ◯ IV.V. Tornozelo
- ◯ IV.VI. Pé
- ◯ V. Não sabe especificar

42. **Lesão nº1** *

2. Que tipo de lesão?

I. Osso

II. Articulação (não-osso) e ligamento

III. Músculo e tendão

IV. Pele

V. Sistema nervoso central/periférico

VI. Outro

VII. Não sabe especificar

Marcar apenas uma oval.

- ◯ I.I. Fratura (osso partido) *Avançar para a pergunta 44*
- ◯ I.II. Outra lesão óssea *Avançar para a pergunta 44*
- ◯ II.I. Luxação/Subluxação/Instabilidade *Avançar para a pergunta 44*
- ◯ II.II. Lesão ligamentar *Avançar para a pergunta 44*
- ◯ II.III. Lesão dos meniscos/cartilagem articular *Avançar para a pergunta 44*
- ◯ II.IV. Sinovite *Avançar para a pergunta 44*
- ◯ III.I. Rutura muscular *Avançar para a pergunta 44*
- ◯ III.II. Rutura de tendão/tendinopatia/bursite *Avançar para a pergunta 44*
- ◯ IV.I. Contusão (inclui hematoma, "nódoa negra"; "pisadura"...) *Avançar para a pergunta 44*
- ◯ IV.II. Escoriação/abrasão/lareração (inclui "arranhão", "raspão", "esfoladela"...) *Avançar para a pergunta 44*
- ◯ IV.III. Ferida cortante *Avançar para a pergunta 44*
- ◯ IV.IV. Queimadura solar *Avançar para a pergunta 44*
- ◯ V.I. Concussão (lesão cerebral traumática causada por um golpe direto na cabeça, pescoço ou corpo, que resulta em uma força impulsiva transmitida para o cérebro) *Avançar para a pergunta 44*
- ◯ V.II. Lesão de nervo *Avançar para a pergunta 44*
- ◯ V.III. Lesão ocular *Avançar para a pergunta 44*
- ◯ VI.I. Visceral (relativo aos órgãos internos do corpo) *Avançar para a pergunta 44*
- ◯ VI.II. Lesão dentária *Avançar para a pergunta 44*
- ◯ VI.III. Outro *Avançar para a pergunta 43*

VI. Não sabe especificar *Avançar para a pergunta 44*

Lesão nº1; Que tipo de lesão? "VI.III. Outro" (2.1.)

43. **Lesão nº1** *
2.1. Qual?

Lesão traumática ou de início gradual/*overuse* (3.)

Lesão de início gradual: os sintomas (p.e. dor ou desconforto) ocorreram gradualmente ao longo do tempo. Nenhum evento específico causou esta lesão, que é agravada pelo surf. Esta lesão pode piorar e melhorar e ser afetada pela quantidade de surf praticada.

Lesão traumática: os sintomas (p.e. dor ou desconforto) tiveram o início súbito e foram causados por um evento específico durante a prática de surf.

44. **Lesão nº1** *
3. Lesão traumática ou de início gradual/*overuse*?

Marcar apenas uma oval.

Traumática *Avançar para a pergunta 45*

De início gradual *Avançar para a pergunta 65*

Lesão nº1 (traumática); Selecionou "Traumática" (4.)

45. **Lesão nº1 (traumática)** *

4. Mecanismo de lesão:

Assinale o que entende por ter sido o mecanismo que despoletou a lesão.

Nota: leash é o acessório que mantém a prancha presa à perna

Marcar apenas uma oval.

- ◯ Remada *Avançar para a pergunta 49*
- ◯ Bico de pato (duck-diving, manobra para passar por debaixo das ondas) *Avançar para a pergunta 49*
- ◯ Take-off (pôr-se a pé) *Avançar para a pergunta 49*
- ◯ Manobra na base da onda (p.e. bottom turn) *Avançar para a pergunta 49*
- ◯ Manobra a meio da onda (p.e. trimming/gerar velocidade) *Avançar para a pergunta 49*
- ◯ Manobra no lip/crista da onda (p.e. reentry) *Avançar para a pergunta 49*
- ◯ Manobra acima do lip/crista da onda (aéreo) *Avançar para a pergunta 49*
- ◯ Realização de um tubo (barrel/tube riding) *Avançar para a pergunta 49*
- ◯ Manobra, mas não sabe especificar qual *Avançar para a pergunta 49*
- ◯ Saída/queda da prancha (incluido uma saída controlada ou de forma descontrolada, wipe-out) *Avançar para a pergunta 49*
- ◯ Contacto com a própria prancha (incluindo quilhas e leash) *Avançar para a pergunta 49*
- ◯ Por ação da turbulência da água *Avançar para a pergunta 49*
- ◯ Contacto com fundo de areia *Avançar para a pergunta 49*
- ◯ Contacto com fundo de rocha *Avançar para a pergunta 49*
- ◯ Contacto com fundo de coral *Avançar para a pergunta 49*
- ◯ Contacto com outros surfistas *Avançar para a pergunta 49*
- ◯ Contacto com outros objetos (não incluindo outras pranchas ou embarcações) *Avançar para a pergunta 46*
- ◯ Contacto com outra prancha (incluindo quilhas e leash) *Avançar para a pergunta 49*
- ◯ Contacto com barco, mota de água ou outro tipo de embarcação *Avançar para a pergunta 49*
- ◯ Contacto com animais *Avançar para a pergunta 47*

- ◯ Exposição solar *Avançar para a pergunta 49*
- ◯ Outro *Avançar para a pergunta 48*

Lesão nº1 (taumática); Selecionou "Contacto com outros objetos (não incluindo outras pranchas ou embarcações)" (4.1.)

46. **Lesão nº1 (traumática)** *
4.1. Qual o objeto?

Avançar para a pergunta 49

Lesão nº1 (taumática); Selecionou "Contacto com animais" (4.1.)

47. **Lesão nº1 (traumática)** *
4.1. Que animal?

Avançar para a pergunta 49

Lesão nº1 (traumática); Selecionou "Outro" (4.1.)

48. **Lesão nº1 (traumática)** *
4.1. Qual?
(Especifique o que entende por ter sido o mecanismo que despoletou a lesão.)

_____

_____

_____

_____

_____

Avançar para a pergunta 49

Lesão nº1 (traumática), continuação (5., 6. 7., 8.)

49. **Lesão nº1 (traumática)** *
5. O local onde se encontrava a praticar surf era conhecido/habitual?

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

50. **Lesão nº1 (traumática)** *
6. Condições do mar na altura da lesão (altura relativamente ao surfista):

Marcar apenas uma oval.

- ◯ Ondas com tamanho abaixo da cintura
- ◯ Ondas com tamanho entre a cintura e a altura do surfista
- ◯ Ondas com tamanho acima da cabeça do surfista
- ◯ Não sabe

Survey Cont.

51. **Lesão nº1 (traumática)** *
7. Teve assistência no local? (assinale, caso se aplique, várias opções)

Marcar tudo o que for aplicável.

- [ ] Não
- [ ] Sim, pelo professor.
- [ ] Sim, pelo nadador-salvador.
- [ ] Sim, pelo INEM (ou organismo de emergência médica aplicável no país em que se encontrava na altura da lesão referida).
- [ ] Sim, por outro colega.
- [ ] Sim, por "outro" (transeunte, bombeiros, etc).
- [ ] Sim, mas não sabe especificar.

52. **Lesão nº1 (traumática)** *
8. Procurou ajuda de algum profissional de saúde?

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 53*
- ◯ Não *Avançar para a pergunta 56*

Lesão nº1 (traumática); Sim, procurou ajuda de algum profissional de saúde. (8.1.; 8.2.)

53. **Lesão nº1 (traumática)** *
8.1. Que/quais profissional/profissionais de saúde? (Selecione vários caso se aplique)

Marcar tudo o que for aplicável.

- [ ] Médico
- [ ] Enfermeiro
- [ ] Farmacêutico
- [ ] Fisioterapeuta
- [ ] Osteopata
- [ ] Dentista
- [ ] Psicólogo
- [ ] Outro

54. **Caso tenha selecionado "outro", indique qual?**

_____

55. **Lesão nº1 (traumática)** *
8.2. Sabe o diagnóstico exato da lesão que referiu? Diga "Sim" ou "não". E, se sim, indique o nome.

_____

_____

_____

_____

_____

Avançar para a pergunta 57

Lesão nº1 (traumática); Não, não procurou ajuda de algum profissional de saúde. (8.1.)

Survey Cont.

56. **Lesão nº1 (traumática)** *
8.1. Fez algum tratamento com ou sem ajuda de terceiros?

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

Lesão nº1 (traumática), continuação (9.)

57. **Lesão nº1 (traumática)** *
9. Recorreu ao Serviço de Urgência (SU)?

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 58*
- ◯ Não *Avançar para a pergunta 60*

Lesão nº1 (traumática); Sim, recorreu ao Serviço de Urgência (SU). (9.1.; 9.2.)

58. **Lesão nº1 (traumática)** *
9.1. Teve necessidade de tratamento?

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

59. **Lesão nº1 (traumática)** *
9.2. Especifique o que ocorreu na sua ida ao Serviço de Urgência (SU).

Marcar apenas uma oval.

- ◯ SU e alta no mesmo dia.
- ◯ SU e internamento.

Lesão nº1 (traumática), continuação. (10.)

60. **Lesão nº1 (traumática)** *
10. Foi submetido a cirurgia?

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 61*
- ◯ Não *Avançar para a pergunta 62*

Lesão nº1 (taumática); Sim, foi submetido a cirurgia. (10.1.)

61. **Lesão nº1 (traumática)** *
10.1. Sabe especificar?

_____

_____

_____

_____

_____

Lesão nº1 (traumática), continuação (11.; 12.; 13.)

Survey Cont.

62. **Lesão nº1 (traumática)** *
11. Teve repercussões nas atividades da vida diária? Se sim, por quanto tempo?

Marcar apenas uma oval.

- ◯ Não
- ◯ Sim; 1 a 6 dias.
- ◯ Sim; semana(s).
- ◯ Sim; mês/meses.
- ◯ Sim; ano(s).
- ◯ Sim; permanente.

63. **Lesão nº1 (traumática)** *
12. Duração da lesão?

Marcar apenas uma oval.

- ◯ <3 meses.
- ◯ =>3 meses (3 meses, inclusive, ou mais).

64. **Lesão nº1 (traumática)** *
13. Impediu a prática de surf? Se sim, por quanto tempo?

Marcar apenas uma oval.

- ◯ Não
- ◯ Sim; 1 a 6 dias.
- ◯ Sim; semana(s).
- ◯ Sim; mês/meses.
- ◯ Sim; ano(s).
- ◯ Sim; permanente.

Avançar para a pergunta 77

Lesão nº1 (início gradual); Selecionou "De início gradual" (4.)

65. **Lesão nº1 (início gradual)** *

4. Mecanismo de lesão. Assinale o que entende por ter sido o mecanismo que despoletou a lesão ou o mecanismo que exacerba/aumenta os seus sintomas.

Marcar apenas uma oval.

- ◯ Manter a cabeça levantada enquanto rema *Avançar para a pergunta 67*
- ◯ Remar por tempo prolongado *Avançar para a pergunta 67*
- ◯ Remar a alta intensidade *Avançar para a pergunta 67*
- ◯ Estar deitado na prancha por longos períodos *Avançar para a pergunta 67*
- ◯ Take-off (pôr-se a pé) *Avançar para a pergunta 67*
- ◯ Manobra na base da onda (p.e. bottom turn) *Avançar para a pergunta 67*
- ◯ Manobra a meio da onda (p.e. trimming/gerar velocidade) *Avançar para a pergunta 67*
- ◯ Manobra no lip/crista da onda (p.e. reentry) *Avançar para a pergunta 67*
- ◯ Manobra acima do lip/crista da onda (aéreo) *Avançar para a pergunta 67*
- ◯ Realização de um tubo (barrel/tube riding) *Avançar para a pergunta 67*
- ◯ Manobra, mas não sabe especificar qual *Avançar para a pergunta 67*
- ◯ Saída/queda da prancha (incluindo uma saída controlada ou de forma descontrolada, wipe-out) *Avançar para a pergunta 67*
- ◯ Estar sentado na prancha por longos períodos *Avançar para a pergunta 67*
- ◯ Ao fazer bico de pato (duck-diving) *Avançar para a pergunta 67*
- ◯ Ao expor-se ao sol por longos períodos *Avançar para a pergunta 67*
- ◯ Ao expor-se ao mar por longos períodos *Avançar para a pergunta 67*
- ◯ Desconhecido *Avançar para a pergunta 67*
- ◯ Outro(s). *Avançar para a pergunta 66*

Lesão nº1 (início gradual). Selecionou "Outro(s)." (4.1.)

Survey Cont.

66. **Lesão nº1 (início gradual)** *
4.1. Mecanismo(s) de lesão. Qual/quais?
(Especifique o que entende por ter sido o mecanismo que despoletou a lesão ou o mecanismo que exacerba/aumenta os seus sintomas.)

_____

_____

_____

_____

_____

Lesão nº1 (início gradual); continuação (5.)

67. **Lesão nº1 (início gradual)** *
5. Procurou ajuda de algum profissional de saúde?

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 68*
- ◯ Não *Avançar para a pergunta 71*

Lesão nº1 (início gradual); Sim, procurou ajuda de algum profissional de saúde. (5.1.; 5.1.1.; 5.2.)

68. **Lesão nº1 (início gradual)** *
5.1. Que/quais profissional/profissionais de saúde?

Marcar tudo o que for aplicável.

- [ ] Médico
- [ ] Enfermeiro
- [ ] Farmacêutico
- [ ] Fisioterapeuta
- [ ] Osteopata
- [ ] Dentista
- [ ] Psicólogo
- [ ] Outro

69. **Lesão nº1 (início gradual)**
5.1.1. Caso tenha selecionado "outro", indique qual:

70. **Lesão nº1 (início gradual)** *
5.2. Sabe o diagnóstico exato da lesão que referiu? Diga "Sim" ou "Não". E, se sim, indique o nome.

Avançar para a pergunta 72

Lesão nº1 (início gradual); Não, não procurou ajuda de algum profissional de saúde. (5.1.)

71. **Lesão nº1 (início gradual)** *
5.1. Fez algum tratamento com ou sem ajuda de terceiros?

Marcar apenas uma oval.

- ◯ Sim
- ◯ Não

Lesão nº1 (início gradual), continuação (6.)

72. **Lesão nº1 (início gradual)** *
6. Foi submetido a cirurgia?

Marcar apenas uma oval.

- ◯ Sim *Avançar para a pergunta 73*
- ◯ Não *Avançar para a pergunta 74*

Lesão nº1 (início gradual); Sim, foi submetido a cirurgia. (6.1.)

73. **Lesão nº1 (início gradual)** *
6.1. Sabe especificar?

_____

_____

_____

_____

_____

Lesão nº1 (início gradual), continuação (7., 8. 9.)

Survey Cont.

74. **Lesão nº1 (início gradual)** *
7. Teve repercussões nas atividades de vida diária? Se sim, por quanto tempo?

Marcar apenas uma oval.

- ◯ Não
- ◯ Sim; 1 a 6 dias.
- ◯ Sim; semana(s).
- ◯ Sim; mês/meses.
- ◯ Sim; ano(s).
- ◯ Sim; permanente.

75. **Lesão nº1 (início gradual)** *
8. Duração da lesão?

Marcar apenas uma oval.

- ◯ <3 meses.
- ◯ >=3 meses (3 meses, inclusive, ou mais).

76. **Lesão nº1 (início gradual)** *
9. Impediu a prática de surf? Se sim, por quanto tempo?

Marcar apenas uma oval.

- ◯ Não.
- ◯ Sim; 1 a 6 dias.
- ◯ Sim; semana(s).
- ◯ Sim; mês/meses.
- ◯ Sim; ano(s).
- ◯ Sim; permanente.

Note: The questionnaire continued if the participant had indicated two or three injuries, as previously described.

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