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Epidemiology and Determinants of Walkovers in Professional Men's Tennis (1973–2019): A Retrospective Cohort Analysis

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Abstract

Walkovers (W/O) refer to when a player wins a match due to the absence of his/her opponent. This investigation aimed to describe W/O in Association of Tennis Professional (ATP) tournaments between 1973 and 2019, analysing epidemiological patterns and associated factors. We hypothesized that W/O incidence varied according to tournament type, surface, and match characteristics. A retrospective cohort study was conducted. Factors that might influence W/O were studied by epidemiological measures, including both absolute and relative measures of risk incidence proportion (IP) per 1000 played matches and cumulative incidence ratio (CIR) are provided as association measures. The IP was 4.2 (95%CI: 3.9-4.5). Matches played in Masters tournaments showed the highest risk of W/O (OR: 1.31; 95% CI: 1.07–1.59), while those in Grand Slams had significantly lower odds (OR: 0.53; 95% CI: 0.40–0.68). W/O were less likely in preliminary (OR: 0.51; 95% CI: 0.43–0.61) and qualifying rounds (OR: 0.37; 95% CI: 0.27–0.50) compared to finals. The probability of W/O showed a decreasing trend from 1980 to 2000 (OR: 0.75; 95% CI: 0.67–0.84), followed by an increase by 2020 (OR: 2.13; 95% CI: 1.25–3.64). The primary causes of W/O were attributed to injuries (28.7%), illnesses (7.8%), and personal reasons (2.5%), although the majority of reasons remained unknown (61.0%). These findings reveal structural and contextual factors associated with W/O. Understanding these patterns may help identify health-related and organizational challenges in professional tennis, highlighting the need to improve injury and health data collection and guiding preventive strategies and scheduling policies.

Keywords: *athletic injuries, tennis, prevention, health, epidemiology*

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Introduction

Tennis is one of the most popular sports in the world in which the match duration is not defined by the game-rules as it has no time limit (Christmass et al., 1998). Male professional tennis matches involve high-intensity intermittent efforts, including forceful strokes, fast accelerations and decelerations and changes of directions played across different indoor and outdoor surfaces (Fernandez-Fernandez et al., 2009; Pluim et al., 2023). Thus, matches can last for several hours, causing on the players a high level of physical and mental exhaustion that can end with injuries and/or retirement from the match (Dines et al., 2015). Moreover, professional tennis players face a continuous increase in competition density, resulting in increased physical, mental, technical and tactical demands and consequently injury rates (Fu et al., 2018). In a professional tennis competition, it can be found different situations that can limit the player's participation (Table S1 in the Supplementary Material). Those situations may be stated by the player him/herself or an official and they may have consequences for the athlete.

In tennis, a Walkover (W/O) occurs when a player automatically advances to the next round without playing the match (Gerdes, 2023). The match shall be deemed to begin after the first service of the first set, so the W/O must be determined before that point (Lawn Tennis Association, 2021). Walkovers may arise not only from injury or illness but also from administrative errors or personal circumstances (Gerdes, 2023). In cases where the cause is medical, players are required to undergo a mandatory examination by an Association of Tennis Professionals (ATP) doctor. This rule's non-compliance may lead to an economic fine that may vary according to the competition (ATP Official Rulebook | ATP Tour | Tennis, 2023).

It is worth clarifying that W/O are not the same as Retirements (Table S1 in the Supplementary Material), where their main difference lies when the decision is made. While the W/O is determined before the beginning of a match, the retirement will be determined during the match. Despite potentially sharing common causes such as injury or illness, the regulatory, competitive, and financial implications of each differ significantly (ATP, 2024; Gerdes, 2023; Lawn Tennis Association, 2021).

In the case of a W/O, the player who withdraws before the beginning of the match generally retains only the economic and ranking compensations earned up to that point in the tournament, prior to the scheduled match. In contrast, a retirement, defined as a withdrawal occurring after the start of a match, typically entitles the player to both the accumulated compensation and the full economic and ranking allocations corresponding to the round in which the retirement occurs. While this distinction tends to be consistent across competitions, it is essential to note that specific regulations may vary from one tournament to another. The operational difference between these two scenarios lies in whether the match takes place in any form; a walkover implies that the match is never initiated, whereas a retirement denotes that at least part of the match has been contested. Additionally, in the event of a W/O occurring in the first round, the withdrawing player is commonly replaced by a Lucky Loser (LL), who then assumes the opportunity to compete and receive the corresponding prize money and ranking points. These procedural differences underscore the importance of examining walkovers and retirements as distinct categories (ATP, 2024; Grand Slam Tennis, 2025).

In scientific literature, we can find several observational studies stating an increase of non-completed games among professional tennis players in the last years (Breznik & Batagelj, 2012; Okholm Kryger et al., 2015), these were mainly attributed to injuries which leaded to different repercussions. Nevertheless, in the best of our knowledge, there are no studies who describes and analyses the causes of W/O in ATP matches. This gap in the literature leaves important aspects of why matches go unfinished unexplored, along with the broader implications for players' careers, tournament operations, and the competitive integrity of the sport. Therefore, the objective of this investigation is to describe the ATP W/O between 1973 and 2019, determining the epidemiology and observing the possible related factors.

Methods

Study design and sample

An observational, retrospective cohort epidemiological study was performed. All ATP tour matches between 1973 and 2019 were studied (n = 168137 matches). The ATP tournaments included are shown in Table S2 in the Supplementary Material. A data base was created from the website GitHub (https://github.com/JeffSackmann/tennis_atp) which gathers the information from the official sites of the ATP tournaments. From the original database, which included 49 variables per match, a total of 14 variables were selected for further analysis. These variables encompassed both match and tournament aspects, such as tournament level, surface, round and score, as well as player-related information, including age, handedness, and ranking for both the winner and loser. Additionally, eight new variables were created during the data wrangling process. These included calculated differences between players' ages and rankings (dif_age and dif_rank), the total number of games played (games), and categorical variables that classify match outcomes (Retirement, Default, and WalkOver).

The final analytical dataset consisted of 22 variables. The variable "WalkOver" was created using the score field, with all identified walkovers compiled into a separate database. This database was later enhanced with information about the causes of each walkover, gathered through manual searches.

Variables

The main variable is "W/O" (Yes/No), when a match is not completed because of a player leaving the competition before the beginning of the match. The variables related with the match are shown in Table S3 in the Supplemental material. In addition, the difference in age and ranking between players in each match was also evaluated at the player level.

Statistical analysis

In the descriptive analysis, absolute (n) and relative (%) frequencies were computed for categorical variables, while measures of central tendency and dispersion were calculated for the continuous ones. A bivariate analysis was performed to describe the characteristics of the match and the players when a W/O occurred. In the specific case of W/O, which occur before matches, observations do not have the sum of game data available for matches. Therefore, we cannot always ensure the calculation of incidence as a rate with respect to the games played. Instead, it would be more feasible to calculate the cumulative incidence or inci-

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dence proportion (IP) for the W/O according to the formula i=e/n, where e is the number of W/O (events) during the study period and n is the respective total number of exposed matches (expressed in units of 1000 matches played). The number of W/O, the exposure as number of matches, the IP and its 95% confidence interval (95%CI) were provided for each category of the relevant variables. The incidence and 95% confidence intervals were estimated using a Poisson distribution.

In addition, following the recommendations of STROBE statement for observational studies (Vandenbroucke et al., 2014) and the CONSORT statement for randomized controlled trials (Moher et al., 2010), relative and absolute measures of association between covariates and the presence of W/O were given. They were expressed as cumulative incidence ratio (CIR), and risk differences (RD) with their respective 95% CI. CIR was estimated as the ratio of incidence proportion between the two specified studied groups (i.e., carpet and clay surfaces). Furthermore, with the aim to identify how many more W/O were sustained in one group as compared with another one, the absolute measure of RD was calculated by subtracting cumulative incidence from 2 exposures group. At the multivariable level, we fitted a logistic regression model to identify factors associated with the likelihood of a walkover. The model was adjusted for key covariates described in the study. A previous analysis of the only continuous variable (year) was conducted to evaluate potential transformations for inclusion in the logistic model. Variable selection was guided by the Bayesian Information Criterion (BIC). We reported odds ratios (OR) and their 95% confidence intervals (95%CI). Model validation was performed using calibration plots and residual diagnostics, while multicollinearity was assessed using the variance inflation factor (VIF). Statistical significance was set at $p \leq 0.05$ for all analyses. These associations are derived from an observational study with an exploratory aim, and therefore should not be interpreted as causal relationships.

All analyses were performed using version 4.1.3 of the R statistical software. The R package compareGroups (Subirana et al., 2014) was used to describe characteristics according to the presence of W/O. The epi.2by2 function of the R package epiR (Stevenson et al., 2024), setting method as cohort time, was used to calculate the incidence. The CIR were calculated using the function pois.exact from the epitools package. Most of the graphics were obtained using ggplot2 package (Wickham, 2009). The reproducible code used in this study is available on a publicly accessible GitHub repository (https://github.com/marticasals/WO_ATP), allowing for the transparency and replicability of the statistical analysis.

Results

Exploratory analysis of ATP matches during the period 1973-2019

A total number of 168137 ATP matches were analysed. A 97.36% (n = 163701) of the matches were completed (Table 1). The median of games per match were 22 (Q1:18-Q3:29). The majority of the players were right-handed, both those who classified for the next round and the one that didn't. The median of age difference was 3.55 years (Q1:1.66-Q3:6.09) and the rank difference was 51 ranking posts (Q1:23-Q3:104).

Table 1. Frequency and percentage of matches based on Tournament Level, Surface, Set, Round, and Match Outcome.

Variable	Frequency	Percentage
Tournament level		
Grand Slams	28294	16.83%
Masters	23313	13.87%
250 or 500	116088	69.04%
Tour Finals	442	0.26%
Surface		
Clay	59396	35.33%
Grass	19127	11.38%
Hard	72123	42.9%
Carpet	17491	10.4%
Sets		
5	24572	14.61%
3	143565	85.39%
Round		
Qualifying	19993	11.89%
Preliminary	123058	73.19%
Final	25086	14.92%
Match outcome		
Completed	163701	97.36%
Default	158	0.09%
Retirement	3560	2.12%
Unknown	10	0.01%
W/O	708	0.42%

Descriptive characteristics of W/O

Seven-hundred and eight (0.42%) W/O were recorded from 1973 and 2019. The proportion of W/O was higher in the Masters 1000 matches (0.55%), followed by 250 or 500 tournaments (0.45%) (Table 2). The IP was 0.0042 (95%CI: 0.0039-0.0045) W/O per scheduled match. For 1000 scheduled matches, 4.2 would not be played due to a W/O.

The Figure 1 shows the temporal evolution of W/O in ATP tournaments, showing a maximum IP in 1973, decreasing on the following years and increasing again from 1990 to 2019.

Table 2. Descriptive characteristics of matches and professional players in W/O.

Variable	W/O	
	Yes N=708	No N=167429
Tournament level		
Grand Slams	60 (0.21%)	28234 (99.8%)
Masters	129 (0.55%)	23184 (99.4%)
250 or 500	518 (0.45%)	115570 (99.6%)
Tour Finals	1 (0.23%)	441 (99.8%)
Surface		
Clay	200 (0.34%)	59196 (99.7%)
Grass	75 (0.39%)	19052 (99.6%)
Hard	323 (0.45%)	71800 (99.6%)
Carpet	110 (0.63%)	17381 (99.4%)
Sets		
5	51 (0.21%)	24521 (99.8%)
3	657 (0.46%)	142908 (99.5%)
Round		
Qualifying	65 (0.33%)	19928 (99.7%)
Preliminary	454 (0.37%)	122604 (99.6%)
Final	189 (0.75%)	24897 (99.2%)
Age difference	3.86(Q1:1.85-Q3:6.11)	3.55 (Q1:1.66-Q3:6.09)
Ranking difference	38 (Q1:17-Q3:73)	51 (Q1:23-Q3:104)

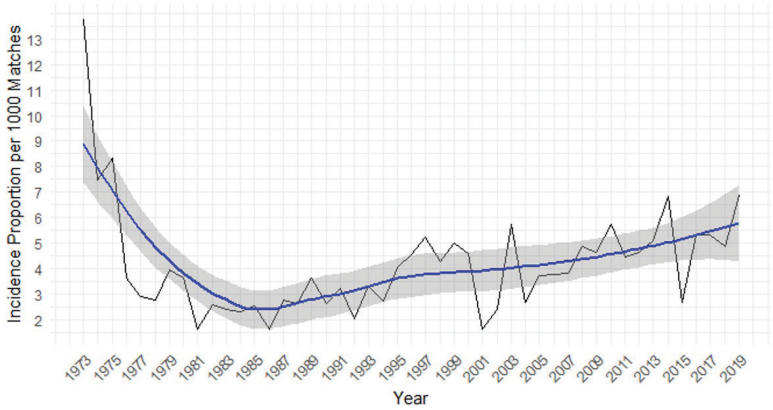

Figure 1. Temporal trend of W/O incidence proportion in ATP matches (1973-2019).

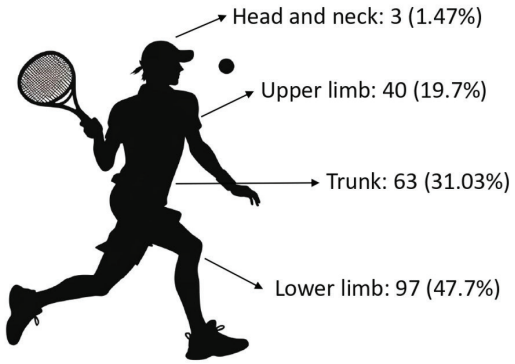

Figure 2. Distributions of body areas affected by injuries that caused a W/O.

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Main causes of the W/O were related to injuries (203; 28.67%), to illnesses (55; 7.77%) and to personal reasons (18; 2.50%). In the remaining 432 cases (61.01%), the reasons were unknown. Regarding these injuries, the most body areas affected were the lower limbs (47.78%), trunk (31.03%) and upper limbs (19.70%) (Figure 2).

Epidemiology measures of W/O

The highest incidence proportion (IP) of walkovers was observed in Masters tournaments (5.53‰; 95% CI: 4.62–6.57), followed by ATP 250/500 (4.46‰; 95% CI: 4.09–4.86). In terms of playing surface, carpet courts had the highest IP (6.29‰; 95% CI: 5.17–7.57), while clay courts showed the lowest (3.37‰; 95% CI: 2.92–3.87).

Regarding match format, best-of-3-set matches had an IP of 4.58‰ (95% CI: 4.23–4.94), compared to 2.08‰ (95% CI: 1.55–2.73) for best-of-5-set matches, with a risk difference (RD) of 2.50‰ (95% CI: 1.83–3.17). Similarly, matches in the final rounds had a higher IP (7.53‰; 95% CI: 6.50–8.68) than those in qualifying rounds (3.25‰; 95% CI: 2.51–4.14), with an RD of 4.28‰ (95% CI: 2.95–5.61).

In terms of cumulative incidence ratio (CIR), Masters tournaments had a CIR of 2.61 (95% CI: 1.92–3.54) when using Grand Slam events as the reference (CIR = 1), indicating a 161% higher relative incidence of walkovers. Matches played on carpet had a CIR of 1.87 (95% CI: 1.48–2.36) compared to clay (CIR = 1), reflecting an 87% increased risk. Final round matches also showed a CIR of 2.32 (95% CI: 1.75–3.07), meaning more than twice the risk compared to qualifying rounds.

Table 3. Incidence proportion (IP); cumulative incidence rate (CIR), risk difference (RD) and confidence interval (95%CI) of W/O in ATP matches by tournament level, surface, number of sets, and match round.

Variable	WalkOver	Matches	IP (95%CI)	CIR (95%CI)	RD (95%CI)
Tournament level					
Grand Slam	60	28294	2.12 (1.62- 2.73)	1	0
Master	129	23313	5.53 (4.62- 6.57)	2.61 (1.92- 3.54)	3.41 (2.32- 4.51)
250 o 500	518	116088	4.46 (4.09- 4.86)	2.10 (1.61- 2.75)	2.34 (1.68- 3.00)
Tour Finals	1	442	2.26 (0.06- 12.54)	1.07 (0.15- 7.68)	0.14 (-4.32- 4.60)
Surface					
Clay	200	59396	3.37 (2.92- 3.87)	1	0
Grass	75	19127	3.92 (3.09- 4.91)	1.16 (0.89- 1.52)	0.55 (-0.45- 1.55)
Hard	323	72123	4.48 (4.00- 4.99)	1.33 (1.12- 1.59)	1.11 (0.44- 1.79)
Carpet	110	17491	6.29 (5.17- 7.57)	1.87 (1.48- 2.36)	2.92 (1.66- 4.18)
Sets					
5	51	24572	2.08 (1.55- 2.73)	1	0
3	657	143565	4.58 (4.23- 4.94)	2.20 (1.66- 2.93)	2.50 (1.83- 3.17)
Round					
Qualifying	65	19993	3.25 (2.51- 4.14)	1	0
Preliminary	454	123058	3.69 (3.36- 4.04)	1.13 (0.88- 1.47)	0.44 (-0.42- 1.30)
Final	189	25086	7.53 (6.50- 8.68)	2.32 (1.75- 3.07)	4.28 (2.95- 5.61)

Multivariable analysis of W/O

The multivariable analysis using a logistic regression model to assess the risk factors associated with walkovers in ATP Tour matches is presented in the Table S4 in the Supplementary Material. The variables that remained significantly associated with the risk of W/O in the final model were tournament level, match round, and year. The corresponding OR with 95% confidence intervals are shown in Figure 3.

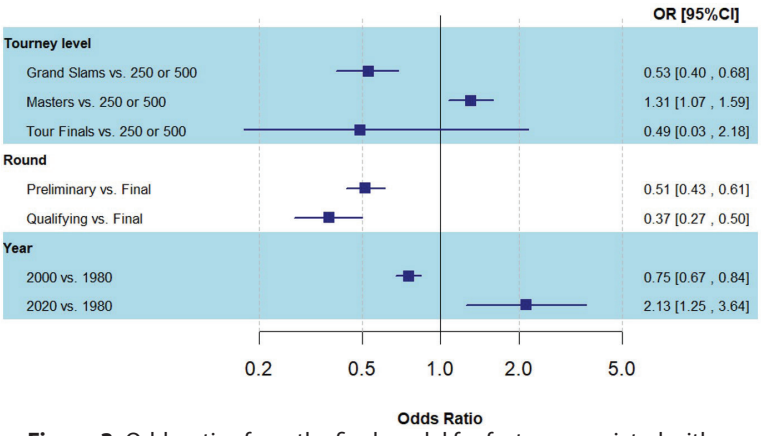

Figure 3. Odds ratios from the final model for factors associated with walkovers in ATP matches.

Regarding tournament level, the odds of a W/O were significantly lower in Grand Slam tournaments compared to ATP 250 or 500 events (OR = 0.53; 95% CI: 0.40–0.68), and significantly higher in Masters tournaments (OR = 1.31; 95% CI: 1.07–1.59). Concerning match round, walkovers were significantly less frequent in preliminary (OR = 0.51; 95% CI: 0.43–0.61) and qualifying rounds (OR = 0.37; 95% CI: 0.27–0.50) compared to finals. Finally, temporal variation showed a notable trend: compared to 1980, the odds of a walkover slightly decreased in 2000 (OR = 0.75; 95% CI: 0.67–0.84), but increased significantly by 2020 (OR = 2.13; 95% CI: 1.25–3.64), indicating an overall growing probability of walkovers over the last decades.

Discussion

The objective of this study was to describe the W/O of all ATP tournaments between 1973 and 2019. Despite previous epidemiological studies about non-completed ATP matches (i.e., medical reasons) have also included W/O in their analysis, this is the first study that analyse specifically the W/O and the factors that may cause or influence them.

The W/O IP reported in this research was 4.2 per 1000 matches. Some studies have been found regarding analyses of W/O and retirements, under the term "medical retirement". For example, Neri-Fuchs et al. (Néri-Fuchs et al., 2023) reported an IP of 3.800 (95%CI: 3.799–3.801) per 100 exposures in ATP and WTA matches and Jayanthi et al. (Jayanthi et al., 2009) reported an incidence rate of 15.6 per 1000 matches in the youth tournaments in the United States Tennis Association (USTA). It is noteworthy to consider that the relatively low incidence of W/O in professional athletes might be influenced by various factors. In comparison with amateur and lower-level competitions, where a player's W/O may have minimal consequences, W/O in professional tennis tournaments can significantly affect a player's ranking points and prize money. Additionally, potential repercussions related to sponsorship contracts may also play a role. These combined factors could encourage players to make greater efforts to compete despite injuries or other conditions, thereby reducing the incidence of W/O observed in our study. Moreover, a well-managed training and competition load by professional support teams may further contribute to this lower occurrence. Concerning retirements, Breznik et al. (Breznik & Batagelj, 2012) reported a frequency of 2.57% of retirements in ATP tournaments and Hartwell et al. (Hartwell et al., 2017) an incidence rate of 2.59 per 1000 matches (95%CI: 1.68-3.5) in the 2013 USTA Pro Circuit. As important note to clarify, retirements and W/O are two different situations that can occur throughout a professional tennis tournament. Despite these cases are caused by similar reasons (i.e., injury or illness), they have different consequences that might affect the player's decisions; in W/O, the player that retires before the beginning of the match gets the economical and the ranking compensations related to the development of the tournament so far, before the scheduled game. By the other hand, after a retirement, the player not only gets the economical and ranking classification until the moment of the game, but also gets the economical and ranking classification of that match (ATP, 2024). As a practical example, if the Greek player Stefano Tsitsipas had retired before the 2023 ATP Finals match against Holger Rune, he would have received 162.750 dollars. Instead, by the only fact of just presenting himself on court and playing the first game gave him the right of an economic compensation of 244.125 dollars (a difference of 81.375 dollars) (Un paseo a cambio de 81.375 dólares, 2023). This clarifies the difference between the occurrence of these situations and reinforces the findings in the present study (W/O, 0.42 %; retirements, 2.12 %).

Furthermore, it is notable that W/O are relatively rare in the first round of tournaments, as players who fail to appear for their initial match are typically replaced by lucky losers (LL) – players who lost in the final round of the qualifying stage and are available to compete on the day of the first round of the main draw. Consequently, the points and prize money allocated to players in the first round are instead awarded to those in the second round, while players who W/O in the first round are replaced by other competitors and do not receive any points or prize money. Following this line, Jayanthi et al. reported that match congestions, physical and mental fatigue played an important role regarding medical retirements, existing differences between the incidence rates on the first four matches (6.3 per 1000 match) and after de the fourth match (16.7 per 1000 match) (Jayanthi et al., 2009). These indicators highlight the importance for coaches, players and organizers to be aware to possible W/O as competitors continue moving forward to the final rounds, especially if they have shown any signs of injury or disability during the tournament.

When analysing the cause of W/O, injuries were the main factor that caused them, followed by illnesses. The same results were reported in previous investigations in tennis players (Hartwell et al., 2017). It should be noted that the cause of W/O began to be reported in 2001; between 1973 and 2000, no data on the cause of W/O were available.

Injuries related with W/O were mainly reported in the lower limbs (47.7%), followed by trunk (31.03%) and upper limbs (19.7%). These findings are consistent with previous investigations in elite tennis players, were the most injured areas were the lower limbs (IP: 1.59; 95%CI: 0.87-2.30), upper limbs (IP: 0.84; 95%CI: 0.32-1.35) and trunk (IP: 0.75; 95%CI: 0.26-1.24) (McCurdie et al., 2017; Hartwell et al., 2017; Maquirrain et al, 2016)

This research notes that the risk of a W/O was higher in 3-set matches comparing with 5-set matches. If we consider that best-of-5-set matches are played at Grand Slams tournaments in which the economical rewards are considerably higher and more ranking points are earned, could explain the willingness of the players to participate in these kinds of matches, despite not being in optimal physical conditions. Even so, taking into consideration the tight calendar that tennis players must face every year, that they manage and organise their participations to arrive on their best conditions to these aforementioned tournaments (Grand Slams). Regarding playing surfaces, carpet courts had a greater proportion of W/O, with an IP of 6.29 (95%CI: 5.17-7.57) per 1000 matches, followed by hard courts 4.48 (95%CI: 4.00-4.99). Similarly, studies examining player retirements have reported a higher prevalence of injuries on hard courts compared to grass or clay surfaces due to constant rapid movements (i.e., accelerations and decelerations) which leads to higher rates of stress and strain in the player's muscles (Oliver et al. 2024).. Despite these associations (between injury rates and surface types) it is important to note that W/O are determined before the match begins, thus potentially limiting the influence of surface type on physical demands during the game. Some studies have explored the relationship between injury occurrence and playing

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surfaces in tennis. For instance, research indicates that male tennis players have a significantly higher risk of injury compared to their female counterparts, with a reported fourfold increase in injury likelihood (95% CI: 1.57-18.65) (Hartwell et al., 2017).

Another factor related with W/O is the tournament round, the final rounds got a 2.32 (95%CI: 1.75-3.07) chance of having a W/O, comparing with classification matches. That fact could be related with the match congestion, as reported with Jayanthi et al. (Jayanthi et al., 2009), stating that the medical related retirements had a incidence rate of 6.3 per 1000 match exposures on the first four matches of a tournament and 16.7 after the fourth match.

Finally, reported W/O are increasing over last years, concurring with other studies like Néri et al (Néri-Fuchs et al., 2023), were the retirements increased after 2000 or Okhlom et al. (Okholm Kryger et al., 2015), who reported an increase of injury proportion among tennis player from 50% to 65% between 2003 and 2012; and Oliver et al. (Oliver et al., 2024) documented an approximately 50% increase in global injury incidence on the ATP tour between 2006 and 2014. Probably, there could be a combination of factors behind this increasing trend. First, professional tennis has evolved from a primarily technical-tactical sport into one characterized by intense physical demands, requiring players to sustain high-intensity efforts and frequent force exertion. Second, the increasingly demanding tournament calendar, coupled with extensive international travel to accumulate ranking points, places substantial physical and psychological stress on players. Third, the rise in reported W/O may reflect heightened awareness among athletes regarding injury prevention and mental health. This growing awareness enables players to better recognize when they are not in optimal condition and withdraw from competition to protect their health. A notable example is Naomi Osaka, who withdrew from the round of 64 at Roland Garros in 2021 due to mental health concerns ('La tenista Naomi Osaka se retira de Roland Garros en medio de la controversia con los medios sobre su salud mental', n.d.). Additionally, the publication of an international consensus in 2009 for the definition and registration of injuries and illnesses in tennis (Pluim, 2014; Pluim et al., 2009) may have contributed to increased reporting and better tracking of medical-related retirements and W/O, thereby influencing the observed trend. To counter this upward trend, the implementation of targeted preventive strategies could be essential. To counter this upward trend, the implementation of targeted preventive strategies could be essential. These may include individualized load management programs, improved periodization of training and competition, and enhanced recovery protocols tailored to the unique physical demands of modern tennis. Moreover, promoting mental health resources and providing psychological support services within the professional circuit may enable athletes to manage stress and burnout more effectively. Integrating these preventive approaches could help maintain player health and performance while potentially reducing the incidence of W/O and injury-related withdrawals.

The results of this study may offer helpful guidance for ATP tournament planning and player support strategies. Adjustments such as optimizing match scheduling, ensuring adequate rest between rounds, and implementing surface-specific preventive measures could contribute to reducing the occurrence of W/O in professional men's tennis. While our analysis focused on external match-level factors, future research should incorporate player-level variables, such as match duration or recovery time, which were not available in our dataset. Comparative insights from ongoing research in WTA tournaments may also help identify sex specific patterns and guide tailored prevention strategies.

Limitations

The present study is the first to analyse W/O in professional tennis; therefore, the results cannot be directly compared with existing literature. The study relied on publicly available, de-identified data from official ATP sources, and no individual-level health or personal information was used. However, the analysis lacks access to more granular data such as player-specific conditions (e.g., match context, accumulated fatigue, travel stress, or medical reasons for W/O), which would allow for a deeper understanding of potential mechanisms. Over the years covered by the analysis, several changes in ATP rules have occurred, potentially influencing both the frequency and nature of W/O. These include modifications in tournament categories and ranking systems, the gradual introduction of final set tiebreaks, and variations in the types of balls used depending on the playing surface. Such changes may also affect key factors like the physical demands placed on players throughout competitions. Moreover, alterations in tournament structure and scoring formats could influence the psychological pressure experienced by athletes. The lack of data on the causes of W/O in ATP tournaments prior to 2001 limits the scope of our overall analysis. This gap in historical records prevents a thorough examination of long-term trends and hinders a full understanding of how W/O rates have changed over the course of ATP competition history. Therefore, interpretations of the results should be made cautiously. Future studies could address this limitation by investigating alternative sources, such as archived match reports, official tournament documents, historical media coverage, or data collected by tennis historians, to build a more complete dataset and support a more detailed longitudinal investigation.

Implications and Future Research

The findings of this study may inform policy discussions within professional tennis organizations. The ATP could consider implementing preventive strategies and monitoring systems to reduce the incidence of W/O, particularly in settings with elevated risk (e.g., specific tournament levels or match rounds). Options such as optimizing match scheduling, introducing minimum recovery periods, or reinforcing pre-match medical screening could be explored. While this study focused exclusively on men's ATP matches, future research should aim to investigate walkovers in WTA to identify sex-based differences in patterns, causes, and risk factors. Comparative analyses between ATP and WTA circuits could provide valuable insights to support the development of circuit-specific preventive strategies.

Moreover, although this study relied on publicly available match-level data, future research would benefit from incorporating player-level covariates, such as prior match duration, recovery time, or recent injuries, to improve model accuracy. Including such variables could help capture more nuanced aspects of physical strain, scheduling demands, and player decision-making. Access to more granular contextual data, including travel load or environmental conditions, would also be valuable to understand the multifactorial nature of W/O better.

Conclusions

This is the first investigation ever carried out describing Walkovers situations in professional tennis from the years 1973 to 2019 and analysing epidemiological patterns and associated factors. The IP was 4.2 per 1000 matches played. Non-completed matches are increasing in last years. W/O were more frequent in Masters tournaments and early rounds, suggesting that match scheduling and tournament structure may contribute to their occurrence. Injuries are the main factor that cause a W/O, especially regarding the lower limbs which entails that at the final rounds of the tournaments, is more likely that a W/O can be produced. W/O show a lower rate compared to retirements. Despite having similar causes, they should be studied separately as players bear different economical and sporting consequences (ranking points) that may affect in their decisions. Further studies about the decision making in tennis players taking a W/O must be performed. Taking into account the factors associated and the indicators that cause W/O situations, that this information may be interesting and helpful for players, coaches and tournament organizers, in order to avoid the potential causes and minimize the medical, economical and logistical effects of W/O in future tournaments.

Disclosure statement

The authors report no competing interests to declare.

Ethics statement

No ethical approval was needed for carrying out this research as all the information used and reported for analysis is freely available online.

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