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Stress Levels among Tennis Umpires: Differences by Gender, On-Court Position, Work Experience and Tournament Categories

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Abstract

The negative psychological issues that could negatively impact a professional career include psychological forms of stress. Threfore, the aim of this research was to examine differences in stress levels among professionals tennis umpires based on gender, on-court position, work experience, and the category of tournaments they officiate. The sample of participants was 92 referees (53 male and 39 female) licensed by the ITF, ATP and WTA. A special questionnaire was designed to assess stress, which will evaluate the attitudes in a specific situation during the officiating of tennis matches. Based on the analysis of the obtained results, it was established that there is a significant difference between the chair and line umpires in matters related to non-delegation for important matches (p=0.031) and criticism from laypersons (p=0.030), as well as a difference between participants of different levels of experience regarding the statement that officiating takes up a lot of time (p=0.025). In all other aspects, there were no differences between chair and line umpires, nor among umpires based on their length of service in officiating or their representation in judging different categories of tournaments. These findings indicate that, in most aspects determining the level of stress, there is no difference concerning different categories of umpires. In other words, tennis umpires experience a similar level of stress regardless of their officiating experience or the level of competition they officiate, and there is no difference based on gender or the position of chair or line umpire.

Keywords: *chair umpire, line umpire, questionnaire, stress, tournaments*

Introduction

In sports games, referees have a responsibility to make sure that players and teams always follow the rules that are specific to their sport and to step in when a team or player breaks a rule (Reilly & Gregson, 2006; Rullang et al., 2017). As a result, the game's referee must be mentally sharp, focused, and highly motivated. Tennis, like many other sports, relies heavily on human decision-making. This is because certain line umpires' decisions can be questionable, if not erroneous (Teixeira da Silva, Carboch, & Deutscher, 2024). In tennis events that allow for line call challenges, an artificial intelligence-based referee, known as electronic line calling (ELC), resolves the challenge, and the chair umpire announces the outcome. Line umpires observe the game from various angles; they positioned directly on the axis of every line. The quantity and position of line umpires on a court vary depending on the prominence of a competition (Carboch Vejvodova, & Suss, 2016).

A referee must be able to control their anxiousness and have a low degree of it (Putra, 2017). The degree of anxiety is influenced by a variety of variables, including experience

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and ability level (Martínez-Gallego et al., 2022). In charge of the game, referees experience stress (Agyei, 2019). A person's ability to concentrate is their capacity to narrow their attention and mental concentration to the information that is crucial to their performance as the game's leader (Jannah, 2017). When focused, they will filter out information that does not help they perform and pay attention exclusively to pertinent data. The performance of the referee while in charge of the game will depend on how well they can regulate their high degree of emotion (Irawan et al., 2020). The negative psychological issues that could negatively impact a person's health and professional career include psychological forms of stress (Al-Haramlah, 2004). As a result, even while under pressure from players and fans, a referee must be able to manage his emotions. This referee is under pressure, and as a result of losing focus while in charge of the game, stress symptoms may affect his judgment (Julian, 2020).

When discussing sources of stress in sports, we refer to physical or mental errors made while officiating, anticipating criticism or reprimands from the coach, witnessing players act inappropriately, feeling pain or injury, a poor referee's decision, seeing an opponent perform well, and poor performances brought on by inclement weather or by the distraction of the audience (Anshel & Kassidis, 1997). Stress is an element that goes along with sports officiating, both for referees and line umpires, since they have a big obligation to make sure the game goes off without issues and uncertainties (Hadi, 2019). High sympathetic nervous system activation, sometimes known as the "fight or flight" reaction, can cause undesirable psychological changes in sports umpires who are under psychological stress. This high level of arousal is frequently not essential to cope with micro-stressors and daily challenges, but it is the response pattern observed in humans, which results in health problems frequently linked to high levels of stress (Haramlah & Ahmad, 2016).

Due to the fast-paced nature of these sports and the high level of tension present during play, decisions on whether the ball will land within or outside the field line must be made with care and accuracy. Umpires can experience a great deal of stress when making decisions or in trials during these games (Larkin et al., 2011). Umpire's physical state affects their judgment while making decisions. Umpires must also be in good physical shape in addition to having the necessary competence, knowledge, and communication skills (Fikri, 2018). Poor physical condition and psychological health brought on by the umpire's nervousness might impede focus and have an influence on decision-making. To ascertain whether there is a connection between anxiety and focus on the tennis chair umpire, this study was carried out. Umpire's job demands him to constantly deal with external pressure, and the strain he feels could lead to stress symptoms that may affect his ability to judge. One of the stress elements, such as fear of failure, fear of physical aggression, moments of problems, and interpersonal conflict, leads to incorrect umpire decisions (Julian et al., 2019). Game knowledge, decision-making abilities, psychological skills, strategic skills, communication or field control, and physical condition are all necessary for effectiveness as a umpire (Feltz, 2011). Umpires' failings during a game might result from a variety of situations, including excessive levels of emotion that they are unable to regulate themselves (Irawan et al., 2020). The umpire feels stress as a consequence of this pressure, which might further impair his ability to make the "right" choice (Julian, 2020) due to a loss of focus when officiating the game. According to Jatra and Fernando (2019), an effective umpire on the field is one who can ensure that the game is played safely and without any player objections. Decisions must be based on fair play, good sportsmanship, objectivity, and consistency (Kodrat et al., 2020) and the most crucial aspect of a umpire's performance is both effectiveness and efficiency (Bloß et al., 2020). Further, officials' scores in these segments improved with increasing years of experience. As a result, the more time officials spend officiating, the higher their self-efficacy level (Teixeira da Silva, Carboch, & Deutscher, 2024).

An analysis of existing studies revealed research examining stress levels among umpires in other similar sports, such as table tennis (Al-Haramlah, 2016; Al-Haramlah, 2018) and volleyball (Nikolovski et al., 2024), but no studies were found specifically examining stress among tennis umpires. However, similar studies have been conducted with tennis umpires. For instance, Raibowo, Jatra, Prabowo, Nopiyanto, and Ilahi (2021) assessed anxiety and concentration among tennis umpires and found a connection between these parameters, indicating that as the level of anxiety increases, the concentration level of the umpire decreases. Additionally, Sivri (2023) studied self-confidence based on gender, age, and competition level and concluded that an increase in the time spent umpiring contributes to a higher level of self-confidence. A similar study was conducted by Grylls, Turner, and Erskine (2021), where the focus was also on assessing the self-confidence of umpires. While these are important psychological traits, they are not direct indicators of stress levels among umpires.

Understanding the differences in stress levels can provide valuable insights into the unique stressors faced by umpires and offer information for the development of targeted support mechanisms and interventions. Since, to the best of our knowledge, there is no existing study that examines stress levels among tennis umpires, this clearly highlights the need for such research. In this regard, the aim of this research was to examine differences in stress levels among tennis umpires based on gender, on-court position, work experience, and the category of tournaments they officiate.

The findings will provide important data on the stress levels of tennis umpires and contribute to the existing literature on stress among umpires in other sports. Additionally, this study will offer valuable information on how stress levels vary in relation to gender, on-court position, work experience, and tournament category level, in order to improve the understanding of the stress that umpires experience in different contexts. These data will be useful for developing targeted support measures and interventions, which will help reduce stress and improve the well-being of umpires, as well as their performance on the court.

Methods

Participants and procedures

The sample of participants consisted of professional tennis umpires who have at least one year of experience in refereeing tournaments of various categories licensed by the ITF, ATP and WTA organizations (Officiating Portal in 2023). The total sample of participants was 92 umpires (male umpires 53 (57.6%) and female umpires 39 (42.4%). This study was approved by the Ethics Committee of the University of Niš (Ref. No. 04-684/2) and was conducted under the Declaration of Helsinki.

According to the official list of umpires, we randomly selected 120 professional umpires, to whom we sent an electronic questionnaire via the ITF organization. Out of the 120 umpires of both genders, 92 completed the entire questionnaire within a month. Participants filled out the questionnaire electronically, and the survey was anonymous, meaning there was no need to provide personal data or an email address when accessing the questionnaire and answering the questions.

For further analysis, the umpires were grouped into subgroups based on gender (male and female), field position (chair and line umpires), tournament level categories they officiate (Futures, Challenger, Masters, and Grand Slam), and length of service categories (1-5, 6-10, 11-15, and over 16 years).

Measuring instruments

In line with the aim of the study, a specially designed questionnaire with ten items/questions (Q1-10) was used, created based on other questionnaires assessing stress levels (Al-Haramlah, 2016; Silva, 2004). These items were created to assess the level of stress among umpires based on their attitudes toward specific situations during tennis match officiating. The 10 items from the questionnaire are: Q1 - Making a wrong decision; Q2 - Loss of concentration during the match; Q3 - Verbal attack and insults by spectators or coaches; Q4 - Threats and verbal attacks by players; Q5 - Physical attack by players or coaches; Q6 - Not delegating to important matches; Q7 - Failure to recognize good refereeing by officials; Q8 - Matches that are physically exhausting; Q9 - Refereeing takes a lot of time for me; Q10 - Criticism by people who do not understand the rules at all. A 10-point Likert scale (1 to 10) was used for the responses, where a score of 1 means the given situation is not stressful at all, and a score of 10 means the situation is extremely stressful for you. The instrument, that is, the questionnaire that was constructed for the purposes of this research, has good internal consistency, that is, it has good reliability, which is shown by the Cronbach Alpha coefficient of 0.807.

Statistics

The data obtained after the applied survey of the umpires were processed by statistical packages that are part of the SPSS 20 software (SPSS Inc., Chicago, IL, USA). Descriptive data are expressed through frequencies and percentages, as well as through mean and standard deviation. Independent-samples t-test was used to determine differences in attitudes between genders and between line and head umpires. While the one-way ANOVA test was used to determine differences in attitudes between referees officiating at different categories of tennis tournaments, as well as in relation to different levels of refereeing experience. The level of significance was set at $p<0.05$.

Results

The results of the percentage statistics in table 1 indicated that, based on the number of years of work experience, the most represented category of studies is with up to five years of experience (44.6%), while this percentage significantly decreases with the increase in the number of years of experience, so that the lowest percentage was umpires in the age group of 16 and more years of experience (7.6%). Also, the downward trend depending on the age category in the percentage of umpires is present for both sexes individually.

Table 1. The numerical and percentage distribution of umpires based on their officiating experience, overall and by gender.

	1-5 age	6-10 age	11-15 age	16 > age
M (53/57.6%)	22/41.5%	20/37.7%	6/11.3%	5/9.4%
F (39/42.4%)	19/48.7%	10/25.6%	8/20.5%	2/5.1%
T (92/100%)	41/44.6%	30/32.6%	14/15.2%	7/7.6%

Notes. The values are presented in numbers and percentages (N/%); M - male; F – female; T – total.

The results of percentage statistics (table 2) indicated that the largest number of umpires judged the challenger category of tournaments (30.4%) and that the smallest number of umpires had experience judging Grand Slam tournaments (16.3%). Additionally, a similar percentage is present in both genders, with a higher number of Masters umpires among men (35.8%) compared to women (15.4%), while a higher percentage of women (23.1%) officiated Grand Slam tournaments compared to men (11.3%).

Table 2. The numerical and percentage distribution of umpires based on the category of tournaments they officiate, overall and by gender.

	Futures	Challenger	Masters	Grand Slam
M (53/57.6%)	13/24.5%	15/28.3%	19/35.8%	6/11.3%
F (39/42.4%)	11/28.2%	13/33.3%	6/15.4%	9/23.1%
T (92/100%)	24/26.1%	28/30.4%	25/27.2%	15/16.3%

Notes. The values are presented in numbers and percentages (N/%); M - male; F – female; T – total.

Table 3 presents the percentage of umpires divided according to their roles as Chair and Line umpires. It is notable that the distribution was made on a personal basis, with 46.7% being Chair umpires and 53.3% being Line umpires.

Based on the results in table 4, we can see that in general there are no gender differences in the attitudes of the entire sample of participants. Also, based on the results of determining the differences between chair and line umpires, chair umpires experienced a significantly higher level of stress regarding non-delegation for important matches compared to line umpires ($p=0.031$). Additionally, line umpires were more concerned about criticism from people who do not understand the rules at all ($p=0.030$). In the remaining eight statements, there were no differences between the groups based on their on-court position.

Table 3. The numerical and percentage distribution of umpires based on their position, overall and by gender.

	Chair Umpire	Line Umpire
M (53/57.6%)	27/50.9%	26/49.1%
F (39/42.4%)	16/41.0%	23/59.0%
T (92/100%)	43/46.7%	49/53.3%

Notes. The values are presented in numbers and percentages (N/%); M - male; F – female; T – total.

Table 4. Gender differences and position variations among tennis umpires

Q	Total	Gender differences results			Difference in positions of umpires		
		Male	Female	p	Chair Umpire	Line Umpire	p
Q1	5.34±2.23	5.49±2.28	5.13±2.18	.444	5.33±2.29	5.35±2.20	.964
Q2	5.08±2.15	5.25±2.24	4.85±2.03	.382	4.95±2.18	5.18±2.14	.611
Q3	4.77±2.29	4.81±2.31	4.72±2.29	.848	4.81±2.31	4.73±2.30	.870
Q4	4.90±2.28	5.08±2.24	4.67±2.33	.398	4.88±1.98	4.92±2.53	.942
Q5	4.84±2.29	4.85±2.42	4.82±2.13	.953	4.79±2.13	4.88±2.44	.857
Q6	5.90±2.34	6.08±2.37	5.67±2.31	.411	6.47±2.37	5.41±2.22	.031*
Q7	5.49±2.18	5.72±2.12	5.18±2.23	.244	5.79±2.17	5.22±2.17	.215
Q8	5.09±1.90	5.08±1.81	5.10±2.05	.947	4.81±1.99	5.33±1.81	.199
Q9	5.01±2.65	5.08±2.67	4.92±2.67	.787	5.35±2.87	4.71±2.44	.255
Q10	4.79±2.81	5.13±2.82	4.33±2.77	.179	4.12±2.79	5.39±2.71	.030*

Notes. The values are presented in mean and standard deviation (M±SD); Q – questions; p - p-value; * - p<0.05.

Table 5. The difference in the representation of umpires by length of service in officiating.

Q	1-5 age	6-10 age	11-15 age	16> age	p
Q1	5.66±2.28	5.10±2.06	5.36±2.34	4.43±2.57	.509
Q2	5.71±2.28	4.67±2.02	4.36±1.91	4.57±1.62	.084
Q3	5.24±2.54	4.27±1.96	5.14±2.25	3.43±1.40	.112
Q4	5.41±2.48	4.43±2.05	5.07±2.16	3.57±1.51	.120
Q5	5.54±2.13	4.27±2.18	4.50±2.53	3.86±2.41	.061
Q6	5.95±2.02	5.97±2.71	5.43±2.50	6.29±2.43	.853
Q7	5.68±2.20	5.30±2.44	5.07±1.64	6.00±2.00	.700
Q8	5.07±1.94	5.23±2.06	5.00±1.96	4.71±0.76	.926
Q9	4.10±2.11	5.93±2.92	5.50±2.50	5.43±3.41	.025*
Q10	5.46±2.73	4.40±2.76	4.14±2.96	3.86±2.85	.217

Notes. The values are presented in mean and standard deviation (M±SD); Q – questions; p - p-value; * - p<0.05.

Table 6. The difference in the representation of umpires officiating different categories of tournaments.

Q	Futures	Challenger	Masters	Grand Slam	p
Q1	5.58±1.74	5.07±2.37	5.64±2.33	4.93±2.58	.657
Q2	5.83±2.12	4.50±1.93	5.24±2.26	4.67±2.19	.127
Q3	5.42±2.62	4.43±2.20	4.96±2.30	4.07±1.71	.251
Q4	5.50±2.54	4.89±2.35	4.72±2.13	4.27±1.91	.400
Q5	5.29±2.26	4.61±2.54	5.04±1.93	4.20±2.43	.466
Q6	6.29±1.76	5.18±2.34	6.64±2.27	5.40±2.92	.087
Q7	5.33±2.35	5.00±2.31	6.20±1.96	5.47±1.85	.242
Q8	5.13±2.21	4.89±1.69	4.88±1.56	5.73±2.28	.514
Q9	4.38±1.88	4.61±2.30	5.16±3.02	6.53±3.25	.068
Q10	5.00±2.81	4.82±2.78	4.76±2.55	4.47±3.46	.954

Notes. The values are presented in mean and standard deviation (M±SD); Q – questions; p - p-value.

Based on the results from Table 5, differences related to refereeing experience were observed in only one item, Q9 – "Refereeing takes up a lot of my time" (p=0.025), while no significant differences were found in the remaining nine items based on this criterion.

Based on the results in Table 6, there are no differences among participants across different tournament categories for any of the items.

Discussion

The aim of this research was to examine differences in stress levels among tennis umpires based on gender, on-court position, work experience, and the category of tournaments they officiate. Based on the analysis of the obtained results, it was established that there is a significant difference between the chair and line umpires in matters related to non-delegation for important matches (p=0.031) and criticism from laypersons (p=0.030), as well as a difference between participants of different levels of experience regarding the statement that officiating takes up a lot of time (p=0.025). In all other aspects, there were no differences based on gender or between chair and line umpires, nor among umpires based on their length of service in officiating or their representation in judging different categories of tournaments.

The results show that making incorrect decisions is a significant source of stress for umpires. Maintaining concentration during matches emerged as another important stressor for umpires. Our data suggest that both male and female umpires experience similar levels of stress. The study also found that not being assigned to important matches and not being recognized for their good judgment contribute to stress for umpires. These factors can affect umpire motivation and job satisfaction. The results indicate that certain stressors may become more pronounced as umpires gain more experience or officiate at higher-level tournaments.

In a study by Costa et al. (2010) on football referees, it was found that referees experience stress from making incorrect decisions, maintaining concentration during matches, and facing verbal attacks and insults from players and spectators. In line with these findings, we can see a connection in our study, where making incorrect decisions was rated highly on average, indicating a high level of stress. In our case, high values were also found for items related to criticism from people who are not familiar with the rules of tennis, as well as for not having their good officiating recognized by officials. Santos et al. (2021) found stress levels among football referees and discovered that female referees reported higher stress levels related to verbal and physical aggression compared to their male counterparts. These results are not consistent with our findings, as we found no differences in stress levels based on gender. This may indicate the need for a more detailed analysis of stress, which could be examined using a larger number of items.

Results from the study Al-Haramlah (2016) revealed that the most significant psychological stressor related to decision-making among table tennis umpires in the fourth championship of the Saudi universities was difficulty in having or accepting the refereeing crew's judgment due to excessive tension during the match, as well as a sense of anxiety and tension among umpires when making any decision to settle the results of the match in the final minute. Study Al-Haramlah (2018) that looked at psychological distress related to umpiring decisions, tennis referees experience psychological stressors associated with decision-making difficulties. Rizki et al. (2019) assessed the mental skills of 55 tennis umpires and found that umpires have excellent abilities using significant mental abilities, have very good aspects regarding goal setting, confidence, commitment, fear control, concentration, reduced ability to control and planning. Raibovo et al. (2021) research that studied the relationship between anxiety and concentration in chief technical referees. Results showed a high correlation coefficient (0.782) between the mentioned variables. Results from this study revealed that in matches concentration is crucial if it is disrupted it will result in problems especially if a tennis umpire is on duty and must make quick choices under pressure to see the ball fall. In accordance with this study, the umpires who were included in our study experienced a high level of stress when it came to a drop in concentration during the matches, but there was no difference between the groups in this parameter. In the study by Sivri (2023), no statistically significant difference was found in the levels of self-efficacy of officials based on gender, age, and position in the tournament. This corresponds to our findings that there were no differences based on gender, as well as position in the tournament. Mohammed (2008) was successful in exposing the psychological strains on the national football team's referees at the national level. Total number of 250 referees were employed in this study. The findings showed that there was a high degree of psychological strain among referees and that differences in psychological pressure among referees due to the level of arbitration and specialization, as well as the level of matches, age, and status in society, were not statistically different significantly. In the study (Voight, 2009) aim is to identify the sources of pressure and conflict-resolution tactics among the American football officials in charge, as well as the impact of these factors on their performance, professional happiness, and mental health. The investigation was carried out with 200 officials and referees. The outcome showed that the conflict between official requirements and club member requirements was the source of the greatest pressure. Therefore, it's critical to resolve conflicts between football referees and officials.

The strength of this study lies in the fact that it is the first research study to examine stress levels among tennis umpires, filling a significant gap in the existing literature. Notably, by conducting a detailed analysis of stress in relation to gender, on-court position, work experience, and tournament level, the study provides a comprehensive insight into the factors influencing stress in tennis officiating. This research expands theoretical knowledge on the impact of stress and contributes to the existing literature on stress levels among referees in other sports.

Despite the importance of this study, certain limitations should still be acknowledged. First, although the questionnaire was created based on previously existing questionnaires and demonstrated a high Cronbach's alpha, it should still undergo validation. Additionally, the questionnaire should include a greater number of items to more comprehensively assess the stress levels of referees. Furthermore, our study did not take into account various contextual factors, such as cultural differences or specific tournament pressures, which can significantly influence stress levels. Future research could consider incorporating these factors for a more comprehensive analysis. Moreover, research should address these limitations to further advance knowledge in this field.

Conclusion

The aim of this research was to examine differences in stress levels among tennis umpires based on gender, on-court position, work experience, and the category of tournaments they officiate. Our findings indicate that, the chair umpires experienced a higher level of stress regarding non-delegation for important matches compared to line umpires, while line umpires were more concerned about criticism from people who do not understand the rules at all. Additionally, differences related to refereeing experience were observed in only one item refereeing takes up a lot of my time. However, in most aspects determining the level of stress, there is no difference concerning different categories of umpires. In other words, tennis umpires experience a similar level of stress regardless of their officiating experience or the level of competition they officiate, and there is no difference based on gender or the position of chair or line umpire.

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Conflict of interest
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethics statement
The studies involving human participants were reviewed and approved by the Faculty of Sport and Physical Education, University of Niš (Ref. No. 04-684/2). The participants provided their written informed consent to participate in this study.

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