Original Investigation
DOI: 10.30827/ijrss

The relationship between tennis participation and wellbeing: a survey of 2287 adults

La relación entre la participación en tenis y el bienestar: una encuesta con 2287 adultos

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Received: 08-08-2024

Accepted: 24-12-2024

Abstract

Sports participation is associated with better wellbeing in adults. Despite its popularity globally, little is known about the relationship with tennis participation and wellbeing. We conducted a survey in the United Kingdom to understand the relationship between playing tennis and wellbeing in adults. A cross-sectional survey among healthy adults aged over 18 was conducted including tennis players and non-tennis players. Information was collected on sociodemographic, frequency of playing tennis, length played tennis for and a 10 item self-rated scale on State of Mind score (scored 0-100, higher scores=greater wellbeing). Data were analysed using mean and standard deviations, Kruskal-Wallis, Mann-Whitney and chi-square tests to compare groups as well as zero-inflated negative binomial models for the main analysis. Tennis players presented 13% higher scores than their peers (69 vs. 61; p<0.001). In the main analysis, playing tennis was associated with a higher state of mind (IRR: 1.10; 95%CI: 1.07-1.13). All the categories of years playing tennis had higher state of mind compared to non-players (0-5 years: 1.11; 1.07-1.16. 5-10 years: 1.08; 1.02-1.15. >10 years: 1.10; 1.06-1.13). Only the category of >1day/week of playing tennis was associated with higher state of mind compared to the group with <1 day/week (1.08; 1.04-1.12). Tennis players that trained regularly without competing, also presented higher state of mind scores compared to those playing tennis for fun (1.07; 1.01-1.13). In conclusion, our survey suggests that playing tennis is associated with higher wellbeing. Future large scale, prospective studies are required to understand the directionality of these findings.

Keywords: *Pickleball, projectile motion, strategy.*

Resumen

La participación en deportes de adultos es asociada con un mejor bienestar. A pesar de su popularidad a nivel global, se sabe poco sobre la relación entre la participación en tenis y el bienestar. Por lo tanto, se realizó una encuesta en Reino Unido para entender la relación entre jugar tenis y el bienestar en adultos. Se completó una encuesta transversal entre adultos saludables mayores de 18 años, la cual incluyó jugadores y no jugadores de tenis. La información recolectada estuvo relacionada con la sociodemogragfía, la frecuencia con la que jugaban tenis y por cuánto tiempo habían jugado. Adicionalmente, se incluyó una escala autoevaluada de 10 elementos sobre el estado de ánimo (de 0 a 100, mayor puntaje=mayor bienestar). Se analizaron los datos usando desviaciones media y estándar y las pruebas Kruskal-Wallis, Mann-Whitney y chi-cuadrado para comparar los grupos. También se utilizaron modelos binomiales negativos inflados a cero para el análisis principal. Los jugadores de tenis tuvieron puntajes un 13 % más altos que sus contrapartes (69 vs. 61; p<0.001). En el análisis principal, jugar tenis estuvo asociado con un mejor estado de ánimo (RTI: 1,10; 95 % IC: 1,07-1,13).

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Cite this article as:
Stubbs, B., & Werneck, A. (2024). The relationship between tennis participation and wellbeing: a survey of 2287 adults. *International Journal of Racket Sports Science, 6*(2), 9-16.

Todas las categorías de años jugando tenis tuvieron un mejor estado de ánimo en comparación a los no jugadores (0-5 años: 1,11; 1,07-1,16. 5-10 años: 1,08; 1,02-1,15. >10 años: 1,10; 1,06-1,13). Solo la categoría de >1 día/semana jugando tenis fue asociada con un mejor estado de ánimo en comparación al del grupo con <1 día/semana (1,08; 1,04-1,12). Los jugadores de tenis que entrenaron de manera regular sin competir también presentaron puntajes superiores en el estado de ánimo en comparación con los que jugaban tenis por diversión (1,07; 1,01-1,13). En conclusión, nuestra encuesta sugiere que jugar tenis está asociado con un mayor bienestar. Es necesario realizar estudios prospectivos a mayor escala para entender la direccionalidad de estos hallazgos.

Palabras clave: *tenis, deportes de raqueta, bienestar, salud mental, deporte.*

INTRODUCTION

There is an abundance of evidence that illustrates that engagement in physical activity promotes healthy ageing, reduces the risk of multiple long-term conditions and reduces the risk of a premature death (Daskalopoulou et al., 2017; Anderson & Durstine, 2019; Zhao et al., 2020). Further, physical activity engagement offers protection of cognitive decline and prevention of the onset of poor mental health or disorders (Iso-Markku et al., 2024 Schuch et al., 2018). Despite these benefits, large proportions of the population do not meet the recommended guidelines for physical activity for health (Bull et al., 2020).

Participation in sports is one way where individuals can attempt to master a sport, experience fun and often have social connection. There is good evidence that various forms of sports participation have multiple health benefits (Oja et al., 2015). A previous meta-analysis (Oja et al., 2015) investigated the health benefits of 26 sports on adults and found support that running, and football were associated with a range of physical health and fitness benefits. Substantially less research has considered the mental health and wellbeing benefits of sports participation. For instance, a recent systematic review on the mental health benefits of sports participation (Eather et al., 2023) found that there is emerging evidence for the mental health benefits of sports participation for adults but for most sports, limited conclusions could be made.

Worldwide, tennis is one of the most participated sports with an excess of 87 million people playing worldwide (International Tennis Federation [ITF], 2022). Despite the popularity of tennis, previous research is sparse on the health and wellbeing benefits of tennis participation on health and wellbeing. For instance, a previous systematic review (Eather et al., 2023) investigating all sports and mental health identified only one study that reported the wellbeing benefits of tennis. The study included 793 adults in Australia and focussed on multiple sports and suggested in their cross-sectional survey playing tennis is positive for mental health (Eime et al., 2014). An earlier systematic review on all health benefits of tennis did not identify any study that investigated the mental health benefits of tennis in the general population (Pluim et al., 2018). Despite the lack of published research, opinion pieces and media articles have repeatedly talked about the mental health benefits of tennis (Sayer, 2023).

Given the popularity of playing tennis, the potential to influence mental health and paucity of evidence to support this widely held claim, we set out to conduct a survey of tennis participation and wellbeing in adults in the United Kingdom (UK). Specifically, we sought to understand if playing to understand the potential association between playing tennis and wellbeing across genders, age groups and based on the tennis player characteristics (frequency of play and number of years playing tennis). Given the high levels of dropout from sports participation in adolescence, (Back et al., 2022) we also sought to understand how the reasons for playing tennis differed among those who dropped out of tennis during adolescence and those that did not

METHODS

A cross-sectional study design was developed, and data collected between April and June 2024. An a-priori minimum sample size of 1,000 adults was set. The survey adopted a naturalistic approach. There was not set quotient made for the number or proportion of people according to age, sex or type of tennis player. Healthy adult volunteers who were resident in the UK were invited to complete the anonymous survey via the secure survey platform Qualtrics. Participants were recruited via a snowball method online and via social media platforms (LinkedIn, X, Instagram). The inclusion criteria included people who had never played tennis or were tennis players (of any type, but not professional tennis players), residents in the UK, adults aged over 18 years of age and able to understand English. After reading the participant information sheet and people confirming they met the eligibility criteria, informed consent was taken, and University ethical approval was gained (MRA-23/24-43024). The survey was designed in line with GDPR regulations.

Sociodemographic information

Participants were asked to provide information on age (18-27, 28-43, 44-59, 60-69, 70-78, 79 and above) and gender (Male, female, non-binary or non-conforming, transgender, prefer not to say). Information on the geographic location in the UK was obtained (Regions in England: London, Northeast, Northwest, Yorkshire & Humber, West Midlands, East Midlands, East of England, South east, South West, Scotland, Wales and

Norther Ireland). For those in London, information was collected on the specific borough in London.

Wellbeing/ State of Mind measurement

An estimation of wellbeing was captured with a 10 item State of Mind measure (ASICS, 2024). The State of Mind measure asks participations to self-rate their feelings over the past month on a scale from 1-10, with 1=not at all and 10 = extremely. The 10 items include 1) felt in control; 2) felt relaxed; 3) felt content; 4) felt positive; 5) felt confident; 6) coping well with stress; 7) memory has been sharp; 8) felt calm; 9) felt focussed; 10) felt energised. Each item is weighted equally and the total for each item is added together producing a score ranging from 10 (lowest wellbeing) to 100) highest wellbeing). Whilst there is no universally agreed definition of wellbeing, it is generally considered to be a positive state of mind in life (Linton et al., 2016). A recent systematic review of 99 welbeing measures noted there is not a universally accepted or standardised tool, but the optimal measures should include a person's feelings, function and cognitive function (Linton et al., 2016). These are all factors which are included in the State of Mind Measure we used, although this has not been "validated" (there is no universally accepted and valid instrument for wellbeing).

Tennis participation

Participants were asked if they had every played tennis and those that had not were the comparison group. Tennis players were subsequently asked to rate how long they had been playing tennis (do not play tennis, 0-5 years, 6-10 years, >10 years), frequency of play (more than once a week, once a week, less than once a week) and type of player (competitive, trained regularly but do not compete, leisure player). Tennis players were also asked if they stopped playing tennis in their adolescence for any reasons. Tennis players were also asked to rate the reasons they played tennis (agree, neutral or disagree) across 15 items. The tennis players were compared to people who reported they had never played tennis.

Statistical analysis

Values were presented as medians and interquartile ranges or as relative frequencies, describing the outcomes according to the covariates. The Kruskal-Wallis test was used to assess potential differences among three or more groups, while the Mann-Whitney test was employed as a post hoc test for between-group differences and to evaluate differences between two independent groups. The chi-square test was used to detect potential differences between two groups or trends in frequencies. Zero-inflated negative binomial regression models were used considering that state of mind was zero-inflated, with a skewed distribution. Values were presented as incident risk rate, which can be interpreted as a percentage of outcome variation in case of a cross-sectional analysis. The significance level was set at $p < 0.05$. All analyses were conducted using the software Stata 18.0 (StataCorp, College Station, TX).

RESULTS

The sample was composed of 2287 participants (907 women), from which 9.8% were 18-27 years old, 30.9% were 28-43 years old, 43.9% were 44-59 years old, 12.6% were 60-69 years old, and 2.6% were 70-78 years old (Table 1). The total state of mind (SOM) score according to gender is presented in Figure 1 (panel A). Men presented with a 6% higher SOM score than women (67 vs. 63; p=0.026). Panel B from Figure 1 shows the state of mind scores according to age groups. The group aged 44-59 years (score = 66) presented higher scores than the groups aged 18-27 (score = 66) and 28-43 (score = 60), while the group aged 60-69 (score = 74) and 70-78 (score = 72) presented higher scores compared with the three younger groups.

Table 1.
Characteristics of the sample.

Variable	Category	n (%)
Gender	Male	907 (39.8)
	Female	1375 (60.3)
Age group	18-27	223 (9.8)
	28-43	705 (30.9)
	44-59	1004 (43.9)
	60-69	288 (12.6)
	70-79	64 (2.8)
Region	East Midlands	100 (4.4)
	East of England	120 (5.3)
	London	640 (28.1)
	North East	76 (3.3)
	North West	184 (8.1)
	Northern Ireland	44 (1.9)
	Scotland	100 (4.4)
	South East	416 (18.2)
	South West	260 (11.4)
	Wales	99 (4.3)
	West Midlands	136 (6.0)
	Yorkshire & Humber	76 (3.3)
	Missing	31 (1.4)

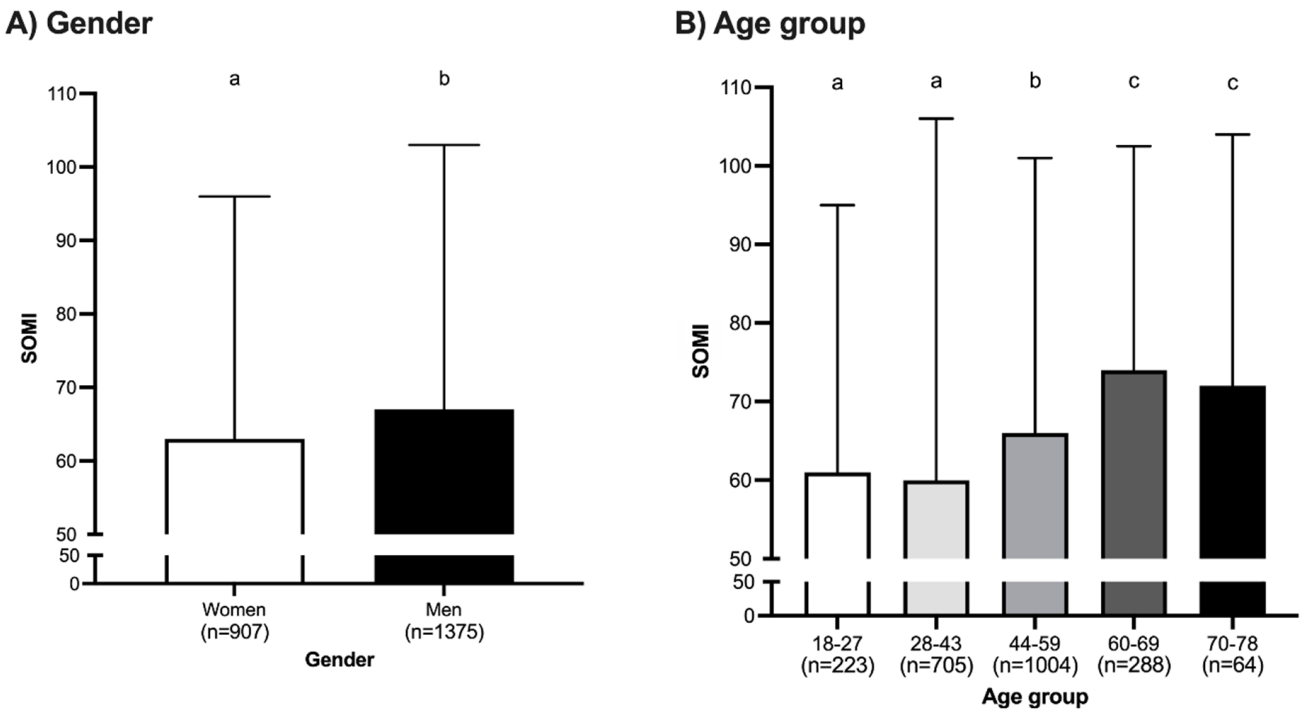

Figure 1. State of mind according to gender and age group.
Note. Different letters represent significant differences between groups.

Figure 2 shows state of mind scores according to tennis participation (panel A), frequency of playing tennis (panel B), years playing tennis (panel C), and type of tennis player (panel D). Tennis players presented 13% higher scores than their peers (69 vs. 61; p<0.001). There was a linear increase in the state of mind scores according to the frequency of tennis playing, with the group playing once a week presenting a 13% higher score than those playing less than once a week (69 vs. 61) and the group playing more than once a week (score = 71.5) presenting 4% higher scores than those playing once a week and 17% higher scores than those playing less than once a week. Considering how long the participants reported playing tennis, the groups playing tennis for 0-5 years (score = 70), 5-10 years (score = 69.5), and >10 years (score = 69) presented higher state of mind scores than those that never played tennis. Regarding the profile of tennis player, those that self-reported being a competitive tennis player (score = 71) and training regularly but not competing (score = 73.5) presented higher state of mind scores than those playing tennis for leisure (score = 64) and for fun (score = 61).

The reasons for playing tennis according to whether the participant have ever stopped playing tennis during adolescence are presented in Table 2. There was a higher frequency of agreeing that tennis makes the participant feel help, manage stress, improve self-care, enjoy playing, make or meet friends, helps optimize their routine, makes them feel part of a team, enjoy competing, and helps to stay in shape. Table 3 shows the reasons for playing tennis according to the frequency of playing tennis. There was a trend for increasing agreement according to the frequency of playing tennis for self-care, improving sleep, enjoying playing, mental wellbeing benefits, being part of the participants' life, make/meet friends, to improve routine, to be part of a team, to compete, to lose weight, to stay in shape and to make the most of the weather. The reasons for playing tennis according to whether the participants stopped playing tennis at adolescence or not are presented in Table 4. Participants that did not stop playing tennis at adolescence presented higher report agreement to feel happy, manage stress, self-care, enjoyment, make or meet friends, routine, to be social, competing and to stay in shape.

The association between playing tennis and related variables with state of mind are presented in Table 5. In the analysis adjusting for gender and age, playing tennis was associated with a 10% higher state of mind. The association was also consistent across all the categories of years playing tennis. Comparing with a frequency of playing tennis lower than weekly, only those practicing tennis at least twice a week presented higher state of mind (8%). In addition, comparing with the participants playing tennis for fun, only those training regularly but not competing presented higher state of mind (7% higher).

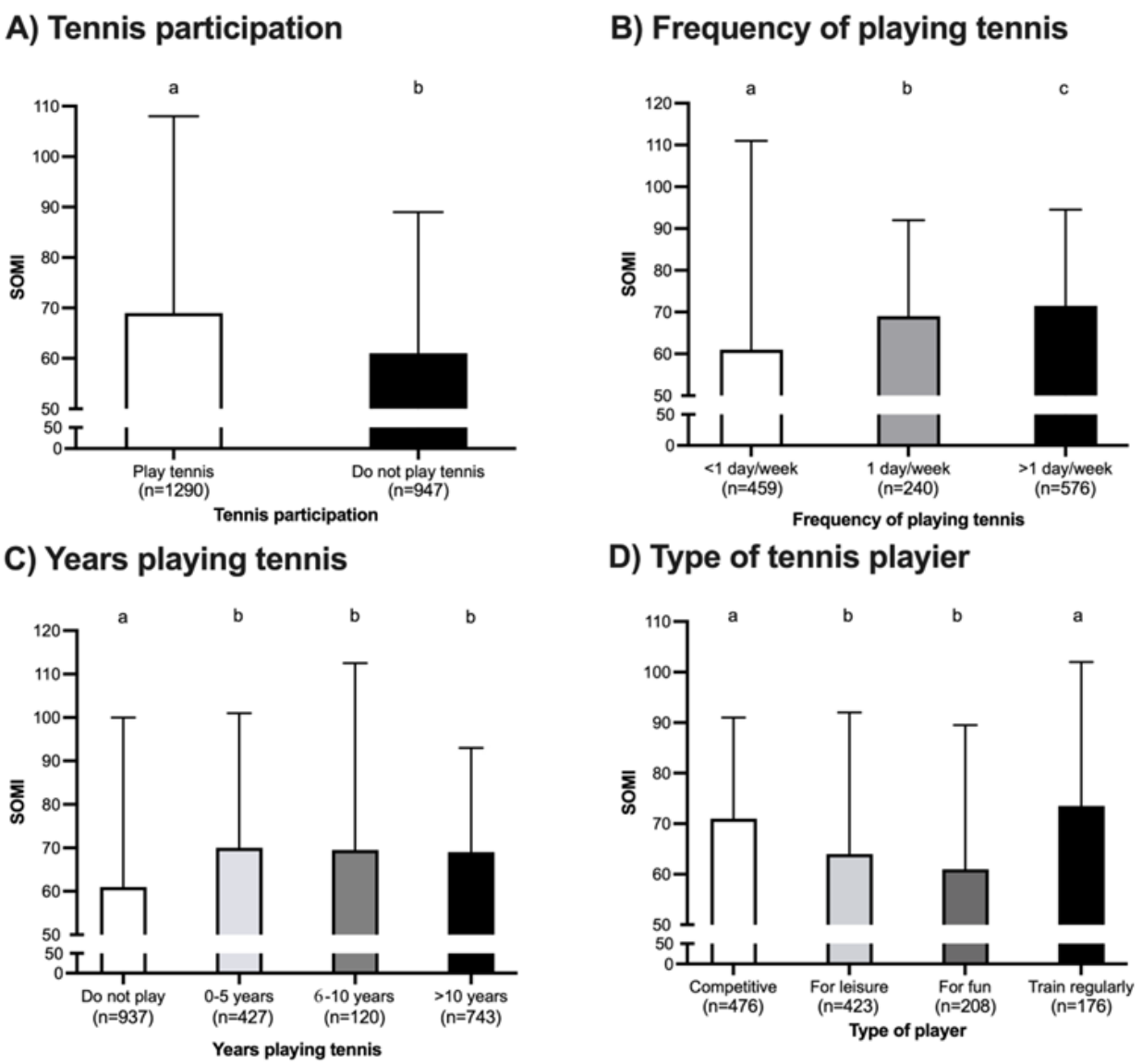

Figure 2. State of mind according to A) tennis participation, B) frequency of playing tennis, C) years playing tennis, and C) type of tennis player.
Note. Different letters represent significant differences between groups.

Table 2.
Reasons for playing tennis according to whether the participant have stopped playing tennis during adolescence

	Stopped (n=404)	Did not stop (n=771)	p
To feel happy	80.2	92.8	<0.001
To manage stress	56.4	63.4	0.021
For self-care	76.2	83.0	0.005
To improve my sleep	42.6	44.4	0.552
Because I enjoy playing	91.1	96.4	<0.001
For the physical health benefits	89.1	90.2	0.559
For the mental wellbeing benefits	81.2	82.5	0.592
Always been part of my life	48.5	51.6	0.313
To make/meet friends	54.5	64.9	<0.001
For routine & structure	45.5	54.7	0.003
To be social / part of a team	53.5	67.5	<0.001
To compete	47.5	59.4	<0.001
To lose weight	37.6	41.3	0.223
To stay in shape	72.3	81.4	<0.001
To make the most of the weather	59.4	55.3	0.186

Note. Values represent relative frequencies. p-value derived from chi-square.

Table 3.
Reasons for playing tennis according to the frequency of playing tennis

	Less than once a week (n=379)	Once a week (n=232)	More than once a week (n=556)	p
To feel happy	87.5	86.2	90.7	0.127
To manage stress	60.3	63.8	60.4	0.634
For self-care	73.9	79.3	86.3	<0.001
To improve my sleep	39.7	51.7	43.2	0.013
Because I enjoy playing	91.6	94.8	97.1	0.001
For the physical health benefits	88.5	93.1	89.9	0.179
For the mental wellbeing benefits	78.1	84.5	84.2	0.034
Always been part of my life	34.5	55.2	60.4	<0.001
To make/meet friends	43.6	70.7	69.8	<0.001
For routine & structure	30.3	53.5	65.5	<0.001
To be social / part of a team	46.7	63.8	73.4	<0.001
To compete	38.6	43.1	71.9	<0.001
To lose weight	34.5	37.9	44.6	0.006
To stay in shape	69.7	75.9	85.6	<0.001
To make the most of the weather	67.3	62.1	47.5	<0.001

Note. Values represent relative frequencies. p-value derived from chi-square for trend.

Table 4
Reasons for playing tennis according to whether the participants stopped playing tennis at adolescence

	Stopped (n=404)	Did not stop (n=771)	p
To feel happy	80.2	92.8	<0.001
To manage stress	56.4	63.4	0.021
For self-care	76.2	83.0	0.005
To improve my sleep	42.6	44.4	0.552
Because I enjoy playing	91.1	96.4	<0.001
For the physical health benefits	89.1	90.2	0.559
For the mental wellbeing benefits	81.2	82.5	0.592
Always been part of my life	48.5	51.6	0.313
To make/meet friends	54.5	64.9	<0.001
For routine & structure	45.5	54.7	0.003
To be social / part of a team	53.5	67.5	<0.001
To compete	47.5	59.4	<0.001
To lose weight	37.6	41.3	0.223
To stay in shape	72.3	81.4	<0.001
To make the most of the weather	59.4	55.3	0.186

Note. Values represent relative frequencies. p-value derived from chi-square for trend.

Table 5
Association between playing tennis and playing-related variables with state of mind

	Crude IRR (95%CI)	Adjusted IRR (95%CI)
Play tennis (Ref = no)		
No	REF	REF
Yes	1.09 (1.06-1.12)	1.10 (1.07-1.13)
Years playing tennis		
Do not play	REF	REF
0-5 years	1.08 (1.04-1.13)	1.11 (1.07-1.16)
5-10 years	1.09 (1.02-1.16)	1.08 (1.02-1.15)
>10 years	1.10 (1.06-1.13)	1.10 (1.06-1.13)
Frequency of playing tennis		
<1 day/week	REF	REF
1 day/week	1.03 (0.98-1.08)	1.02 (0.97-1.07)
>1 day/week	1.09 (1.05-1.13)	1.08 (1.04-1.12)
Type of tennis player		
Competitive	1.04 (0.99-1.10)	1.04 (0.99-1.09)
For leisure	0.97 (0.92-1.02)	0.96 (0.91-1.01)
For fun	REF	REF
Train regularly	1.08 (1.01-1.14)	1.07 (1.01-1.13)

Note. Adjusted for gender and age. Play tennis: n=2237. Years playing tennis: n=2237. Frequency of playing tennis: n=1275. Type of player: n=1283.

DISCUSSION

To the best of our knowledge, this is the largest study to attempt to understand the relationship between playing tennis and wellbeing in adults. They key findings are that participants playing tennis presented higher state of mind compared to participants that do not play tennis. This finding was consistent across all the categories of years playing tennis, while those playing at least twice a week presented higher state of mind scores compared to participants playing tennis less frequently than once a week. In addition, participants reporting training regularly presented higher state of mind compared to participants playing for fun.

This finding that playing tennis was associated with wellbeing is consistent with wider findings on sports participation and wellbeing. For instance, a recent systematic review found that playing sports in adulthood is associated with better wellbeing (Eather et al., 2023). A previous cross-sectional survey among 793 women who predominantly played tennis or netball, found a suggestion that playing tennis was associated with greater health related quality of life and life satisfaction, but no apparent dose response relationship was evident (Eime et al, 2014). Whilst it is not possible to determine this from cross sectional data, we found some evidence that the association

of a positive relationship with tennis and wellbeing was relatively stable regardless of length of time people had played or frequency people played tennis for. A number of other cross-sectional surveys have investigated multiple sports and wellbeing, including tennis, but have had small numbers of people playing tennis and not sought to understand the relationship between tennis and wellbeing specifically (Gerber et al., 2014; Sorenson et al., 2024).

The reasons why playing tennis may be associated with greater wellbeing are unclear. However, this could include many of the wider neurobiological factors that have been reported from general physical activity participation such as changes in inflammation, increased released of brain derived neurotrophic factor, reductions in cortisol and possible changes in key emotional processing areas of the brain in the short and long term such as the hippocampus (Kandola et al., 2019). The psychosocial potential mechanisms how tennis influences wellbeing could include influencing social support, a key factor that wider research has shown exercise can improve mental health (Kandola et al., 2019). Tennis is a social sport, and such interactions are known to promote better mental health (Eather et al., 2023). Tennis is also a sport that requires a relative high degree of skill and participation allows people to develop a skill, overcome challenges and work towards mastering this skill (Eather et al., 2023). We found relatively consistent wellbeing associations regardless of the type of player. One previous survey among tennis professionals did not find an association with playing tennis and mental health (Spring et al., 2020) and wider literature has often found high levels of poor mental health in elite athletes (Rice et al., 2016). Our study of benefits among competitive (but no professional players) suggests that such players whose career does not depend on the outcome continues to have a favourable association with wellbeing.

The findings of a potential difference in the reasons people play tennis among those that do and do not dropout from participation in adolescence is interesting. Previous research has consistently shown that dropping out of sport at this time is high and critical. We noted a trend for a higher frequency of playing tennis and a greater endorsement of playing tennis for self-care, improving sleep, enjoying playing, mental wellbeing benefits, being part of the participants' life, make/meet friends, to improve routine, to be part of a team, to compete, to lose weight, to stay in shape and to make the most of the weather. These measures are all typically associated with greater mental health and could play a role in helping people to remain engaged in tennis.

CONCLUSION

In this large survey, we found provisional evidence of an association between tennis participation and wellbeing. The findings were evidence across all types of players and regardless of the length of time people played tennis. We found some interesting findings of potential difference in the reasons why people play tennis among those who do and do not drop out of playing tennis during the critical adolescence period.

Limitations

Whilst some novel insights have been found, it is important that these are considered in the context of the various limitations of this study. First, the study is cross sectional, and it is not possible to understand the directionality of the relationship between tennis participation and wellbeing. Future research should adopt a prospective or interventional design to understand the association between tennis participation and wellbeing and relevant moderators or mediators of this relationship. Second, the measure of wellbeing, the State of Mind score, is not a validated measure. Future research should seek to clarify the results we identified. Third, some important information from the sample was not available. For instance, information on physical health, fitness and other sociodemographic information (e.g. income) were not available. Fourth, there was some skew in the age distribution (age 44-59 was overrepresented) which could limit generalisability. Future research should seek to implement quotas to align with the general population. Finally, we did not capture and could therefore not adjust for habitual physical activity levels. Future research should seek to provide a comprehensive understanding to account for health, fitness and other variables that might influence the relationship between tennis participation and wellbeing.

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