

## **Original Research**

# **Physical Risk and Benefits Associated with Pickleball in Active Aging Adults**

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### **Abstract**

**Background and Purpose:** Pickleball is an emerging racquet sport in aging active adult communities. While competitive and physically demanding sports are likely an important component in the continued health and quality of life (QoL), with aging comes an increased potential for injury. The fear of sustaining an injury while participating in physical demanding sports often leads to older adults curtailing their participation in these sports-related activities. By succumbing to the fear and reducing their exposure to physical challenges associated with these sports, older adults may subsequently forfeit the potential benefits to be gained from exercising at a high or strenuous level. The current study is a descriptive exploration of the perceptions of older adult related to the benefits and risks of playing pickleball related to injuries.

**Methods:** An online survey of 129 pickleball players from north Georgia age 50+ was conducted with age breakdown of 54% age 60-69, 32% age 70-79, and 14% age 50-59, and majority being male (57%).

**Results and Discussion:** Respondents were physically active individuals and dedicated pickleball players. Half (50%) have suffered a physical injury playing pickleball. Additionally, 90% of those injured said that their pickleball injuries did not negatively affect their lives and 85% reported that they do not worry about playing pickleball because of a fear of injury. Falls while playing pickleball were reported by 58% of respondents, yet only 6% reported falls not associated with pickleball ( $p < 0.05$  by Chi-Square). Although playing pickleball has an increased risk of injuries, the identified reduction in falls that occurred while not playing pickleball suggests a meaningful benefit of participating in physically demanding sports for the older adult.

**Conclusions:** The results of this study suggest that, although a substantial number of aging individuals experienced significant injuries while playing pickleball, nearly all believed that the benefits of physical activity and social interactions outweigh risk of injury. In fact, half of the respondents reported injuries while playing pickleball, but they did not report an associated fear that affected their choice to play. Despite a high number of on-court falls, the respondents reported less off-court falls than is expected for their age group. In light of the reported decreased number of off-court falls, the benefits of playing a physically demanding sport like pickleball may outweigh the risk of on-court injuries.

**Keywords:** Pickleball, Fall Prevention, Sports-Related Injury, Active Older Adult

## Introduction

By year 2035, predictions indicate that there will be more adults aged 65 and older in the United States (US) than people 18 and younger, due in part to an increased life expectancy (79 years), and a decline in birth rate in the US.<sup>1</sup> “Silver Tsunami” is a term that is used to describe the impact aging adults may have on the US economy and on our healthcare system. A palpable fear is developing that with the increased number of older adults, an unbearable financial strain will be imposed on younger citizens as older adults begin to outnumber younger people.<sup>1</sup>

Aging is a natural process of decline and not a pathology. Failure in aging, on the other hand, is a pathologic state, and includes disease, injury, and functional decline. Even though individuals age at a relatively standard rate, neither the timing nor severity of failure are predictable. In most cases, failure can be mitigated greatly as adults age. Healthy aging, as defined by the World Health Organization (WHO), is the process of maintaining functional ability that enables wellbeing in older age.<sup>2</sup> Health organizations including American College of Sports Medicine, US Dept of Health and Human Services, the Center for Disease Control and Prevention, and the World Health Organization advocate that adults, including older adults, participate in at least 150 hours per week of moderate-intensity purposeful physical activity (PA) or 75 minutes per week of an activity to a vigorous-intensity activity.<sup>3, 4, 5, 6</sup> Increasing exercise time to more than 300 minutes per week will increase the health benefits of PA.<sup>6</sup> Increasing the intensity of the activity to a vigorous activity, “that made you breathe harder or puff and pant”, has demonstrated an inverse dose-response relationship with all-cause mortality.<sup>7</sup> Reports estimate 28% of adults 50 and older do not engage in any purposeful PA outside of their daily activities.<sup>8</sup> Inactivity, defined as less than 30 minutes of PA a week, has been linked to higher risk of pre-mature death for adults aged 40 and older.<sup>9</sup>

Falling is a pathologic event that can occur as adults age. According to recent data, the CDC estimates that about 29% of older adults have at least one fall annually, with 38% of these falls resulting in the need to seek medical care or restrict normal activity (for 1 day).<sup>10</sup> In 2014, approximately 29 million falls occurred in the older adult

population and these falls caused 7 million injuries including wrist fractures, hip fractures, and traumatic head injuries.<sup>10</sup>

Pickleball is a popular racquet sport played by individuals of all ages but is especially popular in active aging communities and leagues where pickleball challenges tennis as the most popular racquet sport. There are over 3.3 million pickleball players in the US, with older adults making up 75% of core players.<sup>11</sup> While pickleball maintains many of the features of tennis, the smaller court size and less compliant ball and racquet for pickleball increase quick movement and direction changes during play. The high demand for quick action and reaction during a pickleball game puts the player at risk of falling or sustaining an injury.<sup>12</sup> Forrester, et al identified the majority of injuries from pickleball seen in the emergency department were primarily patients over the age of 50 with resulting sprains, strains, fractures and contusions mostly associated with the lower extremity.<sup>13</sup>

Although there is risk associated with playing pickleball, the literature suggests a potential positive role for pickleball in an older adult's health. Smith, et al reported that playing pickleball for 1 hour in a doubles match 3 x a week at a moderate-intensity (4.1 METs) showed improvements in cardiorespiratory fitness in middle-aged and older adults, including improvements in high-density and low-density lipoprotein cholesterol levels, systolic and diastolic blood pressures, and maximal oxygen uptake after 6 weeks of pickleball play.<sup>14</sup> Heo et al. reported that pickleball may have a positive effect on the psychological health, along with the physical health, of older adults.<sup>15</sup>

To date there are no studies that examine the risk-benefit ratio to older adults who play pickleball. The present study is a descriptive analysis of the relationship between the risks associated with pickleball to the benefits, as perceived by older adults, of continued play. Additionally, this study compares the incidence of on-the-court falls to falls that occur off-the-court. Might the benefits gain by older adults who play pickleball outweigh the risks associated with this competitive sport?

## **Methods**

Data were obtained using Qualtrics Survey Software online survey tool. Study participants were obtained randomly by open solicitation from two large Georgia pickleball communities, the Georgia Pickleball Association and the Cresswind Pickleball Club. Total combined membership of these two communities is estimated at approximately three-hundred-and-fifty individuals. An invitation to participate in the study, along with a link to the online survey, was posted on each association's website. Study participants voluntarily completed the online survey anonymously and without email tracking or incentive. Data were collected in the Qualtrics tool between the dates of October 10, 2018 through March 5, 2019. All surveys started were completed. Survey response is estimated to be approximately thirty-five percent (35%) of the solicited pickleball organization membership.

The survey was developed by the researchers and included inquiries about level, frequency, and duration of pickleball play. Survey construction included 28 items on one screen in Qualtrics, non-randomization of items and no adaptive question techniques were applied. Information was solicited regarding injuries sustained while playing pickleball and outside of playing pickleball including type and severity of pickleball-associated injuries. Along with general demographic information, questions were posed about the participants' general health, activity and exercise level, and quality of life perception. The survey was reviewed by the Institutional Review Board of the University of North Georgia and considered exempt from informed consent requirements due to less than minimal risk associated with survey participation. Participants were informed, before beginning the survey that responses were anonymous and only the results of compiled data are presented to the public.

## Results

### Respondents

Demographics of the 129 respondents are presented in Table 1.

**Table 1: Demographics of participants**

<b>Responses</b>	<b>Responses (N=129)</b>	<b>% of Responses</b>
Male	73	56.59%
Female	56	43.41%
Age Range: 50-59	18	13.95%
Age Range: 60-69	70	54.26%
Age Range: 70-79	41	31.78%
Age Range: >80	0	0.0%

The respondents to this survey represent primarily experienced pickleball players who play frequently. Most respondents reported playing pickleball for one year or more, 67%; and 80% of respondents played pickleball 2 or more times a week. Respondents appear to be highly active in addition to pickleball, with 63% respondents reporting “Other requirements in my life” as the primary factor limiting frequency of pickleball play. Seventy-five (75%) percent report regularly participating in purposeful physical activity or playing another sport other than pickleball.

Along with being highly physically active, the respondents of this study consider themselves healthy, and expressed that they correlate physical activity with being healthy. Most respondents rate their overall health as “Better than Average” or “Excellent”, 84%, with only 16% rating their overall health as “Average”. No respondents rated their overall health as “Lower than Average” or “Poor”. The main reason reported for playing pickleball was “To improve my health”, 36%, followed closely by “To become a better player”, 35%. (Table 2)

**Table 2: Reported motivating factors for playing pickleball**

<b>Responses</b>	<b>Responses (N=128)</b>	<b>% of Reponses</b>
“To improve my health”	46	35.94%
“To become a better player”	45	35.16%
“Social interactions”	26	20.31%
“To get out of the house?”	6	4.69%
“I like to play in tournaments”	5	3.91%

### **Injuries**

Of those surveyed, half of participants (50%) report having suffered an injury while playing pickleball with 39% of these having more than one injury. Less than half, 40%, report that their pickleball-related injuries prevented them from playing pickleball; however, overwhelmingly participants reported that pickleball-related injuries did not have a negative impact on their lives, 90%. In fact, interestingly only 15% of respondents worried “about playing pickleball because of risk of getting an injury”.

Most of the injuries, 68%, were described as “Acute” (Examples of acute injuries given in the question as examples, were bruises, sore muscles, or broken bones) as opposed to “Chronic” (examples of chronic injuries were back pain or tendonitis that continues on-and-on.). Most sought care at a “Doctor’s Office” for their Pickleball injuries. (Table 3)

**Table 3: Responses to where medical help sought**

<b>Responses</b>	<b>Responses (N=58)</b>	<b>% of Responses</b>
Doctor's office	31	53.45%
Emergency room or immediate care clinic	9	15.52%
Physical Therapist	6	10.34%
Chiropractor	6	10.34%
Other	6	10.34%
Total	58	100.00%

When asked about their fall history, only 7 respondents, 6%, reported a fall not associated with pickleball. Three of these falls occurred in the 60-69 age group and 4 occurred in the 70-79 age group. There were no falls reported in the 50-59 age group that were not associated with playing pickleball. (Table 4)

**Table 4: Reports on falls**

<b>Responses</b>	<b>Responses</b>	<b>% of Responses</b>
Falling while playing pickleball (N= 128)	72	57.6%
Falling more than once while playing pickleball (N = 128)	39	31.2%
Falling while NOT playing pickleball (N=125)	7	6%

## **Quality of Life & Motivators of Pickleball Play**

All but 3 respondents, 98%, reported that they believed playing pickleball improved their quality of life. All respondents believed that routine exercise is important to their quality of life. Most of the respondents, 98%, reported doing other physical activities to improve their health and quality of life. Although respondents reported a high incidence of injuries associated with pickleball, most of the respondents, 85%, reported that they did not worry about playing pickleball because of the risk of sustaining an injury. Internal motivating factors influenced our respondents to play pickleball more than motivating factors with an external benefit.

## **Discussion**

The survey responses indicated that adult, recreational pickleball players, 50 years old and older, experience a remarkable number of injuries while playing pickleball. However, these injuries had minimal impact on the majority of players' daily lives and, on their ability, to play pickleball. The risk of injury while playing pickleball has been shown to be significant, the data suggests that playing pickleball may have a protective effect on older adults in their daily lives. The physical demands placed on the older adult while playing pickleball may in fact provide these players with more opportunity to optimize their bodies to resist physical challenges off the court. It is possible that older adults who play pickleball are inherently more fit and less at risk of falling. However, with the motivational drive to continue to play pickleball, older adult pickleball players are at an advantage to gain continued benefits from playing the sport.

Although respondents in the present study had a high rate of on-court falls, they reported an overall low fall rate off the court. There were only 7 off-court falls (6%) were reported, and these falls occurred in the 60 and over age group. A fall rate of 6% is lower than the reported national average for older adults of approximately 28%.<sup>10</sup> The low incidence of off-court falls occurring in pickleball players may suggest that playing pickleball confers a protective effect on the older adults. Further studies on this effect are warranted. Thus, activities that are historically considered risky or dangerous to the older adult and are often discouraged by many healthcare providers should potentially be the exact activities being prescribed to lessen the older adults overall fall risk.

Pickleball players in our survey reported being highly motivated to continue playing pickleball. Casper & Jeon found an increased connection/attachment with pickleball as the frequency of play increased.<sup>16</sup> Overall, Fitness and Socialization were rated as significantly high motivational factor in pickleball playing, but Skill Mastery and Competition were more closely related to players who identified as Allegiant player in the Psychological Continuum Model.<sup>15</sup> Intrinsic motivation factors, rather than extrinsic motivation factors, are driving older adults to play pickleball and to continue to participate in moderate-intense levels of physical activity.<sup>16</sup> This exercise may improve both the player's quality-of-life and quality-of-health.

The survey results also indicate that playing pickleball improves the player's perception of their overall well-being and Quality of Life even in the presence of increased injury incidence. Therefore, it should be considered that although playing pickleball is a risky activity, this risk may be outweighed by the benefits of active play resulting in the overall well-being and quality of life of the pickleball player.

## **Conclusion**

Falls in the older adult may result in increased morbidity and mortality. Evidence suggests when an older adult falls, they are at increased risk of other failures in aging that include decline in function, hospitalization, loss of living independence, and even death. Preventing life-altering failure events like falls is vitally important; however, the manner in which we prevent these events may have a significant negative impact on the older adult's life and resiliency. Current standard practice for fall prevention is to simply reduce activities that are associated with a higher fall incidence. On the surface, it makes common sense to limit risky behaviors to reduce the risk of falling. However, in reality this approach is only limiting the older adult's *opportunity* to fall – not their overall fall risk. Further, by limiting engagement in challenging activities, we may be inadvertently reducing their fall resiliency or ability to not be harmed by a fall. Could it be that it is not the fall that causes the failure in older adults? Could it be the physiologic decline that occurs prior to the fall, by engaging in less challenging activities; is the true cause of the fall-related failure? Focusing on reducing falls in older adults may be less important than finding ways to encourage greater challenges during their physical activities and

exercise routines. Perhaps rather than advocating for the older adult to ‘play it safe’, physical therapists should be encouraging older adults to “Play Hard & Stay Safe”.

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### References

1. Bureau UC. Older People Projected to Outnumber Children. Press Release. Mar 13, 2018. Website <https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html> Accessed November 17, 2020.
2. World Health Organization. Ageing: Healthy ageing and functional ability. Newsroom. Oct 26, 2020. Website: <https://www.who.int/news-room/q-a-detail/ageing-health-ageing-and-functional-ability#:~:text=WHO%20defines%20healthy%20ageing%20as,they%20have%20reason%20to%20value>. Accessed November 17, 2020
3. Nelson ME, Rejeski WJ, Blair SN, et al. Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc.* 2007. 39(8):1435-1445.
4. US Department of Health and Human Services. 2008 physical activity guidelines for Americans. Washington, DC: US Department of Health and Human Services; 2008. <https://health.gov/paguidelines/pdf/paguide.pdf>
5. Centers of Disease Control and Prevention. How much physical activity do older adults need? [https://www.cdc.gov/physicalactivity/basics/older\\_adults/index.htm](https://www.cdc.gov/physicalactivity/basics/older_adults/index.htm) Accessed 11/17/2020.
6. WHO Physical Activity Recommendations Fact Sheet. World Health Organization. [https://www.who.int/dietphysicalactivity/factsheet\\_olderadults/en/](https://www.who.int/dietphysicalactivity/factsheet_olderadults/en/) Accessed 1/17/2020.
7. Gebel K, Ding D, Chey T, Stamatakis E, Brown WJ, Bauman AE. Effect of moderate to vigorous physical activity on all-cause mortality in middle-aged and older Australians. *JAMA Intern Med.* 2015. 175(6):970-977.
8. Watson KB, Carlson SA, Gunn JP, et al. Physical Inactivity amount adults aged 50 years and older – United States, 2014. *MMWR Morb Mortal Wkly. Rep* 2016. 65:954-958.
9. Carlson SA, Adams EK, Yang Z, Fulton JE. Percentage of deaths associated with inadequate physical activity in the United States. *Prev Chronic Dis.* 2018. 15:E38.

10. Bergen G, Stevens MR, Burns ER. Falls and Fall Injuries Among Adults Aged  $\geq 65$  Years — United States, 2014. *MMWR Morb Mortal Wkly Rep* 2016. 65:993–998.
11. Pickleball Participation Report 2016. Sports & Fitness Industry Association. [https://www.sfia.org/reports/507\\_Pickleball-Participation-Report-2016](https://www.sfia.org/reports/507_Pickleball-Participation-Report-2016) Accessed March 1, 2020
12. Oja P, Kelly P, Pedisic Z, et al. Associations of specific types of sports and exercise with all-cause and cardiovascular-disease mortality: a cohort study of 80 306 British adults. *Br J Sports Med*. 2017. 51(10):812-817.
13. Forrester MB. Pickleball-Related Injuries Treated in Emergency Departments. *J Emerg Med*. 2020. 58(2):275-279.
14. Smith LE, Buchanan CA, Dalleck LC. The Acute and Chronic Physiological Responses to Pickleball in Middle-Aged and Older Adults. *Int J Res Ex Phys*. 2018. 13(2):21-32.
15. Heo J, Ryu J, Yang H, Min Kim K. Serious leisure and depression in older adults: a study of pickleball players. *Leisure Studies*. 2018. 37(5):561-573.
16. Casper JM, Jeon JH. Psychological connection to pickleball: Assessing motives and participation in older adults. *Journal of Aging and Physical Activity*. 2018. 27(1):28–33.