

# **Creating a User-Controllable Pickleball Serving Machine**

(Technical Topic)

## **A Study on the Cause of Pickleball's Increase in Popularity and its Effects on the Surrounding Community**

(STS Topic)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## **Introduction to Pickleball:**

Pickleball is currently the fastest-growing sport in the United States. Boasting a 159% increase of players from 2019-2022 (Mackey, 2023), it begs the question as to why so many people have taken up the sport over half a century after its conception, as well as which groups in particular are flocking to the sport. As modern medicine throughout the world sees improvements and innovations, the senior population has seen a corresponding increase in life expectancy over the last 80 years (CDC, 2019). As of a 2020 US Census Bureau study, about 16.8% of the US population is made up of adults 65 years or older (US Census Bureau, 2023). While much of this is due to the increase of medicine's effectiveness, a key element in maintaining proper health as one gets older is physical activity, something that is emphasized as people get older. Pickleball has been on the rise as a means of fulfilling this need to exercise. The sport became particularly popular during the COVID-19 pandemic, as it offered the ability for players to be social without the need to be too close to each other in order to play. This, as well as the slower pace of play, has influenced many elderly people to take up the sport as an outlet for exercise and leisure.

As with any advancement in society, it is important to understand the driving factors, as well as the effects and consequences. Being that pickleball's growing player base seems to be driven by societal desire, the phenomenon will be analyzed using the Social Construction of Technology theory. This theory will aid in understanding why pickleball has become so popular, the impacts on its players, specifically the elderly, and the other various impacts such as those related to infrastructure and to non-players.

## **Research Question and Methods:**

This paper aims to answer the question of what influenced pickleball's stark increase in its player base and how this popularity spike affects those associated with its community. This question will be answered through recent research about the time period surrounding the popularity increase, as well as research about the effects of games like pickleball on the players and the non-players. When researching this subject, the guiding key words included pickleball, COVID-19, mental and physical health, elderly, infrastructure, and noise. These key words thoroughly cover the cause and effect of this phenomenon. The rest of this paper will consist of evidence and analysis that aim to answer the question stated above. First will be the rise of the sport & the factors that influenced this. Next, the positive effects on the playing community & other relevant groups will be analyzed using the Social Construction of Technology (SCOT) framework. Following the positive effects will be the negative effects on players, then the negative effects on non players. It is important to note the limitations of this research paper, so that will be discussed following the causes and effects of the sport's rise. Finally, this paper will conclude by looking to the future and providing a reason for this research. The look to future work is important because if there is nothing to be gained from this paper, there is not much of a point in writing it or conducting the research behind it.

### **Background of Pickleball and the COVID-19 Pandemic**

Invented in 1965 by Bill Bell and Joel Pritchard, pickleball is a sport involving hard paddles and a plastic ball (Pickleball History | Pickleball Origin | USA Pickleball, 2013). Generally, the sport is played outside on a hard court and it incorporates elements of tennis and badminton. Players rally back and forth over the net inside the court's boundaries until a player fails to return the ball into the playable area. In contrast to a tennis court, pickleball courts are 44 feet from baseline to baseline, and the net has a height of 36 inches (Patton, 2021). This, paired

with the plastic ball's lower travel speed, makes pickleball more user friendly than similar sports like tennis or badminton. As a result, many people, including those whose bodies limit them from playing higher speed sports like tennis, have taken up pickleball as a means of getting active.

During December of 2019, patients in Wuhan, China began to experience symptoms of an unknown respiratory illness. Over the next few months, more information came to light about the virus, and in March 2020, COVID-19 was declared by the World Health Organization to be a pandemic (CDC, 2023). Interestingly, COVID-19 was found to affect the elderly and immunocompromised population in a deadlier way than younger people with healthy immune systems. The unique circumstances surrounding the pandemic initiated a worldwide quarantine in an effort to keep those who are most susceptible to the virus safe. Progressing for about three years, the virus changed the way that people viewed and fulfilled their basic needs and their needs for social interaction. One of these methods of fulfillment, as described below, became pickleball.

### **Social Construction of Technology and Pickleball**

In order to determine how phenomena like the recent pickleball craze are brought about, it is important to analyze the factors behind them and where those factors come from. By doing so, one can also draw inferences about the potential effects on the community. Because pickleball is a sport that needs players in order for it to function, it is clear that society drives the rate that it grows or recedes in popularity. As a result, Social Construction of Technology (SCOT) seems to be a good fit to analyze the trend and its consequences. The two stages of SCOT are interpretative flexibility and closure. Interpretative flexibility explores the idea that each piece of technology means something different to everybody. Bringing this up leads to the

discussion of relevant social groups (RSGs), which describe the people that are affected by the technology in question (Wikipedia Contributors, 2023). RSGs make up the focal point of the STS discussion in this paper, as the research aims to determine the effects of pickleball on these people. The two main groups of RSGs are users and producers of technology, but often there are other groups such as bystanders that are affected. In this instance, users are the players, the producers are the ones funding and building the necessary infrastructure and equipment, and the bystanders are the nonplayers that pickleball affects. The three groups will be the main focal point of the RSGs section of the SCOT analysis.

Further analyzing the SCOT framework brings up the idea of design flexibility. Design flexibility explains that there are many ways to achieve the same goal through technology, and this idea ties into the point of closure, which is discussed shortly. Additionally, different social groups have different interpretations of technological goals, which influences their technological outcomes, furthering the idea that society drives technology. The final component of interpretative flexibility explores problems and conflicts with the given technology. These problems are focused on how people use the technology and how various uses spur the realization of more problems. The interpretative flexibility stage leads into the closure stage, which defines when the technology solves the problem at hand. Closure is achieved in two ways: rhetorical closure or redefinition of the problem (Wikipedia Contributors, 2023). Rhetorical closure refers to when society sees the problem as solved and innovations on the existing technology are no longer necessary. Reaching this state further reinforces the idea that society has a heavy impact on technology, both in creating the need for innovation and ending this need. The second means of reaching closure, redefinition of the problem, refers to using a design to solve a different problem than what it was intended for. Thus, the problem is redefined in that the

original problem still exists, but an entirely new problem now has a solution. Because pickleball's phenomenon has not yet reached the stage of closure, it is not as pertinent to the SCOT based analysis of the sport, so it is not mentioned as much throughout this paper.

## **Results and Discussion**

It is essential to understand why this sport has seen such a sharp increase in players since 2019. In short, it was a way for people to safely interact with each other in a time when not many activities could provide the same level of interaction. It abides by quarantine's rules, but has a heavier social aspect than many other sports that do so, such as tennis or volleyball. The increase in player base has strongly affected both players and non-players. For players, they see the positive effect of an increase in activity level, especially in the elderly population. For non-players, the economy is positively affected because the large number of players inspires a need for more infrastructure to support them. Conversely, some members of the community are negatively affected too. While getting active is good for the elderly community, with age comes an increased susceptibility to injury, and many seniors are getting hurt while they play pickleball. For non-players, many who live nearby to the courts are anti-pickleball. This is because the paddles are noisy and the players are loud. Additionally, while need for infrastructure stimulates the economy, it may have a negative effect on the environment due to repurposing green space.

As described earlier, in March 2020, COVID-19 was declared to be a pandemic by the World Health Organization (CDC, 2023). As the virus progressed, people were forced into a state of quarantine in their homes and the world's level of social interaction was drastically altered. The pandemic continued to evolve in different ways over the following years until May 2023, when the state of Public Health Emergency was finally lifted by the Center for Disease Control (CDC, 2023). Due to the nature of the virus, people were not supposed to be in close

proximity to each other to avoid spreading particles by breathing. This meant that people were forced to explore new outlets for social interaction, while still maintaining safe practices. With people spending less time going places, physical activity levels saw a significant decrease worldwide (Park et al., 2022). Being an important aspect of physical life, this was an issue that needed to change. The community soon found pickleball as a physical and social outlet, as players do not need to be close to their partners or opponents to play, and the only object everybody touches is the ball. Being one of the particularly affected groups, this advancement was useful for seniors. They were able to spend some time every week in an active heart rate zone without putting themselves in danger of contracting a potentially fatal virus. As of 2023, 17.6% of US pickleball players were seniors, age 65 and up. The year saw a 10% growth of players age 55 and up (2023 *USA Pickleball Fact Sheet*, n.d.). The sport offered a relatively player-friendly way to stay active, so the senior community jumped on the opportunity to utilize it. Overall participation in the sport demonstrates interpretive flexibility. For seniors, it served more as a way to stay active and maintain muscle, but for younger players, it served a more social role in a world deprived of social interaction. While it is difficult to say whether the pandemic was the sole cause of such a stark increase in active players, the circumstances and limited options for activity and social interaction suggest that it played an important role.

Seniors who played pickleball were shown to have an average daily step count just over 3400 steps higher than those who do not play (Casper et al, 2023). Elderly people are especially in need of activity, as age generally makes people more frail and more susceptible to serious injury. By getting out and getting active, they delay muscle degradation, which acts in a protective manner against injury. Additionally, a study has been shown to positively link pickleball play with overall well-being in seniors (Heo & Ryu, 2018). Furthermore, a different

study showed that in rural areas where it is generally more difficult to maintain a healthy level of physical activity, pickleball was again demonstrated to be a good source of physical health benefits (Wray et al., 2021). The groups mentioned prove to be the most relevant social groups, as they are the ones that are most directly affected by their own pickleball play. They would be considered the users, and the long term effects on their use of the sport are generally positive, with a few exceptions noted later. The number of studies, although they are not conducted over a particularly long period of time, all seem to point to a positive mental and physical effect from pickleball play. Thus, it follows that the users reap positive rewards from the sport. Apart from the sport's users are those that are involved in the construction of new pickleball courts and equipment. These people would be considered producers, and Sportico, a sports news company, has stated that in order to meet the current demand for spaces to play pickleball, 25,000 new courts will need to be built, totalling just over \$900 million (Jackson, 2023). It stands to reason that the producers will also be positively affected by this impending need. They further state that the majority of this growth will need to happen in large cities like Los Angeles and New York, as they are falling behind in accommodating their players. The change, driven entirely by society's desire to play the sport, further enforces the link between society and the technology it drives.

Opposing the previously mentioned groups are those who draw negative consequences from pickleball's popularity spike. Those who are negatively affected are important to examine as well, as they also make up a relevant social group. One of the larger negative aspects of the sport is that because it seems so user friendly, people play when they are not always in fit condition to. UBS analysts estimate that American pickleball players will spend between \$250 million and \$500 million on injuries related to the sport (Bohannon, 2023). For younger people, this issue is less pronounced because their bodies are more durable and less susceptible to serious



injury than their elderly counterparts. However, the trends indicate that injuries to players above the age of 60 have been increasing rapidly (Bohannon, 2023). This presents an important counterpoint to the positive health effects, as seniors heal slower and are often hit harder with injuries as they age, to the point where they are more likely to be potentially life altering. The negative aspect brings up an interesting ethical dilemma in which the majority of players reap rewards from the sport, while a small group of individuals face much more serious pain from it. It brings up a problem that needs to be solved, serving as another obstacle between pickleball's current state of being and closure and stabilization on the trend.

In addition to injured players, many non-playing homeowners take issue with the sport due to the noise that comes with it. Because it is a slower paced game on a smaller court, the nature of the sport is far more social than many others. As a result, players are often much louder than the tennis players that would usually be using the courts they play on. Worsening the situation, the contact between the paddle and the ball introduces another more problematic element of the noise. From 100 feet away, the sound that comes from hitting the ball with the paddle can reach about 70dBA. This compares to the noise level of a vacuum cleaner (Keh, 2023). The volume, in addition to the high pitch generated from striking the ball, combines for a sharp noise that is frustrating for those who live near courts. Some homeowners have even stated that they moved houses to be rid of the noise, and others have stated that the consistent sounds from the courts are "borderline torture" which drives them to the point where they "cannot open [their] windows" (Meyersohn, 2023). The potential mental health issues this brings up demonstrate that there are serious consequences that prevent the phenomenon from reaching a state of closure or stabilization until the affected groups are appeased. Broadening the scope of the potential issues is the infrastructure needed in the future. As previously mentioned, 25,000

courts are estimated to be needed. While infrastructure will stimulate the economy, it is likely that these courts will need to take up existing green space such as parks or fields. The scope of the problem becomes much wider, as these new courts provide no benefit to the environment and their construction will likely require the use of fossil fuels. The consequences mentioned demonstrate that there still exists a need for alternative designs to solve the problem, so it is likely that iterations of solutions will continue to emerge and need to be studied before closure and stabilization are achieved.

When researching pickleball's sudden rise in popularity and the effects, it is important to acknowledge the limitations of this study. Because the whole phenomenon is such recent history, the studies referenced in this paper were conducted over only a maximum of a couple of years, whereas it takes a bit more time than that to confidently prove a link between pickleball and overall health increases. It is important to note, however, that two or three years of any consistent exercise regimen are life changing. This fact adds a great deal of credibility to these studies' timeframes. The other main limitation of this paper is that the phenomenon's recency means that there are not many studies that exist about it. There are still enough to draw conclusions about the sport's causes and effects, however in some instances it was necessary to make inferences based on multiple studies' results. Supplementing the studies in the research conducted were many articles from news sources or pickleball related organizations. Because there are not years and years of results available for research, some of the figures referenced are predictions based on existing data, which could have been heavily skewed by the situation around the COVID-19 pandemic. The predictions could potentially be far off due to the assumption that people will still consistently play when regular activity is safe, which would bring about a need for further reevaluation of the phenomenon.

In terms of the future, it is important to evaluate why it is important or beneficial to study phenomena like the spike in pickleball's popularity. Like many occurrences in society, this will drive a lot of technological developments. Bringing this issue closer to closure and stabilization will also yield positive impacts by reducing or eliminating the negative effects while maintaining the positive ones. Because there are so many positive and negative effects, important conclusions are drawn about potentially influencing the beginning or end of similar trends in order to manipulate the results. For instance, the non COVID-19 related causes could be simulated in inactive areas to stimulate mental and physical well-being. The study on pickleball will need to be continued as the sport continues to gain or lose traction, and the future information to be gained could prove useful and effective in keeping people active and healthy.

## **Conclusion**

Pickleball has seen a massive increase in its player community mainly due to the circumstances regarding COVID-19 and the fact that pickleball was a safe way to get social and active. The main benefits of this sport are increased physical and mental health among players, as well as boosting the economy and providing jobs due to the infrastructural need. Conversely, older players are facing more injuries, non players are bothered by the noise, and the infrastructure poses a potential threat to the environment. The consequences, positive and negative, bring about important potential outcomes. It is important to use these pieces of research to maximize the good while minimizing the bad. Doing so successfully would bring about closure and stabilization to the pickleball phenomenon, allowing the benefits to overtake the problems.

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