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# **Pickleball noise: The physiological and psychological effects on nearby residents**

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Pickleball play creates a new type of unwanted noise - repetitive, impulsive “pops,” exposing those living near courts to thousands of piercing pickleball pops per day. Noise has adverse health effects, but those from pickleball noise have not been previously studied. Content analysis, a scientific method which examines words or phrases in public content to identify patterns, was used to explore a possible link between long-term exposure to pickleball noise and self-reported adverse health effects. This physician-led analysis identified 246 such mentions. Physical health effects represented almost half (45.9%) of all mentions. Of these, 46.0% involved the nervous system and 25.7% the heart. Psychological health effects represented 54.1% of all mentions. Of these, over half (51.3%) described severe distress or used the term “torture,” with two mentioning suicidal thoughts. Nearly a quarter (23.9%) reported trauma or PTSD-like symptoms. The remainder included anxiety, stress, and depression. Beyond these acute effects, the responses suggest a highly activated physiological stress response. Such responses are known to be harmful when sustained over time. These findings highlight a need for further research into the complex acoustical characteristics of pickleball noise and its health effects, which must be considered when making decisions about pickleball court placement.

## 1. INTRODUCTION

Pickleball noise is repetitive impulse noise, exposing those living near busy pickleball courts to thousands of pickleball “pops”/day (1), creating a completely new type of unwanted noise in the residential sounds. One resident, quoted in a news article, likened it to living next to a pistol range (2). Pickleball is a racquet sport similar to tennis but played on smaller courts with hard paddles and plastic balls. Unlike tennis’s soft “ping,” pickleball produces a louder “pop.” In 2024, over 4,000 new courts were built (3), often by converting one tennis court into four pickleball courts. With smaller courts and four-player games, pickleball generates significantly more paddle-ball impacts than tennis. As new courts are built, pickleball noise is disrupting residential areas, leading to conflicts and complaints. One Google Map lists >360 pickleball noise hotspots across North America (4). This issue is the focus of >200 news reports, countless social media posts, and dozens of legal claims. An audio sample of the noise from 4 pickleball courts can be heard at <https://doi.org/10.5281/zenodo.15566001>.

Pickleball noise is impulse noise, sometimes referred to as impulsive noise. Although the implications are different, in acoustics the terms “noise” and “sound” are often used inter-changeably. As defined by the American National Standards Institute (ANSI), impulse sound is characterized by:

- “Brief excursions of sound pressure (acoustic impulses) that significantly exceed the ambient environmental sound pressure” and
- “Duration of a single impulsive sound is usually less than one second” (6).

Examples of impulse sound include:

- Highly impulsive (e.g., metal hammering, wood hammering, small-arms gunfire, pile driving, drop forging, pneumatic hammering, and riveting) (6,7).
- Regular impulsive (slamming of car door, outdoor balls games, such as football (soccer) or basketball, and church bells (6,7).

A typical pickleball pop has a rapid onset of 1-2 millisecond (ms) short duration that repeats, echoes, and reverberates in a high-density fashion for another 20 milliseconds, as shown in Figure 1 (8).

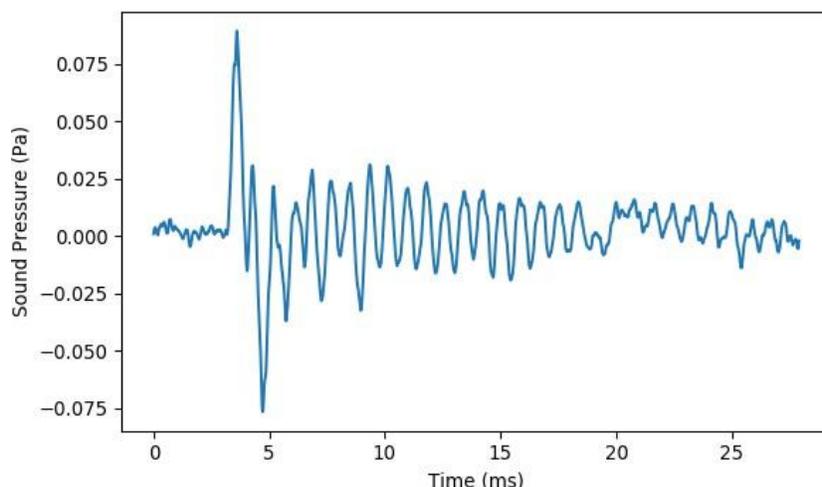


Figure 1. Pickleball noise sound pressure trace.  
Reproduced with permission from Lance Willis, Spenderian and Willis, Tucson, AZ

Chronic exposure to impulse noise in the residential setting is a new phenomenon. There is only a small body of literature on the effects of impulse noise in occupational settings, with a focus on hearing loss. Pickleball noise averages fall below U.S. National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health (OSHA) hearing loss limits (9) although exposure times may exceed daily occupational limits. Impulse noise may have a disproportionate impact on hearing (10) and the long-term effects of environmental noise on the adult auditory system are not yet well understood (11).

The health effects of long-term non-occupational impulse noise exposure remain unclear. Impulse noise is more irritating than steady noise. ANSI Standards and additional research recommend adding a 5-12 decibel (dB) penalty to standard measurements when measuring impulse noise in general (6,12), including pickleball noise (13). When studied in relationship to intellectual tasks, impulse noise caused a measurable physiological stress response after just 50 minutes of exposure. The researchers noted that compared to steady state sound “there is additional stress effect related to the impulsiveness of the sound, reflected as a psychological experience”. Impulse noise also affects concentration (14).

The pickleball pop has an average peak frequency near 1200 Hz, which falls within the highly sensitive range for human hearing, and matches the frequencies used in vehicle backup alarms (15). Pickleball pops measured courtside in LAeq, LASmax, and LCpeak were 69.7 dBA, 92.2 dBA, and 115.6 dBC, respectively (9). Each busy court produces approximately 900 pops/hour (1) and a set of busy public courts can produce 20,000-40,000 individual pops (noise events)/day. Aviation studies show that an increased number of noise events correlates with increased noise annoyance (16) and this is likely true for pickleball noise. Figure 2 demonstrates the hourly distribution of 21,208 total pops over one day at a private condominium complex with restricted access to courts.

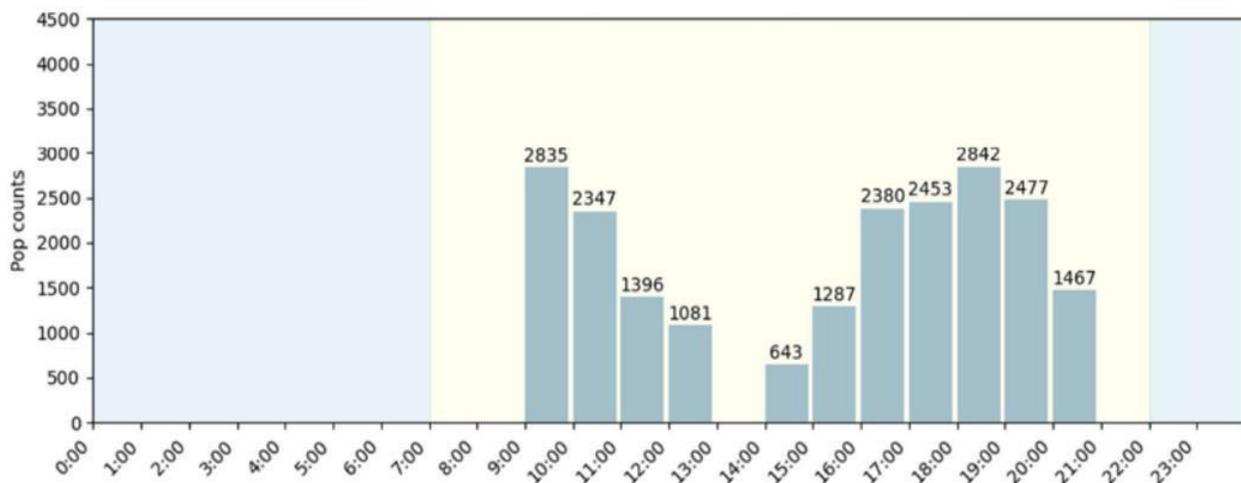


Figure 2. Pops per hour at 4 pickleball courts, Total of 21,208 total pops in one day. Reproduced with permission from NoiseNet US Operations, Brisbane, Australia.

In many neighborhoods, residents are exposed to pickleball noise from dawn to dusk, or with lighted courts, even later. Exposure to > 90 hours of pickleball noise per week, for months and years, is not unusual. While it is commonly believed that sensitivity to a noise decreases the longer one is exposed to it, longer exposure (e.g., years) increases sensitivity to certain types of noise (17). Figure 3 demonstrates a typical day of pickleball noise exposure for someone living near busy courts with hours of operation from 8 am to 9 pm.

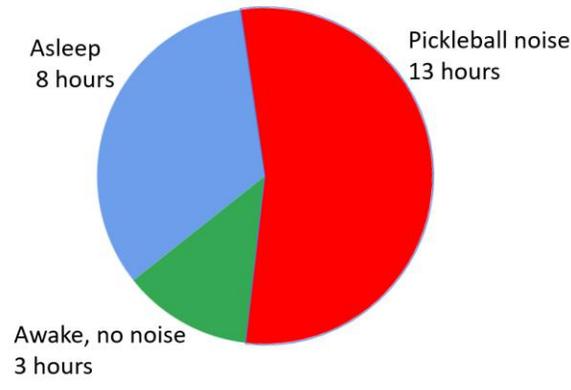


Figure 3. A typical day for a neighbor, courts open 8 am -9 pm.

Finally, neighbors close to pickleball courts have no control over the noise. An external locus of control has been associated with higher noise annoyance levels (18).

Noise is defined as unwanted and/or harmful sound (19). Exposure to noise triggers the body's involuntary stress response. Almost instantaneously, the heart rate and blood pressure increase. Within minutes, stress hormones such as adrenaline and cortisol are released. Over time, repeated stress can cause inflammation in the blood vessels, which has been linked to heart disease and a higher risk of death (20).

Decades of research show that prolonged noise exposure, generally from transportation noise, triggers a physiologic stress response and is linked to serious health problems including cardiovascular disease, anxiety, and sleep disturbances (21,22,23). Additionally, noise may also contribute to an increased risk of stroke, dementia, and cognitive decline (24). Noise can also lead to learning problems in children and problems concentrating, annoyance, and stress (21,23,25).

There are no known reports examining the effects of impulse noise on the general public. This report, using the scientific method of content analysis, may be the first.

## 2. OBJECTIVE OF THIS STUDY

To assess self-reported adverse health effects associated with chronic exposure to impulse pickleball noise by evaluating public comments from people living near pickleball courts.

## 3. METHODS

Given the absence of published reports on the impact of chronic impulse noise exposure in residential settings, content analysis was chosen as an appropriate methodology for this early-stage research. A content analysis, often used in public health to identify early trends, uses only information available in unsolicited comments (e.g., public interviews, news reports, social media posts) as its data source. It does not rely on interviews, surveys, or other interpersonal interactions (26).

This physician-led conceptual content analysis used publicly available comments about pickleball noise from Facebook, Reddit, news reports, legal filings, and public websites. A list of 120 news reports about pickleball noise was identified (27) and updated monthly via Google searches from August 1, 2024 through February 28, 2025 using the search term "pickleball noise news report". Only one report, from

The New York Times, addressed the possibility of potential adverse health effects from pickleball noise (2). Some news reports referenced other sources, allowing identification of additional content for analysis. Publicly available legal filings were found with Google searches for “pickleball noise lawsuits” or by finding filings mentioned in news reports. Social media was searched using the term “pickleball noise.” Two Facebook groups focused on pickleball noise were searched more thoroughly with the terms and concepts as identified in Table 1.

Categories were developed from an initial review of 20 comments, standard medical classification, and prior research on noise and health. Categories were defined narrowly, to minimize subjective interpretation, as seen in Table 1. Coding of the content to categories was performed by a physician and repeated independently by a second health professional. Inter-rater reliability was excellent at 89.4%. (Ideal >80%). For any one individual, multiple self-reported health effects could be reported, but duplicates within the same category were not tallied.

When possible, the distance between pickleball courts and the residence of the individual reporting a concern was estimated using available data including hotspot reports to the Facebook Pickleball Noise Relief group, public records, and Google Maps.

Table 1. Categories and definitions used for content analysis

Category	Definition
anxiety	used the terms "anxiety" or "anxious"
auditory hallucinations/phantom pops	hearing pickleball pops when no play is occurring
cardiovascular problems, other	any cardiac/heart reference or stroke, excluding heart rate abnormalities or high blood pressure
depression	used the term "depression" or "depressed"
difficulty concentrating	Inability to concentrate, difficulty with or hard time concentrating
disrupted/loss of sleep	any comment related to loss/lack/disrupted/interrupted sleep
elevated blood pressure	high, elevated, increased blood pressure
fast or irregular heart rate	any description of fast heart rate, flutters, irregular heart beat
gastrointestinal issues	nausea, diarrhea, any concern related to digestion
headaches	headaches, migraines
hypersensitization to sound	subjective, any description that described a hypersensitivity to sound
hypervigilant	any description that described a sense of uncomfortable waiting with heightened alertness for noise to begin.
neurology-other	Any neurologic reference, excluding phantom pops, difficulty concentrating, sleep, hypersensitivity to sound
nightmares	nightmares, bad dreams about pickleball
PTSD-like	used term "PTSD" or similar phrasing e.g. "pickleball stress disorder"
severe distress	Subjective (e.g., suicidal thoughts, "this is living hell". Does not include any comments that were assigned to other categories)
stress	used the term "stress", "stressful", "or "can't relax"
torture	used the term "torture"

#### 4. RESULTS

164 unsolicited public comments from 98 individuals mentioning adverse mental or physical health effects from pickleball noise were identified between May 3, 2022 and Feb. 14, 2025. Some comments referenced multiple types of health impacts, resulting in a total of 246 unique adverse impacts. Ten individuals reported adverse health effects in legal filings, 24 in news reports, and 64 in online comments.

Distance between court(s) and private residences could be determined for 67.3% of individuals. Of this group, 76.9% of comments came from residents living within 100 feet of courts and 86.3% were within 300 feet of courts. Comments did not mention daily exposure times. There was insufficient data on noise mitigation efforts (e.g., barriers, reduced hours, quiet paddles and balls) or number of courts at each location to allow analysis of these factors.

The self-reported health effects from pickleball noise are presented in Figure 4. Stress, anxiety, and sleep disruption and a variety of cardiovascular symptoms were reported, consistent with prior research on noise and health. A substantial portion of comments referred to trauma, torture, or a post-traumatic stress disorder (PTSD)-like experience. Hearing phantom pickleball pops (i.e. hearing the popping when no actual play is occurring) also represented a significant proportion of comments. Comments communicating severe distress were the most frequent type of comment. This category included two mentions of suicidal thoughts.

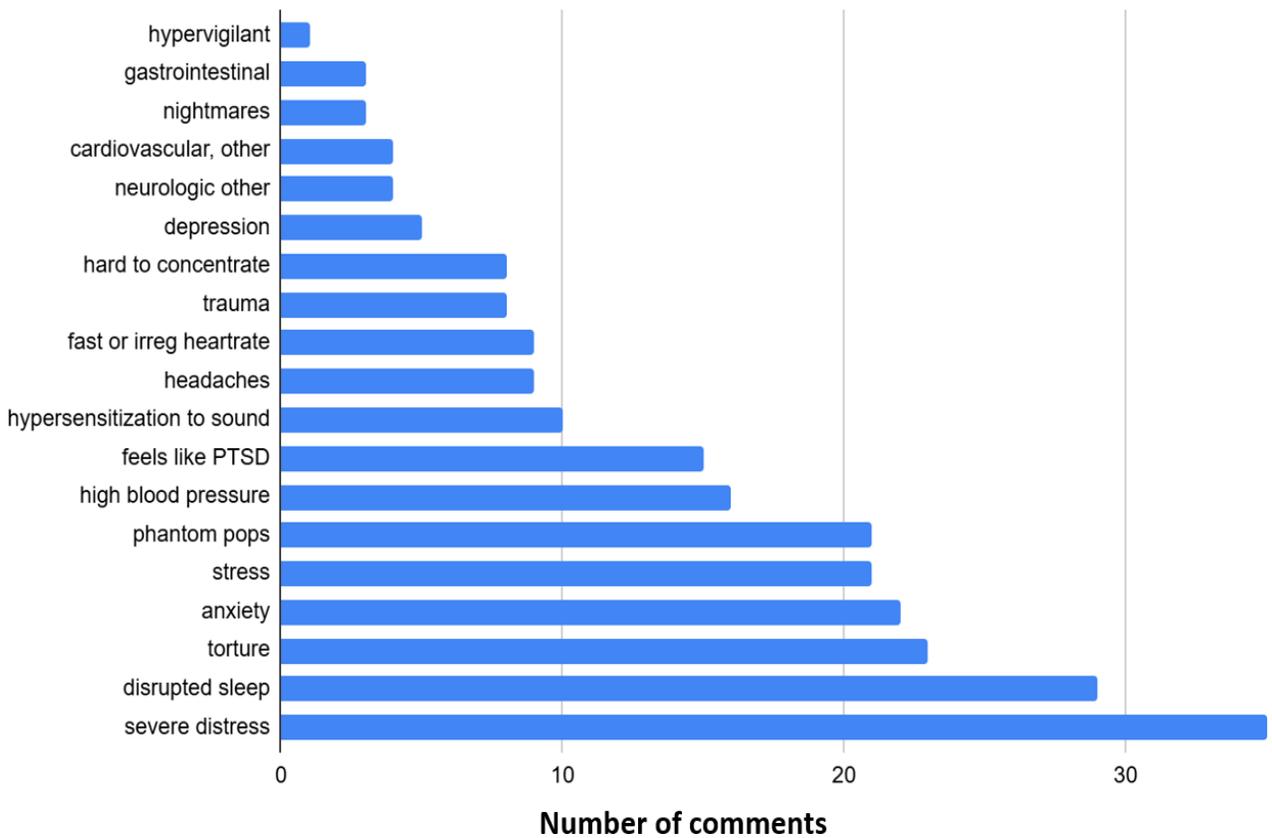


Figure 4. Self-reported health effects from pickleball noise, public comments.

Physical symptoms were noted almost as frequently as psychological symptoms. See Figure 5. While recognizing that physical and psychological symptoms often inter-relate, in this study, physical health effects are defined as a physical perception by the individual. Psychological health effects are defined as an emotional perception by the individual. Physical health effects from pickleball noise accounted for 45.9% of all comments. Of these, almost half (46.0%) were neurologic, a quarter (25.7%) were cardiovascular, and another quarter (25.7%) involved sleep disruption, as shown in Figure 5.

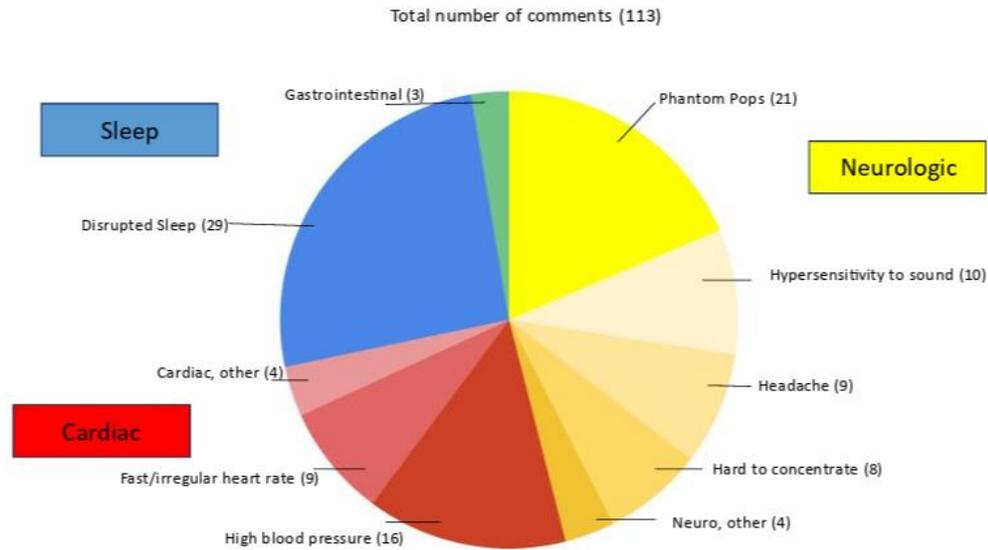


Figure 5. Self-reported physical symptoms from pickleball noise exposure

Psychological health effects from pickleball noise represented 54.1% of total comments, as shown in Figure 6. Of these, just more than half the comments (51.3%) communicated severe distress or used the term “torture.” Almost a quarter (23.9%) experienced a sense of trauma. This included comments on “trauma,” “nightmares,” “hypervigilance,” and “PTSD.” Specifically, 15.3% (15/98) of individuals felt they were suffering from a PTSD like condition, using the term “PTSD” or a similar term (e.g. “pickleball stress disorder”).

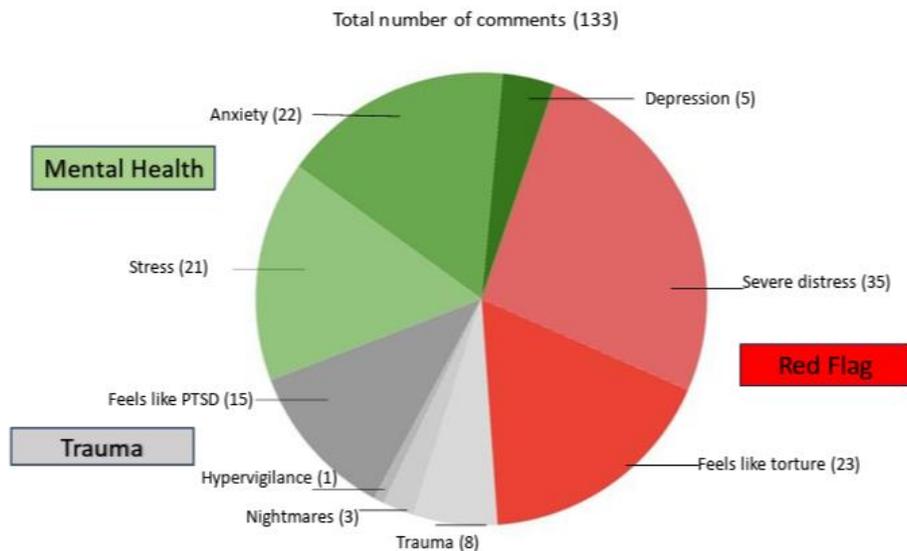


Figure 6. Self-reported psychological symptoms from pickleball noise exposure.

The remainder of comments on psychological health effects included stress, anxiety, and depression. Comments for stress, anxiety and depression were categorized narrowly, including comments only if they used the specific terms or derivatives (e.g., stress, stressful or depression, depressed). No other subjective interpretations of stress were included. A sample of comments categorized as “Severe distress” is provided in Table 2. The researcher noted multiple mentions of individuals forced to move, feeling trapped inside their home, or needing medication to manage symptoms due to pickleball noise.

Table 2 A sample of comments categorized as “severe distress”.

“Pickleball noise is worse than dying of cancer” (cancer patient, now deceased)
“I was told to kill myself or move”
“Suicidal thoughts”
“Extreme anguish”
“It makes me want to splatter my own brains all over the screaming yelling payers 20 feet from my bedroom”
“The pain, suffering and mental anguish is unbearable. Someday the perpetrators of this nightmare will pay.”
“The slow un-aliving of a person”
“Beyond distressing”
“This dangerous, involuntary noise torture experiment ran its full course. Now please stop it”
“I cannot live a normal life...for me, it's hell.”
“You feel as if someone is constantly punching your head”. Went on a hunger strike.
“I am not sure what I can do other than move from my home of 24 years because this play is seriously affecting my mental health”
“No one would choose to live this way. It is physically and emotionally debilitating”

## 5. DISCUSSION

### A. The health effects of pickleball noise exposure

This study links prolonged exposure to pickleball noise to health issues reported by nearby residents. Many of the reported health effects align with prior noise research, but some neurological and psychological effects may be more severe than previously reported. Manufacturing noise is typically separated from homes by zoning laws, construction noise is short-term, and sports-related impulsive sounds usually occur farther from residences and for limited durations. No other exposure introduces impulsive noise into residential areas with such high repetition and persistence.

Epidemiologic evidence has linked noise exposure to depression and anxiety (28). Depression and anxiety were noted in this study, aligning with results from previous noise research. Sleep disturbances, along with noise annoyance, contribute to noise-related mental health issues (29). Disrupted sleep was a significant concern and not an unexpected finding, as it is part of the physiologic stress response. However, some individuals described being awakened by hearing phantom pickleball noises and then being unable to fall back asleep. Pickleball nightmares were also mentioned.

Phantom pops were reported by 21.4% (21/98) of commenters, with some calling it “auditory hallucinations”. The symptoms were noted both during the day and at night, sometimes associated with a racing heart. In some cases, these symptoms persisted months after exposure had stopped. Potential explanations include tinnitus or auditory hallucinations. Both tinnitus and hallucinations stem from central auditory processing issues, occurring within the brain.

Tinnitus, the perception of sound without an external source (30), has been linked to industrial and traffic noise annoyance. Research suggests neuroplastic changes in the brain may contribute to noise-related tinnitus (31). Tinnitus and prolonged noise exposure are associated with neuro-psychiatric diseases, cognitive decline, and dementia (32). Auditory hallucinations, also defined as sensory perceptions of hearing noises without an external stimulus, are associated with severe stress or psychiatric conditions, including post-traumatic stress disorder (PTSD), although the cerebral mechanism has not been completely defined (33).

“PTSD” or a “PTSD-like” response was mentioned by 15.3% (15/98) of commenters. Lay people often use the term “PTSD” to describe the effects of traumatic experiences. Although symptoms reported by those exposed to pickleball noise do not meet current criteria for a formal PTSD diagnosis (34), the comments do clearly communicate a personal experience of trauma and must be taken seriously. Combined with comments on nightmares, hypervigilance, or trauma, this group of concerns accounted for 20% of psychological complaints. Repeated exposure can worsen symptoms of trauma, which typically persist unless the trigger is removed.

While definitions of traumatic events vary, one definition is: “Traumatizing events are those that fundamentally uproot a person’s sense of safety—whether through a single event, an ongoing set of experiences, or a proximity to violence” (35). The relationship between sound and trauma is complex and requires a multidisciplinary approach that considers context, culture, and psychology, as well as acoustics (36).

Comments categorized as “severe distress” or “torture” made up a notable portion of the responses. Some individuals compared the relentless impulse noise exposure to specific forms of torture, such as “dripping water torture.” Although these categories are not part of standard medical classifications, they strongly suggest heightened activation of the physiological stress response and warrant further investigation.

Two comments mentioned suicidal thoughts, and another described chronic pickleball noise as “un-aliving.” Given research linking transportation noise to a slight increase in suicide risk (37), these concerns should not be ignored.

#### B. The psycho-acoustics of pickleball noise exposure

The proportion of comments about phantom pickleball pops and the severity of some of the psychological health effects are concerning. The psychoacoustics of the pickleball pop may be a key factor behind these psychological and neurological health effects. The characteristics of pickleball noise that may contribute to the adverse health effects found in this study are outlined in Figure 7.

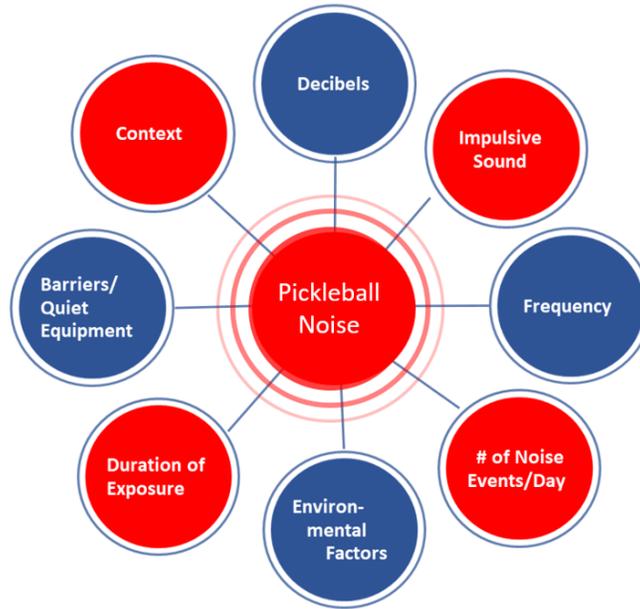


Figure 7. Factors contributing to human perceptions of pickleball noise.

Local U.S. noise ordinances often overlook key aspects of pickleball noise, relying mainly on decibel levels, often measured incorrectly-without accounting for impulse noise penalties (38). Many pickleball sound studies share this flaw, focusing only on decibels and omitting the impulsive nature of the sound. A review of 79 pickleball sound studies found that only one of 36 consultants classified the pickleball “pop” as highly impulsive and applied the full 12 dB penalty, while just three applied a 5 dB penalty (1). These inadequate measurements obscure the true auditory, physical, and psychological impacts. As pickleball noise expert Bob Unetich told NPR in 2023, “You can’t take pop, pop, pop for 12 hours a day every day and remain sane” (39).

Civic leaders often interpret noise complaints as a NIMBY (Not in My Back Yard) issue or just an “annoyance.” However, from a health perspective, the findings of this study show that pickleball noise should be viewed as much more than an “annoyance”

Given the potential for serious health effects in nearby residents, immediate mitigation or closure of problematic courts and careful planning for new courts is recommended. The placement of courts should involve certified acoustic professionals who can predict and evaluate noise exposure levels and potential problems near residences. A multifactorial approach that fully assesses the human impact of pickleball noise exposure is recommended.

Acoustic consultants have already provided general recommendations for setbacks, while recognizing that each site brings unique factors that require thorough evaluation. One consulting company that has evaluated more than 150 pickleball court locations reports that “as a ‘general rule of thumb’, within 100 feet of residences, it is extremely difficult (i.e., costly) to adequately mitigate pickleball sound without enclosing the courts. (40). Courts 100–400 feet away typically also require multiple costly mitigation strategies and enforceable rules (8,41,42,43). Courts between 400-1000 feet should undergo individualized sound assessment (8,42,43). Of note, enforceable rules regarding quieter paddles and balls or shortened hours of operation appear to be enforceable only in private courts or in municipal courts with constant supervision.

Based on the acoustic consultant advice and our data, we suggest that existing courts <1000 feet from homes should undergo comprehensive sound evaluations including analysis of all factors influencing perception of pickleball noise sound. To avoid years of costly litigation, it may be advisable to delay locating new courts within 1000 feet of homes until further research is available. For courts within 100 feet of homes, our findings support the consultants’ recommendations. Approximately 75% of the

reported health concerns noted in our study came from people living <100 feet from courts. We recommend that courts not be placed within 100 feet of homes unless completely enclosed.

Our preliminary findings raise serious concerns about the health effects of prolonged exposure to pickleball noise. Just as indoor smoking bans and designated smoking areas protect others from secondhand smoke, pickleball court locations must be planned to protect non-players living near the courts from intrusive impulse noise. And, just as no safe lower limit was found for secondhand smoke, it is possible that no safe exposure level exists for repetitive impulse noise either. Detailed acoustical, physiological, and epidemiological research is needed. Until then, every effort should be made to place new courts as far from homes as possible.

## 6. STRENGTHS AND LIMITATIONS OF THIS STUDY

Content analysis helps identify early patterns when research is limited and can guide future studies, but it does not measure prevalence or establish causation. It may be biased by self-selection, as those most affected may be more likely to speak out. However, gaslighting and harassment of neighbors has been reported in social media and may discourage some individuals from speaking out. Coding is subjective but follows standard health classifications to enable verification and replication. Potential bias exists as both reviewers of the data are members of related Facebook groups.

## 7. CONCLUSION

Once constructed, pickleball courts can be expected to operate for many years into the future. Local decision makers need comprehensive information as they make decisions about pickleball court location and local regulations. This should include not only a comprehensive sound study that includes all the acoustic measurements relevant to impulsive pickleball noise but also information about the potential adverse health effects on nearby neighbors.

This study links prolonged exposure to pickleball noise to self-reported adverse health effects in nearby residents. Chronic noise exposure is already known to be associated with heart disease, diabetes, disrupted sleep, and other adverse health effects. Our results also link pickleball noise exposure to reports of suicidal thoughts, a sense of torture, PTSD-like symptoms, and comments suggesting severe distress. Psychological concerns, sleep disruptions, and hearing phantom pickleball pops were found. Both the immediate stress responses and the long-term effects suggest a potential risk of long-term harm to the physical and mental health of those living near pickleball courts.

These findings underscore the urgent need for further research. Further study should address the complex acoustical properties of pickleball noise, as well as the significant psychological and physiological impacts of long-term exposure to impulse noise in residential settings.

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The harassment experienced by neighbors is real, including reported death threats, and the authors respect the courage it takes to speak publicly about these concerns. A data file—including links to public sources—will be provided upon request to journalists or researchers at accredited institutions who agree to adhere to standard privacy protocols.

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