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### Effect of noise levels on the impulsivity of school going children

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#### Abstract

Environmental noise is a developing problem in schools because it can impair cognitive, emotional and behavioural development of children. The present study on the “effect of noise levels on the impulsivity of school going children” was conducted with specific objective to assess the effect of noise on the impulsivity of children from 2 different blocks in the Kangra district of Himachal Pradesh. The data were collected from blocks - Nagrota Bagwan and Rait selecting 150 students from Nagrota and 150 students from Rait block, resulting in a total sample size of 300 respondents. Total 20 schools were selected randomly, 10 from each block. The data were collected through self-structured interview schedules to evaluate the noise and impulsivity. It was found that the majority of schools in the Nagrota block were placed near road and other noise-generating areas resulting in much higher noise levels than Rait. Although most children reported no regular classroom disruptions, transportation noise was significantly greater in Nagrota schools. The findings also revealed that children who were exposed to higher levels of noise were more impulsive. Children from Nagrota block had considerably higher mean impulsivity ratings than Rait students indicating a definite link between greater noise levels and impulsive conduct. The study shows that noise from the environment has a considerable impact on impulsivity in school-aged children. Creating quieter and more acoustically friendly classroom settings is critical for enhancing behavioural management, concentration and overall learning results. These findings highlight the need of adequate noise control techniques in school design and administration to provide child-friendly learning environments.

**Keywords:** Noise level, impulsivity trait and school going children

#### Introduction

The spread of excessive sound in the environment is referred to as environmental noise. Stress, sleep disruptions and even hearing loss are just a few of the major negative consequences it may have on health and well-being of everyone. It can originate from a variety of sources, including transportation, construction and industrial activities. Noise pollution may have serious effects on children. It can hinder learning and focus which have an impact on academic achievement (Mincera 2024, Latha 2014, Shield and Dockrell 2008) <sup>[3, 7, 10]</sup>. Additionally, it may affect cognitive development and lead to behavioural problems, tension and worry. The environmental noise also reduces performance in lower reading comprehension, reduced math scores, poorer executive functioning and slower processing speed (Fretes and Palau 2025, Caviola 2021, Clark and Sörqvist 2012) <sup>[2, 5, 9]</sup>. Children are especially vulnerable in the unique setting of classrooms. Compared to adults, they are less able to filter out background noise due to their developing cognitive and auditory processes. Language comprehension and concentration are two critical learning processes that can be severely hampered by this audio interference. Additionally, excessive

loudness in the classroom can cause cognitive fatigue which can raise stress levels and cause behavioural problems like impulsivity (Söderlund *et al.* 2024) <sup>[4]</sup>. Impulsivity is an ability to act without planning, thinking or taking consequences into account. It's an important factor in child development since it affects behaviour, social relationships and problem-solving. Self-control and emotional regulation issues might result from high impulsivity. Impulsivity might hinder learning in the classroom because children may find it difficult to focus, wait their time or do work efficiently. My research will offer vital information on how noise affects impulsive behaviour which may directly influence design strategies and classroom management. For example, the results may encourage the implementation of particular behavioural treatments aimed at reducing noise-related impulsivity or the creation of quieter learning settings through improved acoustics. In the end, this may improve every child's educational experience.

#### Methodology

The present study was carried out in the Himachal Pradesh

state of India. The Kangra district was selected purposively. The descriptive research design was used for study. The sample consisted of students studying in the 1st-7th class in age group of 6-12 years. A total of 300 respondents was selected. Himachal Pradesh, a northern state of India, consists of 12 districts, out of which Kangra was selected purposively. Two blocks from Kangra district were selected randomly. Out of 300 respondents, 150 students from

Nagrota block and 150 from Rait block was selected. Total of 20 schools were selected randomly, 10 from each block. Self-structured interview schedule was used to evaluate the noise levels surrounded by classrooms and impulsivity trait of the students. t-test was used to find out the differences between the Nagrota and Rait blocks.

## Results and Discussion

**Table 1:** Frequency distribution of the respondents according to their socio-personal characteristics

| Personal Characteristics | Category   | Nagrota (n=150) |            | Rait (n=150) |            | Grand Total (n=300) |            |
|--------------------------|------------|-----------------|------------|--------------|------------|---------------------|------------|
|                          |            | Frequency       | Percentage | Frequency    | Percentage | Frequency           | Percentage |
| Age                      | 6-8 years  | 54              | 36.0       | 53           | 35.3       | 107                 | 35.6       |
|                          | 9-12 years | 96              | 64.0       | 97           | 64.6       | 193                 | 64.3       |
|                          | Total      | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |
| Class                    | 1st- 5th   | 110             | 73.3       | 110          | 73.3       | 220                 | 73.3       |
|                          | 6th- 7th   | 40              | 26.6       | 40           | 26.6       | 80                  | 26.6       |
|                          | Total      | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |

### 1. Personal characteristics of the respondents

Table 1 shows the respondents' personal characteristics, including their age, gender, caste and class.

The age of the respondents was divided into two groups 6-8 years and 9-12 years. The majority of the total sample was in the older group (64.3%) aged 9-12 years compared to 35.6 percent of respondents who were 6-8 years old. This trend was consistent in both locations, Nagrota

The majority of the respondents, 73.3 percent were studying in 1st to 5th classes. The remaining respondents, 26.6 percent were in classes 6th to 7th. So in total, there were 73.3 percent of respondents in 1st-5th grade and 26.6 percent of respondents in the 6th-7th grade in both the blocks.

### Noise Level

**Table 2:** Frequency distribution of the respondents according to the noise levels in their classrooms

| Vicinity of school               | Nagrota (n=150) |            | Rait (n=150) |            | Grand Total (n=300) |            |
|----------------------------------|-----------------|------------|--------------|------------|---------------------|------------|
|                                  | Frequency       | Percentage | Frequency    | Percentage | Frequency           | Percentage |
| Road                             | 90              | 60.0       | 131          | 87.3       | 221                 | 73.6       |
| Temple                           | 11              | 7.3        | 0            | 0          | 11                  | 3.6        |
| Industry                         | 15              | 10.0       | 0            | 0          | 15                  | 5.0        |
| Market                           | 19              | 12.6       | 0            | 0          | 19                  | 6.3        |
| Nothing                          | 15              | 10.0       | 19           | 12.6       | 34                  | 11.3       |
| Total                            | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |
| Type of distraction in classroom | Nagrota (n=150) |            | Rait (n=150) |            | Grand Total (n=300) |            |
|                                  | Frequency       | Percentage | Frequency    | Percentage | Frequency           | Percentage |
| Transport                        | 52              | 34.6       | 0            | 0          | 52                  | 17.3       |
| Temple                           | 0               | 0          | 0            | 0          | 0                   | 0          |
| Glare                            | 14              | 9.3        | 11           | 7.3        | 25                  | 8.3        |
| Any other                        | 11              | 7.3        | 0            | 0          | 11                  | 7.3        |
| Nothing                          | 73              | 48.6       | 139          | 92.6       | 212                 | 70.6       |
| Total                            | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |

Table 2 depicts that 73.6 percent of schools were situated close to the road. While 11.3 percent of schools were not placed near any particular landmark. A minor percentage of schools were positioned close to market (6.3%), industry (5%) and temples (3.6%). About 60 percent of schools were located close to the road in Nagrota block. In Rait, majority (87.3%) schools were located near the road. There were no market, industries or temples close to any of the schools on this block.

The majority of respondents (70.6%) reported no

distractions, 17.3 percent of respondents highlighted distractions related to transportation, 8.3 percent related to glare (light reflection) and 7.3 percent identified other forms of disturbance (construction activities). The transport-related disturbances were the most frequent in Nagrota (34.6%). Almost half (48.6%) of the respondents stated that there was no distraction in Nagrota and 92.6 percent in Rait. The glare was mentioned by just 7.3 percent of respondents from the Rait block.

**Table 3:** Frequency distribution of the respondents according to their impulsivity trait

| Variables                                                         | Category  | Nagrota (n=150) |            | Rait (n=150) |            | Grand Total (n=300) |            |
|-------------------------------------------------------------------|-----------|-----------------|------------|--------------|------------|---------------------|------------|
|                                                                   |           | Frequency       | Percentage | Frequency    | Percentage | Frequency           | Percentage |
| Find it difficult to stay in your seat for long time              | Always    | 11              | 7.3        | 23           | 15.3       | 34                  | 11.3       |
|                                                                   | Sometimes | 39              | 26.0       | 38           | 25.3       | 77                  | 25.6       |
|                                                                   | Rarely    | 33              | 22.0       | 25           | 16.6       | 58                  | 19.3       |
|                                                                   | Never     | 67              | 44.6       | 64           | 42.6       | 131                 | 43.6       |
|                                                                   | Total     | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |
| Interrupt others while they are speaking                          | Always    | 21              | 14.0       | 25           | 16.6       | 46                  | 15.3       |
|                                                                   | Sometimes | 13              | 8.6        | 18           | 12.0       | 31                  | 10.3       |
|                                                                   | Rarely    | 32              | 21.3       | 26           | 17.3       | 58                  | 19.3       |
|                                                                   | Never     | 84              | 56.0       | 81           | 54.0       | 165                 | 55.0       |
|                                                                   | Total     | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |
| Blurt out answers without waiting for your turn                   | Always    | 24              | 16.0       | 25           | 16.6       | 49                  | 16.3       |
|                                                                   | Sometimes | 27              | 18.0       | 24           | 16.0       | 51                  | 17.0       |
|                                                                   | Rarely    | 18              | 12.0       | 13           | 8.6        | 31                  | 10.3       |
|                                                                   | Never     | 81              | 54.0       | 88           | 58.6       | 169                 | 56.3       |
|                                                                   | Total     | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |
| Find it difficult to stand in queue for school bus/ assembly line | Always    | 23              | 15.3       | 24           | 16.0       | 47                  | 15.6       |
|                                                                   | Sometimes | 32              | 21.3       | 34           | 22.6       | 66                  | 22.0       |
|                                                                   | Rarely    | 48              | 32.0       | 48           | 32.0       | 96                  | 32.0       |
|                                                                   | Never     | 47              | 31.3       | 44           | 29.3       | 91                  | 30.3       |
|                                                                   | Total     | 150             | 100.0      | 150          | 100.0      | 300                 | 100.0      |

Table 3 reveals that less than the half (43.6%) of the respondents never found it difficult to stay in their seat for long time, only 19.3 percent rarely, about 25.6 percent sometimes and 11.3 percent always found it difficult to stay in their seat for long time. In Nagrota, respondents never found it difficult to stay in their seat for long time were 44.6 percent whereas 42.6 percent in Rait. Almost 22 percent of respondents from Nagrota rarely found it difficult to stay in their seat for long time and 16.6 percent in Rait. Less than one-third (26%) of respondents from Nagrota sometimes found it difficult to stay in their seat for long time and 25.3 percent in Rait. The percentage of respondents who always found it difficult to stay in their seat for long time were 7.3 percent in Nagrota and 15.3 percent in Rait.

More than the half (55%) of the respondents never interrupted others while they were speaking, about 19.3 percent rarely whereas 10.3 percent sometimes and 15.3 percent always interrupted others while they were speaking. In Nagrota, respondents never interrupted others while they were speaking were 56 percent and 54 percent in Rait. Almost 21.3 percent of respondents from Nagrota rarely interrupted others while they were speaking and 17.3 percent in Rait. Only 8.6 percent of respondents from Nagrota sometimes interrupted others while they were speaking and 12 percent in Rait. The percentage of respondents who always interrupted others while they were speaking were 14 percent in Nagrota and 16.6 percent in Rait.

About 56.3 percent of the respondents never blurted out answers without waiting for their turn, only 10.3 percent rarely whereas 17 percent sometimes and 16.3 percent always blurted out answers without waiting for their turn. In Nagrota, respondents never blurted out answers without waiting for their turn were 16 percent and 16.6 percent in Rait. Only 12 percent of respondents from Nagrota rarely blurted out answers without waiting for their turn and 8.6 percent in Rait. Just 18 percent of respondents from Nagrota sometimes blurted out answers without waiting for their turn and 16 percent in Rait. The percentage of respondents who

always blurted out answers without waiting for their turn were 16 percent in Nagrota and 16.6 percent in Rait.

Less than the one-third (30.3%) of the respondents never found it difficult to stay in queue for school bus/assembly line, about 32 percent rarely whereas 22 percent sometimes and 15.3 percent always found it difficult to stay in queue for school bus/assembly line. In Nagrota, one-third (31.3%) of respondents never found it difficult to stay in queue for school bus/assembly line and 29.3 percent in Rait. One-third (32%) of respondents from Nagrota and Rait rarely found it difficult to stay in queue for school bus/assembly line. About 21.3 percent of respondents from Nagrota sometimes found it difficult to stay in queue for school bus/assembly line and 22.6 percent in Rait. The percentage of respondents who always found it difficult to stay in queue for school bus/assembly line were 15.3 percent in Nagrota and 16 percent in Rait.

**Table 4:** Mean differences between the schools of Nagrota and Rait blocks regarding their noise level

| Noise Level | Nagrota (n=150) | Rait (n=150) | t-value  |
|-------------|-----------------|--------------|----------|
|             | Mean±SD         | Mean±SD      |          |
|             | 8.13±0.79       | 6.83±2.44    | 6.2649** |

\*\* significance at the 5% level

Table 4 demonstrates that the mean values of Nagrota and Rait schools were found to be 8.13 and 6.83 respectively. The differences between the mean values regarding noise level between Nagrota and Rait schools were found to be significant, where the mean values of the Nagrota schools were higher than the Rait schools.

**Table 5:** Mean differences between the schools of Nagrota and Rait blocks regarding their impulsivity trait

| Impulsivity Trait | Nagrota (n=150) | Rait (n=150) | t-value  |
|-------------------|-----------------|--------------|----------|
|                   | Mean±SD         | Mean±SD      |          |
|                   | 12.06±3.47      | 11.79±3.68   | 1.6314** |

\*\* significance at the 5% level

Table 5 demonstrates that the mean values of Nagrota and Rait schools were found to be 12.06 and 11.79 respectively. The differences between the mean values regarding impulsivity trait between Nagrota and Rait schools were found to be significant, where the mean values of the Nagrota schools were higher than the Rait schools.

### Conclusion

The current study comes to the conclusion that impulsivity of school going children is significantly influenced by noise in the environment. Because of their close proximity to highways, markets, and other external noise sources, the results clearly show that schools in the Nagrota block had significantly higher noise levels than those in the Rait block. Even though there was a road close to schools in the Rait block but still the noise pollution was less because of the significant distance between their buildings and the boundary walls. As a result, students in Nagrota schools exhibited more impulsive conduct than Rait, suggesting a strong link between impulsive traits and louder classroom environments. Children expressing frequent impulsive actions in loud classrooms correlate with research indicating that noise from the environment heightens hyperactivity and impulsive responses (Vostal *et al.* 2013 and Söderlund *et al.* 2024) <sup>[8, 4]</sup>. Despite having modest levels of impulsivity overall, a significant percentage of students reported having trouble with things like waiting in lines, staying sat for extended periods of time, interrupting others and blurting out responses. In settings where noise levels were greater, these behaviors were more noticeable. The idea that excessive noise might negatively impact children's self-regulation and behavioural control is supported by the statistically significant differences between the two blocks for both noise level and impulsivity characteristic. Overall, the study shows that fostering better behavioural outcomes in students requires making schools quieter and acoustically supportive (Cal *et al.* 2025, Polewczyk and Jarosz 2020) <sup>[1, 6]</sup>. Reducing noise exposure in and around classrooms may assist reduce impulsive behaviour which would enhance attention spans, classroom discipline and overall educational experience of students. The results highlight the necessity for planners, school administrators and regulators to take noise control techniques into account as a crucial component of child- friendly and productive learning environments.

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