

# PARTICIPATION IN NOISY LEISURE ACTIVITIES IN A SAMPLE OF HIGH SCHOOL STUDENTS

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## INTRODUCTION

Recent interest in the prevalence of noise-induced hearing loss in young people has shifted the focus from occupational noise levels to the noise levels of leisure activities. The recreational activities of youth, particularly those activities which use high fidelity, high intensity sound delivery systems (e.g. personal stereo systems, movie theatres), impulse noises (e.g. hunting, fireworks), and high powered motorized vehicles (e.g. motocross bikes, race cars) have been implicated as damaging to the human auditory system. An increased incidence of high-frequency hearing loss in young adults has been attributed to exposure of such leisure noises. Lees et al. (1985) conducted a study with 60 Canadian 16-25 year olds, and found that 40% of the subjects showed evidence of a 'notch' at the 6000 Hz frequency region [1]. These results showed a significant correlation of detectable hearing loss with the amount of reported leisure noise exposure. As a result, the investigators attributed the measured hearing loss to individual's leisure noise exposure. Some studies have shown, however, that leisure noise has little effect on the audiometric thresholds of adolescents. Axelsson et al. (1993) conducted a study with 52 Swedish children in grades one, four and six from a small, suburban community, who were provided with diaries in which they recorded the amount of time spent in various recreational activities [2]. When compared to the audiometric results, the investigators found that the children with higher thresholds did not have higher mean weighted noise exposures. These results seemed to suggest that the normal noise exposure experienced by children does not have a major impact on hearing sensitivity. Burén and colleagues (1992), when examining the audiometric thresholds of children and adolescents in Norway, concluded that children between the ages of 10 and 18 years were not exposed to any harmful noise [3].

There is little controversy in the assumption that some recreational activities have the *potential* to be hazardous to the human auditory system in that they exceed sound levels of 80 dBA. However, there is a lack of adequate research to determine the amount of risk that exposure to these leisure noises may impose. Damage risk to the human auditory system is dependent on the characteristics of the sound itself (i.e. sound level) and the temporal aspects of the sound exposure, including the duration and patterns of participation. Risk criteria cannot be established without adequate information regarding the sound intensity and temporal patterns of leisure noise exposure, which include the frequency and duration of exposure.

Noise hazard and risk criteria are often based upon occupational noise limits, such as those established in ISO 1999 [1990] [4]. These criteria demonstrate the relationship between hearing hazard and the intensity, frequency, and temporal pattern of the noise. As a result, the estimate of risk gathered from occupational noise exposures cannot be directly applied to the duration, type and exposure levels of leisure noises. For example, the occupational noise exposure limits are based upon a high intensity, continuous noise for an 8 hour workday, and a five day work week. While studies have primarily examined the A-weighted sound pressure levels of noisy recreational activities, the potential risk imposed by leisure noises has not been adequately investigated. It is essential to cal-

culate the accumulated duration of the individual's noise exposure as a component of establishing hazardous leisure noise levels, duration and frequencies. In order to determine the potential risk of damaging noise exposures arising from leisure activities, the noise immission levels, which include estimates of duration and temporal pattern of leisure noise must be described. A review conducted by MRC Institute of Hearing Research in Britain (1986) stresses the need for a participation survey to determine the rate of participation of young people in noisy leisure activities [5].

This research is an initial attempt to quantify the participation by Canadian teens and young adults in noisy leisure activities in terms of participation rates, hours per activity, and frequency of participation. This paper reports the preliminary results from the first phase of the study.

## METHOD

A questionnaire was administered to a group of local, semi-urban high school students between the ages of 15 and 19 during the spring months of April and May. A total of 123 respondents participated (57 males, 66 females). Questionnaire administration was performed in a quiet school room. The questionnaire listed 32 recreational activities that have been previously implicated as potentially damaging to the auditory system, such as listening to the stereo through loud speakers, riding go carts, and hunting. Students indicated their participation in specific leisure activities during the previous one-week period. Given the limitations of self-report surveys, such as respondent bias, memory limitations and other uncontrolled factors, the questionnaire provided a cued-recall report, and restricted the responses that occurred over a one-week period, in order to minimize any memory constraints that might have an impact on the responses. The students were then asked to indicate the total duration of participation or exposure in the activities in which they participated. Responses to the questionnaire were analyzed for total participation time and number of activities reported.

## 3.0 RESULTS

The responses to the questionnaires were analyzed cumulatively as a group and compared with sub-groups based on gender and age. The activities that were identified as the most popular sources of noise exposure were: listening to stereo through speakers (96.7%), listening to music through headphones (64.2%), vacuuming and attending sporting events (57.7%) and riding in a 'boom car'\* (55.3%) [Table 1]. Of the students that listened to music through loudspeakers, 65.1% indicated that the music was 'loud', as did the 64.9% of those who listened to 'loud' music through headphones. Analysis by gender revealed that listening to the stereo through speakers remained the most popular activity for both males and females. The average number of noisy activities in which males participated was not significantly different than females (males:  $\bar{M}$ =7.91,  $\bar{SD}$ =4.20; females:  $\bar{M}$ =7.38,  $\bar{SD}$ =3.93). When the respondents were grouped according to year of birth (age), the mean number of activities decreased with increasing age, with exception to the youngest age group (see Table 2). Figure 1 shows the percentage of respondents and total number of noisy

recreational activities.

The activities which displayed the highest amount of exposure based on total duration of all respondents over a one week period included listening to the stereo ( $M=4.66$  hours, range=0.17–21); attending sporting events ( $M=3.68$  hours, range=0.25–12.5); listening to music through headphones ( $M=2.45$  hours, range=0.08–16); and using lawn mowers ( $M=2.31$  hours, range=0.33–15).

\*N.B. "Boom car" was interpreted by the students to mean a vehicle playing loud music.

| Leisure Activity | Males (N=57) | Females (N=66) | TOTAL (N=123) |
|------------------|--------------|----------------|---------------|
| Stereo           | 96.5%        | 97.0%          | 96.7%         |
| Headphones       | 68.4%        | 60.6%          | 64.8%         |
| Sports event     | 59.6%        | 56.1%          | 58.2%         |
| Vacuum           | 47.4%        | 66.7%          | 57.7%         |
| Boom Car*        | 54.4%        | 56.1%          | 55.3%         |
| Lawn mower       | 66.7%        | 43.9%          | 54.5%         |
| Attend a movie   | 36.8%        | 43.9%          | 40.7%         |
| Play in band     | 35.1%        | 34.8%          | 35.0%         |
| Power tools      | 43.9%        | 15.2%          | 28.5%         |
| Fitness class    | 8.8%         | 43.9%          | 27.6%         |
| Restaurant       | 17.5%        | 31.8%          | 25.2%         |
| ATV              | 35.1%        | 9.1%           | 21.1%         |
| Club attendance  | 19.3%        | 21.2%          | 20.3%         |
| Farm equipment   | 28.1%        | 13.6%          | 20.5%         |
| Motor bikes      | 28.1%        | 9.1%           | 17.9%         |
| Other activity   | 21.1%        | 13.6%          | 17.6%         |
| Attend dance     | 10.5%        | 18.2%          | 14.6%         |
| Firecrackers     | 14.0%        | 15.2%          | 14.6%         |
| Arcade           | 10.5%        | 12.1%          | 11.4%         |
| Drag race        | 12.3%        | 7.6%           | 9.8%          |
| Rock concert     | 12.3%        | 7.6%           | 9.8%          |
| Fireworks        | 7.0%         | 10.6%          | 9.1%          |
| Leafblower       | 12.3%        | 6.1%           | 8.9%          |
| Gocarts          | 8.8%         | 7.6%           | 8.1%          |
| Hunting          | 10.5%        | 4.5%           | 7.4%          |
| Carnival         | 7.0%         | 6.1%           | 6.5%          |
| Orchestra        | 3.5%         | 6.1%           | 4.9%          |
| Jet ski          | 0.0%         | 7.6%           | 4.1%          |
| Models           | 3.5%         | 4.5%           | 4.1%          |
| Airplane         | 3.5%         | 3.0%           | 3.3%          |
| Snowmobile       | 5.3%         | 1.5%           | 3.3%          |
| Rug shampooing   | 1.8%         | 3.0%           | 2.5%          |
| Snowblower       | 1.8%         | 0.0%           | 0.8%          |

Table 1. Participation rates for males vs. females and total group

| Age | N  | Mean | Median | Mode | S.D. |
|-----|----|------|--------|------|------|
| 19  | 20 | 5.90 | 4.50   | 3    | 3.85 |
| 18  | 20 | 6.80 | 6.50   | 5    | 2.53 |
| 17  | 13 | 8.38 | 8.00   | 3    | 4.72 |
| 16  | 37 | 8.95 | 8.00   | 6    | 4.50 |
| 15  | 33 | 7.39 | 6.00   | 5    | 3.76 |

Table 2. Average number of activities according to age

#### 4.0 SUMMARY AND FUTURE DIRECTIONS

Limited numbers of studies have examined popular adolescent leisure activities. Those that have done so have generally focused on the sound levels produced by activities and not the amount of time spent in the activities or their frequency of occurrence. The results obtained from this study confirm that listening to stereos, either through loudspeakers or headphones are consistently popular among youth [6], followed by attendance at sporting events, vacu-

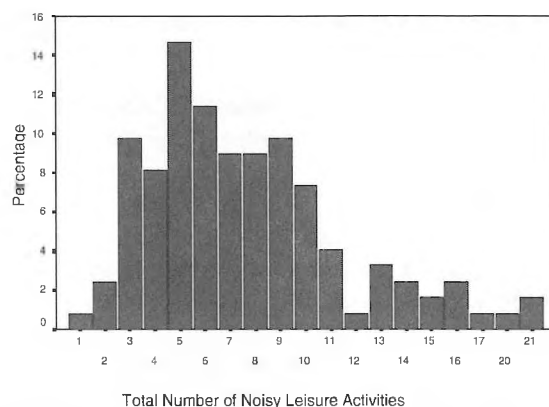


Figure 1. Percentage of respondents participating in number of leisure activities.

uming, and riding in cars playing loud music. Popularity in these activities suggest that further investigations are required to examine the duration and temporal characteristics of these leisure noise exposures, in order to accurately determine the risk of noise-induced hearing loss from participation in or exposure to these activities. In addition, in a country such as Canada, seasonal variations are a likely determinant of participation activities and patterns. Future goals include the administration of this survey during the summer and winter months to determine any seasonal variants or other participation patterns.

#### ACKNOWLEDGEMENTS

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