Halifax Noise Study: Resident Perceptions Into Noise Annoyance

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Background

Halifax regional municipality (HRM) is quickly growing[1], and with that comes an increase in volume of traffic, infrastructure, and activities such as construction leading to an increase in urban noise.[2] Urban noise has been shown to be a significant source of stress leading to negative health outcomes in the human population[3], as well as the natural environment.[4] The purpose of this research is to investigate the level of annoyance and sources of noise in Halifax by better understanding how residents perceive noise in their neighbourhood.

Research Objectives

The objectives of this research are:

1) To explore the level of annoyance associated with noise in Halifax.

2) To investigate the sources of noise residents of Halifax find to be most annoying.

Literature Review

Methods

The use of noise annoyance scales through community surveys tend to be more subjective [5] than acoustic noise mapping allowing valuable insight for both future research and municipal planning.

Health Impacts

Exposure to everyday urban noise outside of the workplace has recently proven to cause auditory impairment in individuals.[6] Experiencing noise at home or in the neighbourhood can lead to an increase in stress, trouble focusing, cardiovascular disease, and/or loss of income for individuals.[7] [8]

Built Environment

Regular communication between animal species such as songbirds are impacted by increased urban noise leading to lower species diversity.[9] Increasing buffer zones with areas of green vegetation may help decrease noise in high annoyance areas.[10]

Methods

An online survey was developed to anonymously solicit perceptions of noise annoyance and sources. The survey was open to adults (18 years or older) who were residents of Halifax. Surveys were distributed by regionally targeted ads on social media beginning February 2022 until March 2022. Scaling questions assessed various levels of noise annoyance, open-ended questions helped determine sources of noise annoyance, and demographic conditions to better understand the study population. Data analysis consisted of finding measures of central tendency as well as the proportion of annoyance from scaling questions. Pattern and focused coding analysis was lastly done for the open-ended responses to understand the most significant source of noise annoyance.

Results and Discussion

Table 1

Respondent Demographics n=468

Age Groups	Frequency	Proportion
22-39	151	32%
40-59	195	42%
60-85	114	24%
Undisclosed	8	2%
Sex		
Female	358	76%
Male	89	19%
Undisclosed	8	5%
Income Relative to Neighbourhood		
Same	278	59%
Lower	110	24%
Higher	73	16%
Undisclosed	7	1%
Housing Type		
Detached	252	54%
Semi-Detached	33	7%
Townhouse	29	6%
High Rise Apartment	49	10%
Low-Rise Apartment (<5 Floors)	74	16%
Other	24	5%
Undisclosed	7	2%

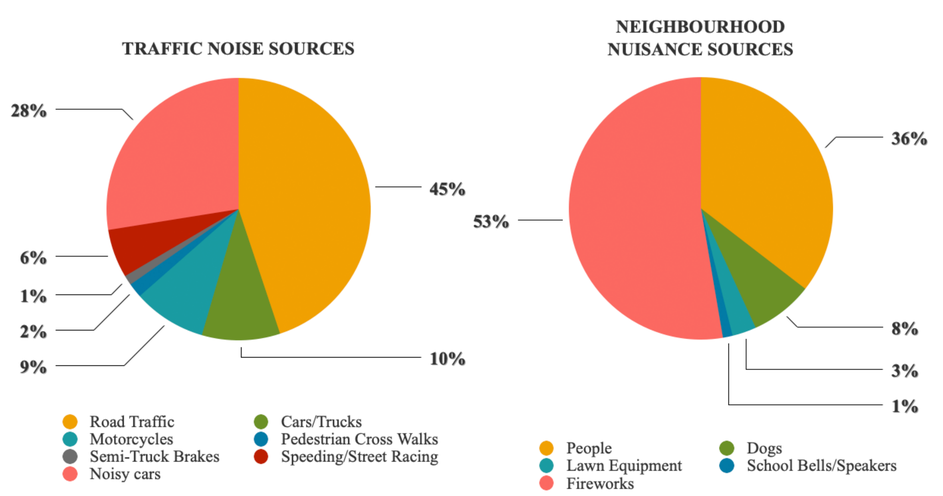

Figure 1

Most Significant Noise Source Subcategories

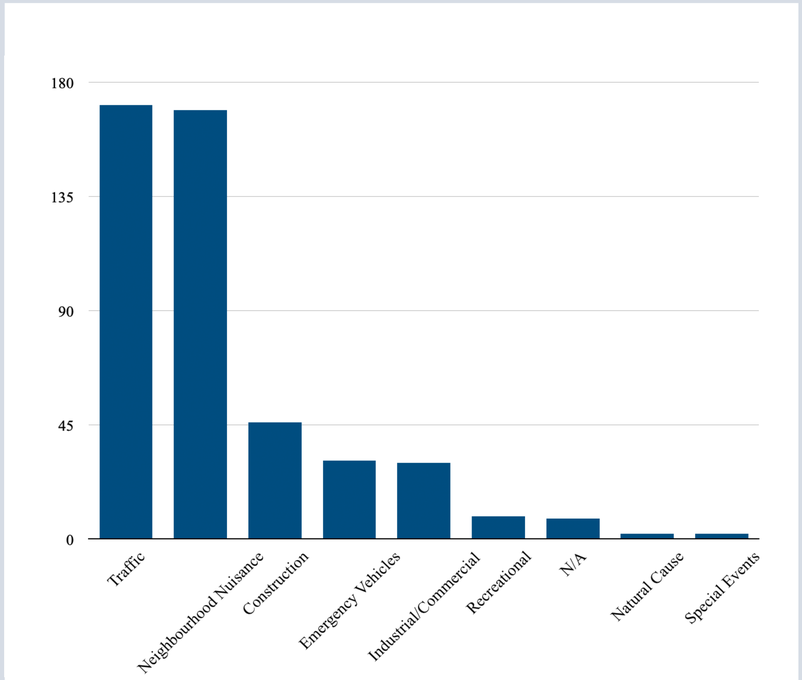

Figure 2

Noise Sources with Highest Annoyance Level According to Halifax Residents

The target response quota for the research study was exceeded, reaching a total of 468 responses as seen in Table 1. To understand the first research objective, the primary scaling question on noise annoyance was broken down into categories of low, medium, and high annoyance. Low annoyance levels were categorized as 1-3 on the scale, medium being 4-6, and high annoyance as 7-10. Overall, 27.6% were within the low category, 25.6% were in the medium category, and 46.8% of respondents fell in the highly annoyed category. As seen in Fig 2., road traffic has been shown to be both a common all time and nighttime annoyance. Neighbourhood nuisances tend to also be a significant noise annoyance source for any time and nighttime with fireworks being especially troublesome at night by interfering with respondents' sleep. More than half of the responses within the neighbourhood nuisance category for both night-time and any time were identified as fireworks (see Fig. 1). With traffic being one of the predominant sources of annoyance, the addition of green buffer zones may help reduce the amplitude of noise.[10] The secondary source of noise annoyance, fireworks, could be reduced dramatically if reduction measures were considered in the city of Halifax to limit the sale and use of backyard fireworks. As fireworks are a nuisance to not only humans, but the natural environment as well[11], Halifax could have a positive impact forward towards overall sustainability by heavily limiting this noise annoyance source.

References: [1]Statistics Canada. (2022, February 9). Infographic 1 *Among Canada's downtowns, the population is growing the fastest in those of Halifax, Montréal and Kelowna*. https://www150.statcan.gc.ca/n1/daily-quotidien/220209/g-b001-eng.htm [2] Mohamed, A.M., Paleologos, E., & Howari, F. (2021). Noise pollution and its impact on human health and the environment. *Pollution assessment for sustainable practices in applied sciences and engineering*, 975-1026. https://doi.org/10.1016/B978-0-12-809582-9.00019-0 [3] Münzel, T., Kröller-Schön, S., Oelze, M., Gori, T., Schmidt, F.P., Steven, S., Hahad, O., Röösli,, Wunderli, J.M., Daiber, A., & Sørensen, M. (2020). Adverse Cardiovascular Effects of Traffic Noise with a Focus on Nighttime Noise and the New WHO Noise Guidelines. *Annual Review of Public Health, 41*(1), 309-328. https://doi.org/10.1146/annurev-publhealth-081519-06240 [4] Rosa, P., & Koper, N. (2018). Integrating multiple disciplines to understand effects of anthropogenic noise on animal communication. *Ecosphere; Washington, 9*(2), 1-19. https://doi.org/ 10.1002/ecs2.2127 [5] Fields, J. M., De jong, R. G., Gjestland, T., Flindell, I. H., Job, R. F. S., Kurra, S., Lercher, P., Vallet, M., Yano, T., Guski, R., Felscher-suhr, U., & Schumer, R. (2001). Standardized general-purpose noise reaction questions for community noise surveys research and a recommendation. *Journal of Sound and Vibration, 242*(4), 641-679. https://doi.org/10.1006/jsvi.2000.3384 [6] Mayes, J. (2021). Urban noise levels are high enough to damage auditory sensorineural health. *Cities & Health, 5*(1-2), 96-102. https://doi.org/10.1080/23748834.2019.1577204 [7] Landon, J., Shepherd, D., & Lodha, V. (2016). A qualitative study of noise sensitivity in adults with autism spectrum disorder. *Research in Autism Spectrum Disorders, 32*, 43-52. https://doi.org/10.1016/j.rasd.2016.08.005 [8]Bjork, J., Ardo, J., Stroh, E., Lovkvist, H., Östergren, P., & Albin, M. (2006). Road traffic noise in Southern Sweden and its relation to annoyance, disturbance of daily activities and health. *Scandinavian Journal of Work, Environment & Health, 32*(5), 392-401. https://doi.org/10.5271/sjweh.1035 [9] Proppe, D., Sturdy, C., & St. Clair, C. (2013). Anthropogenic noise decreases urban songbird diversity and may contribute to homogenization. *Global Change Biology, 19*(4), 1075-1084. https://doi.org/10.1111/gcb.12098 [10] Dzhambov, A.M., & Dimitrova, D.D. (2014). Urban green spaces' effectiveness as a psychological buffer for the negative health impact of noise pollution: *A systematic review, 16*(70), 157-165. Retrieved October 6, 2021, from https://www.noiseandhealth.org/text.asp?2014/16/70/157/134916 [11] Lai, Y., & Brimblecombe, P. (2020). Changes in air pollution and attitude to fireworks in Beijing. *Atmospheric Environment (1994), 231*, 117549. https://doi.org/10.1016/j.atmosenv.2020.117549