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## Noise impacts from professional dog grooming forced-air dryers

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### Abstract

This study was designed to measure the sound output of four commonly used brands of forced-air dryers used by dog groomers in the United States. Many dog groomers have questions about the effect of this exposure on their hearing, as well as on the hearing of the dogs that are being groomed. Readings taken from each dryer at 1 meter (the likely distance of the dryer from the groomer and the dog) showed average levels ranging from 105.5 to 108.3 dB SPL or 94.8 to 108.0 dBA. Using the 90 dBA criterion required by the US Occupational Safety and Health

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Administration, dog groomers/bathers are at risk if exposure to the lowest intensity dryer (94.8 dBA) exceeds 4 hours per day. If the more stringent 85 dBA criterion and 3 dB tradeoff is applied, less than one hour of exposure is permissible in an 8 hour day. Cautions are recommended for any persons exposed to noise from forced-air dryers.

## Keywords

Dryer noise; Hearing protection; Service occupations

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## Introduction

The pet industry in the United States is robust and expanding with an estimated 78.2 million dogs in 46.3 million homes in 2010<sup>[1]</sup> and yearly profits of 48.35 billion dollars, 2.9 billion dollars of which was spent on grooming. It is estimated that there are 60,000-80,000 professional groomers in the United States.<sup>[2]</sup> One of the primary tools of the dog grooming trade is the forced-air dryer, also known as high-velocity dryers. Our survey of groomers showed that a typical professional groomer or groomer/bather is exposed to the source level of these forced-air dryers for an average of two hours per day, totaling about ten hours per week. The highest levels of exposure were about twice that, totaling as much as twenty hours per week.

Most noise exposures in the US occur in the mining, manufacturing, and construction industries.<sup>[3]</sup> A much smaller percentage of noise exposures are reported in the Services sector. However, there are instances of high noise exposures within service-oriented occupations. Unfortunately, workers in businesses that are not typically known for having high workplace noise exposures are much less likely to wear hearing protection than workers in traditionally noisy jobs.

Much of the existing literature on noise levels in animal care facilities pertains to the adverse effects of noise on the psychological well-being of the dogs.<sup>[4,5]</sup> Anecdotal evidence from groomer trade publications and websites suggests that the noise produced by forced-air dryers causes many dogs to be frightened. However, little research has been conducted on hazardous noise levels in animal-related facilities with respect to its effect on human hearing. This study was conducted to measure and quantify the extent of the hazard posed for dog groomers when using forced-air dryers. The authors are also very much interested in the effects of noise on dogs, but this issue was not addressed in this study since dryer exposure for dogs themselves is likely very limited as compared to groomers.

## Methods

Four of the most commonly used forced-air dryers that were tested for this investigation are listed in Table 1. Typically, when these dryers are being used the positions of the groomer and the dog being groomed are within 1 meter of the source, and thus both are exposed to significant noise levels from the equipment. In this study, we investigated four dryers of different makes and models used in typical grooming situations to determine source levels and exposure of both the groomer and dog being groomed.

Noise level measurements were taken using a Bruel and Kjaer Type 2270 sound level meter with 1/2-inch Type 4189 microphone using BZ-7223 frequency analysis software. This sound level meter was calibrated using a Bruel and Kjaer Type 4231 sound calibrator. The microphone was positioned between the dog and groomer and the dryer nozzle. Each dryer was measured under typical operating conditions for 5 minutes to obtain a representative  $L_{eq}$  (average) noise sample.

Both a one-third octave-band analysis based on ISO standard R 266 and ANSI S1.6-1984 and a high resolution power spectrum analysis were used to quantify the sound levels within the hearing range of the human groomer and dog being groomed.<sup>[6-8]</sup> The high resolution power spectrum is a representation of sound pressure level as a function of frequency in kilohertz (kHz). Spectral analyses of acoustic recordings were accomplished through averaging the fourier transform of the signal across multiple one-second windows, using the Matlab Signal Processing Toolbox. In addition, the average overall sound pressure level in dB SPL and A-weighted sound pressure level in dBA were computed from the recorded signal and the microphone sensitivity values. Recordings for power spectral analysis were taken using an M-Audio Microtrack II™ recorder with cardioid condenser microphone. All calibrations were relative to a 1000 Hz tone at  $94 \text{ dB} \pm 0.2 \text{ dB}$ . The microphone sensitivity was  $-58 \text{ dB re } 1 \text{ V/Pa} \pm 2.5 \text{ dB}$  where  $1 \text{ Pa} = 94 \text{ dB SPL}$ . Recordings were made in one-minute segments during the dryer operation.

## Results

All dryers showed elevated noise levels in the bands between 400 Hz and 10 kHz. The average sound levels in dB SPL and dBA for the four makes of dryers is shown in Table 2.

## Discussion

All four of the dryers tested show significant noise levels that have the potential to impact groomer and animal hearing. While overall sound pressure levels are somewhat similar across the four models, there are some differences in the frequency characteristics. The K9 II, Metro Air Force Master Blaster, and MDC Romani Granddaddy models all exhibit similar sound levels in the human hearing range, with overall noise levels of 105-108dBA and almost all noise power in that range so that dB SPL and dBA are nearly identical. In contrast, the double K Challenge Air DBL9000 II model has similar overall noise power but differing frequency characteristics, including significant energy in the 0-20Hz range, so that the A-weighted noise level is somewhat lower, about 95dBA.

In the US, the Occupational Safety and Health Administration (OSHA) standard for occupational noise exposure specifies a limit of 90 dBA for an 8-hour workday, using a 5 dB exchange rate (time/intensity trading relationship).<sup>[9]</sup> While the US OSHA standards have the legal backing of federal regulation, the US National Institute for Occupational Safety and Health (NIOSH) has recommended more stringent guidelines that include a more protective 3 dB time-intensity tradeoff.<sup>[10]</sup> This latter guideline is becoming the benchmark for standard of care by many hearing conservation professionals. Using either guideline, the dryer noise levels that dog groomers may be exposed to is excessive and puts their hearing

at risk. Given the significantly greater amount of time groomers are exposed to the sound of the dryers, groomer risk far exceeds that of their canine patrons. Indeed the dog exposure is both more limited and infrequent and as such may be inconsequential.

To be specific, the average sound level for three of the four makes of dryer in this study was 105-108 dBA. OSHA regulations limit exposure to this level of noise to 40-60 minutes per workday. The more stringent NIOSH guidelines would limit exposure to less than five minutes within an 8 hour work day. Yet according to our survey, a professional groomer is exposed to the source level of these forced-air dryers for two hours per day with the potential for professional groomers' exposure reaching as much as four hours per day. Using the lowest (i.e., 94.8dBA) noise- producing dryer would allow a groomer to operate for approximately four hours under the OSHA regulation and 47 minutes using the NIOSH recommended limits.

### Conclusions and recommendations

Noise level measurements of the four dryers investigated in this study clearly exceed allowable and safe levels given the reported lengths of time a groomer may be working with the dryers in a given day. The hearing health of dog groomers who use these commonly employed dryers is at risk. Hearing protection as used in any high noise employment setting should be standard for dog groomers exposed to dryer noise for more than one hour to be in compliance with regulations set by the Occupational Health and Safety Administration. Use of hearing protection for shorter exposure times is recommended and would be in agreement with guidelines developed by the National Institute for Occupational Safety and Health. Dogs are not considered to be at imminent risk of hearing damage from dryer noise given the minimal time of exposure that occurs on an infrequent basis. However, groomers have noted that dogs may be easier to handle during the grooming process if their ears are covered while dryers are on.

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**Table 1**

Specifications for professional dog grooming forced-air dryers tested

<b>Make</b>	<b>Model</b>	<b>Air volume (cfm)</b>	<b>Max air flow (fpm)</b>
K9	II	101	60,921
Metro	Air force master blaster	229	58,500
Double K	Challenge air DBL9000 II stand dryer	260	56,212
MDC Romani, Inc.	Granddaddy	248	56,000

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**Table 2**

Average sound pressure levels for forced-air dryers tested

<b>Make</b>	<b>Model</b>	<b>dB SPL</b>	<b>dBA</b>
K9	II	107.0	107.2
Metro	Air force master blaster	107.9	108.0
Double K	Challenge air DBL9000 II stand dryer	108.3	94.8
MDC Romani, Inc.	Granddaddy	105.5	105.1

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