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Knowledge, Attitudes, Behaviors and Noise Exposure of Baristas

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Abstract

Objective—To examine the daily noise exposure of baristas working in cafés, and to measure their knowledge, attitudes and behaviors regarding hearing conservation and perceptions of noise in their work environment.

Design—Fifteen baristas from six cafés in Portland completed the Knowledge, Attitudes and Behaviors questionnaire, a sound disturbance survey, and a structured interview to document perceptions of noise in the work environment. To measure daily noise exposure, a subset of eight participants wore a personal dosimeter for three different work shifts.

Study Sample—11 females and 4 males aged between 19 and 36 years old (mean: 26.3, SD: 4.6) recruited from independently owned cafés in the Portland metro area.

Results—Dosimetry measurements revealed Leq measurements between 71 dBA and 83 dBA, with noise doses ranging from 4% to 74%, indicating that baristas are not exposed to sound levels above the regulatory criterion. Questionnaire results indicated that baristas have low awareness about the hazards of noise, are not opposed to hearing conservation, and rarely use hearing protection when engaged in noisy activities.

Conclusions—Baristas here lacked the pertinent education and motivation to commit to invaluable hearing conservation practices.

Keywords

Hearing conservation; noise-induced hearing loss; health belief model; cafés; questionnaires

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Declaration of Interest

Portions of this work were presented at the American Auditory Society Annual Conference, Phoenix, AZ (March 6, 2015), the Missouri Academy of Audiology Annual Conference, Saint Louis, MO (September 12, 2014), and the International Hearing Aid Research Conference, Lake Tahoe, CA (August 14, 2014).

Introduction

In 1981, the Occupational Safety and Health Administration (OSHA) promulgated an amendment to the existing noise exposure standards regarding Hearing Conservation Program requirements and how to protect general industry employees (OSHA Technical Manual, 1999). However, there are hospitality industry professions that are not covered under the amendment in which workers may be exposed to dangerously high levels of noise. One such group of individuals is classified by the Bureau of Labor Statistics (2010) as 'Counter Attendants, Cafeteria, Food Concession, and Coffee Shop.' Baristas, who prepare or serve specialty coffee, drinks, and food to patrons, fall into this classification. In 2010 there were an estimated 439,000 baristas in the United States, and that number is projected to increase by 267,800 by 2022 (O-Net Online, 2010). Baristas are exposed to noise sources from coffee grinders, espresso machines, and ambient noise from the café in which they work. Data in the National Acoustic Laboratories/HEARING CRC NOISE (Non-occupational Incidents, Situations and Events) Database described in Beach (2014) showed sound levels between 66.5 dBA to 81.9 dBA for cafés measured over periods of 0.5 to 3.0 hours. Similarly, according to the NoiseNavigator™ database (Berger, Neitzel and Kladden, 2013), sound levels in restaurants range from 65 dBA to 90 dBA across 8 studies, and household coffee grinders (which tend to be smaller than those used in cafés) range in level from 80–95 dBA. These data suggest that baristas may be exposed to potentially damaging noise levels during their workday.

While it is important to make objective assessments of sound levels in potentially hazardous work environments, it is also relevant to examine workers' attitudes, beliefs and subjective evaluations of sound in the work environment, with a view to understanding barriers and facilitators to use of healthy hearing practices. To this end, a number of investigations have applied principles of health behavior theory towards the development and evaluation of hearing conservation programs (Lusk et al, 1997; McCullagh et al, 2002; Gilliver et al, 2014; Saunders and Griest, 2009). In this study the attitudes and beliefs of baristas were examined using the Health Belief Model (HBM, Rosenstock, 1966) as the theoretical framework. The premise of the HBM is that an individual must perceive a threat from a health condition if he/she is to take action to prevent it. Perception of threat is influenced by six constructs: (a) perceived susceptibility (the feeling of being vulnerable to acquiring the condition), (b) perceived severity (the perception of the seriousness of the consequences if the condition is acquired), (c) perceived benefit (the belief that an intervention will lead to a positive outcome), (d) perceived barriers (the barriers that must be overcome in order to effectively use an intervention/prevent a condition), (e) perceived self-efficacy (the individual's belief that he or she can successfully use the intervention/prevent the condition) and (f) cue to action (an external cue that prompts the individual to take action).

The purpose of this study was to determine whether baristas are exposed to hazardous levels of sound during a typical workday and to learn about their attitudes toward hearing and hearing conservation. To achieve this, we used personal dosimetry to measure the daily sound pressure levels to which baristas were exposed during their work shift, and measured knowledge, attitudes and behaviors regarding hearing, noise, use of hearing protection, and perceived ambient noise levels in the café environment using questionnaires.

Materials and Methods

The protocol received Institutional Review Board (IRB) exemption by the VA Portland Health Care System IRB and Research and Development committee. Patient identifiable information (first name only) was used only during data collection to identify a barista while he/she participated in the study so the dosimeter data collected on three occasions could be correctly combined.

Participants

Fifteen baristas were recruited from six different cafés in the Portland metro area. Consent to participate was first obtained from the owners/managers of the cafés and then from the baristas. To participate in the study, individuals had to be at least 18 years of age, have a minimum daily work shift of four hours, and have the ability to complete the questionnaires independently.

Recruitment took place from June to August 2014, and participants remained in the study for up to two weeks. Participants received a \$10 gift card to a local grocery store for each set of questionnaires/noise dosimetry measurement completed. Eleven females and four males, ranging in age from 19 to 36 years old (mean = 26.3, SD = 4.6), took part. They had worked as a barista for between 6 months and 9.5 years (mean = 5.7, SD = 2.9). The mean number of hours typically worked per week was 32.3 hrs. (SD = 3.6; range = 25 to 37 hrs.).

Test Measures

All fifteen participants completed a structured interview, the Knowledge, Attitudes, and Behaviors Questionnaire (KAB), and a noise disturbance survey. Eight of these participants also completed personal dosimetry measurements. Each measure is described below.

Structured Interview—The structured interview consisted of ten questions to document tasks performed and equipment used throughout the workday, and the typical percentage of each day spent performing various job duties.

Knowledge, Attitudes, and Behaviors questionnaire (KAB; Saunders et al, 2014)—The KAB consists of three sections. Section 1 assesses knowledge about the auditory system, hearing conservation, and noise-induced hearing loss (NIHL). Section 2 assesses the participant's attitudes about hearing loss and hearing conservation practices within the constructs of the HBM. Section 3 documents the participant's behaviors associated with participation in eight noisy activities, the frequency and duration of participation, use of hearing protection during participation, and occurrence of tinnitus after engaging in the activity. More information about the KAB can be found in Saunders et al (2014).

Noise Disturbance Survey adapted from Topf (1985)—The noise disturbance survey was adapted to assess the positive and negative impacts of café noise. The survey consists of 39 items in five sections measuring (1) overall perceived level of noise, (2) impact of sounds in the café, (3) perceived level of specific sources of sound, (4) the extent

to which specific sources of sound were bothersome and (5) helpful. See Supplementary Digital Content 1 for a copy of the survey.

Noise Dosimetry using Etymotic Research ER-200DW7 Personal Noise

Dosimeters—Each dosimeter was calibrated prior to and immediately following data collection. Dosimeters were set to National Institute for Occupational Safety and Health noise exposure criteria (a criterion level of 85 dB, a threshold level of 65 dB, and an exchange rate of 3 dB). Equivalent continuous sound levels (L_{eq}) and doses were obtained during work shifts.

Procedure

Following agreement to participate, baristas completed a structured interview, the KAB, and the noise disturbance survey. Due to time limitations, seven participants ended their participation at this point. The remaining eight baristas each wore a dosimeter during three weekday work shifts that ranged in duration from 4 hr. 52 min to 8 hr. 48 min.

Analyses

SPSS v22 was used for all statistical analyses. Dosimeter data were analyzed to examine the noise levels to which baristas were exposed during each work shift. Data from the questionnaires were analyzed to obtain an understanding of the impact of noise and participants' knowledge, attitudes and beliefs around hearing conservation.

Results

KAB

Knowledge scores ranged from 12.5% to 75% (mean = 40.4%; SD = 17.8%). Attitude scores, which could range from -50 (negative attitude) to +50 (positive attitude) varied by scale. Susceptibility, Barriers and Cues to Action scores were neutral (Susceptibility: mean = 4.6, SD = 8.3; Barriers: mean = 8.3, SD = 9.2; Cues to Action: mean = 1.2, SD = 27.5) suggesting these factors likely had little influence on behaviors. Severity and Benefit scores were positive (Severity: mean = 18.3, SD = 26.4; Benefits: mean = 21.0, SD = 9.2) suggesting these constructs might have a positive influence on the baristas' behaviors toward preventing hearing loss. Self-efficacy scores were negative (Mean = -11.3, SD = 24.7) suggesting the baristas had low self-efficacy for preventing hearing loss. Behavior responses revealed that every barista frequently engaged in at least one noisy activity, with the most common being listening to music in the car, through headphones and at music events. Thirteen baristas reported working in a moderately loud environment almost every day. All 14 baristas who reported attending music events reported experiencing 'pain or ringing' in their ears after the events. Hearing protection device use was extremely low (only one participant used hearing protection routinely).

Noise Disturbance Survey

The noise disturbance survey data are shown in Table 1. It is evident from the high rate of agreement with the positive impact statements that in general, sounds in the cafés are

considered to be a positive influence. However, from the high rate of agreement with some of the negative impacts statements, it is evident that the baristas realize that noise can impact both hearing and communication. Participants also rated the loudness of specific sound sources and how helpful and bothersome they were. Table 2 shows these results. It is seen that sounds were more often considered helpful than bothersome, despite the fact that some sound sources were rated as being 'loud' or 'very loud.'

Dosimeter data

Figure 1 shows the dosimeter data for each barista separately. The bars show the Leq averaged over a shift, while the dose averaged across shifts is shown in text above the bars. Leq values ranged from 73.8 dBA to 83.6 dBA across participants, with average dose across the three shifts ranging from 7.2% to 57%. Daily doses were all well below the OSHA regulatory levels and NIOSH recommended levels. Figure 2 shows Leq by time of day for each café separately, combined across baristas. Café A consistently had the highest sound levels, while Cafés B and C had similar levels.

Discussion

The study examined the daily noise exposure, and knowledge, attitudes, and behaviors of baristas using dosimetry, questionnaires and interviews. Dosimetry was used to determine whether baristas are exposed to hazardous levels of sound during a typical work shift, while the questionnaire and interview data were collected to gain a better understanding of the overall effects of noise in a work environment, and to learn whether baristas are aware of the impacts of high sound levels and whether they are willing to consider uses of hearing protection when participating in noisy leisure activities.

Personal dosimetry data revealed that the baristas in this study were well within OSHA and NIOSH noise exposure limits. These data are similar to those available in the National Acoustic Laboratories and the HEARing CRC NOISE (Non-occupational Incidents, Situations and Events) Database, which shows sound levels between 66.5 dBA to 81.9 dBA for different cafés measured over periods of 0.5 to 3.0 hours. Our data showed a moderate positive correlation between shift duration and dose ($r=0.489$, $p<0.015$), which, while not surprising, is worth discussion because it indicates that baristas who work long shifts may at times be exposed to potentially hazardous noise levels, particularly if they then engage in leisure activities that are noisy. There was a considerable difference in daily dose of the two baristas from Café A (average doses of 18.4% versus 57.0%). Based on conversation with each, this disparity might be due to their differing job duties.

Compared to a group of 235 older individuals (mean age = 48.3 yrs.) in the study of Saunders et al. (2014), the baristas had lower knowledge scores (57.6% versus 40%). While previous data suggest knowledge accumulates over time, it is concerning that a younger population – that is highly likely to engage in noisy leisure activities (Beach et al, 2013), has such little knowledge about hearing and hearing conservation. The baristas' attitudes scores also differed from the participants of Saunders et al. The baristas had lower perceived susceptibility, saw fewer benefits to taking action to protect their hearing, and had much lower self-efficacy for protecting their hearing. Other studies of younger populations have

shown similar (Rawool & Colligon-Wayne, 2008; Chung et al, 2005). On a positive note the baristas had neutral Barriers scores, that is, they did not perceive barriers to protecting their hearing. A similar finding was reported by Holmes et al. (2007) for a group of 246 individuals aged 18–27 years. Together these findings indicate the importance of providing education about hearing and hearing loss prevention to this population of individuals, as follows. Low self-efficacy suggests an awareness of a lack of knowledge about hearing and hearing loss prevention, low benefits and susceptibility scores further reflect a lack of knowledge, and neutral barriers could be interpreted as a positive indication that the individuals would be open to education. We do not propose that this profile is specific to baristas, but more that it likely reflects the attitudes and beliefs of younger individuals.

The adapted Topf survey identified conflicting perspectives about sound sources in the café, with some sounds being rated as loud, bothersome and helpful (e.g. the espresso machine). Likewise, many baristas agreed that the overall sounds in the café made it a fun and exciting workplace, but also agreed that the sounds may affect their own and their customers' hearing. This perspective indicates an awareness that noise can be hazardous but also reflects a 'pro-noise' opinion, as described by Widén and Erlandsson in their qualitative study of risk perception in musical settings among individuals aged 17–28 years of age.

The study has some limitations that should be mentioned. First, data were collected from a small sample of cafés and baristas, thus our data may not be representative of the 'typical café', but it is probable that there is no 'typical café' and that noise levels will vary greatly across cafés. Second, while dosimetry permitted measurements of Leq, no specific measurements of café equipment noise were made, which would permit a better understanding of the potentially problematic sources of noise. Likewise, the dosimeters used here did not permit measurement of impulse noise, which informal observation suggests, are often present in cafés. Use of more sophisticated sound measurement equipment may reveal other important information.

Despite the limitations outlined above, the study has revealed that baristas are not exposed to hazardous levels of noise during a typical work shift and therefore do not require the use of hearing protection devices during their work shifts. However, the combination of occupational noise exposure, participation noisy leisure time activities combined with low use of hearing protection and the presence of tinnitus following those activities, suggests that with time, damage to the auditory system is likely to occur among these individuals. This highlights the continuous need for providing hearing health education to younger generations.

Conclusion

It is concluded that the baristas in this study were not exposed to hazardous noise in their workplace. They have low awareness about the hazards of noise but their attitudes do not suggest opposition to hearing conservation. This indicates the importance of hearing health education for younger generations of individuals so that they have the knowledge to consider appropriate hearing conservation practices.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Leq (dBA) for each shift by barista (1, 2 and 3), day of recording (Day 1: dark bar, Day 2: no shading, Day 3: light bar) and coffee shop (A, B, and C). Numbers in text indicate dose for each barista averaged across work shifts.

Figure 2.

Leq (dBA) by time of day for each café separately, combined across baristas. Some values shown originate from up to 9 readings (3 baristas over 3 shifts), while others, typically those at the start or end of the day, originate from just one or two readings.

Table 1

Noise Disturbance Survey responses to negative and positive statements regarding sounds in the coffee shop. Participants' (n=15) agreement, neutral opinion, and disagreement are indicated as a percentage for each statement.

Positive impacts	Agree	Neutral	Disagree
Make for an exciting place to be	73%	20%	7%
Help me focus on my work	20%	60%	20%
Create a good atmosphere for customers	73%	13%	13%
Help customers relax	33%	20%	47%
Make for a fun work place	80%	13%	7%
Negative impacts			
Make it difficult to hear coworkers	40%	47%	13%
Make it difficult to hear alerts/warnings	33%	20%	47%
Make me feel stressed	20%	40%	40%
Make it difficult to concentrate	13%	53%	33%
Affect my ability to do my work	13%	33%	53%
Make it difficult to hear customers	67%	20%	13%
Might affect customers' hearing	53%	20%	27%
Might affect my hearing	67%	7%	27%

Table 2

Noise Disturbance Survey responses to rating of loudness, helpfulness and bothersomeness of specific sound sources in the café. Data shown is the percent of participants in each rating category.

Sound source	Rating		
	Loud or very loud	Quite a bit or extremely helpful	Quite a bit or extremely bothersome
Coffee grinder	100%	0%	13%
Furniture scraping/banging	47%	0%	7%
Conversations between staff	20%	47%	7%
Background music	27%	47%	7%
Customer noise	27%	20%	0%
Sounds from kitchen	13%	0%	0%
Espresso machine	47%	27%	13%