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INTERVENTIONS TO REDUCE HIGH-VOLUME PORTABLE HEADSETS: "TURN DOWN THE SOUND!"

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Two studies examined effects of interventions to reduce noise levels from portable stereo headphones. Study 1 examined the effectiveness of warning signs posted in and nearby public elevators with 567 passengers possessing a portable headphone (total $N = 7{,}811$). During a 9-day baseline, the mean percentage of headphones played at an observer-audible level was 85%. During a subsequent 6-day warning sign phase, the mean percentage of audible headphones declined to 59%, which increased to a mean of 76% during a second baseline phase (5 days). Study 2 assessed the impact of a student confederate who lowered his or her observer-audible headphone volume at the polite request of a second student confederate. Of the 4,069 elevator passengers, 433 possessed a portable headset. The mean percentage of observer-audible headphones during a 4-day baseline was 85%. Subsequently, a 5-day modeling intervention reduced audible volumes to a mean of 46%. During a second baseline phase of 4 days, the mean level was 77%, and during reintroduction of the modeling phase (9 days) the mean level was 42%. The modeling intervention was significantly more effective with women (53% compliance) than men (29% compliance).

DESCRIPTORS: audio headsets, signs, modeling, prevention, behavioral community psychology

About 23 million portable stereo headset radios and tape players are sold annually in the United States (Monroe, 1990). In many densely populated urban areas, thousands of individuals use these headsets to mask the environmental sounds of city dwelling. Unfortunately, by using a personal stereo, especially if set at a high volume, an individual may be at risk from several health hazards. For example, the person may be unable to notice what is going on in the immediate environment and thereby be unable to hear safety signals from traffic noise or another person's verbal warnings.

Recent studies have found the sound levels for many of these headsets to range as high as 102 to 131 decibels at full volume (Lee, Senders, Gantz, & Otto, 1985; Rice, Rossi, & Olina, 1987; Rinntelmann & Peppard, 1983). Navarro (1990) examined 51 portable stereo headsets to determine whether they produced sufficient levels to damage hearing. Each headset was coupled to the artificial ear of a sound level meter and decibel (dB) levels were measured at three settings: one third full volume, two thirds full volume, and full volume. Results showed that the headsets produced an average of 87 dB at one third volume, 100 dB at two thirds volume, and 108 dB at full volume. The noise level of many headsets at full volume was so high (128 to 131 dB) that the authors compared the intensity to having a shotgun discharged next to one's ear.

These studies were presented at the annual meeting of the Eastern Psychological Association, New York, April 1991. These data were collected when the first author was a Visiting Assistant Professor and the second author a B.A. Psychology major at Baruch College, CUNY.

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Although the civil liberty to own and play such devices certainly is not an issue, the extremely high volumes preferred by many people can present a health hazard to the user. Audiologists believe headset sounds loud enough to be heard by passers-by can cause hearing damage if used more than an hour per day (Monroe, 1990). Researchers have found habitual use of portable headsets at high volumes to result in temporary threshold shifts in hearing and to increase the risk of permanent hearing loss (Rice, Breslin, & Roper, 1987). In a laboratory setting, Lee et al. (1985) examined the extended free use of headsets by 16 teenagers, and found that an average of 44% set the volume level at over 100 dB during three observation sessions. At the end of the sessions, 11 of the 16 youths reported tinnitus (i.e., the muffling of sound with discomfort in the ears and a temporary hearing impairment).

Because noise-induced hearing loss is cumulative and is a function of sound intensity and duration (Pearce, 1985), listening even to moderately loud music for 15 min or longer with repeated daily exposure may cause permanent damage (Monroe, 1990). In fact, a Chicago public service announcement in November 1989 claimed that 26% of college students have some permanent hearing loss attributable to loud music. To prevent hearing impairment from high-volume settings, Navarro (1990) suggested headset users restrict the playing of their unit to no more than 1 hr per day at no more than half the volume level. Unfortunately, many people seem to set their headset volume at levels causing a serious health hazard and (most probably) are playing their headsets for more than 15 min daily. Consequently, interventions are needed to encourage listeners to "turn down the sound" of their portable headsets.

We evaluated certain behavior-change interventions to decrease exposure to the potential health hazards of high-volume headset use. Specifically, we assessed whether independent use of visual prompts (warning signs and posters) and social influence (another person modeling the volume reduction) caused headset users to lower the volume. These two behavior-change techniques were studied independently as strategies for reducing the risk of a potential personal health hazard.

Visual prompts (i.e., warning signs and posters) have effectively increased public awareness and promoted safety behavior in a variety of community settings (e.g., Ferrari & Baldwin, 1989a; Geller, Bruff, & Nimmer, 1985; Jones, Kazdin, & Haney, 1981; Twardosz, Cataldo, & Risley, 1974). Some studies found that using visual prompts alone may be as effective as using them in conjunction with other methods, especially when the target behavior is relatively convenient. For example, Ferrari and Baldwin (1989b) found visual prompts alone (signs, posters, fliers, buttons, and media messages) to increase the use of safety belts for children in supermarket shopping carts. Jason, Clay, and Martin (1979) found hazard posters in elevators to reduce public smoking; Lavelli, Lavelli, and Jason (1980) reported signs alone were useful to increase the use of available ear plugs by commuters to reduce hearing loss caused by noisy subway trains.

Geller, Winett, and Everett (1982) and Wogalter et al. (1987) outlined and empirically supported several criteria necessary for warning posters and signs to be effective. Essentially these criteria involved the presentation of a signal word (e.g., "warning," "caution"), a statement on the health hazard, the aversive consequences of noncompliance, and instructions for a specific "should do" response to avoid danger. In addition, the message should be attention getting, comprehensive, concise, and durable. Wogalter et al. (1987) found, for instance, that to encourage people not to drink contaminated water from a public fountain, a warning poster with attention-getting characteristics (i.e., highlighting the word "warning" with drawings of the head and torso of a person with a mouth and digestive tract revealed) yielded 33% compliance, compared to a less enhanced sign (12%) or a no-warning baseline (0%). Study 1 of this report used visual prompts as a behavior-change intervention.

People typically don't process all the information in warning messages, particularly if they scan the message (Wright, Creighton, & Threlfall, 1982). An alternative strategy to promote compliance with a hazard warning could involve social influence from peers who perform the same or similar act. Peer social influence has been effective in modeling public health behaviors (e.g., Ferrari, Barone, Jason, & Rose, 1985a, 1985b). Wogalter, Allison, and McKenna (1989), for example, found that if a model performed a safety behavior (e.g., wore gloves and glasses in a chemistry laboratory, or avoided a faulty public elevator), compliance by a participant increased significantly, especially if the target response required minimal effort. Study 2 of this report focused on whether compliance would occur when another person in the hazardous situation modeled the appropriate behavior.

STUDY 1

METHOD

Setting and Participants

Study 1 was conducted at Baruch College in midtown New York. One campus building served as the site, because of the high amount of public traffic passing daily through this building. None of the other campus buildings were available as experimental sites because of administrative constraints. The only major access to class or to a department office in the selected building was to ride one of six automatically operated elevators. Three elevators ran nonstop from the lobby to the ninth floor, and the other three elevators went to the 12th floor before continuing on to several other floors in the building. Four elevators measured 70 in. by 55.5 in. and could accommodate up to 15 passengers. The remaining two elevators measured 83 in. by 67.5 in. and had capacities of 18 passengers each.

During the academic year of this study, total enrollment at Baruch College was approximately 16,000 students (56% males). During Study 1, the ratio of men to women participants was 41.4% to 58.6%.

Observation and General Procedures

Observations were made Mondays through Thursdays during intervals between class periods (9:15 a.m. to 5:05 p.m.). Six peak periods were monitored each day, with the median amount of time for an observation session being 25 min (range, 20 to 30 min). Peak class periods were determined from information provided by the University Registrar. Each observer recorded an average of 4.6 class periods per day to sample individuals who might enter or leave the building.

When an elevator door opened, an observer attempted to locate himself or herself in a corner to assess the behavior of riders. All recordings were made unobtrusively; the observer scanned the passengers several times without making eye contact and then checked the gender and target behaviors of the elevator passengers. Recordings were made on paper usually held at waist level or below, to be out of obvious sight of the passengers. No passengers questioned observers about the procedure.

The observer recorded the number of male and female passengers with and without a portable stereo headset. The observer also classified the target behaviors of headset users into one of seven categories: (a) a passenger with a headset on head and audible by the observer (head/on); (b) a passenger with a headset on head and not audible (head/off); (c) a passenger with a headset around neck and audible by the observer (neck/on); (d) a passenger with a headset around neck and not audible (neck/off); (e) a passenger holding a headset in his or her hand that was either audible (hold/on) or inaudible (hold/off); and (f) a passenger putting a headset away that was off (put away). Ability to make these classifications was not impaired despite levels of ambient noises (e.g., loud conversations). Pilot observations found that positioning observers in a designated elevator location did not limit monitoring ability. Observers stated that headsets marked in the head/on category were played at such loud volumes they could be heard from any elevator corner.

The observer completed a round-trip ride by recording from the lobby to the ninth or 12th floor, depending on which floor was the first stop of the elevator, and then from that floor back to the lobby. The length of time it took an elevator to travel from the lobby to its first stop was 30 s to the ninth floor and 42 s to the 12th floor. Each observer

Figure 1. Warning signs displayed outside elevator doors next to operating buttons and in clear view of passengers. (Photo and signs by Tim Thomson)

rode all six elevators at least once per peak period, with 6.9 being the mean number of rides per period. No observer ever interacted directly with the passengers.

A second independent observer was present to record the number of male and female passengers with no headset, as well as the seven target behaviors. Interobserver agreement was computed for each target behavior by dividing the higher frequency of a behavior into the lowest frequency and then multiplying by 100.

Experimental Procedures and Design

During the intervention phase, hazard signs and posters were placed in all elevators on each floor and in the lobby of the building. These warning prompts met the criteria for effectiveness discussed above (Geller et al., 1982; Wogalter et al., 1987). Large white posters (11 in. by 14 in.) containing a drawing of a Walkman® inside a red circle with a red diagonal line through the figure were located on each floor and in the lobby adjacent to the elevators. Above each of the drawings was the single word WARNING, and underneath was the statement: "Long exposure to high intensity sounds can contribute to 26% hearing loss among college students. Please *Turn Down the Sound.* Thank you." White warning signs (5.5 in. by 14 in.) were also placed in all six elevators. These signs contained red and black lettering stating "Please *Turn Down the Sound.* Thank you." All italic words were printed in red letters. Figure 1 shows a picture of the intervention signs as they appeared in the setting, placed in and outside the elevator doors.

The effectiveness of this intervention on high-volume portable stereo headsets was assessed with an ABA reversal design. A baseline condition (A) was in effect for 9 days; this was followed by signs and posters (B) for 6 days and a return to baseline (A) for 5 days.

Results

Interrater Agreement

The second observer was present on 14 of the 20 observation days. Mean interobserver agreement for each target behavior was quite high: for head/on it was 97.9% and was 100% for each of the remaining seven categories. The overall mean across all behaviors was 99.6%, with a daily range of 97% to 100%.

Audible Headset Use

A total of 7,811 elevator passengers were monitored over 20 observation days. Across the three phases, the mean percentage of passengers with a portable headset was 7.3% (or nearly 29 individuals per day). Table 1 indicates the number of passengers performing each target behavior across observation phases. The number of target passengers decreased across phases. Figure 2 shows the percentage of men and women passengers who played their headsets at a level audible to an observer (public-audible in figure). Each daily percentage point was computed by taking the number of pas-

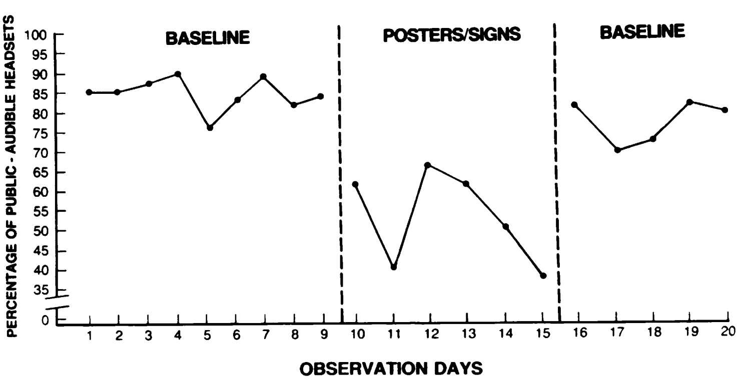

Figure 2. Daily percentage of portable headsets audible to observers in Study 1.

sengers with their headsets audible to observers (i.e., the head/on category) and dividing that amount by the total number of passengers in all target categories.

During the initial baseline, the mean percentage of passengers whose headset volume was audible to the observers was 84.5% (range, 86.5% to 89.6%). After implementing the signs and posters, the mean percentage of observer-audible headsets decreased to 59.1% (range, 38.5% to 81.2%). A return to baseline showed an increase, with a mean percentage of 75.9% (range, 71% to 82.6%) of the headsets being publicly audible.

Gender differences. Among the passengers without a portable headset (n = 7,244), 4,303 (59.4%) were women and 2,911 (40.6%) were men. During the initial baseline phase, 138 men and 143 women carried headsets turned on, and 11 men and 12 women carried headsets classified as off or put away. In the warning phase, 47 men and 53 women kept their headset on at observer-audible levels, but 28 men and 22 women complied wth the posters and signs. During the second baseline phase, 49 men and 41 women had their headsets set in one of the on categories, compared to 8 men and 15 women who were classified off or put away categories. Chi-square comparisons indicated no significant gender difference in audible headset use between men and women per phase.

We next determined whether a gender difference existed for compliance to the warning prompts. During the initial baseline phase, 7.4% of the men and 7.7% of the women were in off or put away categories. These percentages increased to 37.3% for men and 29.3% for women when the warning signs and posters were introduced. In the second baseline phase, the percentage of passengers whose headset volume was classified as off or put away decreased to 14% for men (above their initial baseline), yet remained relatively constant for women at 26.8%.

STUDY 2

This study examined the behavioral effects of social influence or modeling on observer-audible headset use. Specifically, we assessed the influence of the behavior of one other person (a confederate) on a target individual's compliance with oral warnings about personal hazards from high-volume headsets. This study was a partial replication of the

Table 1
Frequency of Target Behaviors Across Phases of Study 1

Target behaviors	Baseline 1 (9 days)	Warning signs (6 days)	Baseline 2 (5 days)
Head/on	258	88	86
Head/off	2	5	4
Neck/on	17	4	1
Neck/off	17	36	16
Hold/on	6	8	3
Hold/off	1	8	1
Put away	3	1	2
Total	304	150	113

study of Wogalter et al. (1989), who used a similar modeling intervention to promote health precaution behaviors. Unlike their study, however, our warning signs were not in place during the modeling intervention.

Method

Setting and Participants

Study 2 was conducted at Baruch College during the next semester, approximately 9 weeks after Study 1. The long break between studies provided the potential for a different student population. The gender ratio in Study 2 was 44.1% men and 55.9% women.

Observation and General Procedures

The same observation and data collection procedures described in Study 1 were used.

Experimental Procedures and Design

During two intervention phases, two student confederates (trained research assistants and observers) noted when a peer had his or her headset playing at a level audible to both confederates. The confederates then signaled each other nonverbally and independently approached this person (who was waiting for an elevator). Before approaching the target, one confederate also placed a headset on his or her head, turned the unit on, and set the volume so that it was audible to others. The role of headset model had been determined by the flip of a coin between male and female observers. When the elevator arrived and passengers entered, both confederates (acting as if unacquainted with each other) entered and stood next to the target participant.

As the elevator began to move, the confederate using the high-volume headset was tapped on the shoulder by the second confederate. The confederate with the headset acknowledged contact by turning his or her head and lifting one earpiece away from the head. The second confederate then said politely, "Excuse me, but by setting your headset so loud you may be causing serious hearing damage that might lead to deafness." Subsequently, the confederate with the headset lowered his or her volume, smiled, and said, "Thanks for the warning." This exchange lasted only 10 to 15 s, and no other communication between confederates occurred. Both confederates monitored the reactions of the passengers, particularly the target participant (to see if this person lowered his or her headset volume). On a few occasions passengers smiled, although some made remarks in reaction (e.g., "Oh, brother").

An ABAB reversal design was used to test this intervention on portable headset use. The initial baseline phase (A) was in effect for 4 days and was followed by a modeling/social influence phase of 5 observation days (B). After a 1-week spring recess, a return to baseline was in effect for 4 days (A), with a return to the modeling/social influence phase for 9 observation days (B).

Results

Interrater Agreement

In addition to serving as intervention confederates, both confederates served as independent observers for 19 of 22 days. (Only one observer was present for 3 baseline days.) Consequently, as in Study 1 there were only two observers present at each recording session, and during intervention phases, these observers served as the confederates. Mean interobserver agreement was 99% for no radio, and 98% for head/on, in which a user's headset was rated audible by the observer/confederates. The overall mean agreement across all behaviors was 98%, with a daily range of 96% to 100%.

If a target participant lowered his or her headset volume so it was no longer audible to the observers, it was recoded as LV (lowered volume) and that person was removed from the head/on category. Interrater agreement was 100% for this target behavior.

Audible Headset Use

A total of 4,069 elevator passengers were monitored across 22 observation days. The mean percentage of passengers with a portable headset radio was 10.9% (or about 20 individuals per day). Table

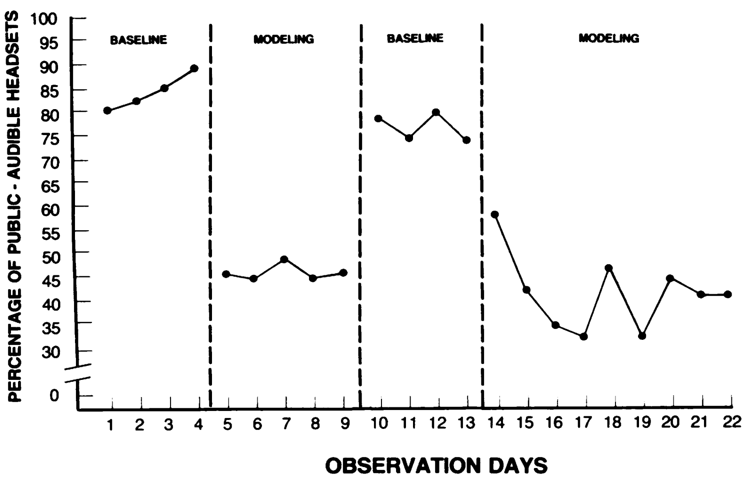

Figure 3. Daily percentage of portable headsets audible to observers in Study 2.

2 presents the number of passengers for each target behavior across observation phases, although there was a decrease in the number of target passengers across phases. Of the target passengers whose headset was on the head and was audible by the observers during intevention phases (n = 154), 61 individuals (27 men, 34 women) lowered the volume to a level below the ability of both confederates to hear any sound. In other words, during the modeling phases (and not once during either baseline), 29.6% of the target passengers whose headsets were observer-audible lowered the volume of their headsets. None of the individuals in the other categories lowered headset volume.

Figure 3 shows the daily percentage of passengers who headset volume was used at an audible level to an observer, including those individuals who lowered the headset volume. Therefore, each daily percentage point was computed using the formula in Study 1. During the initial baseline phase, the mean percentage of passengers whose headset volume was observer-audible was 85% (range, 82% to 89%). After the first modeling intervention, the mean percentage decreased to 46.4% (range, 46.2% to 50%), or nearly half. The mean percentage increased during a return to baseline (M = 77.2%; range, 73.7% to 80.9%) and decreased again after a second modeling condition (M = 42.4%; range, 41.7% to 58.3%).

Gender differences. As in the previous study, a majority of the passengers with no radios (n = 3,626) were women (n = 2,070, 57.1%; men: n = 1,556, 42.9%). Among the passengers who carried a headset, 242 (54.6%) were men and 201 (45.4%) were women. During the initial baseline phase, 75 men and 63 women had their headsets on, compared to only 6 men and 10 women with their headsets off or put away. In the first modeling phase, 27 men and 8 women were classified in the

Table 2
Frequency of Target Behaviors Across Phases of Study 2

Target behaviors	Baseline 1 (4 days)	Modeling 1 (5 days)	Baseline 2 (4 days)	Modeling 2 (9 days)
Head/on	131	31	59	62
Head/off	7	3	7	9
Lowered[a] volume	0	20	0	41
Neck/on	5	2	4	3
Neck/off	4	4	2	9
Hold/on	2	2	2	2
Hold/off	2	2	1	8
Put away	3	3	3	10
Total	154	67	78	144

[a] The number of individuals in the head/on category who reduced their headset volume level below the audible point for both observers. These individuals originally were head/on participants who were reclassified. The remaining head/on participants are individuals who at no point lowered their headset volume in the presence of the observers.

on categories, 7 men and 5 women were in the off or put away categories, and 13 men and 7 women lowered their headset volume in compliance with the model. During the second baseline phase, 41 men and 25 women played their headsets at observer-audible levels, and only 5 men and 7 women were perceived to have inaudible headsets. Finally, in the second modeling phase, 43 men and 24 women had headsets on, 11 men and 25 women had headsets off or put away, and (more important) 14 men and 27 women lowered their headset volume during the social influence procedure. Chi-square analyses across phases indicated no significant greater difference between target behavior categories ($p > .10$).

The possibility of a gender difference in compliance to the model by headset owners was also assessed. During the initial baseline phase, the percentages of men and women in the off and put away categories were 7.4% and 13.7%, respectively, and there were no individuals who lowered their headset volume. In the first modeling phase, these percentages increased in the off and put away categories to 14.9% for men and 25% for women. Moreover, 27.7% of the men and 35% of the women lowered headset volume in compliance with the model. During the second baseline phase, off and put away rates decreased slightly (still above initial baseline rates) for men (10.9%) and women (21.9%), and no individual lowered the headset volume. In the second modeling phase, 16.2% of the men and 32.9% of the women were in the off and put away categories. In addition, 20.6% of the men and 35.6% of the women lowered headset volume in compliance with the model. Chi-square analysis indicated a significant gender difference in compliance rates, $\chi^2(1, n = 54) = 10.9, p = .001$. Overall, 53% of the women lowered headset volume when exposed to the model, in contrast to only 29% of the men.

Audible Headset Volume

To determine whether headset volumes audible to observers represent potentially damaging noise levels for users, we assessed the decibel levels of headsets set at observer-audible volumes. During 1 week in the semester following data collection for Study 2, the second author and an assistant asked every third student waiting for an elevator at the lobby with a observer-audible headset if he or she would allow measurement of the unit's noise level. Headset users were asked not to touch the volume control as they slipped off their unit. The researchers then coupled each headset to a newly charged 1551-C sound level meter (Model 5492, General Radio Company) for 30 s to allow the meter time to adjust to the volume. To ensure a reliable measurement, the unit's decibel level was checked by both researchers before recording the results.

A total of 40 headsets were tested (from 20 men and 20 women). These headsets were set at a mean level of 94.9 dB ($SD = 8.6$), with a range of 79 to 111 dB. There was no significant gender difference (men: $M = 96.8$, $SD = 8.3$; women: $M = 93.6$, $SD = 8.6$). Moreover, given the fact that continuous noise at levels above 90 dB results in permanent hearing loss (Pearce, 1985), it should be noted that 9 men and 9 women (45% of the sample) had units set at dangerous levels (between 90 and 100 dB), and 6 men and 3 women had units set over 100 dB. To the extent that these wearers are a representative sample of young adults with headsets played above 90 dB for extended periods of time, it seems that substantial numbers of portable headset users are indeed exposed to potentially damaging noise levels.

DISCUSSION

The results from both studies indicated that the volume of observer-audible headset (a potential hazard to the listener) can be reduced effectively for men and women with visual warning prompts or a modeling technique. Study 1 supported the suggestions by Geller et al. (1982) and Wogalter et al. (1987) the effectiveness of warning signs, because compliance with the warnings occurred among target passengers. Positioning these warning notices in and outside the elevators provided an ideal environment in which to test the effects of visual prompts. Passengers waiting for the elevator had an opportunity to be exposed to the prompts mounted on the wall and, once in the elevator, they were exposed to the health message again.

Study 2 indicated that modeling is an influential strategy to promote compliance to appropriate health-related behaviors. In the presence of the two observer confederates, exposure to the high volume from audio headsets was reduced among target passengers, especially among women. Study 2 also suggested that many young people may be setting the volume of their headsets at dangerously high levels.

Both studies also raise the issue of gender differences in compliance to behavior-change strategies. In Study 1, both men and women complied with the sign requests to "turn down the sound," but women headset users continued at lower than initial baseline rates when the signs and posters were removed. It is possible that these women changed their preference for very high headset volumes. In Study 2, both genders decreased observer-audible headset rates during the modeling phases, but women turned down the sound significantly more often than men. These results suggest a gender difference following the removal of prompts, with maintenance of desired behavior by women but not by men, and a gender difference with peer-pressure interventions, with women demonstrating greater compliance than men. Consequently, if other intervention straegies were derived to reduce headset volume, one might expect more desired behavior change among women than men.

The present studies fit into the taxonomy for community interventions proposed by Geller, Ludwig, Gilmore, and Berry (1990). These behavior analysts outlined five factors to consider in large-scale behavior-change studies: (a) *involvement*—the behavior-change technique sets the occasion for participant action relevant to the target behavior; (b) *social support*—the technique includes opportunities for continued support from others toward appropriate goals; (c) *response information*—the technique offers new and specific information on the target behavior; (d) *extrinsic control*—the technique manipulates response consequences to influence the target behavior; and (e) *intrinsic control*—the technique offers the opportunity for personal choice and control over the target behavior.

Although not tested directly, the warning signs and social influence techniques used here contained several of these components. For instance, the signs and posters conveyed specific response information on what should be done and stated long-term consequences from not following the warnings. The modeling intervention created social support for conforming to the model, yet allowed personal autonomy regarding compliance. Using Geller et al.'s (1990) scoring system to predict or evaluate intervention effectiveness, the modeling program receives a higher impact score than the warning signs because the former intervention involved both demonstration and social support, as well as oral activation. Because comparative information is limited in the present studies, further research is needed to determine directly the role of each factor in community interventions aimed at reducing health hazards.

Clearly, additional research on stereo headset use is warranted. For instance, it would be informative to study compliance as a function of audience size (e.g., target passenger alone, with 2 to 3 others, or more than 3 others). The findings of such studies would be relevant to the psychological concept of social facilitation. Methodologically, it was not possible to obtain repeated individual data on each passenger. It is not known, therefore, whether the same individuals were repeatedly observed riding the elevators during the course of the observations, limiting the generalizability of the results. However, it seems logical that the same population of passengers was monitored across phases of each study. Each study took place during a 14-week school semester. Students had to attend the same classes in this building two or three times per week, Monday through Thursday, increasing the likelihood of their repeated exposure to the interventions. However, there is little reason to believe that the brief exposure to either intervention generalized to other settings or to other times of headset use. In fact, the reversals suggest the absence of both maintenance and generality, and future research on compliance should address these conceptual issues.

The number of headset owners riding elevators decreased from the first baseline to the first intervention phase in each study (i.e., Study 1, from 304 to 150; Study 2, from 154 to 67), irrespective of the different number of observation days within phases. It is possible that some students avoided the elevators because of the intervention. Such drop-off rates detract from the potential social validity of the interventions. However, active avoidance seems unlikely because students would have had to miss classes for weeks. Of course, students could have used the stairs to get to their classes, but they would have had to walk nine or 12 flights of stairs each day. Also, it seems that students would have voiced their objections to the campus administration or to faculty if they found the interventions offensive; in fact, no student complained. Follow-up research in this domain should address consumer acceptance and usefulness of intervention techniques after termination of an experimental procedure. Motivating indigenous personnel to intervene for another person's health and safety is an important challenge for behavioral community psychologists targeting health-related behaviors.

REFERENCES

Ferrari, J. R., & Baldwin, C. H. (1989a). From cars to carts: Increasing safety belt usage in shopping carts. *Behavior Modification,* **13,** 51–54.

Ferrari, J. R., & Baldwin, C. H. (1989b). Promoting safety belt usage in shopping carts: "Buckle-up your baby." *Environment & Behavior,* **21,** 602–618.

Ferrari, J. R., Barone, R. C., Jason, L. A., & Rose, T. (1985a). The effects of a personal phone call prompt on blood donor commitment. *Journal of Community Psychology,* **13,** 295–298.

Ferrari, J. R., Barone, R. C., Jason, L. A., & Rose, T. (1985b). The use of incentives to increase blood donations. *Journal of Social Psychology,* **125,** 791–793.

Geller, E. S., Bruff, C. D., & Nimmer, J. G. (1985). The "Flash for Life": A community prompting strategy for safety belt promotion. *Journal of Applied Behavior Analysis,* **18,** 145–159.

Geller, E. S., Ludwig, T., Gilmore, M., & Berry, T. (1990). A taxonomy of behavior change techniques for community intervention. *The Community Psychologist,* **23,** 4–6.

Geller, E. S., Winett, R. A., & Everett, P. B. (1982). *Preserving the environment: New strategies for behavior change.* Elmsford, NY: Pergamon Press.

Jason, L. A., Clay, R., & Martin, M. (1979). Reducing cigarette smoking in supermarkets and elevators. *Journal of Environmental Systems,* **9,** 57–66.

Jones, R. T., Kazdin, A. E., & Haney, J. L. (1981). Social validation and training of emergency fire safety skills for potential injury prevention and life saving. *Journal of Applied Behavior Analysis,* **14,** 249–260.

Lavelli, M. A., Lavelli, S. H., & Jason, L. A. (1980). Preventing hearing loss in underground subways. *Man-Environmental Systems,* **11,** 247–248.

Lee, P. C., Senders, C. W., Gantz, B. J., & Otto, S. R. (1985). Transient sensorineutral hearing loss after overuse of portable headphone cassette radios. *Otolaryngology,* **93,** 622–625.

Monroe, L. R. (1990, January 3). Listen to the music: Headsets for children strike a harmful note. *Los Angeles Times,* p. 3.

Navarro, R. (1990). *Sound pressure levels of portable stereo-headphones.* Paper available from the Ear Institute of Indiana, 8103 Clearvista Parkway, Indianapolis, IN, 46256.

Pearce, F. (1985). Noise: Industry turns a deaf ear. *New Scientist,* **108,** 38–42.

Rice, C. G., Breslin, M., & Roper, R. G. (1987). Sound levels from personal cassette players. *British Journal of Audiology,* **21,** 273–278.

Rice, C. G., Rossi, G., & Olina, M. (1987). Damage risk from personal cassette players. *British Journal of Audiology,* **21,** 279–288.

Rinntelmann, W. F., & Peppard, A. R. (1983). [Data from 18 portable stereo units.] Unpublished data. Department of Audiology, Wayne State University, Detroit.

Twardosz, S., Cataldo, M. F., & Risley, T. (1974). Open environment design for infant and toddler day care. *Journal of Applied Behavior Analysis,* **7,** 529–549.

Wogalter, M. S., Allison, S. T., & McKenna, N. A. (1989). Effects of cost and social influence on warning compliance. *Human Factors,* **31,** 133–140.

Wogalter, M. S., Godfrey, S. S., Fontenelle, G. A., Desaulniers, D. R., Rothstein, P. R., & Laughery, K. R. (1987). Effectiveness of warning prompts. *Human Factors,* **29,** 599–612.

Wright, P., Creighton, P., & Threlfall, S. M. (1982). Some factors determining when instructions will be read. *Ergonomics,* **25,** 225–237.

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