Hearing Dogs: A Longitudinal Study of Social and Psychological Effects on Deaf and Hard-of-Hearing Recipients

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The organization Hearing Dogs for Deaf People provides assistance dogs that alert their deaf or hard-of-hearing recipients to key sounds, thus increasing their independence and also providing companionship. Fifty-one recipients took part in a longitudinal study to monitor the dogs' working performance over time and to examine the social and psychological effects of having a Hearing Dog. The Profile of Mood State (POMS) questionnaire and the General Health Questionnaire (GHQ) were used together with a Hearing Dog Questionnaire (HDQ) specifically developed for this study. There were a number of significant differences in measures of well-being between the period prior to placing the Hearing Dog and the period after placement, but there were no comparable differences during the year-long waiting period prior to placement of the dog. Recipients reported significant reductions in hearing-related problems such as response to environmental sounds; significant reductions in measures of tension, anxiety, and depression; and significant improvements in social involvement and independence. The longitudinal nature of this study supports evidence that these improvements persist for some time after the placement of a dog, with significant differences being reported, in many cases, up to 18 months after acquiring a dog.

The primary role of an assistance dog is to provide a service. For example, Guide Dogs for blind people are trained to lead their owners safely, Hearing Dogs are trained to alert deaf and hard-of-hearing people to significant environmental sounds, and Dogs for the Disabled are trained to perform various everyday tasks for people with physical disabilities. Clearly, these forms of assistance enhance independence in the recipient. In addition, assistance dogs are known to provide a number of other important benefits for recipients.

In a study of Dogs for the Disabled, Lane, McNicholas, and Collis (1998) found that 92% of recipients reported an increased sense of social integration and that people frequently stopped to talk to them. Seventy-three percent of the participants reported that they had made new friends since having the dog. The retrospective study of assistance dogs by Hart, Hart, and Bergin (1987) also showed this effect, with participants reporting a significantly higher number of social greetings from adults and children on a typical shopping trip compared to no social greetings received on trips before they had their dog. The effect was particularly strong for participants who experienced difficulties with communication and social interaction prior to the placement of the dog. Other studies too indicate that assistance dogs can substantially reduce the tendency of able-bodied people to ignore or avoid persons with disabilities, both adults and children (Eddy, Hart, & Boltz, 1988; Mader, Hart, & Bergin, 1989), and it is well established that pet dogs facilitate interactions between able-bodied and disabled people (McNicholas & Collis, 2000; Messent, 1983). It is clear that benefits of assistance dogs for their new owners include enhanced opportunities for social exchange, which very likely...
enhances feelings of acceptance in the community, increases self-esteem, and reduces loneliness.

Reports from many participants in the study by Lane et al. (1998) suggested that an enhanced sense of physical and psychological health may be associated with feelings toward the dog as a close affectionate companion and a source of support and comfort. A subsequent study by McNicholas and Collis (2001) examined the differences between the recipients of Dogs for the Disabled and people on the waiting list. The benefits of having a dog reported by people who had already received a dog consistently exceeded levels of anticipated benefits reported by waiting list participants not only in feelings of social integration but also in affection/friendship in their relationship with the dog, feelings of support derived from the relationship, feelings of improved health, and fewer minor symptoms of illness. Allen and Blascovich (1996) reported that recipients of assistance dogs experience substantial improvements in self-esteem, internal locus of control, and psychological well-being within 6 months after receiving their dogs. Moreover, the need for paid and unpaid workers who provided individual assistance was reduced after the receiving of the dog, demonstrating important economic benefits of assistance dogs.

In relation to the role of Hearing Dogs specifically, there have been several retrospective studies evaluating the effects of receiving an assistance dog. Hart, Zasloff, and Benfatto (1996) studied 38 Hearing Dog owners (31.6% of these owners were born deaf) with a control group of 15 prospective owners, examining the relationships between Hearing Dog ownership and the owners’ levels of loneliness, changes in social interactions with people, and life stress. The majority of Hearing Dog owners said that Hearing Dogs had changed their interactions with the hearing community. Seventy-six percent reported that their interactions with neighbors and members of the local community improved compared with an expectation of only 33.3% among controls. The majority of participants with Hearing Dogs mentioned the assistance aspect of alerting (the owner) to sounds as their highest rated reason for acquiring the dog, followed by protection and companionship.

In Mowry, Carnaham, and Watson’s (1994) retrospective study of 550 Hearing Dog owners in the United States, users again reported that their dogs provided them with benefits related to and beyond the sound-alerting function. These included psychological benefits (relaxation, self-confidence, and reduced depression), social benefits (companionship, reduced loneliness, and better social life), and practical benefits (greater independence, increased safety, and better physical health). The chief problems (or main difficulties) associated with Hearing Dogs involved interference from other people (patting or distracting the dog) and access to public facilities.

In contrast to prior investigations, this study used a longitudinal rather than a retrospective or cross-sectional design, thus avoiding some of the problems of those designs, for example, a tendency in some individuals retrospectively to perceive a prior situation as worse than it actually was (Spelten, Barton, & Folkard, 1993). Recipients were followed through the process of applying for, matching with, training, and placement of a Hearing Dog plus routine follow-up visits. The study investigated changes in psychological mood state, social function, and prevalence of minor health problems that would not ordinarily be expected to occur over the 3-year time period of the study. The aim was to evaluate whether any such changes could plausibly be attributed to having the dog. An additional aim was to monitor the success of Hearing Dogs over time by assessing the recipients’ satisfaction with their dogs in comparison to the time before the Hearing Dog was part of their daily life.

Method

Participants

Participants were deaf or hard-of-hearing people who applied for a trained Hearing Dog from the organization Hearing Dogs for Deaf People. There were 51 participants, consisting of 40 females and 11 males. This represents the normal ratio of men to women having Hearing Dogs at the present time. The ages ranged from 22 to 87 years with a mean of 51.

The age of onset of deafness varied, falling into three groups: 10 were deaf at birth, 4 became deaf before the age of 2 years, and 37 became deaf at a later age. The split between those who were either born
deaf or became deaf shortly after age 2 and those who were deaf at a later age represents a typical ratio among applicants at the time. All the participants had a significant hearing loss categorized by a Hearing Therapist as moderate (2.0%), severe (43.1%), or profound (54.9%). Twenty-seven percent of the participants used British Sign Language (BSL), and 18% considered BSL to be their first language and identified themselves as being part of the Deaf community. With regard to pet ownership, 74.5% of participants had owned a dog before. At the time of application 13.7% owned a dog, 17.6% owned a cat, 3.9% owned a caged bird, and 2.0% owned fish.

All the participants had a Hearing Dog placed with them during the time of the study. The dogs were trained for a number of chosen sounds. Normally, these were the alarm clock, doorbell and/or doorknocker, telephone, oven timer, call (i.e., the dog fetches the deaf person named by the caller), the smoke alarm, and the fire alarm. All dogs were trained to respond to between four and eight household sounds, according to the needs of the potential recipient. Two percent of the recipients requested that their dog be trained to four sounds, 7.8% to five sounds, 45.1% to six sounds, 5.9% to seven sounds, and 39.2% to eight sounds.

Questionnaires

When considering the appropriate questionnaires for this study, it had to be remembered that questionnaires regarding the mood state of deaf people are required to use straightforward language that can, if necessary, be easily supported or translated into BSL. The questionnaires used in this longitudinal study were Profile of Mood States (POMS), General Health Questionnaire (GHQ-30), and a specially devised Hearing Dog Questionnaire (HDQ).

The POMS (McNair, Lorr, & Droppelman, 1992) questionnaire is designed to measure subtle changes in mood state over relatively short time periods. POMS measures six identifiable mood or affective states: tension, depression, aggression, vigor, fatigue, and confusion. The POMS questionnaire used in this study has a 5-point adjective rating scale, ranging from not at all represented by a score of 0 to extremely represented by a score of 4. Participants were asked to respond regarding how they had felt during the previous week in response to a range of descriptive terms like “lonely” or “energetic.” An overall mood disturbance score is also calculated with vigor being a positive mood and the other five factors representing negative moods. Therefore the negative mood scores are added and the positive score of vigor is subtracted to produce an overall mood score.

The GHQ-30 (Goldberg & Williams, 1992) was used as a measure of minor mental health problems, health adjustment, and psychological well-being. The GHQ has been used successfully in a number of studies comparing mental health in the same population at different times including Singerman, Reidner, and Folstein’s (1980) study of 156 patients at a hearing loss clinic. There are four subscales: anxiety, depression, social functioning, and sleep. An overall general health score is also obtained. Participants are asked to respond regarding their health over the past few weeks, in response to 30 statements. Ratings are on a 4-point adjective rating scale, ranging from not at all represented by a score of 0 to much more than usual represented by a score of 3.

The HDQ was developed by the first author specifically to focus on deafness-related issues. The questions asked participants about problems commonly experienced by deaf applicants in everyday life prior to the placement of a Hearing Dog. The aim of the study was to assess whether the placement of a dog would lead to any changes in these areas. The first five questions addressed practical help the Hearing Dog might be providing through the specially trained sound work. The remaining questions asked about problems and feelings commonly described by deaf people, for example, concerns about security, dependency on others, and avoiding interactions with other people in case they are misunderstood. There were also questions relating to fearfulness and loneliness. All questions asked participants to respond on a 5-point scale ranging from Never to Always. The full set of questions in the HDQ is listed in the Appendix.

Design and Analysis

The design was longitudinal, with data collected at five time points. Each time point corresponded to a stage
in the procedure used by the organization Hearing Dogs for Deaf People in placing Hearing Dogs with recipients. Interviews were conducted by the lead researcher or a member of staff at Hearing Dogs for Deaf People familiar with working with deaf people and able to converse in BSL if required.

Time 1 questionnaires were completed by each participant during the formal home interview that was used to assess the applicant’s suitability to receive a Hearing Dog. Participants completed the POMS, GHQ, and HDQ at this time. During the interview, the participant was informed of the waiting time for a Hearing Dog.

Time 2 was at the end of the waiting period, which, at the time of the study, was typically about 9.5 months (SD ± 6.1). Participants attended a 5-day residential period at the Training Centre when they began work with the Hearing Dog assigned to them. At the beginning of the residential period, participants completed the GHQ and POMS.

Time 3 was at the end of the 5-day residential week, after which participants returned home with the dog (“placement”). Only the POMS questionnaire was completed.

Time 4 occurred within the week following the final assessment of the dog–person partnership, which took place approximately 3 months (M = 3.9 months, SD ± 1.4) after receiving the dog. Data was collected using the POMS, GHQ, and HDQ in the participant’s home.

Time 5 was the final data collection point that took place at a follow-up visit a minimum of 14 months (M = 20.3 months, SD ± 5.4) after receipt of the dog. The POMS, GHQ, and HDQ were again administered in the participant’s home.

Paired-sample t tests (two-tailed) were used for all statistical comparisons across time points. This procedure was favored over a repeated-measures analysis of variance (ANOVA) because any participants with incomplete data would have been dropped from an ANOVA, and, due to the longitudinal nature of the study, there was inevitably missing data from various time periods. In contrast, paired-sample t tests use all the available data. Because this involved multiple significance tests for each dependent variable, the Bonferroni criterion for significance was used to correct the Type I error rate. The Bonferroni criterion is simply the usual criterion for significance (.05) made more stringent by dividing it by the number of comparisons in a set. For example, if four time points were to be compared, there are 6 pairwise comparisons, so the criterion for significance is .05/6 = .0083.

Results

Profile Of Mood States

With data available from all five time points there are 10 pairwise comparisons so the Bonferroni criterion for significance is p < .05/10 = .005. For the vigor subscale, higher scores indicate greater well-being; for all other POMS measures lower scores indicate greater well-being. There were significant differences in means over time for all six subscales and in the overall mood disturbance score (see Table 1). For each of the POMS measures, the highest mean score (lowest for vigor) was found at either Times 1 or 2. Conversely,

<table>
<thead>
<tr>
<th>Comparison between</th>
<th>df</th>
<th>Tension</th>
<th>Depression</th>
<th>Aggression</th>
<th>Vigor</th>
<th>Fatigue</th>
<th>Confusion</th>
<th>Overall mood disturbance</th>
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<tbody>
<tr>
<td>Times 1 and 3</td>
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<tr>
<td>Times 1 and 4</td>
<td>37</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
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<tr>
<td>Times 1 and 5</td>
<td>32</td>
<td>↓</td>
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<tr>
<td>Times 2 and 5</td>
<td>43</td>
<td>↓</td>
<td>↓</td>
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<tr>
<td>Times 3 and 4</td>
<td>40</td>
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</table>

Note: Downward arrows (↓) indicate significant decrease over time and upward arrows (↑) indicate significant increases over time. POMS = Profile of Mood State; df = degrees of freedom for the t test.

*There were no significant differences for Times 1 and 2, 3 and 4, 3 and 5, or 4 and 5.
for each of these measures, the lowest mean score (highest for vigor) was at Time 4. A striking feature of these results is a lack of any significant changes in mean scores over the 12-month waiting period between Times 1 and 2, before receipt of the dog, contrasting with many significant differences between these two predog data collection points, and Times 4 and 5 after placement of the dog. Clearly, the onset of living with the dog was associated with improvements in well-being as measured by the POMS. The pattern of change over time for the overall mood disturbance score is shown in Figure 1 and reflects the general pattern of the POMS measures over time.

General Health Questionnaire

With data available from four time points (Times 1, 2, 4, and 5), there are six pairwise comparisons, so the Bonferroni criterion for significance is $p < .05/6 = .0083$. There were significant differences in means over time for four GHQ subscales and for the overall score (Table 2). For all these measures, lower scores indicate higher levels of well-being. For all measures, the highest mean score was found at either Times 1 or 2 and the lowest mean score at Time 4. As with the POMS measures, there were no significant changes in mean scores over the 12-month waiting period between Times 1 and 2, before receipt of the dog, contrasting with many significant differences between these two data collection points and Times 4 and 5 after placement of the dog. There was one small but statistically significant difference out of line with the main trend—an increase in difficulties in social functioning between Times 4 and 5 at the end of the study, but the means at Time 5 were still significantly lower than at Times 1 and 2. The patterns of change over time for the GHQ subscale scores are shown in Figure 2.

Hearing Dog Questionnaire

With data available from three time points (Times 1, 4, and 5), there are three pairwise comparisons, so the Bonferroni criterion for significance is $p < .05/3 = .0167$.

The first five questions of the HDQ relate to responding to environmental sounds that the Hearing Dogs were trained to alert their owners to: a general question about responding to environmental sounds, and questions about responding to the alarm clock, doorbell or door knock, smoke alarm, and being called by name (see Appendix). For all five questions, there were significant differences in mean scores between

Table 2  Significant pairwise comparisons for mean GHQ scores

<table>
<thead>
<tr>
<th>Comparison between</th>
<th>df</th>
<th>Anxiety</th>
<th>Depression</th>
<th>Social functioning</th>
<th>Sleep</th>
<th>Overall GHQ score</th>
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<tr>
<td>Times 1 and 4</td>
<td>37</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
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<td>↓</td>
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<tr>
<td>Times 2 and 4</td>
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<td>↓</td>
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<tr>
<td>Times 4 and 5</td>
<td>43</td>
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</tbody>
</table>

Note. Downward arrows (↓) indicate significant decrease over time and upward arrows (↑) indicate significant increases over time. GHQ = General Health Questionnaire; df = degrees of freedom for the $t$ test.

*aThere were no significant differences for Times 1 and 2.*
Times 1 and 4 and between Times 1 and 5, reflecting reductions in difficulty over time. There were no significant differences between Times 4 and 5. The means are shown in Figure 3.

Questions 6, 9, and 10 in the HDQ relate to aspects of fearfulness: feeling unsafe when alone, fear of leaving the home, and fear of cars. For all three questions there was a significant difference in mean ratings between Times 1 and 4. The difference between Times 1 and 5 was also significant for Questions 6 and 9 but not for Question 10. Each of the significant differences reflected a reduction in fearfulness over time. The pattern of means is shown in Figure 4.

Questions 7, 8, and 11 in the HDQ relate to the experience of social isolation: dependence on other “as your ears,” avoiding interactions with other people, and feeling lonely. For all three questions, there were significant differences in mean scores between Times 1 and 4, and between Times 1 and 5, reflecting lessening feelings of social isolation over time. For Question 7, there was a smaller but significant increase in mean scores for feeling lonely from Times 4 to 5, but the differences for Questions 8 and 11 were not significant. The pattern of means is shown in Figure 5.

Discussion

A striking feature of the results is a lack of statistically significant differences in POMS or GHQ scores during the year-long period waiting for the dog between the initial assessment of the person (Time 1) and the preplacement interview (Time 2), which serves as a control. In contrast, there were many significant differences between this predog period (Times 1 and 2) and after receiving the dog (Times 4 and 5), indicating improvements in a number of different but related domains of well-being. It is noteworthy that improvements extended beyond Time 4 (3 months...
after placement of the dog) to Time 5 (1 year after placement), well beyond what would be expected if the effects were simply due to the novelty of having the dog. The means for Time 5 show a small degree of movement toward initial levels, nonetheless a majority of the POMS and GHQ measures showed significant improvements between Times 2 and 5.

One interesting finding was a reduction in both POMS tension and GHQ anxiety subscales, which supports anecdotal reports frequently given by recipients who claim that their dog enables them to relax more, feel less anxious about the world around them, and less anxious when alone in the house. This is not unexpected because the presence of a dog means that a deaf person no longer has to remain constantly vigilant for signs of intrusion in the home and other warning sounds, for example, smoke alarms and gas alarms. The findings from the three HDQ questions related to fearfulness further supports this interpretation. These findings are also consistent with Serpell’s (1991) longitudinal study of effects of pet ownership on human health in adults with normal hearing. Serpell found that after the acquisition of a dog, dog owners reported a significant reduction in their perceived safety/fear of crime over the 10-month period. Participants reported perceiving themselves to be safer/less afraid following the acquisition of a dog. In their study of Hearing Dog owners, Hart et al. (1996) also reported that deaf people with a Hearing Dog felt safer when they were alone after placement of a dog and the control group (deaf individuals on the waiting list) fully anticipated that this would be a benefit.

The results from the POMS and GHQ depression subscales show a particularly clear pattern of lower levels of depression after the placement of a Hearing Dog. These results support the belief that the placement of a Hearing Dog reduces levels of depression in the deaf recipients. Deaf people tend to suffer a number of problems as hearing impairment directly impacts on one’s ability to communicate, and studies have shown it to be associated with multiple negative outcomes including depression (Jerger, Chmiel, Wilson, & Luchi, 1995; Mulrow, Aguilar, Endicott, Tuley, & Velez, 1990). Mowry et al.’s (1994) retrospective study on American Hearing Dog owners also found a reduction in reported depression. In a study of AIDS patients, another group vulnerable to depression, Siegel, Angulo, Detels, Wesch, and Mullen (1999) found that those patients who owned pets were less likely to be depressed than those who did not.

In what is now the standard view of how dogs and other companion animals influence human well-being, people are seen having a social relationship with the animal, not necessarily the same in all respects with social relationships with other people, but nonetheless comparable (e.g., Collis & McNicholas, 1998). People who for one reason or another have a limited network of close affectionate relationships with other people may be especially helped by having a dog around in several ways. The dog may be perceived as always available, predictable in its responses and nonjudgmental, and a constant source of comfort irrespective of fluctuations in human support. No social skills or verbal communication are required to elicit a Hearing Dog’s attention, and the Hearing Dog may even provide a refuge from the strains of human interactions. All these points would be very relevant to a deaf person who may have concerns regarding how they are perceived by other hearing colleagues and family, have less independence in the family (Beattie, 1981) and have difficulties socializing and making friends (Thomas & Herbst, 1980).

This interpretation, where a dog is seen as providing social support in much the same way as people,
is described by McNicholas and Collis (1998) as a direct causal model for the influence of companion animals on people’s well-being. They distinguish it from the indirect model that sees the Hearing Dog as facilitating the owner’s contacts and relationships with people, which leads to the people providing additional social support. The finding that the GHQ Social Functioning subscale improved following the placement of the Hearing Dog is consistent with the idea that the dog acts as a social catalyst in this way, as is the finding that responses to the HDQ Question 8 indicated that participants were less likely to avoid interactions with people after the placement of the dog. Prior to placement of the Hearing Dog, people in the street may have been unaware of the deaf person’s disability and neighbors may even have considered them rude or uncooperative if attempts at casual conversation had been ignored. Nondisabled people and hearing people are often unclear about how to respond to disability and may choose to avoid people with disabilities or remain emotionally distant from them (Thompson, 1982; Worthington, 1974). Deaf people may have balance problems that can visibly affect their gait (Yardley, 1994), and their speech may sound unusual. This is just the kind of situation where a dog can be an “icebreaker” in assisting the initiation of casual conversations with strangers.

The results of the HDQ provided important information for the charity Hearing Dogs for Deaf People. The significant effects of differences in answers to the questions on responsiveness to environmental sounds indicate success in meeting the primary goals of providing a Hearing Dog that is their sound-alerting function. The longitudinal nature of the study improved on Hart et al.’s (1996) retrospective study, not least in demonstrating convincingly that the reduction in difficulty responding to sounds was still found approximately 1 year after placement of the Hearing Dog, indicating that the placement process was successful. Prior to the placement of a Hearing Dog, recipients responding to the HDQ Question 7 indicated that they felt dependent on friends and relatives to inform them of sounds occurring around them. This dependency was reduced after the placement of the dog. This finding is in keeping with results from Allen and Blascovich (1996), who examined the provision of assistance dogs to 48 wheelchair users. All participants reported substantial improvements in community integration and psychological well-being and, in addition, demonstrated increased independence and substantial changes in terms of reduced requirements for caregivers and care hours.

The question relating to avoiding interactions with other people (Q8) also showed significant differences in comparisons of times before and after placement of the Hearing Dog. Recipients reported avoiding interactions with other people significantly less after placement. This indicates that there is an improvement in social functioning, with the Hearing Dog acting as a social lubricant, assisting hearing people in “breaking the ice” with a deaf person. This may well be a two-way process, with deaf people being less likely to avoid interactions with hearing people when with their Hearing Dog and also finding that interactions with hearing people are less stressful when they occur. Arguably the dog has helped remove the social difficulties of disability and helps able-bodied people who are unclear as to how to respond to the disability become more confident about approaching (Thompson, 1982; Worthington, 1974). Future research could assess the additional benefits gained from the placement of a trained assistance dog, whose jacket identifies a recipient’s disability, in comparison with an unidentified pet dog.

The final question in the HDQ asked how much of the time the owner felt lonely. As expected, recipients reported feeling significantly less lonely after the placement of their Hearing Dog. However Gilbey (2003) also studied loneliness in recipients of Hearing Dogs in the United Kingdom and found no difference in reported loneliness in recipients. Gilbey argued that loneliness may be a perception of missing one’s own species and missing the companionship of other human beings that cannot be relieved by a pet or animal companion. It is to be hoped that further research will clarify this important issue.

Conclusions

This longitudinal study provides evidence that Hearing Dogs succeed in the tasks for which they are trained—alerting recipients to significant environmental sounds.
In addition, significant reductions in anxiety, tension, and depression were found together with improved social functioning and social integration. Such improvements in well-being were not found during the waiting period of more than a year prior to receipt of the dog. The improvements were still evident more than a year after receipt of the dog. These results strengthen the findings of earlier retrospective studies investigating the effects of Hearing Dogs.

Appendix: Questions in the Hearing Dog Questionnaire

1. Do you have difficulty responding to the environmental sounds of daily life?
2. Do you have difficulty responding to the sound of the Alarm Clock?
3. Do you have difficulty responding to the sound of the Doorbell/Door knock?
4. Do you have difficulty responding to the sounds of the Smoke Alarm?
5. Do you have difficulty responding to someone calling your name?
6. Do you feel unsafe when you are alone?
7. Are you dependent on others, parents, family members etc as your ears?
8. Do you avoid interactions with other people?
9. Are you fearful of leaving your home?
10. Are you fearful of cars when walking outdoors?
11. How much of the time do you feel lonely?

Response scores (and options) were 1 (Never), 2 (25% of the Time), 3 (50% of the Time), 4 (75% of the Time), and 5 (Almost Always).

Note

1. In the UK, assistance dogs refers to Hearing Dogs for Deaf People, Guide Dogs for the Blind, Canine Partners, Dogs for the Disabled, and Support Dogs, whereas service dogs refers to dogs used by military and police forces. In the United States, service dogs are defined as assistance dogs.

References


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