

Field Study News

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Not letting a little water get in the way of a child's life

A field trial investigated the effects of children's daily water activities on Phonak Sky™ hearing aids. Seven families took part in the trial over an 8-week period and activities included playing in the swimming pool, with water sprinklers and splashing in the bathtub. Lab analysis found no detrimental effects to the hearing aids and the majority of participating parents reported, that they would feel confident about their child wearing hearing aids in such activities in the future.

Introduction

The Outcomes of Children with Hearing Loss study is a multi-site, longitudinal investigation in the US evaluating success factors for hard of hearing children. Recent data from this study has confirmed that consistent use of well-fitted amplification is a key factor for successful speech and language acquisition (Moeller, et.al. 2015). Unfortunately, due to the nature of hearing aid technology, there are many language-rich activities or environments where hearing aids are not typically worn, due to the risk of damage from moisture. As an example, for young children the bathtub is a language-rich environment, but hearing aids are generally not worn during bath time. In fact, many times hearing aids are not even taken into the bathroom for fear of water damage.

A recent survey (Market Research ID875, 2017), carried out with families in the US, asked them to rank eight aspects about their child's hearing aids in terms of importance. The highest ranked aspects turned out to be having hearing aids that are comfortable and robust. Having waterproof hearing aids was ranked number four on the list and remained at a similar importance level across different ages. The survey also showed that activities involving water was rated as the third most important leisure activity for children. Although this survey showed that waterproof capability was relatively important to families of children wearing hearing aids, it also

showed that hearing aids are only worn 10-20% of the time in activities involving water. This means there is a reasonable amount of time being spent without access to environmental sounds and language. Reasons for not wearing hearing aids during activities involving water may be that parents or children being worried, that the hearing aids would become damaged due to moisture.

Over the years, Ingress Protection (IP) testing has become standard for hearing instruments. Phonak Sky hearing instruments have an IP68 rating. IP68 indicates that the hearing aid is water resistant and dust tight. It survived continuous immersion in 1 meter of water for 60 minutes and after 8 hours in a dust chamber as per the IEC60529 standard, no traces of dust were evident within the housing. However, an IP rating does not necessarily give a clear idea of what type of water activities in a real-life environment are acceptable, which can be confusing for HCPs, parents, and families.

For these reasons, the aim of this field trial was to provide professionals and families with concrete examples of activities involving water where children can wear their Phonak Sky hearing aids without worrying about potential damage.

Methodology

Eight children and their parents took part in an 8-week field trial. One family did not return the questionnaires and were therefore excluded from the study. For the remaining seven participants (1 male, 6 females), the age range was 4 years, 5 months to 7 years, 1 month (mean age 5 years, 9 months). All 7 children were current wearers of Phonak Sky hearing aids. A mixture of power levels were used, depending on the child's hearing loss (P, SP, and UP). Six children were fitted bilaterally and one child was fitted unilaterally. This resulted in a total of 13 hearing aids which were investigated. Before the hearing aids were given to the children, they underwent some electroacoustic measurements in the Research and Development department at Phonak Headquarters, in order to have some baseline measurements of the function of the microphones.

Families attended an initial appointment in order for the child to be provided with a new set of Phonak Sky hearing aids. The children's current hearing aid settings were transferred to all study devices, with no additional programming or verification. Parents were given an activity journal, in the form of a questionnaire and specific instructions for the following 8 weeks.

The children wore the study hearing aids full-time for the following 8 weeks. The parents filled out the activity journal on a daily basis and all activities which involved water or moisture were recorded. Each family was instructed to use the hearing aids in at least two light, clear-water activities per week. Parents were provided with a list of suggested activities which included: bathing (without submerging head under water), playing at the sink, playing in the rain, running through sprinklers, water-balloon fighting, or any other activities which involved water. Showering was not included as completely submerging the hearing aids in water is not recommended. Parents were advised to check the hearing instruments after water exposure and to record in the journal whether the hearing aids were still functioning. They also had to note whether they had undertaken any of the following activities: a listening check, wiped the hearing aid, changed the batteries, used a drying kit or asked the child about the function of the hearing aid. There were also a few other questions at the end of the journal regarding parent's opinions, on whether they found the visual and listening checks too much effort, and whether they would feel comfortable about their child continuing to wear their hearing aids during these water-based activities in the future.

At the end of the 8 weeks, children reverted to their own hearing aids and the study hearing aids were sent to the Research and Development department at Phonak Headquarters, for analysis. Hearing aids were checked for any defects due to water exposure. Specifically, this involved:

- Electroacoustic measurements to investigate the functionality of the hearing aid microphones. Data was compared to either product datasheets or measurements taken on the same hearing aids, before the trial started.
- A listening check using a stethoclip. Testers checked for the presence of acoustical or inductive feedback and the presence of acoustical artifacts.
- Functional check of the program toggle and volume control.
- Opening the hearing aid casing to check for any signs of corrosion.

Results

All seven families returned the activity journal. All children had worn the hearing aids during water-based activities at least 2-3 times a week. Some children had worn them more often than this, as some had been on summer holidays and were playing at pools or beaches every day. Parents recorded the following activities involving water:

- Playing in a paddling pool
- Bathing in a lake without going underwater
- Playing or walking in the rain
- Showering without washing hair
- Playing in the bath without submerging head
- Playing at a fountain or with a sprinkler
- Playing with a water hose or with water sprayers
- Participating in water balloon games
- Playing on a beach
- Swimming in the sea without submerging head
- Washing face

Following the activity involving water, parents were asked to perform a check of each hearing aid. They also noted any activities they had undertaken to ensure the hearing aid was dry and working. In all cases, parents reported that the hearing aids passed both a visual and listening inspection at the end of the activity. No parents reported that the checks or activities were too much effort.

Figure 1 shows the distribution of answers to the question 'Has your child ever worn the hearing aids during the tested

water activities prior to this study?' The majority of parents answered 'no' to this question.

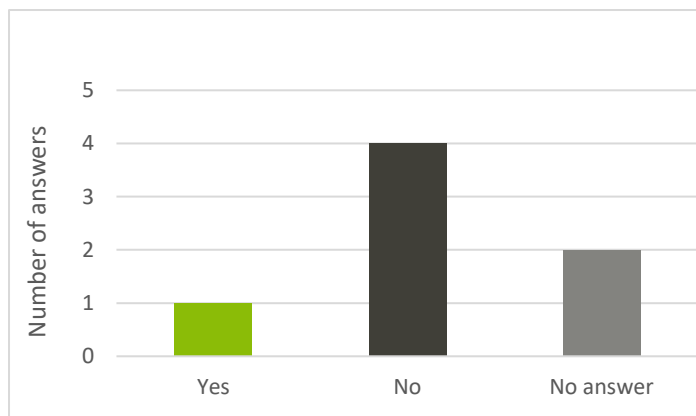


Figure 1. The number of answers to the question: 'Has your child ever worn the hearing aids during the tested water activities prior to this study?'

Figure 2 shows the distribution of answers to the question 'Do you feel comfortable about your child wearing the hearing aids during these water activities in the future?' The majority of parents answered 'yes' to this question.

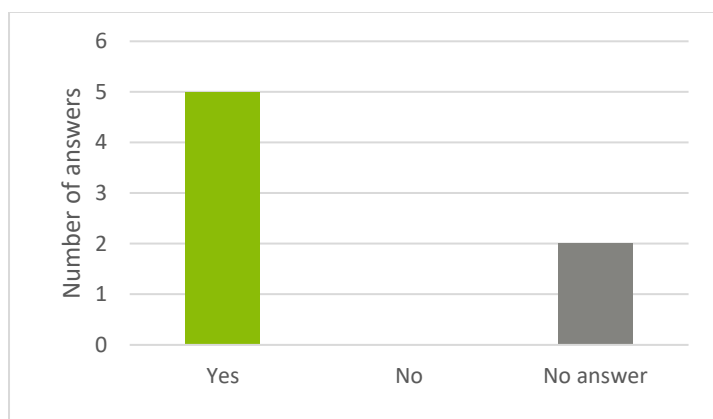


Figure 2. The number of answers to the question: 'Do you feel comfortable about your child wearing the hearing aids during these water activities in the future?'

The lab analysis of the hearing aids following the 8-week trial revealed the following for all hearing aids which were used in the study:

- Electroacoustic measurement data matched either that of the product data sheet or measurements taken prior to the start of the field trial. This revealed no detriment in functionality of the hearing aid microphones.
- For the listening check, no feedback or artifacts were detected.
- All program toggles and volume control switches were fully functioning.
- No signs of corrosion were found within the hearing aid housing.

In summary, according to the tests carried out in the laboratory, no negative effects on the hearing aids could be detected.

Conclusion

Phonak Sky hearing aids are proven to be water resistant, with hearing aids surviving all water-based activities during the trial. The findings suggest that children taking part in light water activities (e.g., playing in the sprinkler, light rain during sports, and splashing in the bathtub), at least 2-3 times a week, will not result in damage to devices.

Although Phonak hearing aids are not intended to be used in non-clear water activities (e.g., chlorinated water, soap, salt water, or other liquids with a chemical content), it is reassuring that the Phonak Sky devices also survived the non-clear water activities reported by parents (i.e., sea water and chlorinated pool).

The majority of parents who took part in this field trial reported new confidence in allowing their children to take part in water-based activities while wearing their hearing aids. This is good news – it means children will no longer miss out on language-rich activities and childhood fun every time life gets a little wet.

References

Moeller, M. P., & Tomblin, J. B. (2015). Epilogue: Conclusions and Implications for Research and Practice. *Ear and Hearing*, 36, 92-98.

Market Research ID875 (2016). Please contact marketinsight@phonak.com if you are interested in further information.

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Jennifer Appleton-Huber received her MSc in Audiology from the University of Manchester in 2004. Until 2013, she worked as an Audiological Scientist mainly in the UK and Switzerland, where she worked with adults and pediatrics, in the areas of hearing aids and cochlear implants. Her current role is

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