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MEDIA RELEASE

UP produces first-of-its-kind solution to encourage safe listening to prevent hearing loss

PRETORIA – In the first study of its kind, researchers at the University of Pretoria (UP) have made headway in understanding the accuracy and reliability of sound-level monitoring earphones and the effect of smartphone feedback, as an intervention to encourage safe listening use among young people.

This innovative research could change the lives of millions of people by reducing the risk of hearing loss caused by personal audio systems. "This is an applied solution to the real-world problem of hearing loss for more than a billion young people at risk," says Professor De Wet Swanepoel of UP's Department of Speech-Language Pathology and Audiology, who led the study. The study was published in the peer-reviewed journal *Ear and Hearing*.

"This world-first technology includes high-quality earphones, with an in-ear microphone to measure personal sound exposure in a person's ear canal," explains Prof Swanepoel. "Coupled with a tracking app that provides real-time feedback on sound levels when using the personal audio devices, dbTrack provides a first-of-its-kind solution for safe listening."

More than a billion adolescents and young people are estimated to be at risk of acquiring recreational noise-induced hearing loss (RNIHL) because of the unsafe use of personal audio systems. RNIHL is preventable, and this research offers an important intervention to promote healthy listening behaviour.

Prof Swanepoel says once the delicate inner ear hair cells are damaged, the hearing loss is permanent and irreversible. Loud noise is particularly harmful to the inner ear. One-time exposure to extremely loud sound or listening to loud sounds for a long time can cause hearing loss.

He adds that the accompanying dbTrack smartphone application records listening activity measured by the earphones and calculates an accurate sound exposure dose in real-time. "Described as a Fitbit for your ears, the dbTrack earphones and app provide instant feedback based on personal listening behaviours," says Prof Swanepoel.

"The in-ear microphone inside the earphone measures sound levels in real-time as the music is playing in someone's ear through their personal audio device. Each set of earphones are individually calibrated for accuracy."

The research team had two objectives. "Firstly, we needed to determine how accurate the in-ear sound-monitoring feature was compared to laboratory equipment," explains Prof Swanepoel. "We recorded sound intensity levels over time in the ears of participants, then recorded the same intensity levels in standard laboratory equipment. We also did test-retest checks in both conditions. Results demonstrated that the in-ear monitoring feature was very accurate and reliable within 1dB.

"Secondly, we wanted to evaluate whether the dbTrack technology and app-based feedback changed listening behaviours when used by listeners. We enrolled participants who were regular users of personal audio devices. They received the dbTrack earphones and app. The research app was set to show no

monitoring feedback for the first two weeks of the study as a control condition. After two weeks, the app switched to provide feedback and notifications on their sound exposure. Results demonstrated significantly safer levels and durations of listening when the app feedback was active."

The app includes feedback on the intensity, duration and associated risk of hearing damage for individuals. The criteria are based on the WHO and ITU Safe Listening Standards.

Prof Swanpoel offers the following tips to protect your ears:

- Listen to personal audio devices at a volume level below 60% of the maximum volume. Use carefully fitted and noise-cancelling headphones if possible.
- Wear earplugs in noisy venues. Move away from sources of loud sound, such as loudspeakers.
- Take short listening breaks away from loud sounds. Limit the daily use of personal audio devices.
- Use smartphone apps and earphones like dbTrack to monitor your sound exposure. Choose devices with built-in safe-listening features.

The first manufacturer to include this technology was Westone audio, in partnership with the hearX Group, and the first production run is already sold out. New versions with various manufacturers of earphones are planned for future release. This study was the proof of concept validating this innovative technology for widespread use.

Caption: This world-first technology uses high-quality earphones with an in-ear microphone to measure personal sound exposure in a person's ear canal. Coupled with a tracking app that provides real-time feedback on sound levels when using the personal audio devices, dbTrack provides a first-of-its-kind solution to encourage safe listening.

This story first appeared on Research Matters, a curated content website featuring the University of Pretoria's impactful and innovative research excellence. The media is free to use it as a content resource. Simply send us a note to inform us that you would like to use content from our site and provide us with a source credit in return. Visit www.up.ac.za/research-matters today.

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ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on the Hatfield Campus, Pretoria. This 113-year-old institution is also the largest producer of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country that has a Faculty of Veterinary Science which is ranked top in Africa, and overall has 120 academic departments, as well as 92 centres and institutes, accommodating more than 55 000 students and offering about 1 100 study programmes.

UP is one of the top five universities in South Africa, according to the 2019-2020 rankings by the Center for World University Rankings. It is also ranked among the top 100 universities worldwide in three fields of study (veterinary science, theology and law), and among the top 1% in eight fields of study (agricultural sciences, clinical medicine, engineering, environment/ecology, immunology, microbiology, plant and animal sciences and social sciences).

In May 2020, the annual UK Financial Times Executive Education Rankings once again ranked GIBS as the top South African and African business school. The University also has an extensive community engagement programme with approximately 33 000 students involved in community upliftment. Furthermore, UP is building considerable capacities and strengths for the Fourth Industrial Revolution by preparing students for the world beyond university and offering work-readiness and entrepreneurship training to its students.

As one of South Africa's research-intensive universities, UP launched the Future Africa Campus in March 2019 as a hub for inter- and transdisciplinary research networks within UP and the global research community to maximise 4IR innovation and address the challenges and stresses our continent and world is facing. In addition UP also launched the Javett Art Centre in September 2019 as a driver of transdisciplinary research development between the Humanities and other faculties. In November 2020 UP launched Engineering 4.0. as a hub not only for Smart Cities and Transport, but also to link the vast resources in technology and data sciences to other faculties via Future Africa. These initiatives are stimulating new thinking at the frontier of 'science for transformation'.

For more information, go to www.up.ac.za