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Short Description of the Submitted Scientific Work and its Significance

The work I am submitting for consideration for the Charité Research Prize Tinnitus & Hearing, is a comprehensive meta-analysis that investigates the effects of objectively verified hearing aid amplification on tinnitus-related outcomes. This meta-analysis investigates the role of objectively verified hearing aid amplification in optimizing tinnitus-related outcomes, focusing on both tinnitus loudness and distress. While hearing aids are a well-established intervention for managing tinnitus, the variability in patient outcomes has long posed a challenge. A critical but underexplored factor contributing to this variability may be the use of objective verification during hearing aid fitting, a process that ensures the prescribed amplification is actually delivered to the patient's ear, accounting for individual anatomical differences. Despite its well-documented advantages in non-tinnitus outcomes, such as speech intelligibility, perceived sound quality, and self-rated listening abilities, the clinical adoption of verification remains notably low.

The present meta-analysis represents the first attempt to rigorously examine the impact of verified versus unverified hearing aid amplification on tinnitus outcomes. A systematic review identified 27 studies, comprising data from 1400 participants, that reported tinnitus distress and loudness both pre- and post-fitting. The studies were categorized based on whether objective verification was performed. In doing so, this work addresses a critical gap in the literature, building on decades of tinnitus research that has underscored the need for evidence-based strategies to optimize hearing aid use for tinnitus relief.

The meta-analytic findings demonstrate significantly greater reductions in tinnitus loudness with verified compared to unverified amplification ($p < 0.00001$), supporting the hypothesis that objective verification enhances therapeutic outcomes for tinnitus patients. Moreover, longitudinal analyses revealed that, while reductions in tinnitus distress with unverified amplification tended to wane over time, the benefits of verified amplification not only persisted but increased, potentially indicating improved neural adaptation and greater adherence to hearing aid use. After 12 months of hearing aid use, the effect size of verified amplification on tinnitus distress was approximately twice as large as that observed with unverified amplification (Hedge's $g = 2.06$ versus 0.99). This suggests that verified amplification not only provides immediate benefits but also promotes sustained and increasing relief from tinnitus-related distress over the long term. The progressive improvement may reflect improved neural adaptation and greater adherence to hearing aid use among patients receiving verified amplification.

The clinical significance of these findings cannot be overstated. Objective verification, though underutilized, is a cost-effective tool that has been available for decades. Given that the anatomy of the ear canal varies significantly between individuals, verification is essential to ensure that each patient receives the precise amplification required to achieve optimal auditory outcomes. The widespread failure to adopt this practice likely contributes to suboptimal hearing aid performance, particularly in the tinnitus population, where small deviations in amplification may have outsized effects on symptom perception.

This study provides compelling evidence for the routine implementation of objective verification in hearing aid fitting protocols for tinnitus patients. By confirming its advantages for reducing both tinnitus loudness and distress, the meta-analysis advances a crucial area of tinnitus management that has

long been recognized but insufficiently addressed in clinical practice. The potential to improve patient outcomes at a relatively low cost underscores the importance of these findings, particularly in the context of the growing societal burden of tinnitus. Ultimately, this work offers an actionable framework for enhancing both the precision of hearing aid fittings and the quality of life for individuals suffering from tinnitus.