THE INFLUENCE OF NON-LINEAR FREQUENCY COMPRESSION ON MUSIC PERCEPTION FOR ADULTS WITH A MODERATE TO SEVERE HEARING LOSS

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OPSOMMING

Rasionaal: Die meeste navorsing met betrekking tot gehoorapparate wat frekwensie verlaag het tot op hede hoofsaaklik gefokus op spraakpersepsievaardighede. Met die verbetering in gehoorapparaattegnologie neem die belangstelling in musiekpersepsie as ‘n dimensie wat gehoorapparaatdraers se kwaliteit van lewe kan verbeter, egter toe. Die doel van hierdie studie was tweeledig: Eerstens, om ’n musiekpersepsietoets vir volwasse persone met gehoorapparate te ontwikkel en tweedens, om die invloed van nie-lineêre frekwensiekompressie (NFK) op musiekpersepsie met behulp van die Musiek Persepsie Toets (MPT) wat deur die navorser ontwikkel is te evalueer.

Navorsingsontwerp en steekproef: Fase 1 het die samestelling van die MPT behels en kan beskryf word as ontwerpgebaseerd. In Fase 2 is ‘n kwasi-eksperimentale navorsingsontwerp geselekteer. Hierdie fase het die passing van deelnemers (40) met NFK gehoorapparate behels waartydens objektiewe data met NFK aktief en onaktief ingesamel is. In Fase 3 is deelnemers versoek om ‘n vraelys te voltooi en sodoende is subjektiewe data oor hul musiekervaring met NFK aktief en onaktief bekom.

Resultate: Resultate het bewys dat normaalhorende volwassenes sowel as volwassenes met gehoorapparate in staat was om al die sub-toetse van die MPT te voltooi. Verder is bevind dat die gebruik van NFK gehoorapparaatdraers se persepsie van toonkleur en melodie statisties beduidend verbeter het, maar nie hul persepsie van toonhoogte nie. In die geheel is geen statisties beduidende verbetering in the persepsie van ritme waargeneem nie, alhoewel prestasie op sommige van die sub-toetse vir ritme wel beduidend verbeter het. Die gebruik van NFK het ook gehoorapparaatdraers se persepsie van die musiekeienskappe bekend as algehele klankgetrouheid, blikkerigheid en weergalming beduidend verbeter. Hoewel deelnemers die luidheid, volheid, duidelikheid, natuurlikheid en aangenaamheid van musiek meer positief met NFK ervaar het, was hierdie voordele nie statisties beduidend nie.

Gevolgtrekking: Die MPT kan suksesvol vir die evaluering van musiekpersepsie by gehoorapparaatdraers in die Suid-Afrikaanse konteks gebruik word en kan daarom daartoe lei dat meer verantwoordbare gehoorapparaatpassings plaasvind. Die gebruik van NFK kan

gehoorapparaatdraers se waardering van musiek verhoog terwyl dit nie musiekpersepsie negatief beïnlvoed nie. ‘n Groot persentasie gehoorapparaatdraers ervaar steeds ‘n verlies aan musiekgenot en daarom mag oudioloë nie die moontlike voordele van NFK ignoreer nie, veral nie as daar in ag geneem word dat vorige navorsing met hierdie tegnologie reeds ‘n verbetering in spraakpersepsie uitgewys het nie.

Sleutelwoorde: Gehoorverlies, musiekpersepsie, nie-lineêre frekwensiekompressie, gehoorapparate, frekwensieverlaging, sensories-neurale gehoorverlies, kogleêre dooie areas, musiekgenot, Suid-Afrikaanse konteks

ABSTRACT

Objective: To date, the main focus in frequency lowering hearing aid studies has been in relation to speech perception abilities. With improvements in hearing aid technology, there is a growing interest in musical perception as a dimension that could improve hearing aid users' quality of life. The purpose of this study was two-fold: Firstly, to develop a test of music perception for adult hearing aid users and secondly, to evaluate the influence of non-linear frequency compression (NFC) on music perception with the use of the Music Perception Test (MPT) compiled by the researcher.

Research design and research sample: Phase 1 entailed the compilation of the MPT and can be described as design-based. A quasi-experimental research design was selected to establish the structure of the method employed in Phase 2, which involved the fitting of participants (n=40) with NFC hearing aids. Objective data was obtained with the hearing aids with NFC active and inactive. Phase 3 was characterized by a survey design which elicited subjective impressions of the participants' musical experiences with NFC active and inactive.

Results: Results proved that normal hearing adults as well as adults using hearing aids were able to complete all the sub-tests of the MPT. Furthermore, the use of NFC resulted in a statistically significant improvement in hearing aid users' perception of timbre and melody, but not of pitch. Overall, no statistically significant improvement in their perception of rhythm was observed, although their performance on some rhythm sub-tests improved significantly. The use of NFC also brought about a statistically significant improvement in hearing aid users' perception of the music qualities of overall fidelity, tinniness and reverberance. Although participants experienced the loudness, fullness, crispness, naturalness and pleasantness of music more positively with NFC, these benefits were not statistically significant.

Conclusion: The MPT can be used successfully for assessing music perception in hearing aid users within the South African context and may therefore result in more accountable hearing aid fittings. The use of NFC may increase hearing aid users' appreciation of music whilst not influencing music perception negatively. Given that a large percentage of hearing aid users express a loss in enjoyment of music, audiologists should not ignore the possible benefits of

NFC, especially if one takes into account that previous research indicated speech perception benefits with this technology.

Key words: Hearing loss, music perception, non-linear frequency compression, hearing aids, frequency lowering, sensory neural hearing loss, cochlear dead regions, music enjoyment, evidence-based practice, South African context

INDEX **PAGE**

REFERENCES

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES