Examining how Cognitive Functioning, Aging, and Hearing Loss, Affect Speech-in-Noise Performance

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Previous research has shown that, for persons with hearing loss, there is a robust relationship between working memory capacity and speech in noise performance. On the other hand, for normally-hearing persons, the results are somewhat mixed. In the current study, the aim was to examine, the relationship between cognitive functioning, age, hearing loss, and speech-in-noise performance. To this end, between-group structural equation modeling (SEM) was carried out on data from the n200 database (Rönnberg et al., 2016). The n200 database is comprised by a sample of 213 persons with hearing loss (M age = 60.76, SD = 8.83) and a sample of 215 persons without hearing loss (M age = 61.53, SD = 8.32). Four cognitive tasks (raven's progressive matrices, reading span task, semantic word-pair task, and visual-spatial working memory task) were selected to create the latent variable *cognitive functioning* and two conditions of background noise (the Hagerman sentences with 4-talker babble and speech-shaped noise (SSN)) were selected to create the latent variable *speech-in-noise*. Furthermore, in the speech-in-noise task, the speech reception threshold targeted 50% word recognition, and each noise condition was presented with three different signal processing settings; linear processing, fast compressions, and binary noise reduction. In the SEM, the effects of cognitive functioning and hearing loss (better ear PTA4) were modeled to affect speech-in-noise performance. Moreover, age was modeled to affect both cognitive functioning and speech-in-noise performance. Preliminary results show that the SEM analyses provide a good fit to the data and indicate that the cognitive functioning is equally related to speech-in-noise performance in both groups. However, age is more strongly related to PTA4 for persons with hearing loss, but equally related to speech-in-noise performance in both groups. Finally, PTA4 is more strongly related to speech-in-noise for persons with hearing loss, which was expected. In conclusion, the relationship between cognitive functioning and speech-innoise performance seems to be generalizable for both groups, giving support to the original assumptions of the Ease-of-Language-Understanding model (e.g., Rönnberg, Holmer, & Rudner, 2019).

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