Purpose: The purpose of this research study was to investigate the underlying relationship between cognitive load and anticipated speech intelligibility benefit. We hypothesized that a decreased signal-to-noise ratio (SNR) would elicit an increase of cognitive load, measured subjectively through task load index (TLX) responses and objectively through task evoked pupillary responses.

Methods: Participants in this project included 5 volunteers with reported normal hearing, ranging in age from 19 to 28 years old. In a sound booth, subjects were fit with videonystagmography goggles and asked to repeat a series of 20 sentences for each listening condition. The three conditions tested were 0, –5, and –10 dB SNR. After each of the three listening conditions, participants verbally rated the difficulty of their listening experience using the task load index. Pupil dilation changes were recorded using the Otometrics ICS Chartr 200 clinical interface.

Results: Speech intelligibility scores alone are insufficient in providing information about overall effort required in noise. TLX scores showed significant increases in perceived cognitive load as SNR decreased, but with high variability across participants. Average pupil change relative to baseline increased systematically, but not significantly, as SNR decreased. Statistical analysis revealed a moderate positive correlation between pupil size and subjective ratings of cognitive load.

Conclusions: Although self-assessment appears to be a reliable way to assess cognitive load in degraded listening environments, an objective measurement is still essential for certain populations. Furthermore, physiological measurements such as pupil dilation may be useful in quantifying listening ease in cochlear implant and hearing aid users. Due to the size of the study we are unable to capture statistically significant results in terms of how SNR is correlated with increased pupil size, although results appeared consistent with our original predictions. Further research is warranted.