# Measurement of Tinnitus Distress: Confirmatory Factor Analysis of the Tinnitus Handicap Inventory and Tinnitus Functional Index and Development of a Combined Short Form

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Tinnitus is the experience of phantom sounds (i.e., ringing, buzzing) in the ears or head. Approximately 10-20% of adults globally experience any tinnitus. For a subset of individuals, tinnitus is bothersome and causes psychological distress. In the absence of a clear physiological cause of tinnitus, psychological treatments including cognitive behavioral therapy have been developed to address the associated distress. Two measures are primarily used to assess change in tinnitus-related distress through treatment: the Tinnitus Handicap Inventory (THI; Newman, Jacobson, & Spitzer, 1996) and the Tinnitus Functional Index (TFI; Meikle et al., 2012). Both consist of 25 questions, which makes them too long to complete frequently during an intervention. The aim of the current study was to develop a short form combining these questionnaires to be used for frequent monitoring during treatment of tinnitus-related distress.

In the current study, 502 participants were included across cultures (both the USA and UK). Confirmatory factory analyses were used to assess whether the THI and TFI measure similar constructs, as well as how well those constructs are measured. We further assessed whether a subset of items from both scales can be used to estimate tinnitus-related distress both at baseline and over the course of treatment.

Results indicated that a joint bifactor model of the full TFI and THI achieved poor fit, suggesting that the THI and TFI do not measure precisely the same construct. We then generated a 10-item short form combining five items from each measure. The resulting bifactor model fit well (Comparative Fit Index = .96, Tucker Lewis Index = .94, Root Mean Square Error of Approximation = .07). The short form correlated highly with observed scores on the TFI and THI (*r*s = .80-.91). Notably, the short form did not pass tests of measurement invariance, suggesting differences in responding across USA and UK samples. In the UK sample (*n* = 271), change in the combined short-form with treatment correlated highly with change in TFI (*r* = .84) and THI (*r* = .76). Regression analyses suggested that change in the combined short-form accounted for unique variance in THI and TFI change over and above a competing short form of the THI.

Our results suggest that the THI and TFI do not measure precisely the same construct, as evidenced by poor fit of a unified bifactor model (and, indeed, any joint model we attempted to fit using all items). We thus generated a 10-item short form of the combined TFI and THI that achieved good fit and appears sensitive to treatment change. The short form developed here warrants further study across cultures and treatment settings as a short measure of tinnitus distress.