Exploring Potential Mechanisms for the Association between Loneliness and Cognition

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**BACKGROUND**

Perceived loneliness is a powerful stressor that tends to increase with age and predicts cognitive decline and risk for Alzheimer’s disease in elderly individuals\textsuperscript{1,2}. Although a growing body of literature supports the relation between feelings of loneliness and cognitive outcomes\textsuperscript{3}, potential mechanisms of this relationship remain largely unexplored.

**Study Aims:**

- To explore two potential mechanisms of the association between loneliness and cognitive outcomes using a behavior genetics-based approach by:
  - Testing whether loneliness moderates genetic and environmental influences on cognitive performance.
  - Comparing patterns of etiological moderation to those described by Shanahan & Hofer (2005)\textsuperscript{4} (i.e., social context as trigger or control).

**SAMPLE**

Participants: 11,197 twins (1,883 MZ, 2,668 DZ complete pairs, age range 25-97, 50% female) from nine studies participating in the IGEMS consortium (SATSA, OCTO-Twin, GENDER, TOSS, LSADT, MADT, MTSADA, MIDUS, VETSA)\textsuperscript{5}.

**MEASURES**

Harmonized Loneliness:
- CES-D (I felt lonely)\textsuperscript{6,6}
- CAMDEX (Have you felt lonely lately?)\textsuperscript{7,6}
  - 72.6% Not Lonely
  - 24.9% Occasionally Lonely
  - 2.5% Often/Always Lonely

Cognitive Performance:
- Verbal ability (Synonyms, N = 4,170, M = 47.84 (10.4))\textsuperscript{6}
- Processing speed (Symbol Digit, N = 6,864, M = 45.78 (11.8))\textsuperscript{6}
- Spatial ability (Block Design, N = 2,192, M = 43.83 (11.4))\textsuperscript{6}
- Working memory (Digits Back, N = 8,342, M = 48.85 (9.9))\textsuperscript{6}

**RESULTS**

**Processing Speed (Symbol Digit):**
- Significant moderation by loneliness of non-shared environmental variance (V\textsubscript{e}) was found.
- Although significant moderation of additive genetic (V\textsubscript{a}) and common environmental (V\textsubscript{c}) variances was not found, a pattern of lower influence for these familial factors emerged for lonely compared to non-lonely participants.

**Spatial Ability (Block Design):**
- No significant moderation by loneliness was observed.

**CONCLUSIONS**

- The observed pattern of moderation for processing speed by loneliness was consistent with loneliness as a suppressor of genetic influences on processing speed performance, suggesting that environmental conditions involving perceived loneliness play an important role in processing speed.
- As decline in processing speed is a key predictor of decline in other cognitive processes\textsuperscript{8} and risk of dementia\textsuperscript{9}, the observed link between loneliness and variability in processing speed suggests that interventions aimed at reducing loneliness may confer cognitive benefits in late life.
- The different findings for these domains suggest potentially distinct etiological pathways for different domains of cognitive functioning in relation to loneliness.