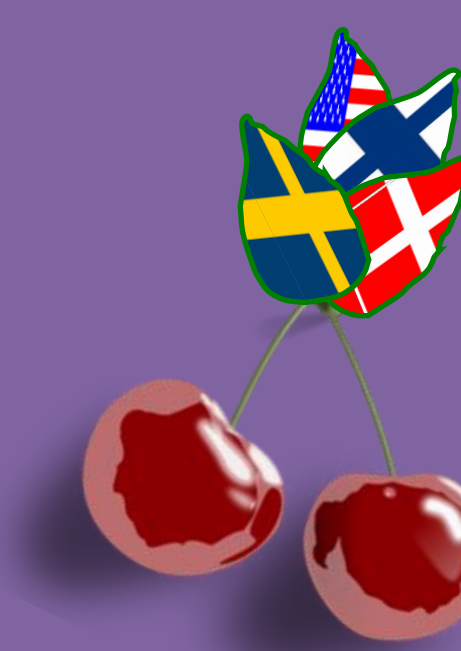




Exploring a Potential Role for Education in the Relation between Loneliness and Cognition



Dianna M. Phillips¹, Andrew J. Petkus², Wendy Johnson³, Carol Franz⁴, Chandra A. Reynolds¹ for the IGEMS Consortium
¹University of California, Riverside; ²University of Southern California; ³University of Edinburgh; ⁴University of California, San Diego

NIA AG037985

BACKGROUND

Feelings of loneliness have been associated with increased dementia risk and rate of cognitive decline, as well as reduced performance on tasks measuring processing speed, working and long-term memory, and spatial ability^{1,2}. Prior work suggests that individuals with less education may be particularly vulnerable to experiencing poor cognitive functioning in the context of loneliness². However, education moderation has only been explored for memory (immediate and delayed recall) and executive function/verbal ability (verbal fluency).²

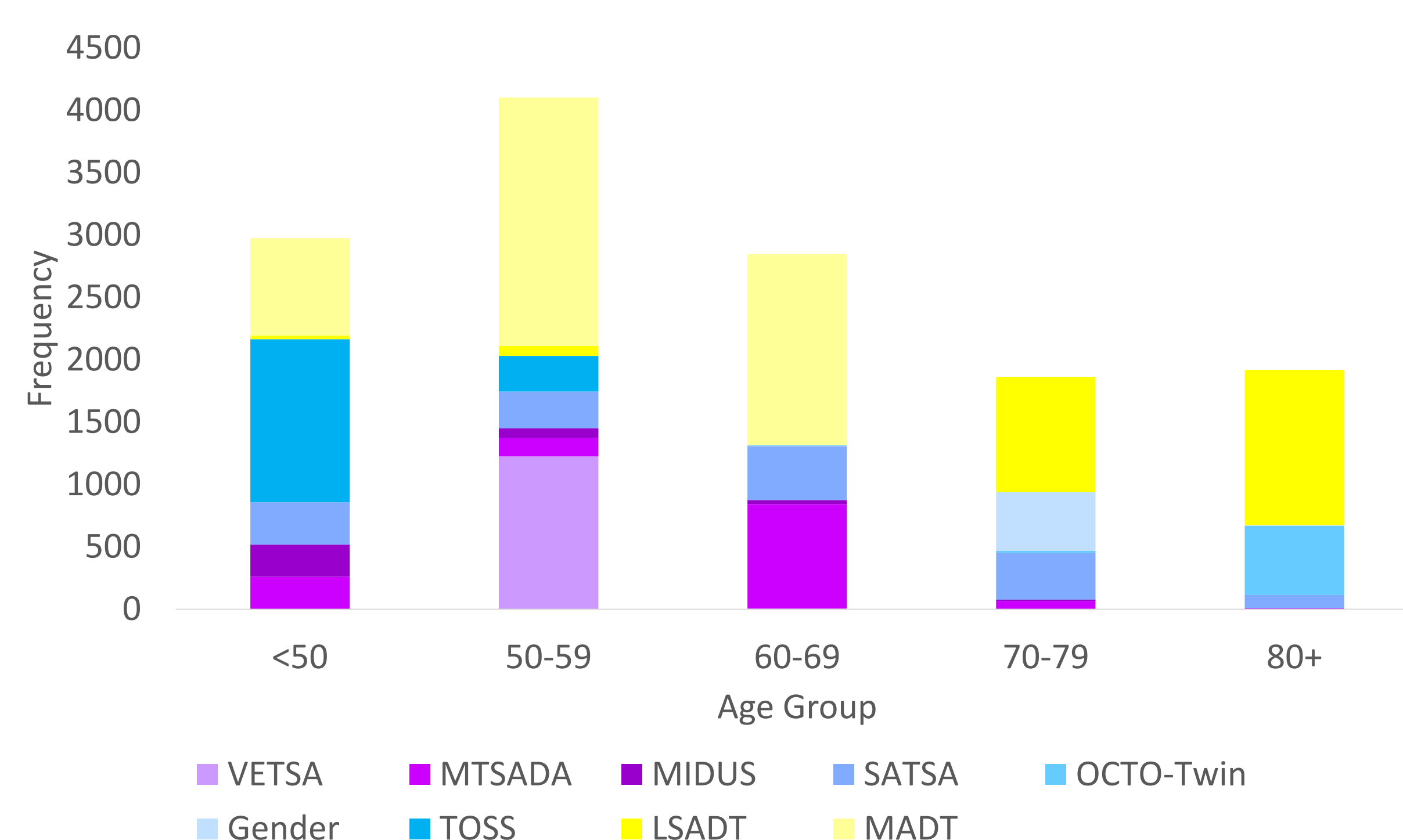
Study Aims:

- Examine relations between loneliness and four domains of cognitive function (verbal ability, spatial ability, processing speed, working memory)
- Test for moderation of these relations by educational attainment and age

SAMPLE

Participants ($n = 12,977$, age range 25-102 years, $M_{age} = 61.76$ (13.8), 51% F) were drawn from nine studies participating in the Consortium on Interplay of Genes and Environment across Multiple Studies (IGEMS)³. The age distribution is shown in Figure 1.

Figure 1. Age distribution by study



MEASURES

Harmonized Loneliness: CES-D⁴ (I felt lonely), CAMDEX⁵ (Have you felt lonely lately?)

- (72.6% Not Lonely, 24.9% Occasionally Lonely, 2.5% Often/Always Lonely)

Cognitive Performance:

Verbal Ability (Synonyms, $M = 47.49$, $SD = 10.6$)
 Processing speed (Symbol Digit, $M = 45.66$, $SD = 11.8$)
 Spatial Ability (Block Design, $M = 43.10$, $SD = 11.3$)
 Working memory (Digits Back, $M = 48.70$, $SD = 9.8$)

Educational Attainment:

Years of education ($M = 9.90$, $SD = 3.6$)

STATISTICAL ANALYSES

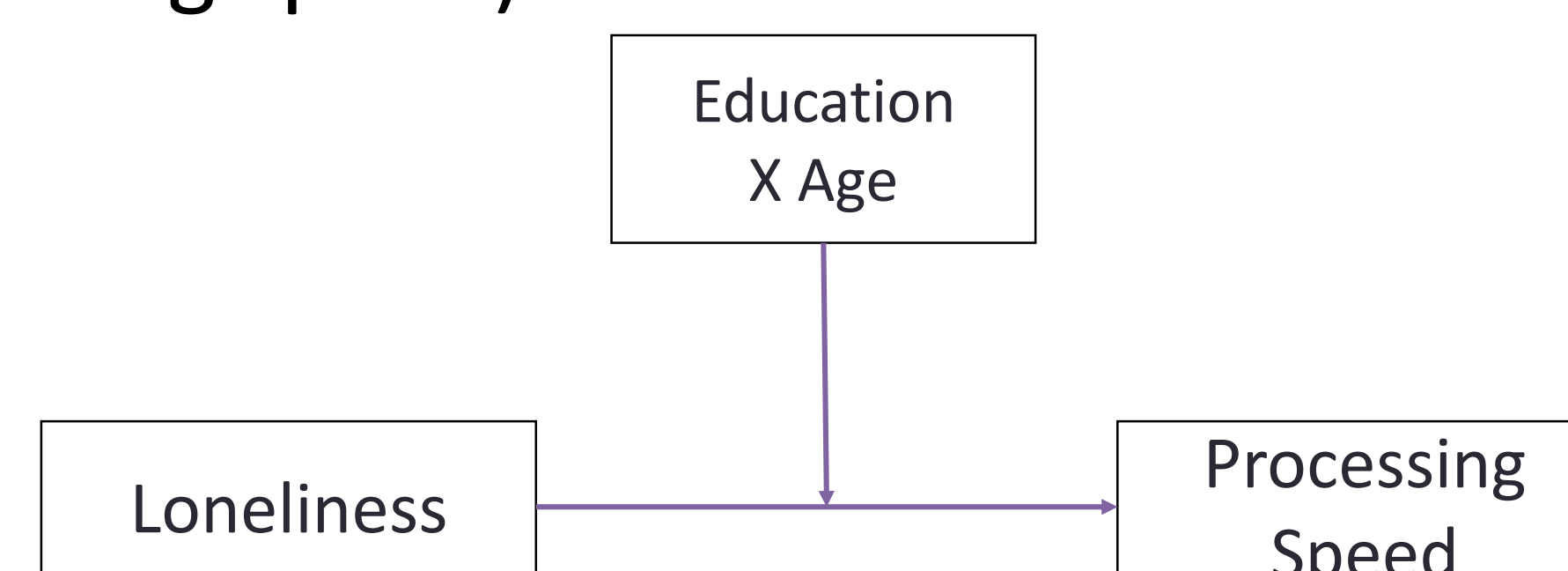
Table 1. Polyserial correlations between loneliness and performance on the four cognitive tasks

	Synonyms	Symbol Digit	Block Design	Digits Backward
Overall Sample	-.04	-.15***	-.15***	-.09***
N	2135	3449	1116	4212
<50 years	.01	-.05	-.14	-.07
N	650	523	117	464
50-59 years	-.08	-.07	-.19*	-.05
N	895	1163	214	1775
60-69 years	-.09	-.13*	-.15†	-.05
N	131	1035	264	931
70+ years	.05	-.14**	-.11*	-.11*
N	459	728	521	1042

*** $p < .0001$ ** $p < .01$, * $p < .05$, † $p < .10$

Model Fitting. Nested multiple mixed linear models were fit for processing speed ($n = 6459$, 54% F) and spatial ability ($n = 1897$, 60% F), adjusting for pair status.

Figure 2. Tested moderation model (shown for processing speed)



Model 0: Covariates (age, age² (symbol digit), sex, country)

Model 1: Independent effects of loneliness and education

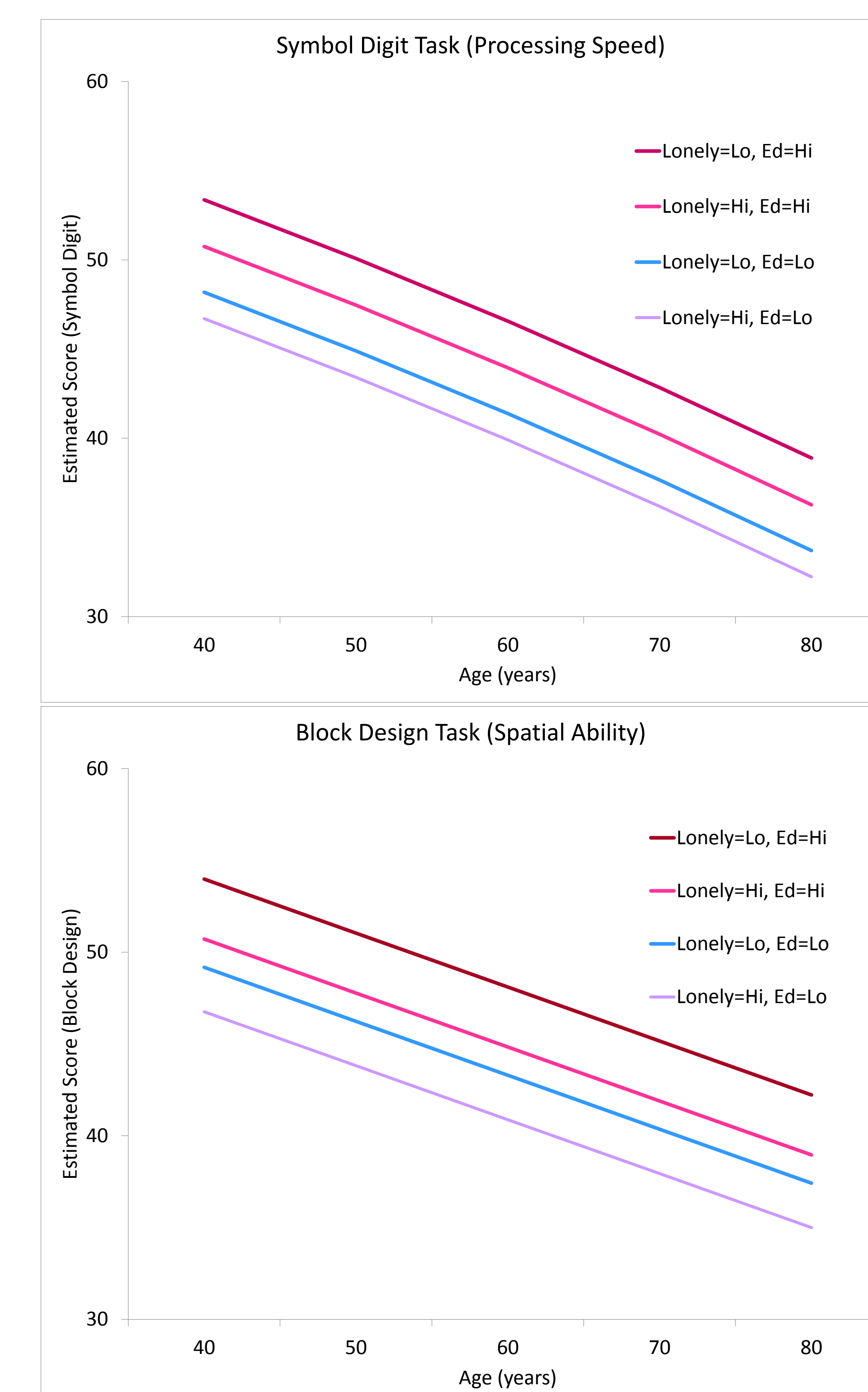
Model 2: Independent + interactive effects of loneliness and education

Model 3: Independent + interactive effects of loneliness, education, age

RESULTS

Model-Fitting. Loneliness and education contributed independently (Model 1) to processing speed ($\Delta\chi^2(2) = 582.6$, $p < .0001$) and spatial ability ($\Delta\chi^2(2) = 117.8$, $p < .0001$).

Figure 3. Estimated cognitive performance by education and loneliness



Lonely: Hi = Always/often Lo = Rarely/never
 Ed: Hi = 12 years Lo = 7 years

CONCLUSIONS

For both spatial ability (Block Design) and processing speed (Symbol Digit), higher levels of loneliness and lower educational attainment each independently contributed to poorer cognitive performance.

Moderation of the relationship between loneliness and cognition by education was not supported.

¹Wilson et al. (2007). Loneliness and risk of AD. *Arch Gen Psychiatry*, 64, 234-240.; ²Shankar et al. (2013). Social isolation and loneliness. *Psychosomatic Medicine*, 75, 161-170.; ³Pedersen et al. (2013). IGEMS. *Twin Research and Human Genetics*, 16(1), 481-489.; ⁴Radloff (1977). The CES-D scale. *Applied Psychological Measurement* 1(3), 385-401.; ⁵Roth et al. (1986). CAMDEX. *British Journal of Psychiatry*, 149(6), 698-709.