

## LETTER TO THE EDITOR

# Cognitive function and crossword puzzles: Which way does the causal direction go?

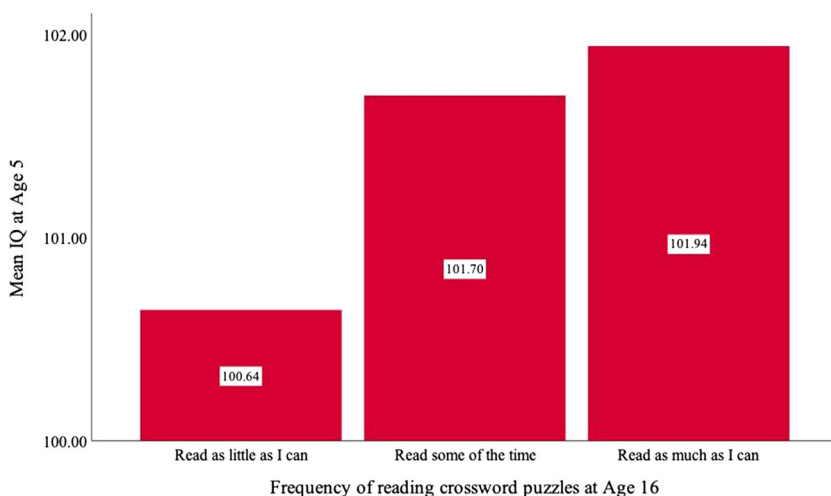
In a recent article in the *Journal*, Brooker et al<sup>1</sup> analyzed a large online sample of older adults (aged 50-93) and discovered that those who performed crossword puzzles more frequently had higher cognitive function than those who performed them less frequently across a large number of cognitive tests. From these findings, Brooker et al concluded that performing crossword puzzles helped prevent cognitive decline in older age. Their data were cross-sectional, however, and it is impossible to draw causal inference from them. Proper causal inference requires controlled experiments or, as the authors themselves recognize, prospectively longitudinal data.

The British Cohort Study (BCS) is a prospectively longitudinal study that included *all* babies ( $n = 17,196$ ) born in Great Britain (England, Wales, and Scotland) during the week of 5 to 11 April 1970. All surviving members of the cohort who still resided in the United Kingdom (Great Britain plus Northern Ireland) were subsequently interviewed at Ages 5, 10, 16, 26, 39, 34, 38, and 42. Respondents' intelligence was measured at Age 5 with eight cognitive tests. The raw scores were factor-analyzed and converted into the standard IQ metric with the mean of 100 and standard deviation of 15. At Age 16, BCS asked the respondents how frequently they "read" crossword puzzles in newspapers, and their responses were

coded: 1 = read as little as I can, 2 = read some of the time, and 3 = read as much as I can.

Figure 1 shows the association between IQ at 5 and the frequency of reading crossword puzzles at 16. The same positive and monotonic association between crossword puzzle frequency and cognitive function that Brooker et al discovered among older respondents was exactly replicated among the BCS respondents in childhood and adolescence, including the fact that those who very seldom performed crossword puzzles had especially lower cognitive function. Further, IQ was measured 11 years before the crossword puzzle frequency. Those who read crossword puzzles as little as they could at 16 had the mean IQ of 100.64 at 5, those who read them some of the time had the mean IQ of 101.70, and those who read them as much as they could had the mean IQ of 101.94. While the absolute differences in IQ among the three groups were very small, the difference between the first group and the second and third groups combined was marginally statistically significant,  $t(2027) = 1.665, p = .096$ .

Given that the same association between crossword puzzle frequency and cognitive function exists among children and adolescents, and given that IQ in the BCS sample was measured 11 years before



**FIGURE 1** The association between IQ at Age 5 and crossword puzzle frequency at Age 16 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

the crossword puzzle frequency, it is doubtful that Brooker et al's causal inference that frequent performance of crossword puzzles prevents cognitive decline among older individuals is valid. It is instead more likely that more intelligent individuals *at all ages* are more likely to prefer to perform crossword puzzles because they are evolutionarily novel, as predicted and explained by the Savanna-IQ Interaction Hypothesis.<sup>2-4</sup>

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