Reply: Timing of brain damage and verbal-performance IQ tilts

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Sir, Many thanks for providing the opportunity to respond to the letter from Dr Gordon concerning our recent paper: Childhood brain insult: can age at insult help us predict outcome? (Anderson et al., 2009). We are grateful for the chance to clarify the issues raised.

The first point raised by Gordon (2009) correctly identified an error in the data presented in Table 5 of our paper. This error has been acknowledged and addressed separately in a recent Corrigendum published in Brain. Importantly, this was a clerical error regarding labelling of variables within the table. Interpretation of the results and data were not impacted by this error.

The second issue of the contention relates to our finding that verbal IQ (VIQ) was consistently less than performance IQ (PIQ) in all groups in our sample. Subsequent analyses confirm a significant VIQ-PIQ discrepancy for our total sample, t(149) = 4.72, P < 0.001, in favour of PIQ. Of note, testing this discrepancy was not a primary aim of our study, and consequently we did not analyse our data to test the significance of these differences in our original manuscript. Rather, our objective was to provide an overview of the pattern of function demonstrated by children with early brain insult, according to the age at which insult was sustained, across a range of domains.

In keeping with the focus of our study, our literature review focused on work relevant to our specific research questions. In his letter, Gordon cites a number of additional studies, which do not appear to represent a systematic review. As a result, it is difficult to determine the ‘level of evidence’ that can be derived from them. Taking a similar non-systematic approach, there are many papers which are consistent with our finding of VIQ lower than PIQ, across a variety of childhood conditions including meningitis (e.g. Grimwood et al., 2000), traumatic brain injury (Anderson et al., 2005; Catroppa et al., 2008) and cranial irradiation (Smibert et al., 1996). Many of the papers cited by Gordon were not included in our paper as they either lacked methodological rigour or addressed issues not central to our focus. Those that were have been cited. Of note, literature in this field is steadily growing, to the extent that it is unrealistic for a data-based paper such as ours to refer to every paper published on early brain insult.

Gordon also considers possible explanations for what he considers unexpectedly low-VIQ scores in our sample. He questions the use of the Wechsler Abbreviated Scale of Intelligence (WASI: Wechsler, 1999). In response to this concern, we refer to the data provided in the WASI manual, which cites robust WASI/WISC-III correlations of 0.82, 0.76 and 0.87 for VIQ, PIQ and full-scale IQ, respectively. We also note that all children in our study were administered the same measure allowing us to be confident that our comparisons were reliable. In contrast, of the 11 papers cited by Gordon, all either failed to cite the IQ tests employed or combined results from multiple versions of the Wechsler scales (with no correction for different tests) or used only prorated IQ scores.

In contrast, all of the studies from our group cited above used the same IQ measure for all participants or employed corrected scores when using multiple test versions. This comparison raises the...
possibility that findings of lower VIQ in studies cited by Gordon may not be reliable.

Finally, Gordon argues that the younger the brain insult the poorer the child's function, and that outcome is associated with a range of factors. This is largely in keeping with our interpretation; however, we caution the adoption of a model supporting a simplistic linear relationship for age and insult and outcome, based on findings from both animal and human literature, which suggest critical periods during brain maturation for both better and worse outcomes depending on the developmental activity in progress at the time of insult (e.g. Kolb et al., 1996; Monfils et al., 2006; Morishita and Hensch, 2008). It is also likely that outcome will be influenced by non-insult factors such as environment.

References