Gender Differences in Means and Variability on the Progressive Matrices in Bosnia-Herzegovina

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Norms are given for 12 and 16 year olds for the Standard Progressive Matrices in Bosnia-Herzegovina. Females obtained higher means than males, but lower variability.

Key Words: Gender differences; Progressive Matrices; Bosnia-Herzegovina; Variability.

From the early years of the twentieth century it has been frequently asserted that there is no difference between males and females in general intelligence but that males have greater variability. Havelock Ellis (1904), Thorndike (1910) and Terman (1916) were among the first to assert that there are more males at both the high and low ends of the intelligence distribution, while females cluster around the mean. These early writers drew this conclusion from the observations that there is no average sex difference in general intelligence measured by a variety of intelligence tests, but men are greatly overrepresented among geniuses and also among the mentally retarded.

During the course of the twentieth century and up to the present there has been a good deal of subsequent research on the theory of greater male variability. The theory has been confirmed in a number of studies, e.g. in the United States by Hedges & Nowell (1995), and in Scotland by Deary et al. (2007). But some studies have failed to confirm the theory. For instance, no sex difference in variability was found in a meta-analysis of sex differences on the Progressive Matrices among university students reported by Irwing & Lynn (2005). As a contribution to this question we present some data from Bosnia-Herzegovina.

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Method and Results

The test used in this study was the Standard Progressive Matrices (SPM), a non-verbal reasoning test constructed in Britain in the 1930s by John Raven (1939). It is one of the most widely used tests of general intelligence, reasoning ability and Spearman's *g*. The study to be reported was carried out in 2005-2006. SPM data were obtained from two stratified samples of school students in Sarajevo Canton (i.e. the city of Sarajevo and the surrounding country). In the construction of samples, quotas were set for gender, age and type of school, so that the sample matched the general population for these variables. The percentages in the three types of school were: gymnasia (31.3%), technical and similar schools (50.5%) and vocational schools (18.0%). The samples consisted of 12 year olds with an average age of 12.5 years (n=266) and 15-18 year olds (n=339) with an average age of 16.5 years. The results (giving numbers, means and standard deviations) for the two samples are shown in Table 1.

Table 1   Standard Progressive Matrices data for Bosnia-Herzegovina.

Age	Male		Female	
	N	M (SD)	N	M (SD)
12.5	130	38.4 (7.4)	136	40.4 (6.7)
16.5	180	44.8 (8.4)	159	49.8 (5.6)

Discussion

There are three points of interest in the results. First, the theory that males have greater variability of intelligence is confirmed by the larger standard deviations of boys in both age groups. Although this phenomenon has frequently been reported, the explanation is not fully understood. Possible factors are that boys are more fragile than girls and more vulnerable to damage from injuries, illness and sub-optimal nutrition that impair intelligence, and that boys are more adversely affected by deleterious recessive genes, and more specifically by X-linked recessive genes.   These would produce more boys at the lower end of the intelligence distribution.

Second, in both samples the males obtained lower means and these are statistically significant at p<.05. This is an unusual result because in most studies there is no sex difference in means on the SPM up to the age of 16 years (Lynn & Irwing, 2004). In the case of the 12 year olds, the explanation may be that girls experience a growth spurt at about this age in which they mature more rapidly then boys in height and weight (Eveleth & Tanner, 1990), and this could also occur for brain development and intelligence.

Third, the mean scores obtained by the samples are slightly lower than those of adolescents in Britain. The mean score of the 12 year olds (39.4) is at the 35th percentile of the British 1979 standardization sample given by Raven (1981) and is equivalent to a British IQ of 94.3. There are no satisfactory British norms for 16.5 year olds, but the British percentile equivalent can be estimated from the norms for British 15.5 year olds given by Raven (1981) and for British 18 year olds given in the 1992 British standardization sample given by Raven et al. (2000). The mean score of the 16.5 year olds (47.3) is at the 52nd percentile of the British 15.5 year olds in the 1979 standardization sample, and at the 19th percentile of the British 18.0 year olds in the 1992 British standardization sample. The average of the two British percentiles is 35.5, and is equivalent to an IQ of 94.4. Thus, the British IQs obtained by the two samples are virtually identical at 94.3 and 94.4. No adjustment need be made to these figures because the British norms on the SPM have not changed over the years 1979-2008 (Lynn, 2009). The likely explanation for this slightly lower IQ lies in the lower living standards in Bosnia-Herzegovina than in Britain. Lower living standards reduce the quality of nutrition and health and this has an adverse effect on intelligence. In 2002 the per capita income (GNI-PPP: Gross national income at purchasing power parity) in Bosnia-Herzegovina was US$ 5,800 compared with US $26,580 in Britain. These figures, together with those in all other countries of the world, are given in Lynn & Vanhanen (2006).

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