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ETHNIC AND RACIAL DIFFERENCES ON THE STANDARD PROGRESSIVE MATRICES IN MEXICO

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Summary. Raven's Standard Progressive Matrices test was administered to a representative sample of 920 white, Mestizo and Native Mexican Indian children aged 7–10 years in Mexico. The mean IQs in relation to a British mean of 100 obtained from the 1979 British standardization sample and adjusted for the estimated subsequent increase were: 98·0 for whites, 94·3 for Mestizos and 83·3 for Native Mexican Indians.

Introduction

A number of studies have been made of the intelligence of Native Americans and Hispanics in the United States. In general these have found that both groups obtain lower average IQs than whites and that Native Americans obtain lower IQs than Hispanics (see Reynolds *et al.*, 1999, for references). Hispanics in the United States, who are also sometimes known as Latinos, are people of Latin American, Caribbean and Spanish-speaking origin and can be pure whites, blacks or Amerindians. There are five principal groups, namely those from Mexico, the rest of Latin America, Cuba, Puerto Rico and from other Caribbean islands. The United States Bureau of the Census (1989) reported that 63% of Hispanics were from Mexico, 13% from Puerto Rico, 10% from Central and South America other than Mexico, 6% were from Cuba and 8% from elsewhere, mainly from Spanish-speaking Caribbean islands, particularly Dominica. Thus by far the largest group come from Mexico, where 9% of the population are white, 60% are Mestizo and 30% Native American (Philip, 1996). Many of those from the rest of Latin America are also Mestizos. It can therefore be reasonably assumed that most Hispanics in the United States are Mestizos.

So far as the authors are aware, there have been no studies of the intelligence of whites in Mexico and only one study of the intelligence of Native Americans and Mestizos. This was carried out by Modiano (1962) on a rural sample of Native Americans and Mestizos using the Draw-a-Man test. The sample's mean IQ in relation to American norms of 100 was 86·5. The shortcomings of the study are that

it is questionable whether the sample is representative of the population of Mexico and results were not reported for Native Americans and Mestizos as separate groups.

There have been a number of studies of the intelligence of Native American Indians in the United States and Canada, and this might be expected to be similar to that of Native American Indians in Mexico. The first American studies were published in the 1920s and 1930s. The most impressive of these in terms of the tests used and the size and representativeness of the samples was that of Haught (1934). This consisted of 886 children and adolescents aged 6–15 years at school in New Mexico. The tests used were the Pinter–Cunningham Primary Mental Test for the younger children, the National Intelligence Test for the middle age range, and the Terman Group Test for the older children. In relation to national American norms set at 100, the median IQs (means were not reported) declined steadily from 84 among the 6-year-olds to 71 among the 15-year-olds, and the median IQ for the whole sample was 80·5. Among more recent studies, three have been the most impressive in terms of the tests used and the size and representativeness of the samples. The first of these was a study of 1129 Navajo children and adolescents aged 6–15 years in New Mexico tested with the Progressive Matrices. Their mean scores, presented as percentiles of the 1979 British standardization sample, declined from the 49th percentile (IQ equivalent, 100) for the 6-year-olds to the 21st percentile (IQ equivalent 88) for the 14–15-year-olds, and the mean percentile for the whole sample was 36·5, equivalent to an IQ of 94·7 (Raven & Court, 1989). The second study by Reynolds *et al.* (1999) reports results of a sample of 240 Native American children aged 6–16 years (mean age 10 years) tested with the Wechsler Intelligence Scale for Children-Revised (WISC-R). In relation to white means of 100, the Native American children obtained a Full Scale IQ of 77·7, a Verbal IQ of 72·7 and a Performance IQ of 86.0. The third study by Beiser & Gotowiec (2000) reports results for 691 8–10-year-old Native American children living on reservations in the Plains, Northern Woodlands, Desert and North-west Coast (Canada) and tested with the WISC-R. Their mean IQs were: Full Scale 87·8; Verbal 79·3; Performance 99·0. These studies are quite variable suggesting that the IQs of Native Americans vary with age, being higher in young children than in adolescents, and with the type of ability, being higher in non-verbal ability than in verbal. Many Native Americans speak their native languages as their first language and English as their second language, learned at school. This almost certainly depresses their verbal IQ when they are tested in English.

There have also been a number of studies of the IQs of Mexican immigrants residing in the United States, of which seven are the most impressive. First, Jensen (1974) reported results for 644 Mexican children aged 6–12 and 638 whites, tested with the Colored Progressive Matrices and the Peabody Picture Vocabulary Test (PPVT). In relation to IQs for whites of 100, the Mexican children obtained IQs of 90·4 on the Colored Progressive Matrices and 84 on the PPVT. The lower vocabulary score is probably attributable to their use of English as a second language. Second, in a further study Jensen (1974) reported results for 608 Mexican children aged 7–13 and for 744 white children for the Colored and Standard Progressive Matrices. In relation to a white mean of 100, the Mexican children obtained a mean IQ of approximately 95. Third, Raven (1986) gives results for 597 6–11-year-old Mexican

children in California and described as a representative sample for the Coloured Progressive Matrices in 1972. In relation to the 1979 British standardization sample, the Mexican children obtained an IQ of 82. Fourth, Raven (1986) gives results for a study of the Coloured Progressive Matrices for a sample of 434 6–11 year old Mexican American children in Texas tested in 1972. In relation to the 1979 British standardization of the Standard Progressive Matrices, they obtained an IQ of 94. Fifth, Raven (1986) reports a third study in which the Standard Progressive Matrices test was given to a sample of 404 9–12-year-olds in Texas. In relation to the British 1979 standardization sample, the IQ was 84. Six, Reynolds *et al.* (1999) gave the WISC-R to a sample of 223 Mexican Americans in Arizona. In relation to a white IQ of 100, they obtained a Full Scale IQ of 86·7, a Performance IQ of 91·3 and a Verbal IQ of 84·7. Seven, Herrnstein & Murray (1994) report a mean IQ of 86 for Latinos on a largely verbal test in the National Longitudinal Study of Youth data. The majority of Latinos are Mexican Americans although they include immigrants from Cuba, Puerto Rico and a variety of Latin American countries. The average of the studies of non-verbal IQs (counting the performance IQ of the Wechsler) is 89·5, and the average of the three verbal IQs is 84·5. It is uncertain how far the lower verbal than non-verbal IQ obtained by Mexicans is attributable to their imperfect knowledge of English. A meta-analysis of 39 studies of the intelligence conceptualized as *g* of adult Hispanics in the United States by Roth *et al.* (2001) produced a mean IQ of 89, the same as the mean of the performance IQ in the seven studies summarized above.

These studies of the IQs of Mexican immigrants in the United States cannot be regarded as necessarily representative of Mexicans, since immigrants may have average IQs above or below those of the population of Mexico. This paper reports what is believed to be the first study of a representative sample of the intelligence of whites, Mestizos and Native Americans in Mexico.

Methods

During October and November of 2000 the Standard Progressive Matrices test was administered to a sample of 920 7–10-year-old children from five socially representative primary schools in Mexico in the town of Ensenada in Baja California. The sample consisted of white, Mestizo (of mixed white and Native Mexican Indian ancestry) and Native American Indians. The test was administered without time limits, but in practice all children completed the test within 40 minutes. The mean ages of the children were: whites 8·82 years; Mestizos 8·91 years; Native Mexican Indians 9·17 years (the decimal points are for years, not months). Data were also obtained for the educational level of the mothers as an index of the socioeconomic status of the families. Educational levels were categorized as elementary, some secondary school, secondary school graduate, teacher certificate, bachelor college degree and postgraduate degree and scored 1 to 5 for the five classes.

Results

The numbers, mean scores and standard deviations of the three groups of Native Mexican Indians, Mestizos and whites on the Progressive Matrices are shown in

Table 1. Means and standard deviations on the Progressive Matrices for Native Mexicans, Mestizos and whites

Ethnic group	*n*	Mean	SD	*d*	IQ
White	155	32·28	10·94	0·00	100·0
Mestizo	571	29·13	10·92	0·28	95·8
Indian	194	20·30	9·50	1·17	82·4

Table 2. Mean and standard deviation data for the Standard Progressive Matrices in Mexico

	7-year-olds			8-year-olds			9-year-olds			10-year-olds		
Ethnic group	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
White	41	23·75	10·46	48	32·68	10·51	38	36·65	8·69	28	38·14	7·17
Mestizo	146	23·07	9·48	142	26·29	10·43	156	32·26	10·25	128	35·12	8·86
Native Mexican	47	14·85	5·32	40	18·62	8·58	45	23·86	9·78	62	22·93	10·33

Table 1. It will be seen that whites obtained the highest mean, followed by the Mestizos, and the Native Mexican Indians obtained the lowest mean. The means of the three groups differ significantly, as tested by analysis of variance ($F=66{\cdot}349$, $p<0{\cdot}001$). The differences between the three groups tested by Scheffe tests are all statistically significant. The Mestizo–white difference is significant at $p<0{\cdot}005$. The differences between Mestizo–Native Mexican Indian and the white–Native Mexican Indian are significant at $p<0{\cdot}001$. Column 5 of Table 1 gives the *d* scores (the differences between the means divided by the standard deviations) of the Native Mexican Indians and the Mestizos compared with the whites. Column 6 gives the transformation of the *d* scores to conventional IQs with the white mean set at 100 with a standard deviation of 15.

Compared with the British standardization sample of 1979 (Raven, 1981), the Mexican white mean is at the 52th percentile of the British children, equivalent to an IQ of approximately 100·7 in relation to an IQ of 100 for British children. The mean of the Mestizos is at the 42th percentile of the British children, corresponding to an IQ of approximately 97. The mean of the Native Mexican Indians is at the 18th percentile of the British children, corresponding to an IQ of approximately 86.

Raven & Court (1989) report a pronounced decline with age of the IQs of Native American children from an IQ of 100 for 6-year-olds to 88 for 14–15-year-olds. To examine whether this decline is present in this study's sample, means for the three ethnic groups for each age group are given in Table 2. It can be seen that there is no trend for the difference between the means to increase over the age range. The

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Table 3. Means and standard deviations of mothers' educational attainment

Ethnic group	*n*	Mean	SD
White	150	3·68	1·36
Mestizo	557	3·19	1·48
Indian	115	1·11	0·49

ANOVA for ethnicity by age interaction is not statistically significant ($F=1·968$, $p=0·07$).

The relation between the mothers' education as an index of the socioeconomic status of the families, the three ethnic groups and IQs of the children was also examined. The mean educational attainment and standard deviations of the mothers of the groups are shown in Table 3. The mean for whites is 3·68, for Mestizos 3·19 and for Native Mexicans 1·11. These differences are statistically significant as tested by ANOVA ($F=134·81$, $p<0·001$). The correlation between mothers' educational attainment and children's scores for the entire sample is 0·333 (statistically significant at $p<0·01$). Within each ethnic group, the correlations between mothers' educational attainment and children's scores were: 0·206 for whites ($p<0·05$); 0·262 for Mestizos ($p<0·01$); and − 0·025 ($p=0·795$) for Native Mexicans. The last result is explained by the low variance of mothers' educational attainment in Native Mexicans.

Discussion

The results contain four points of interest. First, the white children in this study obtain a virtually identical IQ to British white children in the 1979 standardization sample. This is consistent with studies from many countries showing that white children throughout the world, including the United States, Australia, New Zealand, Argentina and a number of countries in continental Europe, all have closely similar mean IQs (see Raven, 1986, 1998; Raven & Court, 1989; Lynn & Vanhanen, 2002). However, the comparison in the present study, showing a mean IQ of 100·7 for Mexican white children in relation to the British mean of 100, should be adjusted to take account of a probable increase in the British mean since 1979. The mean of British children on the Progressive Matrices increased by approximately 2 IQ points a decade from the first standardization in 1938 to the second standardization of 1979 (Lynn & Hampson, 1986). If this increase is projected forward, the British IQ in 2000 would be approximately 104, and hence the mean IQ of Mexican whites would be 96·7 in relation to an estimated British IQ of 100 for the year 2000, the mean IQ of the Mestizos would be 93, and the mean IQ of Native American Indians would be 82. However, evidence suggests that the rate of increase of IQs has fallen in recent years. In the United States the rate of increase of the Wechsler IQ was 3·3 IQ points over the period 1932–1978 (Flynn, 1984), but the latest evidence is that the increase was 1·71 IQ points over the years 1978–1995 (Flynn, 1998). It has been found by Teasdale & Owen (2000) that the rate of increase of IQ in Denmark over the years

1988–98, as measured by a non-verbal reasoning test similar to the Progressive Matrices, was 1·35 IQ points. It seems likely that a similar decline in the rate of increase of IQ has taken place in Britain, and the most reasonable assumption is that the same rate of increase has taken place for the Progressive Matrices in Britain as occurred in Denmark during 1988–98, and therefore that the British IQ increased by 2·7 IQ points over the 20-year period 1979–99. On the basis of this assumption an adjustment of the results for Mexico gives an IQ for whites of 98·0, for Mestizos of 94·3 and for Native Mexican Indians of 83·3. It is proposed that these are the best estimates of the IQs of the three Mexican ethnic groups in relation to a British IQ of 100.

Second, the results for the Mestizo and the Native Mexican Indian children are consistent with the findings of a number of studies carried out in the United States and summarized in the Introduction showing that Mexicans and Native American Indians obtain lower mean IQs than whites. The three studies of Native American Indians summarized in the Introduction showed quite variable results ranging from an IQ of 77·7 to 94·7. The average of the three studies is 86·7, while the present result is 83·3. With regard to Mexicans in the United States, the mean non-verbal IQ of 89·5 derived from the seven studies summarized in the Introduction is intermediate between the IQs of 83·3 for the Native Mexican Indians and 94·3 for the Mestizos obtained in the present study. Mexicans in the United States include Mestizos and Native American Indians but the proportions of the two groups are not known.

Third, one of the previous studies summarized in the Introduction (Raven & Court, 1989) found that the IQs of Hispanic children declined with age over the age range of 6 to 14–15 years. There was no significant decline of IQs with age in the present sample, nor have any declines with age been reported in other samples. It seems probable that the decline found in the Raven and Court study is a sampling error.

Fourth, the causes of the differences in IQs between white, Mestizo and Native Mexican children in Mexico could lie in environmental or genetic factors or in some mix of the two. In Mexico, whites, Mestizos and Native Mexicans differ in socioeconomic status, education, earnings and living standards. These differences were confirmed in the present study by the differences between the three ethnic groups in mothers' educational level, and it was also found that mothers' educational level is associated with the children's IQs. These associations result from complex interactions between various cultural and economic differences and children's IQs between the three ethnic groups. The causal relationships between these cannot be determined from the data in the present study.

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