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Brief report

Maternal IQ and child mortality in 222 Serbian Roma (Gypsy) women

Jelena Čvorović [a], J. Philippe Rushton [b,*], Lazar Tenjevic [c]

[a] *Serbian Academy of Sciences, Belgrade, Serbia*
[b] *University of Western Ontario, London, Ontario, Canada*
[c] *Belgrade University of Philosophy, Belgrade, Serbia*

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Abstract

A significant negative correlation ($r = -0.26$) is found between maternal IQ measured by the Raven's Matrices and child mortality in 222 Serbian Roma (Gypsy) women. Statistical adjustments for schooling, age, religion, number of marriages, age at first reproduction, and birth spacing did not remove the correlation. Indeed, maternal schooling had no association with child mortality after controlling for IQ. We suggest that in addition to cognitively mediated self-management, an explanation for the relationship may lie in a cross-species life-history theory in which IQ scores are linked to brain size and a robust constitution.

Keywords: Gypsies; Longevity; Intelligence; Life-history theory; Evolutionary psychology

1. Introduction

Studies show that IQ scores predict mortality (Batty, Deary, & Gottfredson, 2007; Gottfredson, 2004). For example, an examination of 2309 noncombatant deaths in Australian soldiers found each additional IQ point was associated with a 1% decrease in mortality (O'Toole & Stankov,

* Corresponding author. Tel.: +1 519 661 3685.
E-mail address: rushton@uwo.ca (J.P. Rushton).

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1992). A study of 1084 11-year-old Scottish children tested in 1921 and 1936 found that childhood IQ significantly predicted age of death to 80 years (Deary, Whiteman, Starr, Whalley, & Fox, 2004). A study of 49,323 Swedish men tested at age 18 on military conscription found IQ linearly associated with all-cause mortality (Hemmingsson, Melin, Allebeck, & Lundberg, 2006). Maternal education also predicts child survival. A study of all births in California in 1978 found that for white women, infant deaths numbered 12.2 per 1000 for those with less than 12 years of education, 8.3 for those with 12 years, and 6.3 for those with 13 or more years (Cramer, 1987). In the above studies, the relation between cognitive ability and mortality remained after adjusting for other variables such as socioeconomic position (SEP), marital status, or birth weight.

IQ also predicts mortality at aggregate levels. In 273 health areas in New York City, predominantly white, the average IQ of school children correlated $r = -0.43$ with the neighborhood's overall death rate and $r = -0.51$ with infant mortality (Maller, 1933). Across 160 countries, Lynn and Vanhanen (2006) found national IQ scores correlated with life expectancy $r = 0.82$ and with mother's mortality $r = -0.73$ and infant mortality $r = -0.77$. These were higher correlations than those found with any other measure such as per capita income (0.65), adult literacy (0.71), and enrollment in tertiary education (0.69). Independent investigators have confirmed these relationships after adjusting for other variables and examining other subsets of data and removing outliers (Kanazawa, 2006).

In the present study, we examine the relation between IQ and mortality in 222 Serbian Roma (Gypsy) women who average an infant mortality rate of almost 10%. The Roma are a diverse population of South Asian stock who migrated to Eastern Europe from northwest India between the 9th and 14th centuries (Čvorović, 2004). Roma communities tend to be segregated and characterized by poverty, unemployment, poor education, and poor quality housing. Between 1971 and 1986 in the former Yugoslavia, Roma infants and children had a mortality rate three times higher than the majority, viz., 0–1 years, 26.1 vs. 6.8%; 1–4 years, 3.3 vs. 1.0%; 5–9 years, 1.2 vs. 0.4% (Petrović, 1992). A subsequent survey of around 7000 Roma found up to 50% of infants die before their second year (Oxfam, 2003). Their hygiene is poor, little attention is paid to health, and there is resistance to immunization programs (Čvorović, 2004; Save the Children, 2001).

2. Method

The sample consisted of 222 female respondents (31% rural; 69% urban) from three Roma communities (Mirijevo, Rakovica, and Drenovac). Most inhabitants are supported by social welfare and child allowances. They have access to hospitals and health care and all have drinking water, electricity, and at least a partial sewage system. Respondents ranged in age from 16- to 72-years-old, with a median of 34 years, had been married at least once, and had given birth to at least one child. For cause of death, 36% of mothers said they did not know the cause, 36% said their child/children had been strangled by witches, and most of the remaining 28% reported suffocation or "body failure" as the cause. There are no death certificates.

The Raven's Progressive Matrices is the most well-known and best researched of all culture-reduced IQ tests. It consists of diagrammatic puzzles, each with a missing part, which the test taker attempts to identify from several options (Raven, Raven, & Court, 1998). Reliability and validity remain high across a wide variety of cultural groups. The tests were administered to each

mother individually, usually in their respective homes or other familiar environments, free from interruption. The mothers were given as much time as they liked to answer each item to maximize the score.

Mothers were interviewed in depth by the first author (Čvorović, 2004). The data on IQ and a description of the three communities have been provided previously (Rushton, Čvorović, & Bons, 2007). The Roma were not paid for their participation, but small gifts were given, such as coffee for the adults and candy for the children. The following information was recorded: mother's age, age at first reproduction, IQ, number of living children, birth spacing, number of lost children, education, religion, number of marriages, and residence community.

3. Results

The internal consistency of the test scores in the sample assessed by Cronbach's alpha coefficient is 0.91. The raw scores on the Raven's predicted the mothers' years of education ($r = 0.38$, $P < 0.001$), whether they were on social assistance ($r = -0.25$, $P < 0.01$), their age at first childbirth ($r = 0.33$, $P < 0.001$), number of children ever born ($r = -0.31$, $P < 0.001$), number of living children ($r = -0.28$, $P < 0.001$), birth spacing ($r = 0.19$, $P < 0.01$), and the number of children who died ($r = -0.23$, $P < 0.001$). Thus, the average age at first childbirth was 17 years for those in the bottom quartile of the Raven's distribution and 21 years for those in the top quartile; the mean birth spacing was 1.95 years for those in the bottom quartile and 2.25 years for those in the top quartile; having one or more deceased children was 26% likely (14/53) for those in the bottom quartile and 0% likely (0/56) for those in the top quartile.

Multiple regression analyses examined whether IQ predicted number of child mortalities in the context of other variables. In one analysis, the mother's age, religion (Christian Orthodox vs. Muslim), number of marriages, education, birth spacing (in years), age at first reproduction (in years), residence settlement (rural vs. urban) and IQ were included as predictors of child mortality. The linear combination of these variables significantly predicted the child's mortality: multiple $R = 0.39$, $F(8, 213) = 4.85$, $P < 0.001$ and explained 15% of the total variance. Bivariate and partial correlation of the predictors and child mortality index are presented in Table 1. Mother's IQ is negatively correlated with child mortality, and is the single most useful predictor. IQ remained a significant predictor of child mortality when the other variables were controlled. When IQ was added to a model based on all the other variables, a statistically significant improvement in prediction occurred of about 2% (F change (1, 213), $P < 0.05$).

4. Discussion

We found that maternal IQ predicted child mortality significantly better than did other variables in 222 Serbian Roma. As such, this study extends the relation between IQ and mortality to a minority sample and a dependent variable only rarely studied (see Batty et al., 2007). Batty et al.'s literature review found that the relation between premorbid IQ and later mortality held even after controlling for socioeconomic position and other mediating variables. They thus raised the possibility that in addition to cognitively mediated self-management, socioeconomic

Table 1
Bravais–Pearson bivariate and partial correlations of predictors with child mortality index in the sample of Roma women ($N = 221$)

Predictors	Bivariate correlation between each predictor and child mortality index	Partial correlation between each predictor and child mortality index
Raven's (IQ) scores	−0.26**	−0.16*
Community	0.20**	0.04
Religion	−0.17*	−0.07
Mother's age	0.19*	0.24*
Mother's education (years of schooling)	−0.06	0.13
Number of marriages	0.06	−0.05
Birth spacing (in years)	−0.12	−0.16*
Age at first reproduction	−0.18**	−0.12

* $P < 0.05$.
** $P < 0.01$.

position, health knowledge, and access to medical care, high IQ scores may reflect a superior constitution.

The idea that IQ scores reflect a superior constitution dovetails with the view that both IQ and longevity belong in a life-history framework (Rushton, 2004). From a life-history perspective, a species' average longevity is a function of its brain size mediated by developmental speed. For example, across 21 primate species, Smith (1989) found that longevity correlated $r = 0.80$–0.90 with brain size, length of gestation, age of weaning, age of eruption of first molar, age at complete dentition, age at sexual maturity, inter-birth interval, and body weight. Across 234 mammalian species, Rushton (2004) found that longevity correlated with brain weight ($r = 0.70$), gestation time (0.72), birth weight (0.44), litter size (−0.43), age at first mating (0.63), duration of lactation (0.62), body weight (0.44), and body length (0.54). Even after controlling for body weight and body length, brain size continued to predict longevity ($r = 0.59$). One explanation is that as larger brains evolve they require more prolonged and complex life histories to sustain them.

Also in support of this hypothesis is the finding that brain size correlates with general mental ability (IQ) both within and between species. The correlation between brain size and IQ among humans is about 0.40 when assessed by magnetic resonance imaging and about 0.20 by external head size (Rushton & Ankney, 2007). Similar relations are found among other animal species. For example, Anderson (1993) found a correlation of $r = 0.48$ in rats between brain weight at autopsy and a general factor of cognitive ability extracted from several tasks. Schultz, Bradbury, Evans, Gregory, and Blackburn (2005) found birds with larger brains such as blue tits and magpies adapted better to changing British farm and urban environments and were reproductively more successful than those with smaller brains like grey partridges and corn buntings. Dunbar and Shultz (2007) found among 24 primate species that the size of the neocortex (relative to body size) correlated $r = 0.67$ with the size of the social group.

The relation between brain size, IQ and longevity can be extrapolated to the much smaller variation among people. In the Nun Study, which examined 678 Catholic sisters in the US aged between 75 and 102 years who agreed to donate their brain after death, those whose head circumference was in the upper two thirds, or with better hand writing ability, or who completed 16 years or more of formal education, lived longer and were four times less likely to suffer

dementia than those with smaller head circumferences and lower education (Mortimer, Snowdon, & Markesbery, 2003).

Population group differences exist in IQ and mortality (Lynn & Vanhanen, 2006). Although mortality differentials between the Roma and the surrounding population are less today than they were in the past, they continue to go beyond what might be expected economically. The Roma have been described as having a "grow fast, breed young" life-history pattern characterized by a lower parental investment strategy, with an earlier age of marriage, earlier first reproduction, high rates of reproduction, higher intercourse frequencies, more marriages, and higher mortality (Bereczkei & Dunbar, 1997; Čvorović, 2004). They also have a lower mean IQ than other Europeans (Rushton et al., 2007). Future work might profitably explore between the alternative hypotheses of cognitive self-management and gene-based life-history theory.

Rushton (2004) suggested that life-history theory might help to resolve a paradox in the general literature – why in spite of increased access to health care, the gap in mortality between rich and poor is increasing rather than decreasing. For example, in Britain from 1921 to 1971, everyone was living longer, but professional workers gained more years than semiskilled and unskilled workers (Townsend & Davidson, 1982). In 1930, people with the lowest SEP had a 23% higher chance of dying at every age than people with the highest SEP. By 1970, this excess had grown to 61%. A decade later it had jumped to 150%. In Britain, a National Health Service has long existed to minimize inequalities in access to medical care. The increasing correlation of health and SEP makes sense given that removing environmental impediments makes individual-difference variables more dependent on heritable characteristics (see also Gottfredson, 2004).

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