IQ and the Health of States

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ABSTRACT: Epidemiologists contend that income inequality reduces the health and life expectancy of the whole population, but this argument does not make sense within its own evolutionary framework. Recent evolutionary psychological theory suggests that the human brain, adapted to the ancestral environment, has difficulty comprehending and dealing with entities and situations that did not exist in the ancestral environment, and that general intelligence evolved as a domain-specific adaptation to solve evolutionarily novel problems. Since most dangers to health in the contemporary society are evolutionarily novel, it follows that more intelligent individuals are better able to recognize and deal with such dangers and live longer. Consistent with the theory, and replicating an earlier study of cross-national data, income inequality has no effect on the health and longevity of the population across the American states, when the racial composition (percent black) is controlled, but the average intelligence of the population (state IQ) has a significant effect. The data presented here and in the earlier study challenge the conclusion that income inequality reduces the health of the population.

INTRODUCTION

In a series of articles and books, Richard Wilkinson argues that economic inequality reduces the health of the population and lowers its life expectancy (Marmot & Wilkinson, 1999; Wilkinson, 1992, 2000). He claims that humans and other primates have an evolved physiological mechanism whereby their cortisol level goes up when they are under attack or otherwise in submissive situations. Heightened levels of cortisol and other stress hormones allow the individuals to deal with the short-term emergencies but at the cost of long-term health. When the submissive status prolongs, the continuously high levels of stress and anxiety damage health. Wilkinson's conclusion is succinctly captured in the blurb on his book *Mind the Gap*, "Inequality kills. People die younger in countries with greater inequalities in income." While Wilkinson's original observation on the negative association between income inequality and health involves cross-national comparisons of nations (Wilkinson, 1992), others have since documented the same negative association for subnational units, such as the American states (Ben Shlomo, White, & Marmot, 1996; Kaplan et al., 1996; Kawachi & Kennedy, 1997; Kennedy, Kawachi, & Prothrow-Smith, 1996; Lynch et al., 1998; Ross et al., 2000). The negative consequences of income inequality for population health and longevity has become part of the established knowledge of epidemiology and public health.

Wilkinson's theory, however, does not make sense within its own evolutionary framework. Given that prolonged stress

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and anxiety lead to health problems and early death, with no apparent compensating benefits in reproductive success,[1] any genetic mutation that allows its carrier *not* to experience stress in the face of permanently low status from which it cannot escape (the "Que sera sera" gene?) will be selected. Chronic low status, being at the bottom of a social hierarchy for life, seems dramatically different from the acute emergency of imminent physical attack, with which cortisol and other stress hormones are designed to deal. Any genotype which makes a distinction between short-term emergencies of physical attack and long-term chronic low status, and which responds differently, with a surge of cortisol, prolactin and other stress hormones to the former, but not to the latter, will be favored by natural selection over another genotype which does not make such a distinction and responds similarly to both. Since all primate societies are hierarchical and there are chronically high- and low-status individuals in them, suggesting that the origins of human social hierarchies may go back at least 15–20 million years in evolutionary history, it appears that there should have been enough time for such a genetic mutation to emerge and spread. What is the ultimate function of stress and anxiety in the face of low status? If there are none, why hasn't natural selection eliminated it?

Recent evolutionary psychological theory suggests an entirely different determinant of health and life expectancy in contemporary society. On the one hand, evolutionary psychology (Crawford, 1993; Symons, 1990; Tooby & Cosmides, 1990) posits that the human brain, just like any other organ, is designed for and adapted to the conditions of the ancestral environment (roughly the African savanna during the Pleistocene Epoch). It may therefore have difficulty comprehending and dealing with entities and situations that did not exist in the ancestral environment (Kanazawa, 2002, 2004a). On the other hand, an evolutionary psychological theory of the evolution of general intelligence[2] proposes that general intelligence may have evolved as a domain-specific adaptation to solve evolutionarily novel problems, for which there are no predesigned psychological adaptations (Kanazawa, 2004b, 2008a). The synthesis of these two theories, *the Savanna-IQ Interaction Hypothesis*, implies that the human brain's difficulty with evolutionarily novel stimuli may interact with general intelligence, such that more intelligent individuals have less difficulty with evolutionarily novel stimuli than the less intelligent individuals. In contrast, general intelligence may not affect individuals' ability to comprehend and deal with evolutionarily familiar entities and situations.

Some critics (including one anonymous reviewer) contend that general intelligence could not be an adaptation because it is an individual difference variable. Adaptations are universal and constant features of a species shared by all its members; in contrast, there are obviously heritable individual differences in general intelligence and some individuals are more intelligent than others. These critics argue that adaptations and heritable individual differences are mutually exclusive.

I strongly disagree with these critics. I believe that a trait could simultaneously be an evolved adaptation and an individual difference variable. Full-time bipedalism is a uniquely human adaptation among mammals, yet some individuals run faster than others. The eye is a complex adaptation, yet some individuals have

better vision than others. Language is an adaptation, yet some individuals have greater linguistic facility than others. Individual differences in general intelligence is what Tooby and Cosmides (1990) call "random quantitative variation on a monomorphic design." "Because the elaborate functional design of individuals [in this case, general intelligence as a domain-specific adaptation] is largely monomorphic [shared by all members of a species], our adaptations do not vary in their architecture from individual to individual (*except quantitatively*)" (Tooby & Cosmides, 1990, p. 37, emphasis added). Intraspecific (interindividual) differences in such traits pale in comparison to interspecific differences. Carl Lewis and I run at a virtually identical speed compared to cheetahs or sloths. Similarly, Einstein and I have virtually identical intelligence compared to cheetahs or sloths. I therefore believe it is possible for a trait to be universal and species-typical (exhibiting virtually no variation in a cross-species comparison) and manifest vast individual differences among members of a single species. I believe general intelligence is one such trait.

Tooby and Cosmides (1990, pp. 38–39) make this exact point, using "a complex psychological mechanism regulating aggression" as their example. They contend that it is an adaptation, even though there are heritable individual differences in the mechanism's threshold of activation, whether one has a "short fuse" or not. Tooby and Cosmides suggest that a complex psychological mechanism regulating aggression "is (by hypothesis) universal and therefore has zero heritability," even though "the *variations* in the exact level at which the threshold of activation is set are probably not adaptations." I would similarly propose that general intelligence is an adaptation and has zero heritability (in the sense that all humans are highly intelligent), even though the exact level of an individual's intelligence is not an adaptation and is highly heritable. And Tooby and Cosmides (1990, p. 57) contend that "nonadaptive, random fluctuations in the monomorphic design of a mental organ can give rise to heritable individual differences in nearly every manifest feature of human psychology." We would therefore expect individual differences in general intelligence as a domain-specific adaptation.

As it happens, there has been accumulating evidence for the Savanna-IQ Interaction Hypothesis. First, individuals' tendency to respond to TV characters as if they were real friends, first discovered by Kanazawa (2002), is limited to those with below-median intelligence (Kanazawa, 2006a); individuals with above-median intelligence do not become more satisfied with their friendships by watching more television.

Second, less intelligent individuals have more children than more intelligent individuals, even though they do not want to, possibly because they have greater difficulty effectively employing evolutionarily novel means of modern contraception (Kanazawa, 2005). Another indication that less intelligent individuals may have greater difficulty employing modern contraception effectively is the fact that the correlation between the lifetime number of sex partners and the number of children is positive among the less intelligent but negative among the more intelligent. The more sex partners less intelligent individuals have, the more children they have; the more sex partners more intelligent individuals have, the fewer children they have.

Third, net of age, sex, race, education, income, and religion, more intelligent individuals are more likely to acquire evolutionarily novel values and preferences such as liberalism, atheism, and, for men, sexual exclusivity, than less intelligent individuals (Kanazawa, 2008b). Consistent with the Hypothesis, however, general intelligence has no effect on the acquisition and espousal of evolutionarily familiar values for children, marriage, family, and friends.

Fourth, net of age, race, sex, education, income, religion, marital status, number of children, and social class, more intelligent individuals are more likely to prefer evolutionarily novel purely instrumental music (such as classical, big band, and easy listening) than less intelligent individuals, while general intelligence has no effect on individuals' preference for evolutionarily familiar vocal music (Kanazawa & Perina, 2008). In addition, the Hypothesis can potentially explain why general intelligence is positively correlated with openness to experience (i.e. novelty) across individuals (Ackerman & Heggestad, 1997; Chamorro-Premuzic & Furnham, 2006).

Finally, criminologists have long known that criminals on average have lower intelligence than the general population (Wilson and Herrnstein 1985; Herrnstein and Murray 1994). From the perspective of the Savanna-IQ Interaction Hypothesis, there are two important points to note (Kanazawa, Forthcoming-a, Forthcoming-b). First, much of what we call interpersonal crime today, such as murder, assault, robbery, and theft, were routine means of intrasexual male competition in the ancestral environment. This is how men competed for status, resources, and mating opportunities for much of human evolutionary history; they beat up and killed each other, and they stole from each other, if they could get away with it. Second, the institutions that control, detect, and punish criminal behavior in society today -- the police, the courts, and the prisons -- are all evolutionarily novel; there was probably very little formal third-party enforcement of norms in the ancestral environment, only second-party enforcement by victims and their kin and allies. Thus it makes sense from the perspective of the Savanna-IQ Interaction Hypothesis that men with low intelligence are more likely to resort to evolutionarily familiar means of competition for resources (theft rather than full-time employment) and mating opportunities (forcible rape rather than computer dating) and not to comprehend fully the consequences of criminal behavior imposed by evolutionarily novel entities of law enforcement.

Most dangers to health and life today (cigarettes, alcohol, junk food, sedentary life, automobiles, guns) are evolutionarily novel; very few individuals in the United States today die of being mauled by wild animals or falling from a cliff. While our ancestors in the African savanna may have partaken in psychotropic drugs and intoxicating substances, since their use is known among contemporary hunter-gatherers, they certainly did not have anything nearly as potent and thus potentially dangerous as crack cocaine or vodka. The Savanna-IQ Interaction Hypothesis would therefore predict that more intelligent individuals can better recognize evolutionarily novel health dangers and risks, deal with them appropriately, and remain healthier and live longer.

Consistent with this prediction, Deary et al.'s (2004) longitudinal analysis of the Scottish Mental Surveys of 1932 and 1947 reveals that childhood IQ has a positive effect on longevity; more intelligent

Scots live longer than less intelligent Scots. Elias et al. (2003) demonstrate that obese men (but not obese women) have lower intelligence than their nonobese counterparts. Kanazawa's (2006b) analysis of cross-national data shows that the average intelligence of a population has a very large and significant effect on life expectancy at birth, infant mortality rate, and age-specific mortality rate across 126 nations. *Neither economic development (GDP per capita) nor income inequality (Gini coefficient) has any effect on health and longevity net of national IQ.* Further consistent with the Savanna-IQ Interaction Hypothesis, national IQ does *not* have any effect on health and longevity in evolutionarily more familiar sub-Saharan Africa, where only income inequality has a significant effect.

This paper seeks to make a contribution to the emerging field of *cognitive epidemiology* (Deary & Der, 2005; Lubinski & Humphreys, 1997). There have been numerous studies which show that more intelligent individuals stay healthier and live longer, even net of education and social class (Deary et. al, 2004; Gottfredson, 2004; Whalley & Deary, 2001). However, exactly *why* this is so is not clear. Deary and Der (2005, p. 67) note that the mechanism behind the correlation between IQ and longevity is "as yet unknown"; Gottfredson and Deary (2004) ask, in the title of their article, "Intelligence predicts health and longevity, but why?" The Savanna-IQ Interaction Hypothesis can potentially offer one possible mechanism by which more intelligent individuals stay healthier and live longer in the (evolutionarily novel) industrial and postindustrial societies. The Hypothesis simultaneously predicts that more intelligent individuals do *not* stay healthier and live longer in an evolutionarily familiar environment (such as hunter-gatherer tribes in sub-Saharan Africa).

The current analysis empirically tests the Hypothesis at the macro level across 50 American states and the District of Columbia. If more intelligent individuals stay healthier and live longer than less intelligent individuals, as the Hypothesis suggests, then it logically follows that, at the higher, macrosocial level of aggregation, the average intelligence of state populations ("state IQ"; Kanazawa, 2006c) should have a positive effect on the health and longevity of the population. The present study aims to replicate Kanazawa's (2006b) cross-national results within the United States, to examine whether state IQs significantly influence their health and longevity of state populations.

DATA

Response Variables

I use four measures of health and longevity which have often been used in the past studies of the relationship between income inequality and health: Life expectancy at birth (the mean number of years of life left remaining to a person at birth), age-adjusted death rate (the number of deaths from all causes per 100,000 population, adjusted for age by applying the age-specific rates to standardized age distribution in order to eliminate the effect of differences in population age structure), infant mortality rate (the number of deaths of infants under one year of age per 1,000 live births),[3] and percent obese (the proportion of the state population that are classified as obese with body mass index greater than 30). Data on life expectancy at birth in the 50 states and the District of Columbia in 2000 are available

from the U.S. Census Bureau (http://www.census.gov/population/projections/MethTab2.xls). Data on age-adjusted death rate and on infant mortality rate for 2000–2002 are available from the National Center for Health Statistics (2005, pp. 168–169, Table 28, and p. 160, Table 23, respectively). Data on percent obese in 2006 are available from the Center for Disease Control (http://apps.nccd.cdc.gov/brfss/list.asp?cat=OB&yr=2006&qkey=4409&state=All).

Explanatory Variables

Income Inequality. I use Gini coefficient to measure the extent of income inequality in each state. Gini coefficient is calculated with the formula: $G = \frac{1}{2*m*(m-1)*\bar{x}} \sum_{i=1}^{m}\sum_{j=1}^{m}\left|x_i - x_j\right|$, where x_i is the units of income (e.g. dollar) that the individual i earns, and m is the total number of individuals in the economy (Foster, 1985, pp. 61–65). There are a total of r units of income in the economy ($\sum x_i = r$). G = 0.0 indicates perfect income equality, where each individual earns the same income ($\frac{r}{m}$), and G = 1.0 indicates maximum income inequality, where one individual earns all r income in the economy. Data on Gini coefficients for the states in 1999 are available from the U.S. Census Bureau (http://www.census.gov/hhes/www/income/histinc/state/state4.html).

State IQ. State IQ is estimated from the SAT scores, using Johnson and Thomopoulos' (2002) work on the characteristics of the left-truncated standard normal distribution to correct for the left-censoring problem that not everyone in a birth cohort graduates from high school and not all high school seniors take the SAT. SAT is a better measure of general intelligence than either ACT or NAEP (National Assessment of Educational Progress) (Frey & Detterman, 2004). Both ACT and NAEP purport to measure knowledge acquired in the school curriculum ("crystallized intelligence"), whereas SAT purports to measure reasoning ability ("fluid intelligence"), hence its original name, Scholastic *Aptitude* Test (Kanazawa, 2006c, p. 594). While Koenig, Frey, and Detterman (2008) show that ACT may also be used as a measure of general intelligence, SAT scores' correlation with general intelligence is higher than ACT scores' (.87 vs. .77). See Kanazawa (2006c) for the details of the estimation procedure, and the actual state IQ estimates.

Racial Composition. The states vary in the proportion of the population which is black, from the low of 0.4% in Montana to the high of 58.9% in the District of Columbia. For a variety of genetic, hormonal, and developmental reasons, blacks are more susceptible to certain diseases (Ellis & Nyborg, 1992; Polednak, 1989; Ross et al., 1986), which contributes to their higher mortality rate and shorter life expectancy (Rushton, 1995). The white-black gap in infant mortality exists even when both parents are university-educated (Schoendorf et al., 1992), so it is not entirely a function of social class. It is therefore important to control for percent black in the population in any aggregate comparison of health and life expectancy. Data on the proportion of the state population which is black in 2003 are available from the U.S. Census Bureau (2005, p. 24, Table 21).

RESULTS

Table 1, Column (1), shows that, when entered alone, state Gini coefficient has a large and significantly negative effect on life expectancy at birth across the 50 states and the District of Columbia ($b = -34.01$, standardized beta = −.57, $p < .0001$). State Gini coefficient has a similarly large and significant effect on age-adjusted death rate (Column (4): $b = 1670.01$, beta = .51, $p < .001$) and infant mortality rate (Column (7): $b = 27.50$, beta = .48, $p < .001$). This is consistent with Wilkinson's claim that "inequality kills," and replicates all the studies on the American states, cited above, which show that income inequality has adverse effects on the health and longevity of the population. However, as Column (10) shows, state Gini coefficient is not at all correlated with percent obese in the state population ($b = 8.67$, beta = .08, *ns*).

The conclusion that income inequality lowers population health, however, appears premature. Table 1, Columns (2), (5), and (8), shows that, *net of percent black in the population, the state Gini coefficient has absolutely no effect on life expectancy at birth* ($b = -4.30$, beta = −.07, *ns*), *age-adjusted death rate* ($b = 226.92$, beta = .07, *ns*), *and infant mortality rate* ($b = -8.77$, beta = −.15, *ns*). In contrast, percent black has a large and significant effect on life expectancy ($b = -.09$, beta = −.72, $p < .0001$), age-adjusted death rate ($b = 4.50$, beta = .63, $p < .001$), and infant mortality rate ($b = .11$, beta = .91, $p < .0001$). Column (11) shows that percent black also has a significantly positive effect on percent obese ($b = .14$, beta = .55, $p < .01$) while income inequality doesn't ($b = -35.67$, beta = −.31, *ns*).

Table 1, Columns (3), (6), (9), and (12), shows that, even when income inequality and percent black are controlled, state IQ has a large and significant effect on measures of health and longevity. State IQ has a significantly positive effect on life expectancy at birth ($b = .03$, beta = .23, $p < .01$), a significantly negative effect on age-adjusted death rate ($b = -1.77$, beta = −.27, $p < .01$), on infant mortality rate ($b = -.03$, beta = −.29, $p < .001$), and on proportion obese ($b = -.11$, beta = −.49, $p < .0001$). State IQ alone explains nearly 30% of the total variance in proportion obese (partial $r = -.53$, controlling for income inequality and percent black). While state IQ is significantly correlated with economic development (Kanazawa, 2006c), controlling for gross state product per capita does not alter the substantive conclusions above (results available upon request).

DISCUSSION

Figures 1-3 show the partial effect on life expectancy at birth of income inequality (Figure 1), percent black (Figure 2), and state IQ (Figure 3). They collectively demonstrate that income inequality has virtually no effect on life expectancy at birth, net of the racial composition of the state population and state IQ, while the latter two factors have significant effects even net of income inequality.

Given that nations with higher national IQs have less income inequality (lower Gini coefficients) than nations with lower national IQ (Kanazawa, 2008b), one might suggest that the effect of state IQ on health across American states is mediated by income inequality. This does not appear to be the case, however, as state IQ and Gini coefficients are not significantly correlated across states ($r = .07$, *ns*, $n = 51$).

The analyses presented above in this paper replicate Kanazawa's (2006b) earlier findings in a cross-national study

TABLE 1

THE EFFECTS OF INCOME INEQUALITY, PERCENT BLACK AND STATE IQ ON LIFE EXPECTANCY AT BIRTH. INFANT AND NEONATAL MORTALITY RATES, AND PERCENT OBESE

	DEPENDENT VARIABLE											
	Life expectancy at birth			Age-adjusted death rate			Infant mortality rate			Percent obese		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Gini coefficient	34.01****	–4.30	–5.78	1670.01***	226.92	322.47	27.50***	–8.77	–7.00	8.67	–35.67	–29.68
	(6.95)	(7.66)	(7.23)	(406.95)	(491.16)	(462.68)	(7.17)	(6.80)	(5.99)	(16.44)	(21.33)	(18.29)
	–.57	*–.07*	*–.10*	*.51*	*.07*	*.10*	*.48*	*–.1534*	*–.12*	*.08*	*–.31*	*–.26*
Percent black		–.09****	–.09****		4.50***	4.39****		.11****	.11****		.14**	.13**
		(.02)	(.02)		(1.07)	(1.01)		(.01)	(.01)		(.05)	(.04)
		–.72	*–.70*		*.63*	*.61*		*.91*	*.89*		*.55*	*.52*
State IQ			.03**			–1.77**			–.03***			–.11****
			(.01)			(.65)			(.01)			(.03)
			.23			*–.27*			*–.29*			*–.49*
Constant	92.18	79.91	77.98	112.60	708.68	833.12	-5.19	9.79	12.10	21.18	39.49	47.31
	(3.12)	(3.31)	(3.19)	(182.67)	(212.07)	(204.37)	(3.22)	(2.94)	(2.65)	(7.38)	(9.21)	(8.08)
R^2	.33	.59	.65	.26	.46	.53	.23	.65	.74	.01	.16	.40
n	51	51	51	51	51	51	51	51	51	51	51	51

Note: Main entries are unstandardized regression coefficients.
(Numbers in parentheses are standard errors).
Numbers in italics are standardized regression coefficients (beta weights).
*p < .05 **p < .01 ***p < .001 ****p < .0001

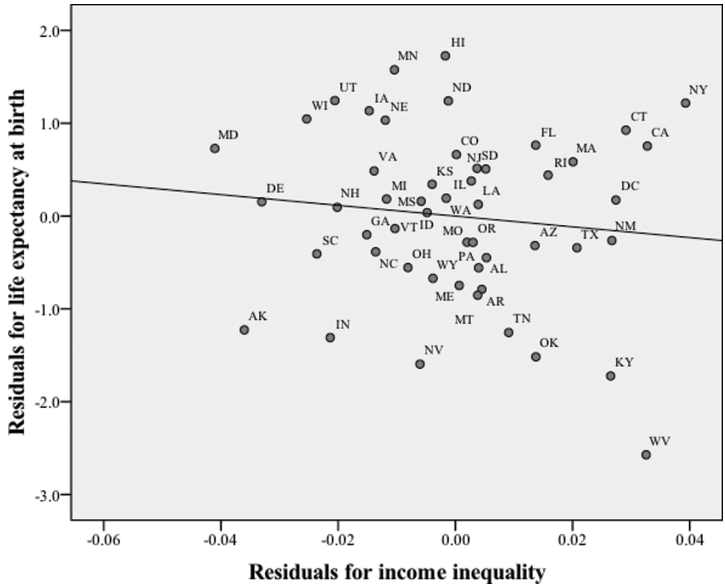

FIG. 1.—Partial relationship between income inequality and life expectancy at birth, controlling for percent black and state IQ.

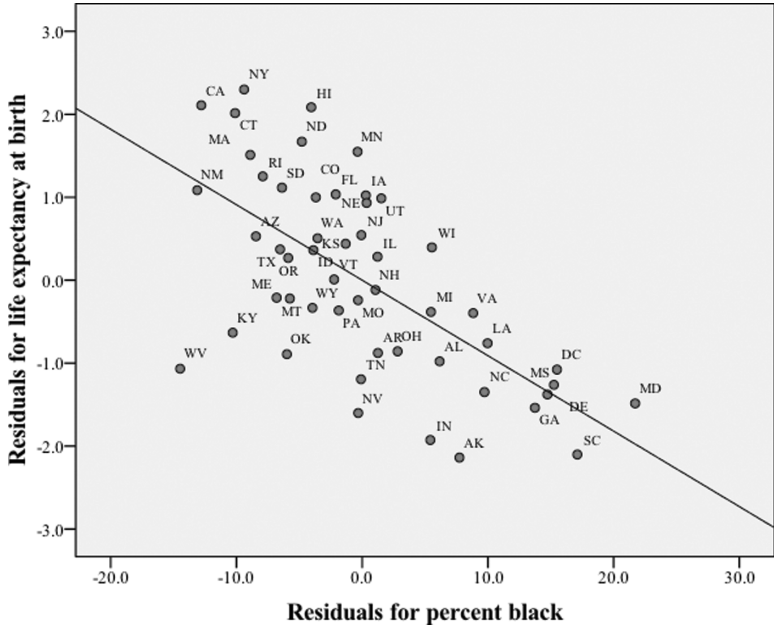

FIG. 2.—Partial relationship between percent black and life expectancy at birth, controlling for income inequality and state IQ.

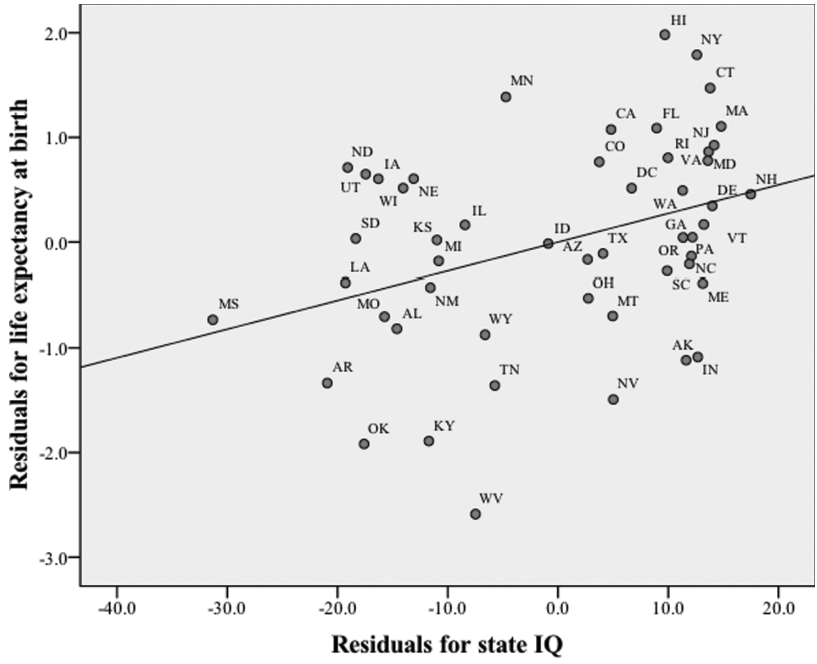

FIG. 3.—Partial relationship between state IQ and life expectancy at birth, controlling for income inequality and percent black.

at the subnational level of the American states. The earlier study shows that neither economic development (GDP per capita) nor income inequality (Gini coefficient) has any significant effect on life expectancy at birth, age-specific mortality rate, and infant mortality rate, across 126 nations. The present study shows that, net of percent black, income inequality has no effect on life expectancy at birth, age-adjusted death rate, infant mortality rate, and percent obese. Further, even after controlling for income inequality and state racial composition, average intelligence of the state population has a significant effect on the measures of health and longevity. The unanimous conclusion of past epidemiological studies cited in the Introduction that income inequality lowers the health and longevity of the population appears to have been premature. Variations in health and longevity across American states appear primarily a function of state racial composition (percent black) and secondarily of state IQ, and not at all of income inequality (Gini coefficient). Contrary to Wilkinson's claim, inequality does *not* kill; lower intelligence does.

The results are consistent with the recent evolutionary psychological theory that the human brain has difficulty comprehending and dealing with entities and situations that did not exist in the ancestral environment (Crawford, 1993; Kanazawa, 2002, 2004a; Symons, 1990; Tooby & Cosmides, 1990), and that this difficulty interacts with general intelligence, such

that less intelligent individuals have greater difficulty with evolutionarily novel stimuli than more intelligent individuals (Kanazawa, 2005, 2006a, 2008b). Because most health risks and hazards in the contemporary societies are evolutionarily novel, this reasoning predicts, consistent with the Savanna-IQ Interaction Hypothesis, that the more intelligent individuals are better able than less intelligent individuals to recognize such health hazards, deal with them appropriately, and, as a result, stay healthier and live longer. In conjunction with an earlier finding that, even after controlling for age, sex, race, marital status, education, occupational prestige, and income, intelligence has a significantly positive effect on reported health of Americans (Kanazawa, 2006b), the present paper provides empirical support for the recent evolutionary psychological theory on the nature and function of general intelligence. The analysis provided above replicates at the macro level a large number of recent studies that show that, even net of education, social class and other social and economic factors, more intelligent individuals stay healthier and live longer than less intelligent individuals (Deary & Der, 2005; Deary et al., 2004; Gottfredson, 2004; Gottfredson & Deary, 2004; Whalley & Deary, 2001).

One alternative explanation for the effect of general intelligence on health and longevity is that both intelligence and health reflect the underlying "body system integrity" (Deary & Der, 2005; Whalley & Deary, 2001). In this view, genetically and developmentally healthier individuals are *simultaneously* more likely to have higher intelligence *and* remain healthy and live longer. In contrast, the Savanna-IQ Interaction Hypothesis suggests that general intelligence affects health and longevity *only in so far as* the latter are affected by individual choices and behavior, via the more intelligent individuals' ability to recognize and deal properly with evolutionarily novel health risks and hazards. The Hypothesis equally predicts that general intelligence does *not* affect mortality when it does not involve individual choice and behavior, and instead caused by diseases of purely genetic origin, such as Huntington's disease. A crucial test to adjudicate between the Savanna-IQ Interaction Hypothesis and the "body system integrity" view is to examine whether general intelligence reduces death from all causes regardless of the degree of individual choice involved.

There are other alternative explanations for the empirical results presented in this paper. For example, Gottfredson (2007) argues that individuals with low intelligence are disproportionately more likely to have "fatal accidents" and thus lower life expectancies, without assuming that general intelligence is a domain-specific adaptation or that the effect of general intelligence on health and life expectancy was markedly different in the ancestral environment, as Kanazawa (2004b) does. The domain-specificity or generality of general intelligence remains an open question in evolutionary psychology and intelligence research (Roberts, 2007).

While the Savanna-IQ Interaction Hypothesis, among others, can account for the effect of state IQ on measures of health and life expectancy, it cannot explain the effect of racial composition. Rushton's (1995) differential *K* theory of race differences can. Rushton argues that individuals of different races have slightly different life history strategies, whereby Africans tend to start reproducing

earlier, produce a larger number of offspring with less parental investment in each, and end their reproductive careers earlier than other races. His theory can therefore explain why states which have larger percentages of blacks have lower life expectancies and higher infant and adult mortality rates. More theoretical and empirical research is clearly necessary to investigate the effect of general intelligence and race on health and longevity.

NOTES

1. Some researchers have proposed just such benefits, however. For example, Korte et al. (2005) propose that vulnerability to stress may be an individual difference variable and may have evolved as a behavioral strategy of low-aggression doves to environmental threats. Allen and Badcock (2003) suggest that depression may have evolved as an adaptive response to the situation of chronic low status, in order to reduce risks in social interaction, when one's value to the group relative to one's burden on it is particularly low. However, this explanation once again raises the question of why the capacity to be depressed did not evolve *without the negative health consequences*.

2. In my 2004 *Psychological Review* article (Kanazawa, 2004b), I use the phrases "general intelligence" and "the *g* factor" synonymously and interchangeably. Technically, however, the *g* factor is a latent variable which emerges in a factor analysis of various cognitive ("IQ") tests. What I mean by "general intelligence," however, is the ability to think and reason, deductively or inductively, think abstractly, use analogies, synthesize information, and apply knowledge to new domains. They are therefore not exact synonyms. The factor-analytic *g* is a *measure* of general intelligence, not general intelligence itself. My theory is about general intelligence as an evolved psychological mechanism, and not at all about the *g* as the latent variable in a factor analysis.

3. Of course, infants under one cannot choose to or not to avoid evolutionarily novel hazards to health. It is the parents' and other adult caretakers' general intelligence that matters to infant mortality and that the state IQ measures. More intelligent parents and caretakers are expected to engage in behavior which promotes the health of the infant, by recognizing and properly dealing with evolutionarily novel risks and threats.

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