

Relevance of education and intelligence for the political development of nations: Democracy, rule of law and political liberty

Heiner Rindermann *

Institute of Psychology, Otto-von-Guericke-Universität Magdeburg, PO Box 4120, D-39016 Magdeburg, Germany

Received 8 March 2006; received in revised form 2 August 2007; accepted 22 September 2007

Available online 26 November 2007

Abstract

Political theory has described a positive linkage between education, cognitive ability and democracy. This assumption is confirmed by positive correlations between education, cognitive ability, and positively valued political conditions ($N=183-130$). Longitudinal studies at the country level ($N=94-16$) allow the analysis of causal relationships. It is shown that in the second half of the 20th century, education and intelligence had a strong positive impact on democracy, rule of law and political liberty independent from wealth (GDP) and chosen country sample. One possible mediator of these relationships is the attainment of higher stages of moral judgment fostered by cognitive ability, which is necessary for the function of democratic rules in society. The other mediators for citizens as well as for leaders could be the increased competence and willingness to process and seek information necessary for political decisions due to greater cognitive ability. There are also weaker and less stable reverse effects of the rule of law and political freedom on cognitive ability.

© 2007 Elsevier Inc. All rights reserved.

Keywords: Education; Intelligence; TIMSS; PISA; PIRLS; Democracy; Rule of law; Freedom; Meritocracy; Rationality

1. Education, intelligence and economic and non-economic welfare

Intelligence is a well-known determinant of economic outcomes, both at the individual level (e.g. Gottfredson, 2003; Hunter, 1986) and at the country level (e.g. Hanushek & Kimko, 2000; Lynn & Vanhanen, 2002, 2006). The belief in the causal significance of education and cognitive abilities (intelligence and knowledge) for economic development is the main reason for the support of educational research by the OECD (Organisation for

Economic Co-operation and Development) and other international economic organizations. At both the individual and the national level, schooling seems to be the most important enhancer of cognitive abilities (e.g. Barber, 2005; Ceci, 1991; Lurija, 1976). Education at home, health care, nutrition and genes are additional important factors (e.g. Armor, 2003).

Economic affluence is only one important aspect of the welfare of individuals and nations. Democracy (for its worldwide distribution see Fig. 1), the rule of law, political freedom and peace, or the absence of torture, despotism, political terror, violence and supremacy of fear are even more important. Economic and political characteristics appear to be connected. Thus democracy is seen as a determinant of economic growth (Lynn & Vanhanen, 2002), and affluence is supposed to further democracy (Lipset, 1960, 1994). But positive relationships of

* Current address: Karl-Franzens-University Graz, Institute of Psychology, Universitätsplatz 2, A-8010 Graz, Austria. Tel.: +49 391 6711919; fax: +49 391 6711914.

E-mail addresses: heiner.rindermann@gse-w.uni-magdeburg.de, heiner.rindermann@uni-graz.at.

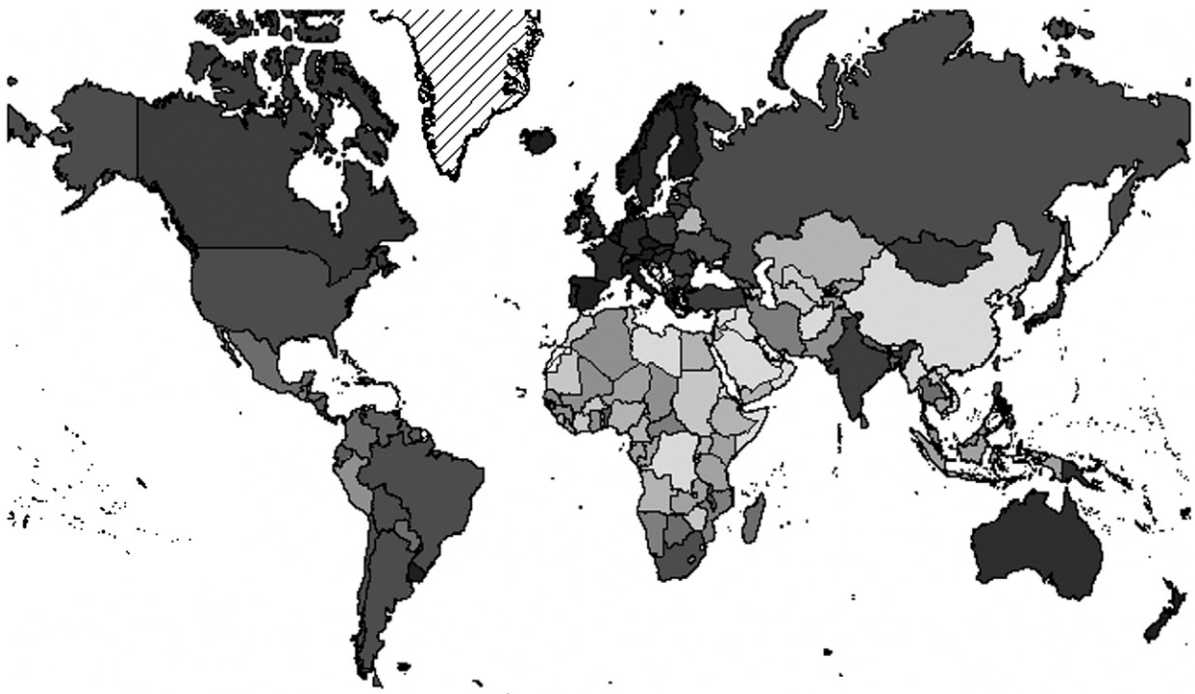


Fig. 1. World map of democracy sum score (1996–2000, sources Vanhanen, 2003, and Marshall & Jaggers, 2000, $N=183$, darker means higher value for democracy, no data for West Sahara and Greenland).

education or abilities with political conditions of nations remain after partialing out gross domestic product (GDP): For example education of adults and democracy ($N=172$ nations) correlate at $r=.60$ (partial correlation with GDP controlled $r_p=.34$), cognitive abilities and democracy ($N=183$) at $r=.56$ ($r_p=.23$; see Rindermann, in press), education and rule of law ($N=130$) at $r=.59$ ($r_p=.23$), cognitive abilities and rule of law ($N=131$) at $r=.64$ ($r_p=.27$)¹, education and political freedom ($N=173$) at $r=.51$ ($r_p=.32$), and cognitive abilities and political freedom ($N=186$) at $r=.38$ ($r_p=.11$). Poverty is thought to affect democracy (Lipset, 1960), but economic wealth itself depends on education and intelligence. Therefore education and intelligence can promote democracy also indirectly, by creating economic wealth.

2. Possible causal nexuses between education, intelligence and politics

When a correlation between two variables A and B is observed, six possible explanations are conceivable: (1)

¹ An old study of Davenport and Remmers (1950) first detected the relationship between cognitive ability and rule of law by correlating results of the Army General Classification Test with lynchings at US state level ($r=-.53$).

A influences B, (2) B influences A, (3) the relationship between A and B is reciprocal (combination of 1 and 2), (4) A and B are together influenced by a known or unknown third variable C, (5) combinations of the explanations (1 and 2 or 3) and (4) (e.g. A on B and B on A and C on A and B), (6) or the correlation between A and B is (partly or entirely) spurious (by errors in definition of concepts, in measurement, or in data aggregation). Additionally, further variables can influence only A or only B, but they have no effect on the relationship between A and B. They are relevant for the explanation of additional variance (for wealth see Irwing, 2007).

2.1. Effects of education and cognitive abilities on politics ("A on B")

A positive influence of education and cognitive abilities on wealth at the individual and national level is unsurprising because cognitive abilities acquired in school enhance the efficiency of work and organization. An influence of education and abilities on political outcomes is less obvious, but such an influence has nevertheless been postulated by many political theorists: Schumpeter (1942) described democracy as based on a rational model of human action and values. Rationality

itself is not conceivable without education, intelligence and knowledge, without insight into causal relationships, farsightedness, and a realistic appreciation of the world and its denizens (Aquinas, 1951/1273, p. 859: “ratio oritur in umbra intelligentiae”; Gottfredson, 1997; Schofer & Meyer, 2005, p. 917: “rationalization fueled by higher educational expansion”).

According to Lipset (1960), education “broadens man’s outlook, enables him to understand the need for norms of tolerance, restrains him from adhering to extremist doctrines, and increases his capacity to make rational electoral choices” (p. 54), and “The higher one’s education, the more likely one is to believe in democratic values and support democratic practices.” (p. 57). Lipset postulated that these individual-level effects of education (tolerance, moderation of political positions, positive attitudes towards democratic values, ability for rational decisions) influence the political culture of nations.

Two relevant effects of education and cognitive ability on politics could be distinguished: a *cognitive effect* (competence to make rational choices, better information processing etc.) and an *ethical effect* (support of democratic values, freedom, human rights etc.), which itself depends on cognitive ability (cognitive development being a prerequisite for moral development) and probably the other way round (a willingness to think and learn furthers cognitive competences).

A similar position is held by the OECD (2000), which postulates an influence of education on the *quality of voting decisions* and *intensity of political participation*: “People with more schooling are likely to make more informed choices when voting and to participate more actively in their communities.” (p. 81)

Simpson (1997) stressed not only the relevance of education, but pointed to *cognitive abilities* as the *central mechanism* (“information-processing-capacity” or “cognitive capacity”; p. 157): “Democracy depends on a public who can process complex information and actively participate in politics” (similarly, see Friedman, 1962).

Meisenberg (2004) placed particular emphasis on intelligence as the capacity for rational and autonomous thinking and behavior of responsible citizen:

“IQ is a powerful predictor of modern, non-traditional values. The causal arrow is likely to point from the latent trait ‘intelligence’ to a rational, non-traditional system of beliefs and values. As people get brighter they develop a habit of critical thinking, questioning religious dogmas and other

sources of traditional authority. Being able to understand the nature of politics, people in modern societies are not easily manipulated by the ruling elite, which is thus forced to use repressive methods to maintain its hold on power.” (p. 139)

Empirical evidence for these explanations comes from correlations in cross-sectional studies at the macro-social level (e.g. Hadenius, 1992; Sanderson, 2001; Simpson, 1997), but cross-sectional studies cannot distinguish between reciprocal causal effects. The tendency towards less extreme positions is also shown by a negative correlation of education (Edu) and cognitive abilities (CA) with support for revolutionary change at the country level ($r_{\text{Edu}} = -.27$, $N = 38$, $r_{\text{CA}} = -.30$, $N = 39$), and by a positive correlation of education and cognitive abilities with support for gradual reform ($r_{\text{Edu}} = .17$, $N = 38$, $r_{\text{CA}} = .25$, $N = 39$; data from Inglehart, 1997).

At the individual level, Milligan, Moretti and Oreopoulos (2004) support the education-and-ability-further-political-participation-thesis: The findings show that education supports democracy both by increasing the quantity of citizens’ involvement in the electoral process (increased probability of voting) as well as the quality of that involvement (increased information on politics). In the US, education increases registration and by this voting. In the US and in the UK educated people follow more politics on TV and in newspapers, attend political meetings, discuss political matters and try to persuade others, in the US, they even trust more the federal government and people in general and do not believe that “federal officials are crooked”. Similar results for the US but with different data sets are found by Dee (2004). Educated people have a higher probability of voting, of reading newspapers and support free speech (e.g. for communists, anti-religionists, homosexuals, militarists, and racists).

An important theoretical basis for the explanation of an intelligence–democratic–attitude-relationship in individuals is found in the developmental psychology of Piaget (1932) and Kohlberg (1987) who have described the *dependence of moral judgment on cognitive development*. Kohlberg (1987, p. 273) emphasized the relevance of this development to social life: “In order to play a social role in the family, school, or society, the child must implicitly take the role of others toward himself and toward others in the group. Moral role taking involves an emotional empathic or sympathetic component, but it also involves a *cognitive capacity* to define situations in terms of rights and duties, in terms of reciprocity and the perspectives of

other selves.” And *moral judgment* does have consequences for social behavior: for instance persons at the highest moral development stage obeyed less frequently in Milgram’s obedience and fictitious torture experiment (Kohlberg, 1969).

This concept was transferred to the political level by Habermas (1976) and elaborated in a cultural development theory by Oesterdiekhoff (2000): The consideration of the perspective of others, the recognition and respect for the rights, interests and goals of others, and the internalization of abstract and formal rules and rights, are essential for democracy, rule of law and political freedom. These cognitive operations require a high level of cognitive development, especially – in the terms of Jean Piaget – the level of formal and logical operations.

In a democracy, intelligence and knowledge are required for citizens to distinguish information from misinformation, to judge promises and political programs, and to develop realistic expectations about the politics and what is attainable thereby. Democracy needs *informed, intelligent and rational citizens*. Citizens should be able to detect deception and ulterior motives, and the violation of rules. And both citizens and politicians have to respect rules in political disputes and conflicts.

Intelligence is important for politics not only at the *individual level*, but also at the *macro-social level*: intelligence is required for institutionalized political decision-making, effective administration, the legal system, bureaucracy, and economic institutions (“government effectiveness”; Kaufmann, 2003). The functioning of public institutions per se is a condition for the rule of law. These all are *rational institutions* that depend on an intelligent culture. And political leadership is a cognitively highly demanding task (Suedfeld, Gutteri, & Tetlock, 2003, p. 255). It is therefore not surprising that McDaniel (2006) found a positive correlation of $r = .34$ between cognitive ability and “government effectiveness” at the state level in the USA.

Last but not least, the intelligence of people and voters on the one hand and the *intelligence of leaders* and their political success and moral standards in government on the other hand are correlated (Simonton, 1985, 2006a,b). People prefer to elect persons as leaders who are about 20 IQ points more intelligent than themselves, but not more (Gibb, 1969), and the intelligence of leaders is correlated with their political success and moral standards. Generally, people prefer persons as leaders who are similar to them (Rushon, 2005).

That education, knowledge and thinking abilities further democracy, autonomy and law is a kind of cultural faith since the Enlightenment (e.g. “The Commonwealth

requires the education of the people as the safeguard of order and liberty.” Inscription in the entablature on the north of the Boston Public Library), but has not been proven empirically in longitudinal studies.

2.2. Effects of politics on education and cognitive abilities (“B on A”)

Dewey (1997/1916), Lipset (1960) and Schofer and Meyer (2005) claim a positive influence of democracy on education. In democratic societies voters prefer leaders who help to develop the society in a positive manner, and the support of education would be one of the possible ways. This requires that citizens are able to identify parties and politicians with constructive aims and that they are willing to take these aims into consideration in their voting decisions.

In most undemocratic societies the leaders are more interested in the protection of their power and extension of their personal or tribal wealth, not in education and the development of possibly dangerous cognitive abilities (threatening their power). According to Vanhanen (2003), “It is easier to maintain autocratic political systems in countries in which the number of literate and educated people is low than it is in countries in which it is high.” (p. 125).

The rule of law produces a predictable social world in which problems can be solved and aims be reached by effort, by the use of intelligence and good formal qualifications, rather than by coercion, personal connections and bribery. By favoring *meritocracy* throughout society, and this includes the educational system, the rule of law tends to support the development of cognitive abilities. Under such circumstances learning is a good investment of time and effort. This is demonstrated by two negative examples: in Georgia (Caucasus) students could get in the 1990s a place at university by bribery (Flitner, 2006); and in Brazil about 50% of all university theses are said to be plagiarized, either by individual students or with the help of specialized companies that sell the theses to students (Hart, 2006). Such means to success undermine the normative basis of education and cognitive ability and they further other efforts than learning and thinking.

Even more fundamental is the relative *absence of fear*. In despotic countries a regime of fear rules life. Studies at the individual level have shown a reciprocal negative causal relationship between anxiety and performance at school (meta-analysis of Hembree, 1988). Treatments to reduce test anxiety are known to increase performance. In a climate of violence and fear the development of cognitive abilities is obstructed, the

psychological stress of violence impairs children's cognitive development: children exposed to violence in their neighborhood (Delaney-Black et al., 2002, p. 283: "I have heard guns being shot.", "I have seen somebody being beat up.", "I have seen somebody get stabbed.", "I have seen somebody get shot.", "Grown-ups in my home hit each other.", "Grown-ups in my home threaten to stab or shoot each other.", "In class worries about people being shot."), on average, show a 7.5-point decrement in IQ and a 9.8-point decrement in reading achievement. In a twin study, Koenen, Moffitt, Caspi, Taylor and Purcell (2003) demonstrated a negative influence of domestic violence on cognitive development of 5-year-old children: children exposed to violence had IQs that were 8 IQ points lower.² At the macro-social level DeGroot (1951) has shown for the Netherlands a reduction of intelligence by war, occupation and through it, by poverty.

Additionally, in a political climate of violence and fear the development of the ability for independent thinking is discouraged because this ability can bring a person into conflict with those in power. In less free societies only technical aspects of education, but not critical and creative thinking abilities, are supported by the leaders. Independently minded intelligent individuals seem to be a provocation for them.

Illegitimate power threatens the intelligence of the powerful too, because they do not have to rely on reason and arguments for achieving success. Finally, unjust treatment or violence against others (people, groups, and nations) may harm oneself by decreasing in the long run one's own individual or macro-social intelligence: Military and the security forces use up individual life time and economic resources, which cannot be used for education. Military orientations and practice on the one hand and intellectual orientations and practice on the other hand are difficult to combine. Especially killing and thinking are incompatible, at both, the individual and social level. Even for leaders, war and bellicose political decisions seem to reduce cognitive complexity (Suedfeld et al., 2003, p. 256, 264). The dialectics of violent victories could be inescapable: *reading, studying, rational arguing and reasoning promote intelligence, while suppressing or destroying other people do not*. Violence and suppression are for both, offenders and victims, a waste of time.

² Reciprocal causation is not excluded, male combat veterans with lower intelligence measured before are more likely to suffer from post-traumatic stress disorder (Buckley, Blanchard, & Neill, 2000); for adolescents in Lebanon, post-traumatic stress disorder was associated with lower scores on achievement and intelligence tests, less with traumatic experiences (Saigh, Mroueh, & Bremner, 1997).

But the influence of politics on education and cognitive abilities should not be overstretched: a climate of fear can foster perhaps a strain of cautious intelligence. Even autocratic leaders need an educated and intelligent elite for technical, military and administrative use (subjects as tools, not as citizens; e.g. Kant, 2003/1803), although this elite can eventually challenge their power (Brecht, 2003/1937; Simpson, 1997). Other factors like genes, wealth and culture (appreciation of education, effort and knowledge) could be even stronger.

2.3. Factors behind education, cognitive abilities and politics ("C influences A and B")

Cultural factors, which are ultimately founded on religion and secular belief systems, have a common influence on education and democracy, the rule of law, human rights and political liberty. In several *Protestant churches* (C), for example, thoughtful reading of the Bible has been highly appreciated for centuries (e.g. Black & Sokoloff, 2006, p. 74), literacy has therefore been highly valued (A), and the faithful have elected their priests, religious freedom has been respected, and tolerance has been practiced (B).

Civil societies or theorists of civic and bourgeois life demand both, education, reading, and thinking, and rule of law, political freedom and democracy (e.g. Alberti, 2004/1441). Education, literacy, democracy, rule of law, freedom and intelligence are all *civic terms*, a result of a *bourgeois philosophy of life* and a result of a *civil society* ("bürgerliche Weltanschauung" and "bürgerliche Gesellschaft").

Democratic values (Inglehart & Welzel, 2005), depending on more general cultural factors, and geographical neighborhood are additional factors. But the frequently used "*modernization process*" as such is a problematic concept if used as a causal explanation: modernization itself depends on culture, education, abilities and further macro-social aspects (affluence, democracy, political liberty etc.) and is hence a dependent variable; and modernization is a descriptive term, a description of a social and cultural process, not its explanation.

2.4. Additional factors behind education, cognitive abilities or politics

The reading of holy texts, literacy and education are held in high esteem in the *Jewish tradition* (Lipset & Raab, 1995; Weber, 1988/1920; Weiss, 2000), and the *Confucian culture* values literacy and achievement as well ("additional variables behind A").

Obviously, politics and political positions depend not only on education but also on *interests* and *social position*

(see Marxist theory and Bourdieu, 1984). Additionally, *historical contingencies* play an important role in the fate of single nations (“additional variables behind B”).

2.5. *The relationship of education and cognitive abilities*

Education is one of the most important causal factors for the development of intelligence and knowledge at the individual and cultural level (Ceci, 1991; Lurija, 1976; Rindermann, *in press*), and it also changes attitudes and personality, followed by modifications of behavior and institutions.

Because democracy, rule of law and political liberty may depend on intellect as well as on attitudes, we can expect that education (if reliably measured) is more closely related to political outcomes than is cognitive ability. Educational titles or school attendance themselves, as measured by school qualifications or by time at school, are not seen as the working causal determinants, what is important are the modifications in cognitive ability, attitudes and personality, followed by modifications of behavior and institutions.

The available data sources for education and cognitive abilities have their limitations. Education is difficult to compare across countries, and accurate cognitive ability measures are scarce for earlier periods and less developed countries. However, because of their high correlation (at the individual level: r around .70, Ceci, 1996; at the macro-social level: r = .78, N = 173, Rindermann, 2006, 2007), education can be used as a proxy for cognitive ability.

3. Methodological problems

The definition and quantitative measurement of democracy is a controversial issue: e.g., are there any differences within the group of democratic societies (Vanhanen, 2003)? Is France more or less democratic than the USA? The answers depend above all on the definition of democracy. There are two different theoretical concepts: the *quality of democratic institutions* or the *practice of democracy* including participation rates. In the second concept a formal democracy without the practice of democracy by its citizens is a minor democracy. Accordingly there are two different assessment strategies: the judgment of the institutions by external experts, or the use of electoral information about the distribution of votes and participation rates. The latter approach reveals substantial differences between modern democracies. But also rights and liberties, such as freedom of the press (Reporters sans frontières, 2006), slightly differ even among democratic nations.

Cognitive abilities are most often measured in students between the ages of 9 and 15. The use of such test results to explain political outcomes seems incongruent because children do not make politics. But in longitudinal analyses the results represent the cognitive ability level of the later adult population; and children’s and parents’ abilities are correlated ($r > .50$; Armor, 2003). The results of student performance studies correlate highly with the result of the adult literacy study (OECD, 2000) at the country level: $r = .70$, $N = 20$ (Rindermann, 2007). Therefore differences between nations in the young population correlate with differences between nations in the adult population at the same point in time, and closely match those of adults 10 or 20 years later. Great differences in reproduction structures of the adults could cause problems in cross-sectional, but not in longitudinal studies.

Another problem for research is the political controversy about intelligence. The concept of intelligence or generally of education, thinking ability and rationality (rationality as the cultural and normative frame for intelligence and knowledge) are politically relevant terms in a double sense: in the Age of Enlightenment knowledge and reason were seen as the way to freedom, burgher emancipation and political self-determination. Today, however, intelligence research is often the object of political–ideological disputes (see Nyborg, 2003; Segerstråle, 2000), especially at the level of nations, cultures and races (see discussions in *Intelligence*, 2006, 34/2, and *Psychology, Public Policy & the Law*, 2005, 11/2). If it could be demonstrated empirically, that intelligence and knowledge have a positive impact on political development in and between nations, if they influence the rationality of political decisions of citizens, leaders, institutions and nations, the political relevance and possibly the scientific dispute of and about these constructs are enlarged.

4. Method

To reduce problems of poor data quality and missing data, and to ensure that countries at all levels of cultural, social and economic development are represented in the sample, an average score was formed from all measures available of one construct for each country.

4.1. *Cognitive abilities and corrections*

As indicators of “cognitive capacity” measures of cognitive abilities are better than traditional measures of literacy (“Literacy ... may even represent bare minimum competence. More refined measures are needed which look at the differences

in knowledge between groups.” Simpson, 1997, p. 165, 174). IQ-tests and standardized international student assessments are the principal sources of information about cognitive abilities. The results of these studies are highly correlated, and the factor structure is one-dimensional (Rindermann, 2006, 2007). The results are aggregated after standardizations and corrections. For a detailed description of the studies and the methods of data aggregation (IQ-test-collection, Programme for International Student Assessment/PISA 2000 and 2003, Third or Trends in International Mathematics and Science Study/TIMSS 1995, 1999 and 2003, Progress in International Reading Literacy Study/PIRLS 2001 and International Association for the Evaluation of Educational Achievement/IEA-Reading 1991) see Rindermann (2007, in press).

For repeated measurements with cognitive abilities old student assessment studies collected by Lee and Barro (1997) were used. From 1964: IEA-Mathematics tested in 13-year old pupils, eighth grade; IEA-Mathematics at the end of secondary school. From 1972: Science tested in 10-year old pupils; science in 14-year old pupils; science at the end of secondary school; reading in 13-year old pupils. The mean correlation between the results of the studies with weighted N (number of countries) and after Fishers-Z-transformation is $r=.62$. The complete sample for old student assessment studies includes 19 nations: Australia, Belgium, Chile, Finland, France, Germany, Great Britain, Hungary, India, Iran, Israel, Italy, Japan, Malawi, Netherlands, New Zealand, Sweden, Thailand, USA. For the second measurement point recent student assessment studies are used, including PISA 2000 and 2003, TIMSS 1995, 1999 and 2003, PIRLS 2001 and IEA-Reading 1991. The IQ-test-collection of Lynn and Vanhanen (2002, 2006) with older and younger test data combined is not included for repeated measurements.

4.2. Education and wealth

For repeated measurements with *years at school* (total) the data pool collected by Barro and Lee (2000) was used (“average schooling years in the total population over age 25”). For 1960 $N=99$ countries, for 1970 $N=101$ countries, for 2000 $N=104$ countries.

For repeated measurements with *gross domestic product* (GDP) the data pool collected by Barro and Lee (1993) was used for 1960 with $N=117$ countries, 1970 with $N=122$ countries, and for 1998 Lynn and Vanhanen (2002) with $N=185$ countries.

4.3. Political aspects

The *Democracy-index* was taken from Vanhanen (1997, 2005), measuring competition (“the smaller parties’ share of the votes cast in parliamentary or presidential elections”, “calculated by subtracting the percentage of the votes won by the largest party from 100”) and participation (“percentage of the total population who actually voted in the election”; 1997, p. 34) in voting decisions for parliamentary or presidential elections and in referendums.

A second *Democracy-index* was taken from Marshall and Jaggers (2000), which includes an evaluation of essential political indicators (“presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders”, “existence of institutionalized constraints on the exercise of power by the executive”, “guarantee of civil liberties to all citizens in their daily lives and in acts of political participation”; p. 17).

The estimate of internal consistency for the sum value from Vanhanen and Marshall/Jaggers is $\alpha=.95$, the sum value exists for $N=183$ countries. The correlation between the two indices is $r=.90$ ($N=157$ countries). The correlations with education and cognitive abilities are slightly higher for the Vanhanen index (DV) than for the Marshall/Jaggers index (DMJ), because of its (DV) emphasis on political participation: with education $r_{DV}=.63$ ($N=172$), $r_{DMJ}=.56$ ($N=155$); with cognitive abilities $r_{DV}=.58$ ($N=183$), $r_{DMJ}=.56$ ($N=157$).

Rule of law: Gwartney and Lawson (2003) surveyed the legal structure and security of property rights (judicial independence, impartial courts, protection of intellectual property, no military interference, integrity of the legal system) for 1970 and later. The earliest possible year was used, $N=123$ countries. A second source was Knack and Keefer (1995) for the period from 1972 to 1995 with two variables: 1. Repudiation of contracts by government and 2. low expropriation risk (original data from International Country Risk Guide, $N=61$). Rule of law was measured here with emphasis on property rights.

The estimate of internal consistency for the sum value from Gwartney/Lawson (LGL) and Knack/Keefer (LKK) is $\alpha=.94$, $N=131$. The two indices correlate at $r=.87$ ($N=53$). Their correlations with education and cognitive abilities are: with education $r_{LGL}=.61$ ($N=122$), $r_{LKK}=.63$ ($N=61$); with cognitive abilities $r_{LGL}=.70$ ($N=123$), $r_{LKK}=.60$ ($N=61$).

Political freedom was taken from Freedom House (2004) for the year 1999 ($N=186$) and for the earliest measurement point (1973–86, $N=171$). Freedom House (an international team) surveys freedom of expression and belief, of association and organizational rights, the rule of law and the respect for human rights, personal autonomy and economic rights. The correlation of political freedom with education is $r=.51$ ($N=173$), with cognitive abilities $r=.41$ ($N=186$).

The sum values of democracy (D), rule of law (L) and political freedom (F) correlate at $r_{D-L}=.70$ ($N=130$), $r_{D-F}=.78$ ($N=183$) and $r_{L-F}=.58$ ($N=131$).

Self-report measures of *support for revolutionary change* (i. e. the opposite of overall satisfaction with a system) and *support for gradual reform* were taken from the 1990 wave of the World Values Survey (Inglehart, 1997), $N=39$ nations.

4.4. Data quality

Data on years at school from Barro and Lee are based on surveys done by international organizations and information given by public administrations. Definitions of school education differ between countries and there is no consideration of differences between countries in the quality of school

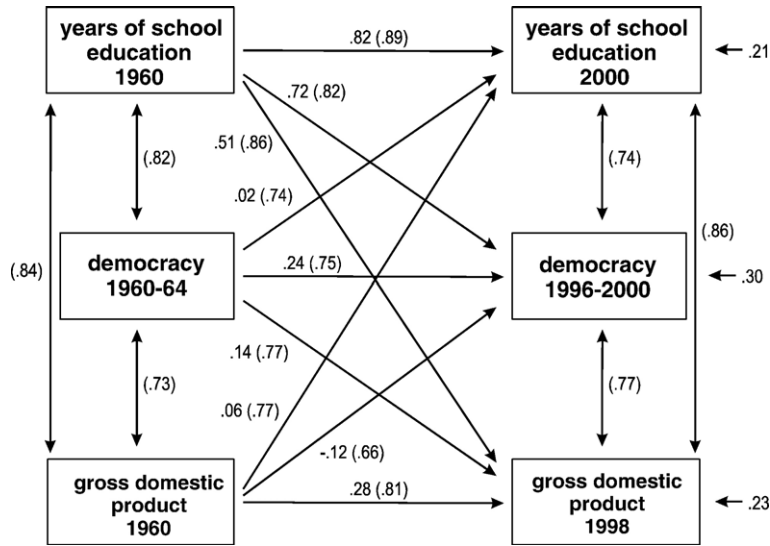


Fig. 2. Standardized path coefficients (and correlations in parentheses) between education (average schooling years in the total population over age 25), democracy and GDP (error terms as unexplained variance on the right), $N=79$ nations.

education and the attributes of students (e. g. competencies). Measures of cognitive abilities (intelligence tests, students' assessment studies like PISA or TIMSS) are less biased by these differences. Both intelligence tests and student assessments measure intelligence and knowledge. If solely student assessment studies are used, the term "cognitive school abilities" is used for the figures.

4.5. Statistical methods

The analysis of longitudinal developments and cross-lagged effects allows the testing of reciprocal causal hypotheses. In these

analyses, the standardized path coefficients (β) between different variables ("cross") measured at different times ("lagged") are to be interpreted. Correlations are always added in parentheses. Correlations help to estimate quickly the influence of other variables in the model (difference between correlation and path coefficient), they allow for checking of the presented coefficients ($1 - \text{error} = R^2 = \sum r\beta$) and for calculation of the proportion of explained variance in each factor ($R^2 = \sum r\beta$). But correlations are not usable for the estimation of effects of variables on other variables, because they depend (more than β -coefficients) on the stability and variance of the variables. An even more important reason is that cross-lagged path coefficients (β) represent the

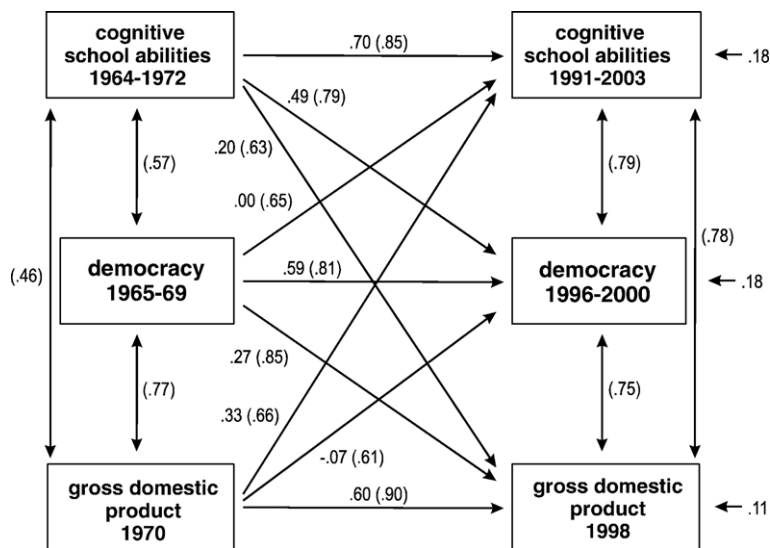


Fig. 3. Standardized path coefficients (and correlations in parentheses) between cognitive abilities, democracy and GDP (error terms as unexplained variance on the right), $N=17$.

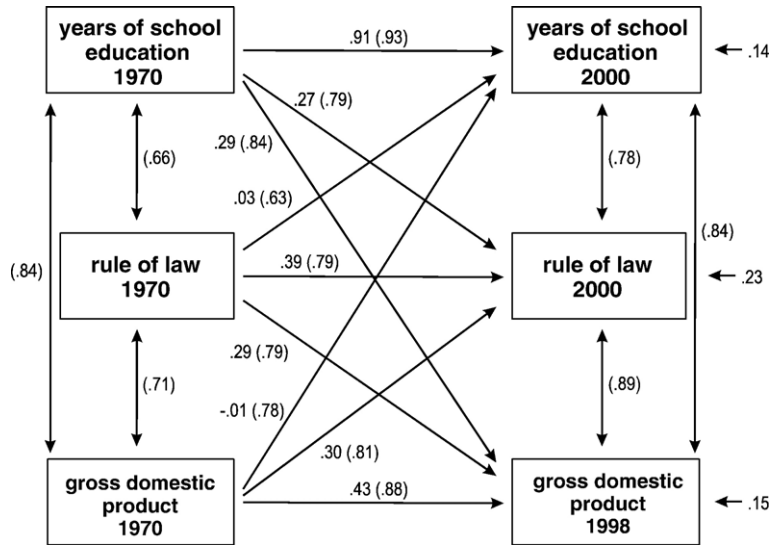


Fig. 4. Standardized path coefficients (and correlations in parentheses) between education (average schooling years in the total population over age 25), rule of law and GDP (error terms as unexplained variance on the right), $N=89$.

incremental part of the other variables in the model, the part that is not explained by self-prediction. Even highly stable variables in a model, such as GDP, can be explained by other variables. Significance tests were not used for interpretation (for a justification and discussion of the method and more information see Rindermann, in press; see also Armstrong, 2007). Confidence intervals are given, but the best method to judge the correctness, truth and robustness against chance factors of the obtained coefficients and their interpretation is a replication in samples from different countries with different variables and with control of additional

possible determinants. This is done by the use of educational and ability variables as proxy variables for each other (Figs. 2–7), by the use of different political variables (democracy, rule of law, political freedom), by the use of different country samples and by the additional control of the effects of economic wealth. If stable results are found, then confidence in the veridicality of the observed effects increases proportionately. Good values for model fit indices are SRMR $\leq .08$ (Hu & Bentler, 1999) or SRMR $\leq .05$ (Schermelleh-Engel, Moosbrugger, & Müller, 2003) and CFI $\geq .95$ (Hu & Bentler, 1999) or CFI $\geq .97$ (Schermelleh-

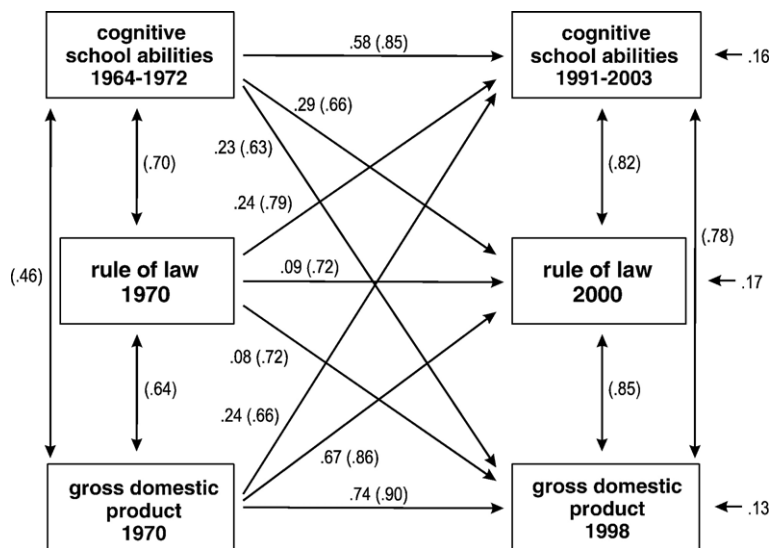


Fig. 5. Standardized path coefficients (and correlations in parentheses) between cognitive abilities, rule of law and GDP (error terms as unexplained variance on the right), $N=17$.

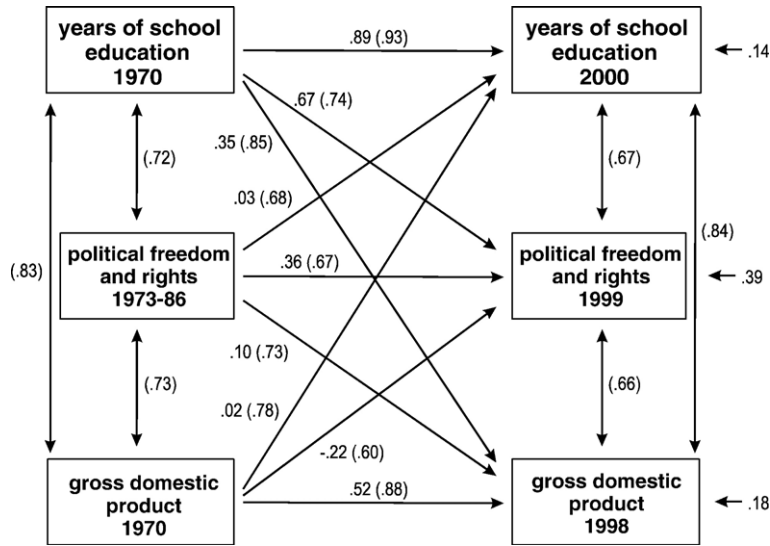


Fig. 6. Standardized path coefficients (and correlations in parentheses) between education (average schooling years in the total population over age 25), political freedom/rights and GDP (error terms as unexplained variance on the right), N=94.

Engel et al., 2003). For the analyses, SPSS 14.0, LISREL 8.20 (fit indices) and Mplus 3.13 (check of results) were used, while SAS 9.1 was used to produce the map.

5. Results

5.1. Correlations

In contrast to economic wealth and HIV-infection rates (Rindermann, in press; Rindermann & Meisenberg, submitted

for publication), political attributes (Pol) are not more highly correlated with cognitive abilities (CA) than with educational level (Edu). For a sum value of democracy, rule of law and political freedom ($\alpha=.87$) the correlation with education is slightly higher ($r_{\text{Edu-Pol}}=.61$, $N=173$, $r_{\text{CA-Pol}}=.55$, $N=186$). This is even more visible in a regression model with these two predictors ($\beta_{\text{Edu} \rightarrow \text{Pol}}=.40$, $r=.61$, $\beta_{\text{CA} \rightarrow \text{Pol}}=.28$, $r=.59$, $N=173$). One possible reason is that education not only enhances cognitive abilities, but changes directly attitudes and personality as well. Political conditions might also have a more

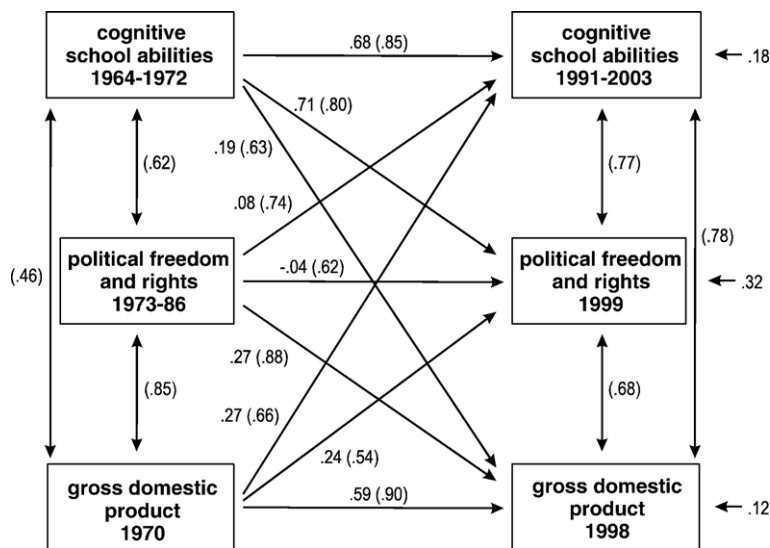


Fig. 7. Standardized path coefficients (and correlations in parentheses) between cognitive abilities, political freedom/rights and GDP (error terms as unexplained variance on the right), N=17.

direct, and therefore stronger, effect on education (or only on the inflation of educational degrees/titles) than on cognitive ability. However, this hypothesis is not supported by the following results.

5.2. Cross-lagged relationships between education, cognitive ability and democracy

In the first analysis the relationships between education (years at school), democracy and wealth (GDP as control variable) are tested. The most important results are the beta-coefficients (β) from education to democracy and from democracy to education (cross-lagged effects). They should be compared with the effects (β) of GDP on democracy and on education. Economic wealth is the most important theoretical rival to education and cognitive ability for the explanation of democratic development (Lipset, 1960, 1994).

The amount of education, measured by the average years of schooling of adults of 25 years or older, strongly favored the development of democracy between the 1960s and the end of the century ($\beta_{SY1 \rightarrow Demo2} = .72$; see Fig. 2 and Table 1). The fit indices are good: SRMR = .021 and CFI = .98. National wealth had no positive influence on democracy ($\beta_{GDP1 \rightarrow Demo2} = -.12$). Bivariate analyses with education and democracy ($N = 85$ countries) or with GDP and democracy ($N = 98$ countries) support these results ($\beta_{SY1 \rightarrow Demo2} = .67$, $r = .79$, $N = 85$; $\beta_{GDP1 \rightarrow Demo2} = -.28$, $r = .69$, $N = 98$; no figures). Education has always a stronger impact on democracy than vice versa; and democracy depends more on education than on wealth. A positive influence of GDP on democracy is completely attributable to education.

Countries in the analysis for cognitive abilities (see Fig. 3, $N = 17$, SRMR = .012 and CFI = 1.00) were: Australia, Belgium, Chile, Finland, France, Germany, Great Britain, Hungary, Iran, Israel, Italy, Japan, Netherlands, New Zealand, Sweden, Thailand, USA. In spite of the changes in country composition ($N = 79$ vs. $N = 17$) and variables (years of school education vs. results of student assessment studies) the results are similar: Cognitive abilities favor democracy ($\beta_{CA1 \rightarrow Demo2} = .49$) and economic development ($\beta_{CA1 \rightarrow GDP2} = .20$). Economic wealth does not favor democracy and may even have a detrimental effect ($\beta_{GDP1 \rightarrow Demo2} = -.07$), but democracy favors economic development ($\beta_{Demo1 \rightarrow GDP2} = .27$). Economic development, in turn, favors cognitive development ($\beta_{GDP1 \rightarrow CA2} = .33$). Economic prosperity is thought to favor neurological and cognitive development in part through better nutrition and health care (Eysenck & Schoenthaler, 1997; Lynn, 1990; Rindermann, in press).

In a bivariate analysis of cognitive ability and democracy, democracy has a positive impact on cognitive development ($\beta_{Demo1 \rightarrow CA2} = .25$, $r = .65$, $N = 17$; no figure). That impact is most likely mediated by the positive influence of democracy on national wealth, and of national wealth on abilities (see Fig. 3).

5.3. Cross-lagged relationships between education, cognitive ability and rule of law

The rule of law (with emphasis on economic rights and freedom) depends positively on education and cognitive abilities

as well ($\beta_{SY1 \rightarrow RoL2} = .27$; $\beta_{CA1 \rightarrow RoL2} = .29$; see Figs. 4 and 5, SRMR = .024 and CFI = .95; SRMR = .015 and CFI = 1.00).

GDP also favors the rule of law ($\beta_{GDP1 \rightarrow RoL2} = .30$; Fig. 4), even slightly more (but within the confidence intervals) than does education ($\beta_{SY1 \rightarrow RoL2} = .27$). Rule of law and education have equally strong effects on national wealth ($\beta_{RoL1 \rightarrow GDP2} = .29$; $\beta_{SY1 \rightarrow GDP2} = .29$). Neither rule of law nor GDP has any effect on education ($\beta_{RoL1 \rightarrow SY2} = .03$; $\beta_{GDP1 \rightarrow SY2} = -.01$).

However, the rule of law favors cognitive development ($\beta_{RoL1 \rightarrow CA2} = .24$; $N = 17$; Fig. 5). GDP is even more powerful than cognitive abilities in promoting the rule of law ($\beta_{GDP1 \rightarrow RoL2} = .67$, $\beta_{CA1 \rightarrow RoL2} = .29$). Cognitive ability seems to be more important than the rule of law for economic growth ($\beta_{CA1 \rightarrow GDP2} = .23$, $\beta_{RoL1 \rightarrow GDP2} = .08$); and rule of law and GDP appear equally important for cognitive development ($\beta_{RoL1 \rightarrow CA2} = .24$; $\beta_{GDP1 \rightarrow CA2} = .24$). Countries in this analysis have been Australia, Belgium, Chile, Finland, France, Germany, Great Britain, Hungary, Iran, Israel, Italy, Japan, Netherlands, New Zealand, Sweden, Thailand, and USA.

5.4. Cross-lagged relationships between education, cognitive ability and political freedom

Longitudinal analyses with political freedom suffer from the lack of really old data. The oldest quantitative data stem from the period between 1973 and 1986. Nevertheless, both variants of the analyses show a strong impact of education and cognitive abilities on the development of political freedom (see Figs. 6 and 7): Education and cognitive abilities have stronger effects on political freedom ($\beta_{SY1 \rightarrow PF2} = .67$ and $\beta_{CA1 \rightarrow PF2} = .71$) than vice versa ($\beta_{PF1 \rightarrow SY2} = .03$ and $\beta_{PF1 \rightarrow CA2} = .08$). Both the education and the ability effects are stronger than the wealth effects on liberty ($\beta_{GDP1 \rightarrow PF2} = -.22$, Fig. 6, $\beta_{GDP1 \rightarrow PF2} = .24$, Fig. 7), wealth can have even a negative effect! Political freedom has a small effect on economic development ($\beta_{SY1 \rightarrow GDP2} = .35$, $\beta_{PF1 \rightarrow GDP2} = .10$; Fig. 6) and both social factors have virtually no effect on education ($\beta_{GDP1 \rightarrow SY2} = .02$, $\beta_{PF1 \rightarrow SY2} = .03$; Fig. 6), but GDP does influence cognitive ability ($\beta_{GDP1 \rightarrow CA2} = .27$, $\beta_{PF1 \rightarrow CA2} = .08$; Fig. 7). Because political freedom influences GDP, political freedom has also an indirect effect on cognitive ability development at the macro-social level ($\beta_{PF1 \rightarrow GDP2} = .27$ and $\beta_{GDP1 \rightarrow CA2} = .27$ plus $\beta_{PF1 \rightarrow CA2} = .08$; Fig. 7). The fit of both models was good (SRMR = .013 and CFI = 0.99 or SRMR = .014 and CFI = 1.00).

5.5. Simultaneous test of educational and cognitive effects on democracy

The previous studies have not dealt with the question, which of the two determinants, education or cognitive ability, are more important for the development of positively valued political conditions. For the model presented in Fig. 8, former education (average years of school education of adults) was taken as a causal factor for later cognitive abilities. Both were used simultaneously to explain democratic development in competition with self-prediction by former democracy (SRMR = .048 and CFI = 1.00).

Table 1
Coefficients for cross-lagged analyses

Relationship	$r(p)$	$\beta(p)$	CI of β
Fig. 2, education (SY), democracy (Demo) and gross domestic product (GDP), $N=79$, from 1960 (1) to 1998/2000 (2)			
SY1→SY2	.89 (.000)	.82 (.000)	.59–1.05
SY1→Demo2	.82 (.000)	.72 (.000)	.45–1.00
SY1→GDP2	.86 (.000)	.51 (.000)	.27–.76
Demo1→SY2	.74 (.000)	.02 (.830)	-.17–.21
Demo1→Demo2	.75 (.000)	.24 (.037)	.02–.46
Demo1→GDP2	.77 (.000)	.14 (.161)	-.06–.33
GDP1→SY2	.77 (.000)	.06 (.505)	-.13–.26
GDP1→Demo2	.66 (.000)	-.12 (.320)	-.35–.12
GDP1→GDP2	.81 (.000)	.28 (.008)	.08–.48

Fig. 3, cognitive ability (CA), democracy (Demo) and gross domestic product (GDP), $N=17$, from 1964/72 (1) to 1991/2003 (2)

CA1→CA2	.85 (.000)	.70 (.000)	.39–1.01
CA1→Demo2	.79 (.000)	.49 (.005)	.18–.80
CA1→GDP2	.63 (.007)	.20 (.095)	-.04–.44
Demo1→CA2	.65 (.005)	.00 (.984)	-.43–.44
Demo1→Demo2	.81 (.000)	.59 (.012)	.15–1.02
Demo1→GDP2	.85 (.000)	.27 (.098)	-.06–.60
GDP1→CA2	.66 (.004)	.33 (.101)	-.07–.73
GDP1→Demo2	.61 (.010)	-.07 (.703)	-.47–.33
GDP1→GDP2	.90 (.000)	.60 (.001)	.29–.91

Fig. 4, education (SY), rule of law (RoL) and gross domestic product (GDP), $N=89$, from 1970 (1) to 1998/2000 (2)

SY1→SY2	.93 (.000)	.91 (.000)	.80–1.01
SY1→RoL2	.79 (.000)	.27 (.007)	.08–.47
SY1→GDP2	.84 (.000)	.29 (.000)	.14–.45
RoL1→SY2	.63 (.000)	.03 (.580)	-.24–.43
RoL1→RoL2	.79 (.000)	.39 (.000)	.24–.54
RoL1→GDP2	.79 (.000)	.29 (.000)	.17–.41
GDP1→SY2	.78 (.000)	-.01 (.932)	-.49–.45
GDP1→RoL2	.81 (.000)	.30 (.005)	.09–.51
GDP1→GDP2	.88 (.000)	.43 (.000)	.26–.59

Fig. 5, cognitive ability (CA), rule of law (RoL) and gross domestic product (GDP), $N=17$, from 1964/72 (1) to 1991/03 (2)

CA1→CA2	.85 (.000)	.58 (.003)	.24–.92
CA1→RoL2	.66 (.004)	.29 (.095)	-.06–.64
CA1→GDP2	.63 (.007)	.23 (.127)	-.07–.53
RoL1→CA2	.79 (.000)	.24 (.218)	-.16–.63
RoL1→RoL2	.72 (.001)	.09 (.635)	-.31–.49
RoL1→GDP2	.72 (.001)	.08 (.635)	-.27–.43
GDP1→CA2	.66 (.004)	.24 (.129)	-.08–.55
GDP1→RoL2	.86 (.000)	.67 (.001)	.35–.99
GDP1→GDP2	.90 (.000)	.74 (.000)	.46–1.02

Fig. 6, education (SY), political freedom/rights (PF) and gross domestic product (GDP), $N=94$, from 1970/86 (1) to 1998/2000 (2)

SY1→SY2	.93 (.000)	.89 (.000)	.74–1.04
SY1→PF2	.74 (.000)	.67 (.000)	.43–.92
SY1→GDP2	.85 (.000)	.35 (.000)	.18–.51
PF1→SY2	.68 (.000)	.03 (.573)	-.08–.15
PF1→PF2	.67 (.000)	.36 (.001)	.15–.56
PF1→GDP2	.73 (.000)	.10 (.154)	-.04–.23

Table 1 (continued)

Relationship	$r(p)$	$\beta(p)$	CI of β
Fig. 6, education (SY), political freedom/rights (PF) and gross domestic product (GDP), $N=94$, from 1970/86 (1) to 1998/2000 (2)			
GDP1→SY2	.78 (.004)	.02 (.830)	-.13–.17
GDP1→PF2	.60 (.000)	-.22 (.082)	-.48–.03
GDP1→GDP2	.88 (.000)	.52 (.000)	.35–.69

Fig. 7, cognitive ability (CA), political freedom/rights (PF) and gross domestic product (GDP), $N=17$, from 1964/72 (1) to 1991/03 (2)

CA1→CA2	.85 (.000)	.68 (.001)	.34–1.01
CA1→PF2	.80 (.000)	.71 (.004)	.27–1.15
CA1→GDP2	.63 (.007)	.19 (.145)	-.075–.46
PF1→CA2	.74 (.001)	.08 (.754)	-.47–.63
PF1→PF2	.62 (.008)	-.04 (.917)	-.76–.69
PF1→GDP2	.88 (.008)	.27 (.214)	-.17–.71
GDP1→CA2	.66 (.004)	.27 (.245)	-.21–.76
GDP1→PF2	.54 (.024)	.24 (.424)	-.40–.89
GDP1→GDP2	.90 (.000)	.59 (.006)	.20–.97

Fig. 8, education (SY), cognitive ability (CA) and democracy (Demo), $N=17$, from 1964/72 (1) to 1991/03 (2)

SY1→CA1	.78 (.000)	.78 (.000)	.44–1.12
SY1→Demo2	.73 (.000)	.10 (.619)	-.33–.53
CA1→CA2	.85 (.000)	.73 (.000)	.38–1.04
CA1→Demo2	.79 (.000)	.42 (.048)	.01–.84
Demo1→CA2	.65 (.005)	.25 (.129)	-.08–.58
Demo1→Demo2	.81 (.000)	.51 (.005)	.19–.83

Fig. 9, education (SY), cognitive ability (CA), democracy (Demo) and gross domestic product (GDP), $N=17$, from 1964/72 (1) to 1991/03 (2)

SY1→CA1	.78 (.000)	.78 (.000)	.44–1.12
SY1→Demo2	.73 (.000)	.19 (.468)	-.36–.73
SY1→GDP2	.67 (.003)	-.22 (.293)	-.66–.22
CA1→CA2	.85 (.000)	.71 (.000)	.39–1.03
CA1→Demo2	.79 (.000)	.37 (.116)	-.11–.84
CA1→GDP2	.63 (.007)	.36 (.068)	-.03–.74
Demo1→CA2	.65 (.005)	.04 (.856)	-.40–.47
Demo1→Demo2	.81 (.000)	.59 (.014)	.14–1.04
Demo1→GDP2	.84 (.000)	.28 (.118)	-.08–.64
GDP1→CA2	.63 (.007)	.29 (.148)	-.12–.69
GDP1→Demo2	.61 (.010)	-.13 (.564)	-.63–.36
GDP1→GDP2	.87 (.000)	.66 (.004)	.26–1.06

Note. Standardized path coefficients (β), exact significance levels up to three decimal places, CI: confidence interval (95%) for standardized path coefficients, SY: years of school education, Demo: democracy, GDP: gross domestic product, CA: cognitive ability (mean of student assessment studies), RoL: rule of law, PF: political freedom/rights, 1: first measurement, 2: second measurement.

Cognitive abilities have a stronger positive impact on democracy ($\beta_{CA1 \rightarrow Demo2} = .42, r = .79$) than education on democracy ($\beta_{SY1 \rightarrow Demo2} = .10, r = .73$). The cognitive hypothesis of democratic development, mainly founded in the cognitive theory of moral development (Piaget, Kohlberg, Oesterdiekhoff), was confirmed strongly. The positive effects of education on democracy are mediated by cognitive abilities. Theoretically important reciprocal effects (education on cognitive ability and cognitive ability on education) could not be tested by this design.

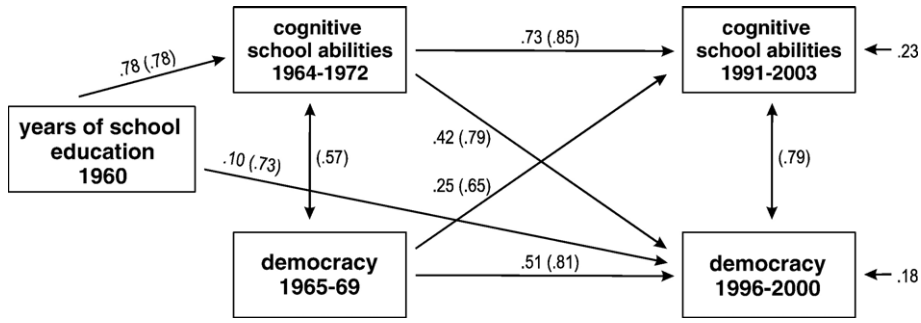


Fig. 8. Standardized path coefficients (and correlations in parentheses) between education, cognitive abilities and democracy (error terms as unexplained variance on the right), $N=17$.

A similar result is given in a complete analysis with GDP (see Fig. 9; SRMR = .049 and CFI = .95). Cognitive ability has a strong effect on democratic development ($\beta_{CA1 \rightarrow Demo2} = .37$) and on economic productivity ($\beta_{CA1 \rightarrow GDP2} = .36$), the effects of education are mediated by ability and the direct effects are small or even negative ($\beta_{SY1 \rightarrow Demo2} = .19$, $\beta_{SY1 \rightarrow GDP2} = -.22$). The analysis suffers from an unfavorable relationship between country sample size and variable/coefficient number.

5.6. Exclusion of former communist countries from Eastern Europe

Simpson (1997) has claimed a strong effect of cognitive abilities for democratization in Eastern Europe (“The impact of literacy on the breakup of the communist countries and the speed at which they move toward democracy is dramatic.”; p. 170). Perhaps all the shown positive effects of education and ability on political development could be observed only due to the historical liberation in Eastern Europe. Therefore the analyses

have been repeated with exclusion of former communist countries from Eastern Europe. The results remain very stable and are documented in a few words here for the presented models:

The sample of Fig. 2 (education and democracy) contained no countries from the former communist bloc. In Fig. 3 the only ex-Communist country from Eastern Europe has been Hungary. But even when Hungary is excluded (Australia, Belgium, Chile, Finland, France, Germany, Great Britain, Hungary, Iran, Israel, Italy, Japan, Netherlands, New Zealand, Sweden, Thailand, and USA; now $N=16$) the results remain similar: A stronger positive impact of cognitive abilities on democracy ($\beta_{CA1 \rightarrow Demo2} = .17$, $r = .80$) is observed than gross domestic product on democracy ($\beta_{GDP1 \rightarrow Demo2} = -.07$, $r = .65$).

Two countries from the former communist bloc (Hungary and Poland) were included in the analysis with education and rule of law (Fig. 4). After exclusion of these countries ($N=87$) the effect of education on the rule of law remains stable ($\beta_{SY1 \rightarrow RoL2} = .27$, $r = .79$, $N=89$, $\beta_{SY1 \rightarrow RoL2} = .27$, $r = .79$, $N=87$), the effect of GDP slightly decreases ($\beta_{GDP1 \rightarrow RoL2} =$

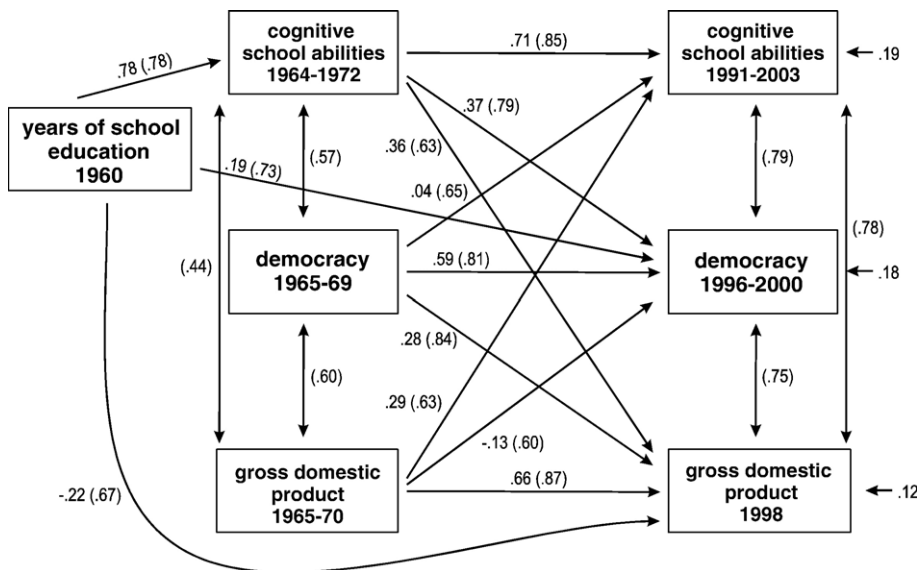


Fig. 9. Standardized path coefficients (and correlations in parentheses) between education, cognitive abilities, democracy and GDP (error terms as unexplained variance on the right), $N=17$.

.30, $r = .81$, $N = 89$, $\beta_{GDP1 \rightarrow RoL2} = .29$, $r = .81$, $N = 87$). When Hungary, the only ex-Communist country in the sample of Fig. 5, is excluded, the effect of abilities on rule of law increases slightly (still within the confidence intervals) from $\beta_{CA1 \rightarrow RoL2} = .29$ ($r = .66$, $N = 17$, Fig. 5) to $\beta_{CA1 \rightarrow RoL2} = .33$ ($r = .75$, $N = 16$). The effect of rule of law on abilities remains nearly unchanged ($\beta_{RoL1 \rightarrow CA2} = .24$, $r = .79$, $N = 17$; $\beta_{RoL1 \rightarrow CA2} = .23$, $r = .80$, $N = 16$).

After exclusion of the ex-Communist countries (Hungary and Poland) from the analysis in Fig. 6 ($N = 94$) the effect of education on political freedom decreases marginally, from $\beta_{SY1 \rightarrow PF2} = .67$ ($r = .74$, $N = 94$) to $\beta_{SY1 \rightarrow PF2} = .62$ ($r = .74$, $N = 92$). When ex-Communist Hungary is excluded from the cross-lagged analysis of Fig. 7, the effect of abilities on political freedom is increased, from $\beta_{CA1 \rightarrow PF2} = .71$ ($r = .80$, $N = 17$) to $\beta_{CA1 \rightarrow PF2} = .75$ ($r = .81$, $N = 16$). However, the reverse effect of political freedom on abilities increases strongly from $\beta_{PF1 \rightarrow CA2} = .08$ ($r = .74$) to $\beta_{PF1 \rightarrow CA2} = .49$ ($r = .90$), and the effect of economic productivity is reduced ($\beta_{GDP1 \rightarrow PF2} = .24$, $r = .54$, $N = 17$ to $\beta_{GDP1 \rightarrow PF2} = .13$, $r = .74$, $N = 16$).

When ex-Communist Hungary is excluded from the cross-lagged analyses of Figs. 8 and 9 the results remain similar for Fig. 8: Cognitive abilities have a stronger positive impact on democracy ($\beta_{CA1 \rightarrow Demo2} = .12$, $r = .80$) than education on democracy ($\beta_{SY1 \rightarrow Demo2} = .08$, $r = .73$). For Fig. 9 there is one substantial change in one coefficient of one variable, maybe due to the small country sample, the high variable number and suppressor effects (from $\beta_{CA1 \rightarrow Demo2} = .37$, $r = .79$, $N = 17$, to $\beta_{CA1 \rightarrow Demo2} = .08$, $r = .80$, $N = 16$). The other results in this analysis remain stable (from $\beta_{CA1 \rightarrow GDP2} = .36$, $r = .63$, $N = 17$, to $\beta_{CA1 \rightarrow GDP2} = .33$, $r = .73$, $N = 16$; from $\beta_{SY1 \rightarrow Demo2} = .19$, $r = .73$, $N = 17$, to $\beta_{SY1 \rightarrow Demo2} = .16$, $r = .73$, $N = 16$; from $\beta_{SY1 \rightarrow GDP2} = -.22$, $r = .67$, $N = 17$, to $\beta_{SY1 \rightarrow GDP2} = -.24$, $r = .71$, $N = 16$). The effects of education ($\beta_{SY1 \rightarrow Demo2} = .19$) and ability ($\beta_{CA1 \rightarrow Demo2} = .08$) on democracy are greater than the effect of wealth ($\beta_{GDP1 \rightarrow Demo2} = -.12$).

6. Discussion

Education and cognitive abilities have a positive impact on all analyzed political outcomes including democracy, rule of law, and political freedom. This result is stable across the very different samples of countries for educational and ability variables. The results are largely independent of the specific country composition of different samples (from $N = 94$, 89 and 79 to 17), from inclusion or exclusion of former communist countries from Eastern Europe (from $N = 92$ and 87 to 16), and from analysis of different positive valued political aspects (democracy, rule of law, political freedom). The positive effects of education and intelligence/knowledge still remain after consideration of wealth and the results are independent from the use of the different variables “years at school” vs. “cognitive school abilities”. But the

influence of education is mainly via the influence of cognitive ability. The direct impact of education on democracy seems to be less important in comparison to the indirect influence through intelligence. Therefore, intelligence is a relevant phenomenon for politics and itself a relevant political phenomenon. Studies at the individual level (Dee, 2004; Milligan et al., 2004) and theoretical and empirical studies of different intelligence research traditions (from Piaget to psychometrics; e.g. Vanhanen, 2007) show that education and cognitive ability change competences, attitudes and behavior in favor of democratic practice in everyday life.

With the exception of the rule of law, education and cognitive abilities show stronger effects than economic wealth on positively valued political outcomes. The positive effects of economic wealth on political outcomes in multivariate analyses are caused also by the former dependence of wealth on education and cognitive abilities, which promote both economic growth and political democratization (see Rindermann, in press).

The empirical evidence for the reverse effects of democracy, rule of law and political freedom on education, intelligence and knowledge is mixed. Democracy shows no positive effect on education or abilities. However, rule of law (a variable with emphasis on property rights and economic freedom) and political freedom show evidence of marginal to medium effects on cognitive development. Rule of law, property rights, economic and political freedom (especially in the sample without former communist countries) seem to motivate people to use and develop their intelligence, possibly because the returns on intelligence to the individual, in the form of increased personal wealth and social status, are greater (meritocracy-hypothesis as appreciation of merits in a society).

This meritocracy-interpretation is supported by the stable negative correlation between *government spending ratio* and cognitive abilities ($r = -.47$, $N = 138$, after partialing out GDP $r = -.24$; Rindermann, in press).³ High government spending ratios could indicate different political conditions that do not encourage either human capital investment or the recognition of high achievement (no merit society), i. e. high taxes, low economic liberty, high military consumption, and redistribution of wealth to the ruling elite, to non-productive people (“rent seeking

³ This is confirmed by reciprocal negative cross-lagged effects between government spending ratio (GSR) and cognitive abilities ($\beta_{GSR1 \rightarrow CA2} = -.28$, $r = .03$ and $\beta_{CA1 \rightarrow GSR2} = -.37$, $r = -.05$, $N = 16$, period between 1960s and 1990s), which remain after inclusion of GDP ($\beta_{GSR1 \rightarrow CA2} = -.28$, $r = .03$, $\beta_{GDP1 \rightarrow CA2} = .30$, $r = .67$, and $\beta_{CA1 \rightarrow GSR2} = -.30$, $r = -.05$, $N = 16$).

mentality”) or administrative tasks. Rarely does high government spending ratio translate into investment in education and health. And high government spending ratios could be more possible and necessary in nations with low ability levels.

In the sampled countries, democracy had no stable direct positive effects on education and on abilities in the period between the 1960s and the end of the century. If there are any positive effects at all, they are mediated by democracy’s favorable influence on economic wealth (Figs. 2 and 3). Perhaps historical approaches and single-country-studies will find stronger support for a democracy-further-education-and-intelligence thesis. This approach could also delineate in more detail the negative influence of war or military practice on macro-social intelligence development (e.g. for Spain and for Israel in the 20th century; for the Netherlands in World War II, DeGroot, 1951).

The more important influences on cognitive abilities have been economic wealth, economic freedom, rule of law and (less stable) political liberty. In countries with a predictable, impartial and justifiable order and with a liberal political system intelligence is nurtured. In countries with these attributes intelligence is nurtured possibly because it is worth the effort to invest time and money in knowledge acquisition and thinking. *The rule of law promotes intelligence and knowledge*. Further theoretical and empirical research is needed to delineate the causal paths in more detail.

Important characteristics of societies (education, cognitive ability, wealth, democracy, rule of law, political freedom) showed in the majority of the models stronger associations at the end of the 20th century than in the ’60s and ’70s. This could simply mean that the more recent data are more accurate than those for earlier years, but it could also mean that the rising complexity of economic and political life entails a growing dependence on cognitive abilities (Hermstein & Murray, 1994). Many of the effects are reciprocal. Cognitive ability can stimulate economic development but is also supported by it, creating a culture of cleverness in which cognitive skill acquisition is practiced as the road to economic success for the individual — provided the rule of law and political freedom maintain the economic incentives.

Wealth is always positively correlated with democracy, rule of law, and political and economic freedom, but the longitudinal effects of wealth on these outcomes are inconsistent and sometimes even negative. An “advantage of backwardness” has been described in prospective studies of economic growth (Weede, 2006), and the same might be true for sociopolitical developments as well. In other words, wealth no longer promotes desirable

political outcomes at high levels of economic and social development because all the good that wealth could possibly do for these outcomes has been achieved in earlier historical time periods already.

Not wealth, but education and especially intelligence are at the core of these developments. The presented empirical results show unambiguously that education and cognitive ability favor democracy, the rule of law, and political freedom. In addition to creating material wealth, they improve the quality of life by fostering the development of legal and democratic institutions. During the 20th century, the rising educational level of the population (Meyer, Ramirez, & Soysal, 1992) and the rise in cognitive abilities (Flynn, 1987) that accompanied the expansion of the school system, have almost certainly been the most important factors for democratization and related institutional improvements, in addition to being the principal cause for technological and economic progress. This does not deny the role of cultural heritage and historical contingencies. The appreciation of human rights and liberty has religious, cultural and philosophical roots that display their own dynamics in history. At least *cultural values* form an important framework for the appreciation of education and thinking.

Democracy in this view and as confirmed by the empirical results is a phenomenon attributable to factors given *within* a country and depending on *its* citizens. If these internal conditions are not given, it would be impossible or at least very difficult to import democracy from the outside with the help of armed forces (see experiences in Afghanistan and Iraq and the history of Liberia, which was planned as an institutional copy of the USA). Social and political institutions are not irrelevant, but they depend in their development in the past and in their functionality in the present on the characteristics of the people. Democracy is more a way of living and thinking (see Dewey, 1997/1916) than a specific attribute of institutions. If institutions in an independent country are missing or faulty, people and their leaders, using their education and abilities, will and can develop them. One important test case of the education-intelligence-further-democracy-thesis will be the political development of China during the 21st century. If the positive influence of high cognitive ability on democratization is a general phenomenon, China will become democratic.

Acknowledgement

I have benefited from a lot of suggestions, help and critical comments received after talks, lectures and distribution of preliminary drafts of this paper by

colleagues (especially by Paul Irwing, Gerhard Meisenberg, Georg W. Oesterdiekhoff, James Thompson, Tatu Vanhanen, and Erich Weede) and by two anonymous reviewers. Helene Schmitz from SAS Institute Heidelberg helped me with her extremely high SAS-competence to draw the maps. A former version of this paper was presented at the Seventh Annual Conference of the International Society for Intelligence Research (ISIR) in San Francisco, December 2006.

References

- Alberti, L. B. (2004/1441). *The family in Renaissance Florence (I libri della famiglia)*. Waveland: Long Grove (Original work published 1441).
- Aquinas, Th. (1951/1273). *Summa Theologica*. Salamanca: Biblioteca de Autores Cristianos (Original work published 1273).
- Armor, D. J. (2003). *Maximizing intelligence*. New Brunswick: Transaction Publishers.
- Armstrong, J. S. (2007). Statistical significance tests are unnecessary even when properly done and properly interpreted. *International Journal of Forecasting*, 23, 335–336.
- Barber, N. (2005). Educational and ecological correlates of IQ scores: A cross-national investigation. *Intelligence*, 33, 273–284.
- Barro, R. J., & Lee, J. -W. (1993). *Barro-Lee data set. International measures of schooling years and schooling quality. Distributed by the World Bank Group*. Washington, Version 1994. Retrieved July 14, 2004 from www.worldbank.org/research/growth/ddbarle2.htm
- Barro, R. J., & Lee, J. -W. (2000). *Barro-Lee data set. International data on educational attainment: Updates and implications*. Boston: Harvard University. Retrieved November 18, 2004 from www2.cid.harvard.edu/ciddata/barrolee/readme.htm
- Black, S. E., & Sokoloff, K. L. (2006). Long term trends in schooling: The rise and decline (?) of public education in the United States. In E. A. Hanushek, & F. Welch (Eds.), *Handbook of the economics of education* (pp. 69–105). Amsterdam: North-Holland.
- Bourdieu, P. (1984). *Homo academicus*. Paris: Les Éditions de Minuit.
- Brecht, B. (2003/1937). Speech on the power of resistance of reason. In T. Kuhn, & S. Giles (Eds.), *Brecht on arts and politics* (pp. 176–179). London: Methuen.
- Buckley, T. C., Blanchard, E. B., & Neill, W. T. (2000). Information processing and PTSD: A review of the empirical literature. *Clinical Psychology Review*, 20, 1041–1065.
- Ceci, S. J. (1991). How much does schooling influence general intelligence and its cognitive components? A reassessment of the evidence. *Developmental Psychology*, 27, 703–722.
- Ceci, S. J. (1996). *On intelligence. A bioecological treatise on intellectual development*. Cambridge: Harvard University Press.
- Davenport, K. S., & Remmers, H. H. (1950). Factors in state characteristics related to average A-12 V-12 test scores. *Journal of Educational Psychology*, 41, 110–115.
- Dee, Th. S. (2004). Are there civic returns to education? *Journal of Public Economics*, 88, 1697–1720.
- DeGroot, A. D. (1951). War and the intelligence of youth. *Journal of Abnormal and Social Psychology*, 46, 596–597.
- Delaney-Black, V., Covington, C., Ondersma, S. J., Nordstrom-Klee, B., Templin, T., Ager, J., et al. (2002). Violence exposure, trauma, and IQ and/or reading deficits among urban children. *Archives of Pediatrics & Adolescent Medicine*, 156, 280–285.
- Dewey, J. (1997/1916). *Democracy and education*. New York: Simon & Schuster (Original work published 1916).
- Eysenck, H. J., & Schoenthaler, S. J. (1997). Raising IQ level by vitamin and mineral supplementation. In R. J. Sternberg, & E. L. Grigorenko (Eds.), *Intelligence, heredity and environment* (pp. 363–392). Cambridge: Cambridge University Press.
- Flitner, E. (2006). Pädagogische Wertschöpfung. Zur Rationalisierung von Schulsystemen durch public-private-partnerships am Beispiel von PISA. In J. Oelkers, R. Casale, R. Horlacher, & S. Larcher Klee (Eds.), *Rationalisierung und Bildung bei Max Weber. Beiträge zur Historischen Bildungsforschung* (pp. 245–266). Bad Heilbrunn: Julius Klinkhardt.
- Flynn, J. R. (1987). Massive IQ gains in 14 nations: What IQ tests really measure. *Psychological Bulletin*, 101, 171–191.
- Freedom House (2004). *Freedom in the world*. Washington. Retrieved October 15, 2004 from www.freedomhouse.org
- Friedman, M. (1962). *Capitalism and freedom*. Chicago: University of Chicago Press.
- Gibb, C. A. (1969). Leadership. In G. Lindzey, & E. Aronson (Eds.), *Handbook of social psychology* (pp. 205–282). Reading, MA: Addison-Wesley.
- Gottfredson, L. (1997). Why g matters: The complexity of everyday life. *Intelligence*, 24, 79–132.
- Gottfredson, L. (2003). g, jobs and life. In H. Nyborg (Ed.), *The scientific study of general intelligence. Tribute to Arthur R. Jensen* (pp. 293–342). Oxford: Pergamon.
- Gwartney, J., & Lawson, R. (2003). *Economic freedom of the world. 2003 annual report*. Vancouver: Fraser Institute.
- Habermas, J. (1976). Geschichte und Evolution. *Geschichte und Gesellschaft*, 2, 310–357.
- Hadenius, A. (1992). *Democracy and development*. New York: Cambridge University Press.
- Hanushek, E. A., & Kimko, D. D. (2000). Schooling, labor-force quality, and the growth of nations. *American Economic Review*, 90, 1184–1208.
- Hart, K. (2006). *Brasilien: Riesiger Markt für gekaufte Examensarbeiten.*: DLF/Spiegel. Retrieved November 4, 2006 from www.spiegel.de/unispiegel/studium/0,1518,446410,00.html
- Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, 50, 47–77.
- Herrnstein, R. J., & Murray, Ch. (1994). *The bell curve. Intelligence and class structure in American life*. New York: Free Press.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge, and job performance. *Journal of Vocational Behavior*, 29, 340–362.
- Inglehart, R. (1997). *Modernization and postmodernization. Cultural, economic, and political change in 43 societies*. Princeton: Princeton University Press.
- Inglehart, R., & Welzel, Ch. (2005). *Modernization, cultural change, and democracy. The human development sequence*. New York: Cambridge University Press.
- Irwing, P. (2007). IQ and inequality in human conditions: Are correlates dependent on the level of analysis? *European Journal of Personality*, 21, 729–731.
- Kant, I. (2003/1803). *On education*. Mineola, NY: Dover (Original work published 1803).
- Kaufmann, D. (2003). *Rethinking governance: Empirical lessons challenge orthodoxy*: Worldbank. Retrieved November 28, 2006 from http://worldbank.org/wbi/governance/pdf/rethink_gov_stanford.pdf

- Knack, S., & Keefer, Ph. (1995). Institutions and economic performance: Cross-country tests using alternative institutional measures. *Economics and Politics*, 7, 207–227.
- Koenen, K. C., Moffitt, T. E., Caspi, A., Taylor, A., & Purcell, S. (2003). Domestic violence is associated with environmental suppression of IQ in young children. *Development and Psychopathology*, 15, 297–311.
- Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed.), *Handbook of socialization* (pp. 347–480). Chicago: Rand McNally.
- Kohlberg, L. (1987). *Child psychology and childhood education. A cognitive-developmental view*. New York: Longman.
- Lee, J. -W., & Barro, R. J. (1997). *Schooling quality in a cross-section of countries*. New York. Retrieved November 18, 2004 from www.nber.org/papers/W6198
- Lipset, S. M. (1960). *Political man. The social bases of politics*. New York: Doubleday.
- Lipset, S. M. (1994). The social requisites of democracy revisited. *American Sociological Review*, 59, 1–22.
- Lipset, S. M., & Raab, E. (1995). *Jews and the New American Scene*. Cambridge: Harvard University Press.
- Lurija, A. R. (1976/1974). *Cognitive development. Its cultural and social foundations*. Cambridge: Harvard University Press (Luria).
- Lynn, R. (1990). The role of nutrition in secular increases in intelligence. *Personality and Individual Differences*, 11, 273–285.
- Lynn, R., & Vanhanen, T. (2002). *IQ and the wealth of nations*. Westport: Praeger.
- Lynn, R., & Vanhanen, T. (2006). *IQ and global inequality*. Athens: Washington Summit.
- Marshall, M. G., & Jagers, K. (2000). *Polity IV Project. Political regime characteristics and transitions, 1800–1999*. University of Maryland. Retrieved October 5, 2004 from www.bsos.umd.edu/cidcm/inscr/polity
- McDaniel, M. A. (2006). Estimating state IQ: Measurement challenges and preliminary correlates. *Intelligence*, 34, 607–619.
- Meisenberg, G. (2004). Talent, character, and the dimensions of national culture. *Mankind Quarterly*, 45, 123–168.
- Meyer, J. W., Ramirez, F. O., & Soysal, Y. N. (1992). World expansion of mass education, 1870–1980. *Sociology of Education*, 65, 128–149.
- Milligan, K., Moretti, E., & Oreopoulos, P. (2004). Does education improve citizenship? Evidence from the U.S. and the U.K. *Journal of Public Economics*, 88, 1667–1695.
- Nyborg, H. (2003). The sociology of psychometric and bio-behavioral sciences: A case study of destructive social reductionism and collective fraud in 20th century academia. In H. Nyborg (Ed.), *The scientific study of general intelligence. Tribute to Arthur R. Jensen* (pp. 441–502). Oxford: Pergamon.
- OECD (2000). *Literacy in the information age. Final report of the International Adult Literacy Survey*. Paris: OECD.
- Oesterdiekhoff, G. W. (2000). *Zivilisation und Strukturgenese*. Frankfurt: Suhrkamp.
- Piaget, J. (1932). *Le jugement moral chez l'enfant*. Paris.
- Reporters sans frontières (2006). *Annual Worldwide Press Freedom Index 2006, 2005, 2004, 2003 and 2002*. Paris. Retrieved July 13, 2006 from www.rsf.org
- Rindermann, H. (2006). Was messen internationale Schulleistungsstudien? Schulleistungen, Schülerfähigkeiten, kognitive Fähigkeiten, Wissen oder allgemeine Intelligenz? [What do international student assessment studies measure? School performance, student abilities, cognitive abilities, knowledge or general intelligence?]. *Psychologische Rundschau*, 57, 69–86.
- Rindermann, H. (2007). The g-factor of international cognitive ability comparisons: The homogeneity of results in PISA, TIMSS, PIRLS and IQ-tests across nations. *European Journal of Personality*, 21, 667–706.
- Rindermann, H. (in press). Relevance of education and intelligence at the national level for the economic welfare of people. *Intelligence*. doi:10.1016/j.intell.2007.02.002
- Rindermann, H. & Meisenberg, G. (submitted for publication). *Relevance of education and intelligence at the national level for non-economic welfare: HIV and AIDS*.
- Rushton, J. Ph. (2005). Ethnic nationalism, evolutionary psychology, and genetic similarity theory. *Nations and Nationalism*, 11, 489–507.
- Saigh, P. A., Mroueh, M., & Bremner, J. D. (1997). Scholastic impairments among traumatized adolescents. *Behaviour Research and Therapy*, 35, 429–436.
- Sanderson, S. K. (2001). *The evolution of human sociality: A Darwinian conflict perspective*. Lanham: Rowman & Littlefield.
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Test of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8, 23–74.
- Schofer, E., & Meyer, J. W. (2005). The worldwide expansion of higher education in the twentieth century. *American Sociological Review*, 70, 898–920.
- Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. New York: Harper & Row.
- Segerstråle, U. (2000). *Defenders of the truth. The sociobiology debate*. New York: Oxford University Press.
- Simonton, D. (2006). *Historiometric assessments of intelligence*. Invited address at 7th ISIR-Conference in San Francisco, 14.–16. December 2006.
- Simonton, D. K. (1985). Intelligence and personal influence in groups: Four nonlinear models. *Psychological Review*, 92, 532–547.
- Simonton, D. K. (2006). Presidential IQ, openness, intellectual brilliance, and leadership: Estimates and correlations for 42 US chief executives. *Political Psychology*, 27, 511–526.
- Simpson, M. (1997). Informational inequality and democracy in the new world order. In M. Midlarsky (Ed.), *Inequality, democracy, and economic development* (pp. 156–176). Cambridge: Cambridge University Press.
- Suedfeld, P., Guttieri, K., & Tetlock, Ph. E. (2003). Assessing integrative complexity at a distance: Archival analyses of thinking and decision making. In J. M. Post (Ed.), *The Psychological assessment of political leaders: with profiles of Saddam Hussein and Bill Clinton* (pp. 246–270). Ann Arbor: The University of Michigan Press.
- Vanhanen, T. (1997). *Prospects of democracy*. London: Routledge.
- Vanhanen, T. (2003). *Democratization. A comparative analysis of 170 countries*. London: Routledge.
- Vanhanen, T. (2005). *Measures of democracy 1810–2004. Finnish social science data archive*. FSD. Retrieved January 17, 2006 from www.fsd.uta.fi/english/data/catalogue/FSD1289
- Vanhanen, T. (2007). *Limits of democratization*. Klaukkala: Paper prepared for presentation at the APSA Annual Meeting, APLS panel on Biopolicy in Chicago, August 30 - September 2, 2007.
- Weber, M. (1988/1920). *Gesammelte Aufsätze zur Religionssoziologie I (Protestantische Ethik, Konfuzianismus und Taoismus)*. Tübingen: J.C.B. Mohr (Original work published 1920).
- Weede, E. (2006). Economic freedom and development: New calculations and interpretations. *Cato Journal*, 26, 511–524.
- Weiss, V. (2000). *Die IQ-Falle. Intelligenz, Sozialstruktur und Politik*. Graz: Leopold Stocker.