Social ecology of intelligence and suicide in the United States revisited

Martin Voracek

University of Vienna

[This manuscript version: Feb 20, 2007](#)

Address correspondence to Martin Voracek, D.Sc., Ph.D., Department of Basic Psychological Research, School of Psychology, University of Vienna, Liebiggasse 5, Rm 03-42, A-1010 Vienna, Austria or e-mail (martin.voracek@univie.ac.at).

Summary.--State and overseas territory scores on the National Assessment of Educational Progress (NAEP) domains of Mathematics, Reading, Science, and Writing (grades 4 and 8, averaged across assessments 1992-2005) were not reliably related to the suicide rates of these geographical units. The ecological (aggregate-level) correlations were modest, ranging from -.11 to .10, and did not change with controls for regional affluence (gross domestic product). While positive ecological correlations between regional intelligence and suicide mortality have been reported within several other countries (Austria, Belarus, Denmark, Ireland and The United Kingdom, and The Netherlands), the current results add to the inconsistent findings from four previous related studies (by Abel and Kruger and by Voracek) about the direction and magnitude of this correlation within the USA. Possible reasons for this conflicting set of findings and directions for future research are discussed.

An increased risk for suicide at higher levels of mental capacity (i.e., intelligence) has been noted by various researchers in the late 19th century (e.g., Morselli, 1881; see also Goldney & Schioldann, 2002). Such an association seems to harmonize with many incidental and scattered findings from suicidology (assembled in detailed reviews in Voracek, 2004, 2005a, 2006g), the evolutionary theory of suicide (de Catanzaro, 1981), population genetical considerations of suicidal behavior (Voracek, 2006c), and differential K theory, i.e., the sociobiology of individual and group differences in life-history traits (for review, see Voracek, 2007c), and this effect should be evident in tests on the individual as well as on the aggregate level (Agerbo, Sterne, & Gunnell, 2007; cf. Voracek, 2003, 2006d).

In fact, all studies that tested the association of the geography of intelligence with rates of completed suicide on the cross-national level have found positive ecological (i.e., group-level) correlations (Lester, 2003; Voracek, 2004, 2005a, 2006b, 2007f; for an inconclusive test, based on national rates of suicide ideas, plans, and attempts, see Voracek, 2007e). Studies that tested the same association on the intranational level yielded positive (Austria: Voracek, 2006g; Belarus: Voracek, 2005b; Denmark: Voracek, 2006e; Ireland and the United Kingdom: Lester, 1995; The Netherlands: Kerkhof & Kunst, 1994), inconclusive (France: Lester, 1993; Germany: Voracek, 2006f), and negative findings (Australia: Voracek, 2007d).

In particular, both positive (Voracek, 2006h, 2007b,c), inconclusive (Voracek, 2007a), and negative findings (Abel & Kruger, 2005; rejoinder: Voracek, 2006a) have been reported for the USA, thus leaving the research question unsettled. To explore this further, the present study investigated the social ecology of intelligence and suicide in the USA anew, using a different proxy variable for regional intelligence than the preceding accounts, namely state-level data from the National Assessment of Educational Progress (NAEP).

METHOD

State scores on the NAEP domains were gleaned from the National Center for Education Statistics website (<http://nces.ed.gov/nationsreportcard/states/>). For Mathematics, grade 4 and 8 scores were available for 1992, 1996, 2000, 2003, and 2005 and for 1990, 1992, 1996, 2000,

2003, and 2005, respectively. For Reading, data were as of 1992, 1994, 1998, 2002, 2003, and 2005 (grade 4 scores) and as of 1998, 2002, 2003, and 2005 (grade 8 scores). For Science, data were available for 2000 and 2005 (grade 4 scores) and for 1996, 2000, and 2005 (grade 8 scores), and for Writing, for 2002 (grade 4 scores) and for 1998 and 2002 (grade 8 scores). The data are for 54 geographical units (all the 50 states, the District of Columbia, and the three overseas territories of American Samoa, Guam, and the Virgin Islands), of which 16 had complete data for all the 29 assessments across the 4 domains and 2 grades listed above (the median value was 25.5 assessments and 75% of the units had data for 21 or more assessments).

The average score of assessment years with available data per domain and grade was taken to form 8 NAEP state scores for analysis (4 domains times 2 grades). Due to nonparticipation in types of assessments, Reading scores were available for 53 units (for grade 4, except for American Samoa; for grade 8, except for Connecticut), Science grade 4 scores for 50 units (except for Alaska, the District of Columbia, Kansas, and Pennsylvania), Science grade 8 scores for 51 units (except for American Samoa, Kansas, and Pennsylvania), Writing grade 4 scores for 46 units (except for Alaska, American Samoa, Colorado, Illinois, New Hampshire, New Jersey, South Dakota, and Wisconsin), Writing grade 8 scores for 48 units (except for Alaska, Illinois, Iowa, New Hampshire, New Jersey, and South Dakota), whereas Mathematics grade 4 and 8 scores were available for all 54 units.

State suicide rates were taken from National Center for Injury Prevention and Control (1997), for American Samoa and Guam from Booth (1999), and for the Virgin Islands from Lester (1996). Data on state gross domestic product (GDP; www.demographia.com/db-usgdpr99.htm) were used as a covariate in the analysis. For comparison and validation, a set of 14 further variables (both contemporary and historical ones) were considered: 4 estimates for state IQ during World War I (Voracek, 2007b), standardized birth rates for superior (i.e., eminent) persons (Voracek, 2007c), average state suicide rates of 1913-1924, 1928-1932, and both periods combined (Voracek, 2007b,c), state IQ estimates derived from the SAT (Scholastic Assessment Test; Kanazawa, 2006), from the ACT (American College Test), from the ACT and

SAT combined, and from NAEP data (McDaniel, 2006a,b), and state SAT and ACT scores averaged for 1998-2004 and 1994-2004, respectively (Voracek, 2006h). Significance was set to $p < .05$ (two-tailed).

RESULTS

The Pearson correlations for the 8 NAEP state scores with suicide rates ranged from $-.11$ to $.10$ (all ns). Controls for state GDP left this main finding unchanged; the range of the respective partial r coefficients was similarly narrow. As for the sets of correlations of the 8 NAEP state scores with the 14 further variables, the pattern was as follows: the associations with the 4 historical (World War I) state IQ estimates ranged from $-.13$ to $.46$, with 29 out of 32 correlations being positive and 9 of these statistically significantly so ($.002 < p < .05$). The associations with birth rates of eminent persons were all significant, ranging from $.45$ to $.77$ (all $ps < .01$). The associations with historical suicide rates were throughout positive and for 2 of these significant (Mathematics grade 8 scores correlated with $.41$ and $.30$ with averaged suicide rates of 1913-1924 and 1928-1932, respectively, $ps < .05$). Two out of the 8 positive correlations with Kanazawa's SAT-derived estimates of state IQ were significant, whereas none of the correlations with McDaniel's ACT-derived estimates of state IQ. All 8 correlations with McDaniel's state IQ estimates derived from the SAT and ACT combined were significant, ranging from $.39$ to $.65$ ($ps < .01$), as were those with McDaniel's NAEP-derived estimates of state IQ, the latter ranging from $.64$ to $.97$ ($ps < .001$). Finally, the 8 NAEP state scores were throughout positively associated with averaged ACT state scores 1994-2004 (rs ranging from $.52$ to $.79$, $ps < .001$), whereas the respective associations with averaged SAT state scores 1998-2004 were generally lower (in 2 cases even negative: rs ranged from $-.26$ to $.39$), with only 3 out of the 8 correlation coefficients achieving nominal significance.

DISCUSSION

The current results contribute to the growing literature on ecological correlations between regional intelligence and suicide rates, but fail to resolve the issue of whether this association is indeed positive within the USA. Correlations between NAEP state scores of

different domains and assessments and state suicide rates are nil and controls for regional affluence (GDP) do not alter this finding.

Abel and Kruger (2005), who were the first to address this question, reported a significant negative correlation of educational attainment and suicide rates across the USA. However, Voracek (2006a) noted that interstate migration was more strongly associated with suicide rates than with educational attainment, thus raising the possibility that this initial finding might be spurious (i.e., an artifact of migration patterns). Voracek (2006h) subsequently reported ecological correlations of state suicide rates with averaged ACT and SAT scores (available from the 1980s into the 2000s) that were consistently positive, albeit only weakly so. However, a refined follow-up study (Voracek, 2007a) that used novel state IQ estimates derived from either SAT, ACT, combined SAT and ACT, or NAEP data, found no consistent associations with state suicide rates. On the other hand, a clear pattern of positive ecological correlations between suicide mortality and regional intelligence in USA was obtained in two further studies (Voracek, 2007b,c) that investigated historical (early 20th-century) suicide rates and two independent and temporally concordant proxies of regional intelligence.

This conflicting evidence from the existing literature, including the present study, may well imply that (i) ecological associations between intelligence and suicide mortality in the USA were once stronger than nowadays, (ii) that the methods for estimating state IQ are less than optimal, (iii) that the available data on educational attainment do not appropriately reflect regional IQ in the USA, or may still have other causes. For instance, to name but two limitations of the NAEP data, these are based on pupils attending public schools (and the proportion of pupils attending non-public schools varies by state) and there is also evidence for state differences in NAEP exemption policy (McDaniel, 2006a). The interrelations of the NAEP data with 14 further indicators for intelligence and suicide mortality, as reported here, are informative for comparison and validation, but cannot resolve these issues. It would thus be advantageous if all of these possibilities (the above points i, ii, and iii) could be addressed by

future research, but clearly such an endeavor will depend on the emergence of suitable data sets for a more definitive test.

REFERENCES

- ABEL, E. L., & KRUGER, M. L. (2005) Educational attainment and suicide rates in the United States. Psychological Reports, 97, 25-28.
- AGERBO, E., STERNE, J. A. C., & GUNNELL, D. J. (2007) Combining individual and ecological data to determine compositional and contextual socio-economic risk factors for suicide. Social Science and Medicine, 64, 451-461.
- BOOTH, H. (1999) Pacific island suicide in comparative perspective. Journal of Biosocial Science, 31, 433-448.
- DE CATANZARO, D. (1981) Suicide and self-damaging behavior: a sociobiological perspective. New York: Academic Press.
- GOLDNEY, R. D., & SCHIOLDANN, J. A. (2002) Pre-Durkheim suicidology: the 1892 reviews of Tuke and Savage. Adelaide: Academic Press.
- KANAZAWA, S. (2006) IQ and the wealth of states. Intelligence, 34, 593-600.
- KERKHOF, A., & KUNST, A. (1994) A European perspective on suicidal behaviour. In R. Jenkins, S. Griffiths, I. Wylie, K. Hawton, G. Morgan, & A. Tylee (Eds.), The prevention of suicide: a conference organised by the Department of Health, Faculty of Public Health Medicine, Royal College of General Practitioners and the Royal College of Psychiatrists. London: Her Majesty's Stationery (HMSO). Pp. 22-33.
- LESTER, D. (1993) Intelligence and suicide in France: an ecological study. Psychological Reports, 73, 1226.
- LESTER, D. (1995) Intelligence and suicide in Ireland and the United Kingdom. Psychological Reports, 77, 122.
- LESTER, D. (1996) Patterns of suicide and homicide in the world. New York: Nova Science Publishers.
- LESTER, D. (2003) National estimates of IQ and suicide and homicide rates. Perceptual and Motor Skills, 97, 206.

- MCDANIEL, M. A. (2006a) Estimating state IQ: measurement challenges and preliminary correlates. Intelligence, 34, 607-619.
- MCDANIEL, M. A. (2006b) State preferences for the ACT versus SAT complicate inferences about SAT-derived state IQ estimates: a comment on Kanazawa (2006). Intelligence, 34, 601-606.
- MORSELLI, H. (1881) Suicide: an essay on comparative moral statistics. London: C. Kegan Paul.
- NATIONAL CENTER FOR INJURY PREVENTION AND CONTROL. (1997) Regional variations in suicide rates: United States, 1990-1994. Morbidity and Mortality Weekly Report, 46, 789-793.
- VORACEK, M. (2003) Risk of suicide in twins: intelligence of twins and singletons may explain risk. British Medical Journal, 327, 1168. [Letter]
- VORACEK, M. (2004) National intelligence and suicide rate: an ecological study of 85 countries. Personality and Individual Differences, 37, 543-553.
- VORACEK, M. (2005a) National intelligence, suicide rate in the elderly, and a threshold intelligence for suicidality: an ecological study of 48 Eurasian countries. Journal of Biosocial Science, 37, 721-740.
- VORACEK, M. (2005b) The social ecology of intelligence and suicide in Belarus. Journal of Social Psychology, 145, 613-617.
- VORACEK, M. (2006a) Educational attainment, intelligence, interstate migration, and suicide rates in the United States: rejoinder to Abel and Kruger (2005). Psychological Reports, 98, 608-610.
- VORACEK, M. (2006b) Exponential fitting of suicide rate and national intelligence estimates. Perceptual and Motor Skills, 102, 896-898.
- VORACEK, M. (2006c) Population genetical musings on suicidal behavior as a common, harmful, heritable mental disorder. Behavioral and Brain Sciences, 29, 423-424. [Commentary]
- VORACEK, M. (2006d) RE: Childhood cognitive performance and risk of mortality: a prospective cohort study of gifted individuals. American Journal of Epidemiology, 163, 1161-1162. [Letter]

- VORACEK, M. (2006e) Regional intelligence and suicide rate in Denmark. Psychological Reports, 98, 671-674.
- VORACEK, M. (2006f) Regional intelligence and suicide rate in Germany. Perceptual and Motor Skills, 103, 639-642.
- VORACEK, M. (2006g) Smart and suicidal? The social ecology of intelligence and suicide in Austria. Death Studies, 30, 471-485.
- VORACEK, M. (2006h) Social ecology of intelligence and suicide in the United States. Perceptual and Motor Skills, 102, 767-775.
- VORACEK, M. (2007a) State IQ and suicide rates in the United States. Perceptual and Motor Skills, 105, 102-106.
- VORACEK, M. (2007b) Early 20th century social ecology of U.S. state IQ and suicide rates: evidence from the Army Alpha and Beta Intelligence Test data of Yerkes (1921). Social Behavior and Personality, 35, 1027-1030.
- VORACEK, M. (2007c) Evidence for a positive ecological correlation of regional intelligence and suicide mortality in the United States during the early 20th century. Perceptual and Motor Skills, 105, 391-402.
- VORACEK, M. (2007d) Regional intelligence and suicide rate: new data for Australia and a synthesis of research. Perceptual and Motor Skills, 105, 191-196.
- VORACEK, M. (2007e) National differences in intelligence and population rates of suicidal ideation, suicide plans, and attempted suicide. Perceptual and Motor Skills, 105, 355-361.
- VORACEK, M. (2007f) National intelligence and suicide rate across Europe: an alternative test using educational attainment data. Psychological Reports, 101, 512-518.