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Do National IQs Predict U.S. Immigrant Cognitive Ability and Outcomes? An Analysis of the National Longitudinal Survey of Freshman

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Abstract

We discuss the global hereditarian hypothesis of race differences in *g* and test it on data from the NLSF. We find that migrants country of origin's IQ predicts GPA and SAT/ACT.

Keywords: National IQs, race differences, country of origin, NLSF

1 Introduction

Lynn and Vanhanen (2002) have shown that there exist large, socially significant national differences in cognitive ability [1]. While there was initially much skepticism of the authors' national IQ estimates, even previously critical researchers have come to acknowledge the reality of the national differences [2]. Despite current agreement as to their existence, the psychometric nature and cause of these differences is still much debated. Lynn and Vanhanen (2002) proposed that the national differences in IQ are partly related to general cognitive abilities (g) and that these differences have a substantially genetic basis. Consistent with this interpretation, Rindermann (2007) found that measures of cognitive ability across nations form a general factor and that national differences represent differences in this factor [3]. However, the existence of a cross-national g factor on which nations differ does not logically imply the existence of aggregate individual-level g differences [4, 5]. It could be, for example, that the national g differences represent an emergent property which do not characterize differences on the individual and subgroup level. This issue has relevance since g bears much of the weight of cognitive ability's real world significance and predictive ability, at least on the individual level. If national differences do not represent aggregate individual ones, then one can not assume that these differences will predict outcomes on the individual and subgroup levels the way that individual g differences would.

This would be of no matter were one solely interested in national performance, but many researchers are interested in the performance of migrants by nation of origin. The assumption underlying the national migrant research program is that national differences in g (that is, in big G, to adopt the terminology of Rindermann (2007b)) represent aggregate individual differences in g (that is, in little g), ones which can be carried by migrants with them and which will act as and predict as would individual differences in g. We call this assumption "the spatial transferability hypothesis (ST)". Accordingly, migrants will carry their national cognitive ability differences with them; these differences will be predictive of migrant outcomes similar to how individual level g differences are.

While this hypothesis has not been clearly explicated before, some researchers have found supportive results. Jones and Schneider have shown that one can predict wages among immigrant groups in the U. S. by their country of origin IQs [6] and Vinogradov and Kolvereid have shown that one can likewise predict migrant self-employment in Norway [7]. One of us (JF) has previously shown that national IQs highly correlate with GMAT (Graduate Management Admission Test), GRE (Graduate Record Examinations), and TOEFL (Test of English as a Foreign Language) scores. [8, 9]. As these tests have often been shown to be predictive of student performance irrespective of national citizenship [10], it is implied that national

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IQs predict, to some extent, migrant academic performance. JF further showed that the PISA test scores of migrants to OCED countries are predictable from the IQs of their parents' nations of origin [9]. Results are summarized in Table 1.

Table 1: Correlations of national IQs with scholastic tests and English abilities.

Variable (N)	Correlation with national IQ
GMAT (143)	.720
TOEFL (157)	.625
GRE-50N (173)	.740
GRE-M (144)	.764
GRE-R (144)	.552
GRE-T (144)	.765
PISA (60)	.427

The other of us (EOWK) previously tested the spatial transferability hypothesis with data from Denmark and Norway [11, 12, 13]. EOWK found that national IQs predicted migrant crime rates in Denmark and Norway, migrant employment rates in Norway, and migrant fertility rates in Denmark. Results are summarized in Table 2.

Taken as a whole, these results suggest that migrants, in some way, carry their national general cognitive abilities with them; this, in turn, suggests that the national differences in g represent aggregate individual differences in g. Clearly, though, more research is needed to determine the extent to which national g transfers internationally.

As noted above Lynn and Vanhanen (2002) not only proposed that the national IQ differences represent aggregate individual differences in g, but also that these differences are partly heritable. This global hereditarian hypothesis predicts that migrants will not just carry national g differences with them but that they will transmit these differences across generations in their new residence. Historically, the generational transition of traits in migrant populations was seen as evidence of genetic contra environmental regional differences. For example, in "On the Use of Teleological Principles in Philosophy (1788)", Immanuel Kant pointed to the dark coloring of Gypsies (a European population of South Asian descent) as evidence that the skin color differences between Asian Indians and Indo-Europeans had a congenital basis [14]. A hereditarian hypothesis then predicts, with regards to nationa IQs, spatial transferability (ST) and generational transferability (GT). Migrants carry their national general intelligence with them and then transmit this across generations. Of course, a subset of environmental hypotheses could also explain cross generational transmission, but a hereditarian hypothesis requires it.

In this paper we further test Lynn and Vanhanen's (2002) global hereditarian hypothesis by examining data from the National Longitudinal Survey of Freshmen. Using this dataset we test both the spatial transferability hypothesis and the generational transferability hypothesis.

2 Research Question

The present study attempts to extend previous findings in a number of ways. Whereas most previous research dealt with migrants to Europe, we focus on migrants to the U.S.A. Importantly, we determine if national IQs are predictive of both migrant test scores and migrant scholastic outcomes such as grade point average (GPA) and, if so, if the national IQ- scholastic outcome association is mediated by test scores as one would expect if the migrant group cognitive ability differences represented differences in general intelligence owing to national differences in the same trait. Also, we decompose the national cognitive ability x test score association by first and second generation to see if National IQs transfer across generations. For robustness checks, we assess whether our migrants are ethnically representative of their nations of origin by comparing measures of national and migrant group skin color. We also explore the effect of parental migrant selectivity on the national cognitive ability x migrant group test score and outcome association. As an alternative test of the spatial and generational transferability hypotheses, we decompose scores down by U.S. (sociologically) defined race/ethnicity (White, Asian, Hispanic, Black) and generation (first, second, third); we also determine if the predictive validity of these scores differs across generations. Specifically, this study attempts to answer the following questions:

(a) Do sociologically defined races in the U.S. perform similarly on tests across generations? Are tests similarly predictive across generations?

(b) Do measures of national cognitive ability predict migrant entrance test scores when migrants are grouped by nation of origin?

(c) If so, is national cognitive ability equally predictive for first and second generation migrant groups?

(d) Does national cognitive ability predict test related scholastic outcomes such as cumulative GPA for the migrant groups?

(e) If so, is the national cognitive ability x scholastic outcome association mediated by migrant group entrance test scores?

(f) Do national skin reflectance scores predict migrant group skin color scores?

Table 2: Predictors and socio-economic variables in Denmark and Norway.

Predictor	Variable	Denmark (N=71)	Norway (N=20)
IQ	Crime	-.467 to -.653	-.620
IQ	Fertility	-.514	
IQ	Employment rate		.507

(g) If there is a national cognitive ability x migrant group test score and/or outcome association, is this association substantially mediated by parental migrant selectivity?

3 Methods

Our data comes from the National Longitudinal Survey of Freshman [15] which followed a 1999 cohort of freshman at 28 selective colleges and universities in the U.S. As this sample is not representative of migrants to the U.S. and as relevant variables were self reported or interviewee assessed, this is not an ideal sample for testing our key hypotheses. Nonetheless, these problematic factors will tend to attenuate any true association and, thus, make for a more robust test of the ST and GT hypotheses. The variables used were:

- SkinColorScore – Rated NLSF survey skin color on a 0-10 scale.
- NationalSkinReflect – Country's average skin reflectance (a skin color measure).
- Gen1TestScore – ACT/SAT test scores for first generation individuals.
- Gen2TestScore – ACT/SAT test scores for second generation individuals.
- Gen12TestScore – ACT/SAT test scores for first and second generation individuals.
- Gen2GPAScore – Wave5 cumulative GPA for 2nd generation individuals.
- LV2012NIQ – Lynn and Vanhanen's (2012) Final National IQs.
- ANT2013AQ – Altinok et al.'s (2013) National Achievement Scores.
- MC2014NGMAT – Meng Hu and Chuck's (2014) National GMAT scores (from [8]).
- Selection – Parental educational selectivity (see: supplementary material).

A detailed description of variables, along with an explanation of how they were constructed, is provided in the supplementary material.

4 Analysis 1

We inspected scores by nativity status and U.S. defined race. First and second generation self defined Blacks, Hispanics, Whites, and Asians performed similar to their respective third generation racial peers; the same pattern of score differences as found in the U.S. population as a whole was found in this selective college sample; the relationship between cumulative GPA and tests scores did not vary significantly by nativity within each racial group, though it did vary significantly between racial groupings. Results are shown in Table 3 and 4. In Table 3, composite ACT/SAT test scores are decomposed by generation and race; first generation means born abroad and having at least one parent born abroad; 2nd generation means born in the U.S. and having at least one foreign born parent; third generation means born in the U.S. and having two U.S. born parents. In Table 4, standardized coefficients, decomposed by race/ethnicity and generation, are presented for the relationship between composite ACT/SAT scores and cumulative GPA. In this table, first and second generation students were grouped together; these were individuals who had at least one foreign born parent. Third generation individuals were individuals who were U.S. born and who had two U.S. born parents.

5 Analysis 2

We next looked at the association between three measures of national cognitive ability, first generation test scores, second generation test scores, combined first and second generation test scores, and second generation cumulative GPA scores. With regards to migrants, we decomposed test scores and GPA scores separately by biological mother's and biological father's nation of origin; we then averaged the mother's and father's nation of origin scores. In the vast majority of instances, both parents hailed from the same country; when not, though, we effectively split their representation. Readers are referred to the supplementary file for an example of the method employed. Since we were concerned with migrant scores, the

Table 3: Results from analysis 1a.

Generation	Race/Ethnicity	Composite Score	N	Std. Dev
First				
	Black	27.14	51	3.77
	Whie	31.71	34	2.34
	Asían	30.27	228	3.48
	Híspanic	27.72	133	3.62
Second				
	Black	27.67	144	3.10
	Whie	30.76	83	2.81
	Asían	31.06	508	3.08
	Hispanic	28.48	354	3.50
Third				
	Black	26.08	540	3.86
	Whie	30.42	699	3.13
	Asían	31.24	45	3.43
	Hispanic	28.77	211	3.42

Table 4: Results from analysis 1b.

Race/ethnicity	Generation	Stand. Beta[a]	N
Black	3rd	0.33	358
	1st & 2nd	0.31	119
White	3rd	0.28	498
	1st & 2nd	0.25	87
Asían	3rd	0.27	28
	1st & 2nd	0.22	500
Híspanic	3rd	0.29	144
	1st & 2nd	0.36	315
All	3rd	0.41	1054
	1st+2nd	0.32	869

[a] Dependent: wave 5 GPA; independent: SAT/ACT test scores.

U.S. was not included as a migrant sending country. The migrant national group test scores were acceptably normally distributed. As GPA was not, we log transformed the value; as this transformation did not produce a normal distribution, which is necessary for accurate use of tests or statistical significance, we presented Spearman correlations below the diagonal. The correlations, Pearson above and Spearman below the diagonal, are shown in Table 5. Most were statistically significant at the .05 level. All three measures of national cognitive ability were similarly correlated with migrant test performance. Since our national cognitive measures were similarly predictive, for the remainder of the discussion, we simply report result based on L&V's (2012) national IQs.

We further looked at the association between L&V's (2012) national IQs, a measure of national skin color, migrant first and second generation test scores, combined first and second generation test scores, log second generation GPA scores, and log migrant skin color. The correlation results are shown in Table 6. The national IQ x test score association did not substantially vary by generation. The Pearson correlation between migrant skin color and national skin reflectance was .705, implying that our migrants were relatively ethnically representative of their nation of origin populations. Since our per national group sample sizes varied widely, ranging from 0.5 to 136.5, we reran the analyses with minimal per group migrant sample sizes of 5, 10, 15, 20; an increase in the minimal per group migrant sample size generally led to an increase in the correlations. This suggests that our correlations are nontrivially attenuated by sampling error.

One reviewer noted that several of Richard Lynn's National IQ estimates had been heavily criticized [16, 17, 18]. It was suggested that we rerun the analyses using the alternative national IQs presented by Wicherts et al. (2010) and Malloy (2013a; 2013b). Following this advice, we created a new variable, "Wicherts Malloy Lynn IQ", which represented L&V's 2012 National IQs with substituted scores for the following countries: Ethiopia (69.4), Ghana (73.3), Kenya (80.4), Nigeria (83.8), Sierra Leone (91.3), South Africa (77.1), Sudan (74.0), Tanzania (72), Uganda (83.9), Zambia (78.5), Dominican Republic (92), Jamaica (79), and Cuba (90). The substituted values are in parentheses and the construction of the variable is discussed in more detail in the supplementary file. Another reader suggested that we weight migrant scores by the square root of the sample sizes; it was suggested that migrant groups which had larger sample sizes should be given more weight since their scores were likely to be more reliable indexes of the "true" immigrant

Table 5: Results from analysis 2a.

	LV2012NIQ	ANT2013AQ	NGMAT	Gen1test	Gen2test	Gen1&2test	Gen2 GPA
LV2012NIQ	1.00	.910**	.739**	.347**	.316**	.371**	.287**
N		68	98	68	88	98	84
ANT2013AQ	.933**	1.00	.693**	.406**	.24	.371**	.24
N	68		68	47	64	68	62
NGMAT	.771**	.690**	1.00	.462**	.283**	.430**	.346**
	98	68		70	89	100	85
Gen1test	.387**	.425**	.497**	1.00	.362**	.866**	.06
	68	47	70		59	70	58
Gen2test	.347**	.266*	.339**	.388**	1.00	.910**	.461**
	88	64	89	59		91	87
Gen1&2test	.404**	.380**	.477**	.843**	.880**	1.00	.473**
	98	68	100	70	91		87
Gen2GPA	.341**	.298*	.400**	.312*	.493**	.524**	1.00
	84	62	85	58	87	87	

Table 6: Results from analysis 2b.

	LV2012NIQ	NationalSkin Reflect	Gen1test	Gen2test	Gen1&2test	log10GPA	log10color
LV2012NIQ	1.00	-.857**	.347**	.316**	.371**	.293**	-.656**
N		95	68	88	98	84	92
NationalSkin Reflect	-.855**	1.00	-.300*	-.264*	-.345*	-.301*	.705**
N	95		68	88	98	84	92
Gen1test	.387**	-.384**	1.00	.362**	.866**	.025	-.147
N	68	68		59	70	58	68
Gen2test	.347**	-.296**	.388**	1.00	.910**	.440**	-.172
N	88	88	59		91	87	86
Gen1&2test	.404**	-.395**	.843**	.880**	1.00	.450**	-.167
N	98	98	70	91		87	96
log10GPA	.341**	-.351**	.312*	.493**	.524**	1.00	-.273*
N	84	84	58	87	87		82
log10color	-.671**	.692**	-.190	-.267*	-.277**	-.403**	1.00
N	92	92	68	86	96	82	96

population scores. We reran the analyses accordingly. Table 7 shows the correlations for the unweighted and weighted scores, using L&V's national IQs and L&V's national IQs with substitutes.

As can be seen, the above modifications did not substantially change our results.

6 Analysis 3

We looked to see if the association between national cognitive measures and second generation migrant GPA scores was mediated by second generation migrant test scores. The results for migrant log10GPA (dependent), L&V's (2012) national IQ (independent), and migrant test scores (covariant) are shown below in Table 8. The national cognitive ability x GPA associations were partially mediated by migrant test scores.

7 Analysis 4

As a robustness check, we reran analysis 2 after taking into account parental migrant selectivity. To compute selectivity we took the difference between the parents' standardized mean educational levels as reported in the NLSF survey and the standardized average schooling years for the origin countries. For the country of origin values, we used age 25-29 data for year 1980, as this would have been the approximate cohort which birthed the NLSF students; the data came from Barro-Lee's educational dataset [19]. The results are shown

Table 7: Results from analysis 2c.

	LV2012NIQ	Wicherts-Lynn-Malloy NIQ	Gen1test	Gen2test	Gen1&2test
LV2012NIQ	1.00	.943**	.347**	.316**	.371**
N		98	68	88	98
Wicherts-Lynn-Malloy NIQ		1.00	.330**	.296**	.362**
N			68	88	98
Gen1test	.398**	.341**	1.00	.362**	.866**
N	132	132		59	70
Gen2test	.417**	.377**		1.00	.910**
N	204	204			91
Gen1&2test	.433**	.390**			1.00
N	256	256			

Note: Weighted by SQRT (sample size) below diagonal; unweighted above.

Table 8: Results from analysis 3a.

Model					t	Sig.
		Unstand. Beta	Std. Error	Stand. Beta		
1	(Constant)	0.38	0.04	0.00	10.35	0.00
	LV2012NIQ	0.00	0.00	0.29	2.77	0.01
2						
	LV2012NIQ	0.00	0.00	0.17	1.86	0.10
	Gen2Test	0.01	0.00	0.38	3.63	0.00

Dependent variable: log10GPA

in Table 9. Controlling for migrant selectivity generally substantially increased the *r* (national cognitive measures x migrant test score correlations).

Taking into account selection also increased the National IQ x log10GPA association from $r(84) = .29$, $p < .01$ to a first-order partial correlation of $r(70) = .36$, $p < .01$. Another way to approach this matter is to control for, instead of selectivity, parental educational levels. When doing so, the National IQ x Gen1 and 2 Test Score and National IQ x log10GPA associations, respectively $r(93) = .36$, $p < .01$ and $r(81) = .28$, $p < .01$ are strong and significant.

8 Analysis 5

The above results were based on group-level analyses. To determine the robustness of these we reran the analyses on the individual level by recoding the individuals' parents' nationality with the appropriate national IQ and national color values. This process resulted in each individual being assigned a maternal national IQ, a paternal national IQ, a maternal national color score, and a paternal national color score. The mother and father values were then averaged. The correlational results for averaged parent National IQs, averaged parent National skin color values, student test scores, student GPAs, and student skin color values, split by generation, are shown below in Table 10 (with the U.S. excluded as before). Spearman correlation was included (below the diagonal) as, for many of the variables, parametric assumptions were violated.

These correlations were statistically significant yet lower than the ones reported above. The lower values resulted from the attenuating effect of using individual level data. The magnitude of this attenuating effect can be judged by comparing the individual level national - student skin color scores with the group level ones. Corrected for this attenuation, the individual level associations are more or less commensurate with the groups level ones.

9 General discussion and conclusion

Based on these results, we can answer all of our research questions in the affirmative. As such, we have found more support for both the spatial and generational transferability hypotheses. We say "support for" and not "proof of" as the survey and method used do not allows us to directly test these hypotheses. Regarding the generational transferability hypothesis, we were unable to look at the association between national IQs and the performance of third (or more) generation immigrants. Regarding the spatial transferability hypothesis, we were unable to show that

Table 9: Results from analysis 4a.

Control Variables		Gen1test	Gen2test	Gen12test
Selection	LV2012NIQ	.528	.503	.540
	df	55	72	77
	ANT2013AQ	.561	.378	.507
	df	44	61	61
	NGMAT	.567	.382	.523
	df	55	72	79

Table 10: Results from analysis 5.

Generation 1: Individual level					
	LV2012NIQ	NationalSkin Reflect	Gen1test	log10GPA	log10color
LV2012NIQ	1.00	.766	.308	.126	.436
N		569	444	330	571
NationalSkin Reflect	.847	1.00	.230	.127	.538
N	569		442	329	569
Gen1test	.298	.270	1.00	.319	.154
N	444	442		305	471
GPA	.120	.086	.302	1.00	.111
N	330	329	305		356
log10color	.411	.455	.135	.092	1.00
N	571	569	471	356	
Generation 2: Individual level					
	LV2012NIQ	NationalSkin Reflect	Gen1test	log10GPA	log10color
LV2012NIQ	1.00	.755	.267	.151	.367
N		1335	1073	809	1339
NationalSkin Reflect	.849	1.00	.176	.119	.504
N	1335		1073	808	1337
Gen1test	.230	.152	1.00	.381	.277
N	1073	1073		1768	2605
GPA	.120	.097	.399	1.00	.195
N					
log10color	.354	.420	.253	.183	1.00
N	1339	1337	2605	2029	

the migrant cognitive ability differences were truly in general intelligence. We could merely show that they predict outcomes as individual level general ability differences would be expected to. It needs to be noted, though, that non-general cognitive ability differences have also been found to be predictive of outcomes such as GPA [20]; as such, we can not rule out the possibility that our migrant cognitive ability differences represent non-g differences of the predictive sort. Future analyses will have to address these two limitations.

In the sample analyzed, national IQs predicted migrant tests scores and GPA; the association does not seem to be explainable in terms of migrant unrepresentativeness with regards to ethnicity or human capital. As we found that migrant selectivity substantially moderated the association between national cognitive ability and migrant cognitive ability, future analyses should attempt to take into account migrant selectivity. We demonstrated one method by which this could be done.

We further note that NLSF is a selected sample for cognitive ability and so there is restriction of range. We did not correct for this because we did not know how strong the restriction was. This restriction of range attenuates the correlations reported here.

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Detailed methods and data

Detailed methods and data can be found in the supplementary material.

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