Estimates of Multiple Intelligences: A Study in Poland

Adrian Furnham[1], Agata Wytykowska[2], and K.V. Petrides[3]

[1]University College London, UK, [2]Warsaw School of Social Psychology, Poland
[3]Institute of Education, University of London, UK

Abstract. Participants from Poland ($N = 258$) provided estimates of their own, their parents', and their grandparents' general and multiple intelligences. Males gave higher self-estimates than females on general, spatial, and musical intelligence. There was evidence of perceived generational differences in estimates of general intelligence, with participants rating themselves slightly higher than their parents, and their parents slightly higher than their grandparents. Regression analyses showed that the most consistent predictors of estimated general intelligence were verbal, mathematical, and intrapersonal intelligence. A comparison between Polish and British ($N = 185$) data revealed interesting cultural effects, primarily concerning father and mother estimates. Overall, the results were broadly in line with those of other studies, although several cultural differences are noted and discussed.

Keywords: multiple intelligences, self-estimated intelligence, cross-cultural, Poland

This study looks at self-estimated intelligence, an area that has received much attention over the past 10 years (e.g., Beloff, 1992; Bennett, 1997; Betsworth, 1999; Chamorro-Premuzic, Furnham, & Moutafi, 2004; Furnham, 2000, 2001; Furnham & Chamorro-Premuzic, 2004; Hogan, 1978; Paulhus, Lysy, & Yik, 1998; Reilly & Mulhern, 1995). This research has uncovered a robust empirical finding, viz., that females tend to provide lower self-estimates than males (Byrd & Stacey, 1993; Furnham & Gasson, 1998; Furnham, Fong, & Martin, 1999a; Petrides, Furnham, & Martin, 2004; Rammstedt & Rammsayer, 2002). This area of research is seen as important because it has been demonstrated that beliefs about intelligence have systematic motivational and behavioral consequences (Dweck, 2000). Further it has been suggested that self-estimated intelligence can have self-fulfilling effects in relation to examination performance (Chamorro-Premuzic & Furnham, 2004).

Hogan (1978, 1980) reported a series of studies, half of which showed a statistically significant male-favoring difference in IQ self-estimates. He also found that most participants attributed higher IQ scores to their fathers than their mothers. Hogan contended that the tendency of females to perceive themselves as less intelligent than males is due to their denial of intellectual equality, which was, at that time, socially rewarded. Beloff (1992) offered a similar interpretation for her finding, based on a sample of 767 Scottish students, that women tend underestimate their intelligence while men to overestimate it. She proposed that females receive "modesty training" during their upbringing, which emphasizes humility, and which results in them having a poorer intellectual self-image relative to males.

Similar studies looking at estimates of parental, grandparental, and sibling IQs tend to show that lay people believe that their fathers are more intelligent than their mothers (Byrd & Stacey, 1993; Furnham, Shahidi, & Baluch, 2002), their grandfathers more intelligent than their grandmothers (Furnham & Rawles, 1995), and their brothers more intelligent than their sisters (Furnham et al., 1999a). Overall, people seem to perceive every generation about a third of a standard deviation more intelligent than the last.

In addition to research focusing exclusively on intelligence estimates, there have also been studies examining the relationship between self-estimated and psychometrically measured IQ (Borkenau & Liebler, 1993; Furnham & Rawles, 1999; Paulhus et al., 1998; Reilly & Mulhern, 1995). The results show that the correlations between them are typically in the range of $r = 0.15$ to $r = 0.30$, but can sometimes be as high as $r = 0.49$ (Chamorro-Premuzic et al., 2004).

A number of related studies have looked at estimates of specific types of intelligence, like emotional intelli-

DOI 10.1027/1016-9040.10.1.51

gence (Petrides & Furnham, 2000; Petrides et al., 2004) and the multiple intelligences (Furnham et al., 1999a; Furnham, Rakow, Sarmany-Schiller, & De Fruyt, 1999b). Gardner (1983) initially identified seven forms of intelligence, which, he argued, every normal individual should develop to some extent. The "object-related" forms include logical-mathematical (the ability to reason logically and solve numerical problems), spatial (the ability to navigate the environment and to form and manipulate mental images) and bodily-kinesthetic intelligence (the ability to carry out motor movement and to express oneself through movement). The "object-free" forms include verbal (linguistic ability) and musical intelligence (the ability to perceive and create pitch and rhythm patterns). Finally, the two "personal" forms include *inter*personal (the ability to understand the behavior, thoughts, and feelings of others) and *intra*personal (the ability to understand oneself and to develop a sense of identity) intelligence. More recently, studies have examined self-estimates of primary mental abilities, as defined by IQ test constructors (Furnham & Crawshaw, 2002; Rammstedt & Rammsayer, 2000, 2001, 2002). The results from these studies suggest that the overall gender difference in estimated IQ is largely due to differences in the two specific facets of mathematical and spatial intelligence. In order to test the cross-cultural robustness of these findings, studies have been conducted in many countries across the world, including Argentina, Belgium, Germany, Japan, Slovakia, and Iran (see Table 1 for full list and details). These studies have revealed both gender and cultural differences, but few interactions between the two.

Most research in the area is based on student samples, although schoolchildren and nonstudent adults have also been surveyed (e.g., Furnham, 2000; Furnham & Petrides, 2004). With few exceptions, two consistent findings have emerged from these studies. First, males give higher self-estimates than females and, second, the gender differences tend to be more pronounced in estimates of mathematical and spatial intelligence. However, several interesting cultural differences have emerged. Some studies, notably from Africa (e.g., Furnham & Akande, 2003) and Eastern Europe (Furnham et al., 1999b), have not revealed any significant gender differences in self-estimated intelligence. Moreover, there appear to be significant cultural differences in the average (mean) scores attributed to self. For example, studies from Africa show less-educated mothers giving themselves relatively high scores (over 1.5 standard deviations above the norm), while studies from Asia show well-educated parents and students giving themselves considerably lower scores (less than half a standard deviation above the norm).

This is only the second study presenting data from Eastern Europe and the first to be conducted in Poland.

Table 1. Self-estimated intelligence studies.

	Country	Reference
1.	America	Furnham, Fong, & Martin (1999); Hogan (1978)
2.	Argentina	Furnham & Chamorro-Premuzic (2005)
3.	Belgium	Furnham, Rakow, Sarmany-Schiller, & De Fruyt (1999b)
4.	China	Zhang & Gong (2001)
5.	Egypt	Furnham & Mottabu (2004)
6.	Germany	Rammstedt & Rammsayer (2000, 2001, 2002)
7.	Great Britain	Beloff (1992); Furnham (2000); Furnham & Rawles (1995, 1999)
8.	Hong Kong	Furnham, Rakow & Mak (2002)
9.	Iran	Furnham, Shahidi & Baluch (2002)
10.	Japan	Furnham, Hosoe & Tang (2002)
11.	Namibia	Furnham & Akande (2004)
12.	New Zealand	Byrd & Stacey (1993); Furnham & Ward (2001)
13.	Singapore	Furnham & Fong (2000)
14.	Slovakia	Furnham, Rakow, Sarmany-Schiller, & De Fruyt (1999b)
15.	South Africa	Furnham & Mkize (2004)
16.	Uganda	Furnham & Baguma (1999)
17.	Zimbabwe	Furnham & Akande (2004)
18.	Zambia	Furnham & Akande (2004)

Based on the existing literature, the following hypotheses were advanced:

- H_1: Males will give higher self-estimates than females on general, mathematical, and spatial intelligence.
- H_2: Participants will rate themselves higher than their parents and grandparents on general intelligence.
- H_3: Verbal, mathematical, and spatial intelligence will be significant predictors of general intelligence.
- H_4: Test experience, gender, and age will be statistically significant predictors of general intelligence.

Method

Participants

A total of 258 individuals took part, of whom 152 were female and 106 male. The average age for the sample was 21.98 years ($SD = 2.73$ years). Most were single (65.9%), with 27.5% "living together," and 5% married. The majority of the sample had attended secondary school (90%), and the rest had attended technical school.

Questionnaire

Participants completed a one-page questionnaire, which included a copy of an IQ bell curve spanning six standard deviations (–3 to +3) and brief descriptions of the anchor scores (e.g., 55 "mild retardation," 100 "average," 145 "gifted"). Subsequently, they were shown a grid with 8 rows and 5 columns. The first row was labeled "general intelligence" and the remaining seven were labeled according to Gardner's (1983) multiple intelligences, each of which was presented with a brief description. The columns requested participants to rate themselves as well as their father, mother, grandfather, and grandmother. As many participants had two grandmothers and/or two grandfathers, they were asked to rate the ones with whom they were most familiar. Thus, each participant was requested to provide 40 estimates in total. In the last part of the questionnaire, participants were asked the following three questions: "Do you believe one can learn to become more intelligent" (27% of the sample said yes), "Have you ever taken an intelligence test" (51% said yes), and "Do you think intelligence tests measure intelligence fairly well" (55% said yes).

Procedure

Participants were undergraduate student volunteers from four different departments (demography, management and marketing, political science, and biology) at the University of Lodz. They completed the questionnaire in class over a period of approximately 30 minutes.

Results

Gender Differences

A MANOVA was computed over each of the five sets of estimates, followed by ANOVAs for the general score as well as for each of the seven multiple intelligences. The only MANOVA to reach statistically significant levels was that concerning self-estimated scores. As can be seen in Table 2, the follow-up ANOVAs revealed that males gave significantly higher estimates on general, spatial, and musical intelligence. These results partially confirm the first hypothesis (H_1).

Table 3. Sidak post-hoc tests for all pair-wise comparisons of general IQ estimates.

Comparison	Mean difference (Sidak post-hoc tests)
Self vs Father	2.65*
Self vs Mother	3.78**
Self vs Grandfather	10.99**
Self vs Grandmother	12.79**
Father vs Mother	1.13
Father vs Grandfather	8.34**
Father vs Grandmother	10.14**
Mother vs Grandfather	7.21**
Mother vs Grandmother	9.01**
Grandfather vs Grandmother	1.80

*$p < .05$, **$p < .001$

Table 2. MANOVA and ANOVA results for self, parent, and grandparent estimates.

	Self			Father			Mother			Grandfather			Grandmother		
	F	*M*	Anova	*F*	*M*	Anova	*F*	M	Anova	*F*	*M*	Anova	*F*	*M*	Anova
General	113.7	117.1	5.69*	111.8	112.7	0.49	110.1	113.1	3.76	102.6	106.4	4.89*	101.7	102.2	0.10
Verbal	109.8	107.2	1.47	106.3	105.7	0.78	106.8	108.9	1.51	99.7	100.5	0.16	98.7	97.6	0.45
Math	114.7	115.4	0.16	111.4	108.6	1.69	103.7	103.5	0.05	99.3	100.2	0.22	94.1	94.8	0.12
Spatial	109.4	114.5	8.35**	115.5	116.2	0.13	104.1	103.5	0.11	103.8	105.3	0.57	98.1	96.5	0.76
Musical	106.3	111.2	5.71*	101.2	99.6	0.78	104.8	104.2	0.78	97.4	99.2	0.92	98.5	98.5	0.02
Bodily-K	111.8	114.3	1.72	104.5	104.5	0.00	106.2	107.7	0.75	98.6	99.3	0.14	99.7	98.2	0.73
Inter P	113.6	114.9	0.65	103.7	103.5	0.01	110.0	112.5	1.40	99.5	100.5	0.40	103.6	104.3	0.14
Intra P	111.9	114.0	3.17	106.7	108.2	0.66	109.5	111.9	2.38	100.9	101.5	0.11	103.3	102.6	0.13
Wilks' λ		2.66**			.90			.86			.18			.67	

*$p < .05$, **$p < .01$

Table 4. Zero-order correlations between the eight estimates for the five rating targets.

	O	V	M	S	Mu	Bk	Ie
Self							
Overall (O)							
Verbal (V)	.51						
Math (M)	.66	.44					
Spatial (S)	.48	.24	.41				
Musical (Mu)	.18	.01	.15	.15			
Bodily-K (Bk)	.33	.15	.29	.24	.45		
Inter-P (Ie)	.37	.39	.23	.22	.09	.19	
Intra-P (Ia)	.46	.27	.39	.28	.11	.20	.38
Father							
Overall (O)							
Verbal (V)	.71						
Math (M)	.68	.57					
Spatial (S)	.49	.41	.52				
Musical (Mu)	.24	.26	.10	.09			
Bodily-K (Bk)	.30	.32	.24	.28	.36		
Inter-P (Ie)	.45	.50	.33	.30	.33	.46	
Intra-P (Ia)	.55	.47	.40	.40	.27	.30	.58
Mother							
Overall (O)							
Verbal (V)	.64						
Math (M)	.60	.49					
Spatial (S)	.50	.40	.57				
Musical (Mu)	.34	.32	.29	.37			
Bodily-K (Bk)	.33	.22	.23	.36	.45		
Inter-P (Ie)	.41	.28	.22	.28	.22	.44	
Intra-P (Ia)	.54	.39	.38	.42	.33	.41	.53
Grandfather							
Overall (O)							
Verbal (V)	.73						
Math (M)	.68	.73					
Spatial (S)	.52	.56	.64				
Musical (Mu)	.45	.51	.50	.53			
Bodily-K (Bk)	.45	.41	.38	.45	.53		
Inter-P (Ie)	.41	.35	.38	.36	.44	.53	
Intra-P (Ia)	.47	.46	.46	.43	.44	.49	.66
Grandmother							
Overall (O)							
Verbal (V)	.68						
Math (M)	.63	.66					
Spatial (S)	.55	.49	.51				
Musical (Mu)	.41	.46	.48	.47			
Bodily-K (Bk)	.33	.34	.29	.38	.50		
Inter-P (Ie)	.45	.38	.38	.48	.42	.45	
Intra-P (Ia)	.51	.48	.42	.51	.50	.46	.53

$.17 > r > .12$, $p < .05$; $r > .17$, $p < .01$

Table 5. Regression of general IQ on the seven multiple intelligences for self, parent, and grandparent estimates.

	Self		Father		Mother		Grandfather		Grandmother	
	β	*t*	β	*t*	β	*t*	β	*t*	β	*t*
Verbal	.21	4.25***	.39	7.87***	.37	7.47***	.44	6.68***	.37	6.25***
Math	.38	7.59***	.33	6.79**	.27	5.04***	.27	3.99***	.24	3.99***
Spatial	.20	4.25***	.07	1.62	.07	1.29	.03	0.43	.16	2.86**
Musical	.02	0.46	.04	1.14	.02	0.51	–.03	0.02	–.05	0.95
Bodily-K	.08	1.77	.00	.00	.02	0.43	.11	1.89	.00	0.05
Inter-P	.07	1.63	.00	.12	.12	2.43*	.07	1.17	.10	1.84
Intra-P	.15	3.19**	.20	4.01***	.18	3.43**	.05	0.82	.13	2.26*
F		50.15***		69.28***		51.69***		48.97***		46.74***
R^2_{adj}		0.57		0.65		0.58		0.59		0.56

*$p < .05$, **$p < .01$, ***$p < .001$

Table 6. Regression of general IQ self-estimates on background predictors.

	β	*t*
Can you learn to become intelligent?	.00	0.03
Have you ever taken an intelligence test?	.26	4.27***
Do you believe they measure intelligence fairly well?	–.01	0.15
Gender	–.14	2.21*
Age	.02	0.33

Note. $F_{(5, 252)} = 4.96$***, $R^2_{adj} = 0.07$. *$p < .05$, **$p < .01$, ***$p < .001$

Generation Differences

A one-way repeated-measures ANOVA was performed, with general IQ estimates for self, father, mother, grandfather, and grandmother as the five levels of the within-subjects factor. This was significant, as expected; $F(4, 908) = 87.20$, $p < .01$. Sidak post-hoc tests indicated that participants believed they were significantly brighter than their father (2.65 IQ points), their mother (3.78 IQ points), their grandfather (10.99 IQ points), and their grandmother (12.79 IQ points). They also rated their fathers as more intelligent than their grandfathers (8.34 IQ points) and their mothers as more intelligent than their grandmothers (9.01 IQ points). These results are summarized in Table 3 and are in line with hypothesis 2 (H_2).

Multiple Intelligence Predictors of General Intelligence Self-Estimates

First zero-order correlations were computed for each rated person. The results are shown in Table 4. Subsequently, five multiple regressions were performed, whereby general IQ estimates for self, father, mother, grandfather, and grandmother were regressed on the seven multiple intelligences. The results of the five regressions are shown in Table 5 and are fairly consistent. Verbal and mathematical intelligence were significant predictors in all five equations, with intrapersonal and spatial intelligence also reaching significance levels in some equations. These results partially confirm the third hypothesis. Musical and bodily-kinesthetic intelligence were not significant predictors in any regression. The amount of variance accounted for in the various equations was between 56% and 65%.

Background Predictors of General Intelligence Self-Estimates

General intelligence self-estimates were regressed on gender, age, and the three questions about intelligence (see method section). Table 6 summarizes the results and shows that participants who had previously taken an intelligence test gave overall higher IQ self-estimates than those who had never been tested. In the presence of the other variables in the equation, gender was a statistically significant predictor, with males providing higher self-estimates than females. With the exception of the finding on age, these results support hypothesis 4. In addition, they highlight the robustness of the male-favoring difference in general IQ self-estimates, which persists even after controlling for prior test experience and age.

Comparison of Polish and British Data

Data from Furnham, Shahidi, and Baluch (2002) were used for a cross-cultural comparison between British and Polish participants. The British sample comprised 185 participants, 129 of whom were female. Table 7 presents the means, F ratios, and significance levels for a series of 2 × 2 ANOVAs, with gender and country of origin

Table 7. Summary of two-way ANOVA results for self, father, and mother with gender and country of origin (Poland vs. Britain) as independent variables.

	Polish		British		*F* level		
	Female	Male	Female	Male	Gender	Country of origin	S × C
Self-estimates							
Verbal	109.8	107.8	109.3	113.0	0.29	2.28	3.48
Math	119.7	115.4	105.4	116.4	13.32***	6.94**	10.26**
Spatial	109.3	114.5	104.3	113.6	20.29***	3.49	1.68
Music	106.2	111.1	100.0	111.1	16.85***	2.18	2.09
Bodily-K	111.8	114.3	104.3	110.0	5.73*	12.15**	0.91
Inter-P	113.6	114.9	113.3	120.3	7.81**	2.79	3.69
Intra-P	111.1	114.0	111.0	116.0	7.30**	0.47	0.57
Father							
Verbal	106.3	105.7	108.3	109.8	0.11	3.75	0.47
Math	111.7	108.6	103.2	103.2	0.33	22.07***	1.43
Spatial	115.5	116.2	103.4	104.7	0.55	80.71***	0.06
Music	101.2	99.6	99.3	105.7	2.86	2.18	7.85**
Bodily-K	104.5	104.5	101.1	103.6	0.60	3.01	0.59
Inter-P	103.7	103.5	111.4	112.9	0.27	40.23***	0.44
Intra-P	106.7	108.2	109.8	110.8	0.81	4.17*	0.47
Mother							
Verbal	106.8	108.9	102.5	112.1	11.86**	0.10	4.68*
Math	103.4	103.6	103.7	115.1	9.82**	9.32**	10.29**
Spatial	104.1	103.5	105.4	115.8	8.41**	15.80***	10.59**
Music	104.8	104.2	95.1	104.2	7.46**	7.31**	9.27**
Bodily-K	106.3	107.7	95.5	107.5	13.17***	17.30***	7.29**
Inter-P	110.1	112.5	98.2	112.5	7.96**	27.21***	2.08
Intra-P	109.6	111.9	102.9	119.1	1.32	24.66***	0.27

*$p < .05$, **$p < .01$, ***$p < .001$

(Poland versus Britain) as the independent variables. With respect to self-estimates, there were six significant gender effects, all showing higher scores for males. There were also six significant gender effects in mother ratings, all showing that male participants gave higher ratings to their mothers than female participants.

Country of origin had a greater impact on father and, especially, mother estimates, than on self-estimates (see Table 7). For father estimates, Polish participants gave higher ratings on mathematical and spatial intelligence and lower ratings on interpersonal and intrapersonal intelligence compared to their British counterparts. The opposite pattern of results was obtained for mother estimates, where British participants gave higher ratings for mathematical and spatial intelligence, but lower ratings for most other types of intelligence.

There were seven significant interactions in the data. For self-ratings, there was an interaction on logical intelligence, with Polish females, but not males, having significantly higher scores than their British counterparts (M_P = 114.76 versus M_B = 105.22). For father ratings, the only significant interaction concerned musical intelligence, where male British participants had a higher mean than their Polish peers (M_B = 105.7 versus M_P = 99.65), but female British participants had a slightly lower mean than their Polish peers (M_B = 101.22 versus M_P = 99.35). Five of the seven interactions were observed in mother ratings. In all cases, as can be seen in Table 7, the interactions arose from the fact that there were strong differences on the British, but not the Polish, sample, with males giving higher ratings than females.

Discussion

As has been found in studies from many other countries, males gave higher self-estimates than females on general and mathematical intelligence. Only one study from New Zealand (Byrd & Stacey, 1993) and another from Slovakia (Furnham, et al., 1999b) failed to find a signif-

icant sex difference in overall self-rated IQ scores. In the present study, the robust difference on self-estimated mathematical intelligence did not emerge in the Polish sample. There was also an unexpected male-favoring difference on self-estimated musical intelligence. Nevertheless, most results were in line with extant findings in the literature. Thus, two studies in Scotland showed differences of around 7 IQ points between men and women: (Beloff, 1992: Males = 126.9, Females = 120.5; Bennett, 1996: Males = 117.1, Females = 109.4), whereas two studies in England showed slightly smaller differences (Furnham & Rawles, 1995: Males = 123.3, Females = 118.4; Furnham & Rawles, 1999; Males = 120.5, Females = 116.6). The difference in the present study was toward the lower end of the spectrum (3.5 points), albeit still statistically significant.

On average, Polish participants believed they were about 3 IQ points brighter than their fathers, 4 points brighter than their mothers, 11 points brighter than their grandfathers, and 13 points brighter than their grandmothers. This trend has been found in previous studies and the means for grandparents are almost identical to those reported in Furnham (2000). Overall, Polish students seemed to give lower parental estimates than UK students, which may be a reflection of post-war education in Poland as experienced by this particular generation.

Previous studies have sought to determine via regression analysis which of Gardner's (1983) seven multiple intelligences are the best predictors of general IQ self-estimates. Mathematical, spatial, and verbal estimates tend to be the main significant predictors in these regressions (Furnham, Tang, Lester, O'Connor, & Montgomery, 2002). As expected, all five regressions on the Polish sample were statistically significant (accounting for between 0.56% and 0.65% of the variance; see Table 5). Also in line with previous findings, verbal and mathematical intelligence were significant predictors of self-estimated IQ in all five regressions, while bodily-kinesthetic intelligence did not reach significance levels in any of the equations. Certain findings, however, are at odds with the literature. Thus, spatial intelligence was a significant predictor of general IQ estimates only in the regressions of self and grandmother, while intrapersonal intelligence was an unexpected predictor of general IQ in every regression except that of grandfather. The low beta weights for spatial intelligence in the estimates of father, mother, and grandfather may be attributable to the fairly high correlations between spatial and mathematical intelligence (see Table 4). It is worth noting that the strongest correlations between spatial and mathematical intelligence were in the mother and grandfather ratings.

A finding that has not been observed before concerned the role of intrapersonal intelligence in the prediction of the overall intelligence self-estimate. Previous studies (e.g., Furnham et al., 2002) have shown that mathematical and, to a lesser extent, spatial intelligence are strong predictors of the overall score, in contrast to the two personal intelligences that rarely reach significance levels. Polish participants were atypical in perceiving such a strong relationship between general cognitive and the ability to understand one's own self.

The cross-cultural comparison of the Polish and British data revealed many significant main effects and interactions. Most effects of country of origin were observed in father and mother estimates. More specifically, father estimates of mathematical and spatial intelligence were much higher in the Polish than the British sample. In contrast, estimates of interpersonal and intrapersonal intelligence were lower. The opposite pattern of results was observed in mother estimates, with the Poles rating their mothers lower on mathematical and spatial intelligence than the British, but higher on musical, bodily-kinesthetic, interpersonal, and intrapersonal intelligence. Interestingly, Petrides et al. (2004) showed that people tend to perceive psychometric intelligence as masculine and emotional intelligence as feminine. The present results suggest that Poles, more so than the British, embrace the stereotypical perception of "hard," analytic skills as masculine and "soft," social skills as feminine.

Some of the foregoing findings must be qualified in light of a number of significant interactions involving gender. With respect to self-estimates, there was only one statistically significant interaction in the data. It concerned logical-mathematical intelligence, where there was a pronounced male-favoring difference only in the British data. The corresponding difference in the Polish data was negligible. In other words, the Polish data did not manifest the well-established male-hubris/female humility effect, whereby males tend to provide higher estimates on certain types of intelligence, including general, mathematical, and spatial intelligence (Furnham, 2001). In addition, there was a marginally significant interaction in self-estimates of verbal intelligence, with a female-favoring difference in the Polish data and a male-favoring difference in the British data. There was also another marginally significant interaction, concerning interpersonal intelligence, where British males gave much higher self-estimates than British females, in contrast to the Polish data, which showed no such difference.

As regards parent estimates, five out of seven significant interactions concerned mother ratings. While male Britons gave much higher estimates of verbal, mathematical, spatial, musical, and bodily-kinesthetic intelligence than their female counterparts, the corresponding differences in the Polish sample were negligible. The only two cases where there were no interactions in the mother data concerned the personal intelligences (intra-

personal and interpersonal). In both these cases, Polish participants, irrespective of gender, rated their mothers higher than their British counterparts rated theirs. It is interesting to note that the two personal intelligences involve types of skills in which females are thought to outperform males (e.g., relationship skills; Argyle, 1990). This pattern of findings suggests that Poles perceive Gardner's (1983) personal intelligences, which are about understanding one's own and other people's emotions, intentions, and motivations, as traits of a feminine nature. Last, with respect to father ratings, there was only one interaction concerning musical intelligence. British females rated their fathers much lower than British males rated theirs, in contrast to Polish females who gave slightly higher estimates compared to Polish males.

It should be acknowledged that cross-cultural studies such as the one presented here have certain kinds of limitations. In order to ensure meaningful comparisons, it is important to have culturally invariant questionnaires and matched participants, otherwise any differences found could be attributable to confounding variables. In the present case, it is possible that differences between the two samples in variables that were not part of the design (e.g., socioeconomic status, parental education) may have had an impact on the results. While it is not immediately clear precisely which confounding variables may have affected the analyses, the best way to establish the robustness of these results is by means of a replication study. In addition, it would be worthwhile to attempt systematically to vary the possible sources of cultural differences by employing samples from a larger number of specially selected countries and regions.

The results of this study show that many, albeit not all, of the standard gender differences in estimates of intelligence emerge in Poland too. This highlights the robustness of certain effects, such as the male-favoring differences in general and spatial intelligence, which have been noted in many different countries and continents (Furnham, 2001). However, other findings, like the male-favoring differences on mathematical intelligence, were not replicated on this sample. More data from Poland and other similar countries could help establish the replicability of these findings and determine whether there exist broad dimensions of difference between Eastern and Western European societies in perceptions and beliefs about intelligence.

References

Argyle, M. (1990). *The psychology of interpersonal behavior.* Harmondsworth, UK: Penguin.

Beloff, H. (1992). Mother, father, and me: Our IQ. *The Psychologist, 5*, 309–311.

Bennett, M. (1997). Self-estimates of ability in men and women. *Journal of Social Psychology, 137*, 540–541.

Betsworth, D. (1999). Accuracy of self-estimated abilities and the relationship between self-estimated abilities and realism for women. *Journal of Career Assessment, 1*, 35–43.

Borkenau, P., & Liebler, A. (1993). Convergence of stranger ratings of personality and intelligence with self-ratings, partner-ratings, and measured intelligence. *Journal of Personality and Social Psychology, 65*, 546–533.

Byrd, M., & Stacey, B. (1993). Bias in IQ perception. *The Psychologist, 6*, 16.

Chamorro-Premuzic, T., & Furnham, A. (2004). A possible model for understanding the personality-intelligence interface. *British Journal of Psychology, 95* 249–264.

Chamorro-Premuzic, T., Furnham, A., & Moutafi, T. (2004). The relationship between estimated and psychometric personality and intelligence scores. *Journal of Research in Personality, 38,* 505–531.

Dweck, C. (2004). *Self-theories: Their role in motivation, personality, and development.* Philadelphia: Psychology Press.

Furnham, A. (2000). Parent's estimates of their own and their children's multiple intelligences. *British Journal of Developmental Psychology, 18*, 583–594.

Furnham, A. (2001). Self-estimates of intelligence: Culture and gender differences in self and other estimates of General (g) and Multiple Intelligences. *Personality and Individual Differences, 31*, 1381–1405.

Furnham A., & Akande A. (2003). African parents' estimates of their own and their children's multiple intelligences. *Current Psychology, 22,* 281–294.

Furnham, A., & Baguma, P. (1999). A cross-cultural study from three countries of self-estimates of intelligence. *North American Journal of Psychology, 1*, 69–78.

Furnham, A., & Chamorro-Premuzic, T. (2003). Estimating one's own personality and intelligence scores. *British Journal of Psychology, 95,* 149–160.

Furnham, A., & Chamorro-Premuzic, T. (2005). Estimating one's own and one's relative's multiple intelligence: A study from Argentina. *Spanish Journal of Psychology.* In press.

Furnham, A., & Crawshaw J. (2002). School children's estimation of their own and their parents' WISC scores. *Psychologia, 45,* 54–67.

Furnham, A., & Fong, G. (2000). Self-estimated and psychometrically measured intelligence: A cross-cultural and sex difference study. *North American Journal of Psychology, 2*, 191–199.

Furnham, A., Fong, G., & Martin, N. (1999a). Sex and cross-cultural differences in the estimated multi-faceted intelligence quotient score for self, parents and siblings. *Personality and Individual Differences, 26*, 1025–1034.

Furnham, A., & Gasson, L. (1998). Sex differences in parental estimates of their children's intelligence. *Sex Roles, 38*, 151–162.

Furnham, A., Hosoe, T., & Tang, T. (2002). Male hubris and female humility? A cross-cultural study of ratings of self, parental, and sibling multiple intelligence in America, Britain, and Japan. *Intelligence, 30*, 101–115.

Furnham, A., & Mkize, N. (2003). Zulu mothers' beliefs about their own and their children's intelligence. *Journal of Social Psychology, 143,* 83–94.

Furnham, A., & Mottabu, R. (2003). Sex and culture differences

in the estimates of general and multiple intelligence: A study comparing British and Egyptian students. *Individual Differences Research, 2,* 82–96

Furnham, A., & Petrides, K.V. (2004). Parental estimates of five types of intelligence. *Australian Journal of Psychology, 56,* 10–17.

Furnham, A., Rakow, T., & Mak, T. (2002). The determinants of parents' beliefs about the intelligence of their children: A study from Hong Kong. *International Journal of Psychology, 37,* 343–352.

Furnham, A., Rakow, T., Sarmany-Schiller, I., & De Fruyt, F. (1999b). European differences in self-perceived multiple intelligences. *European Psychologist, 4,* 131–138.

Furnham, A., & Rawles, R. (1995). Sex differences in the estimation of intelligence. *Journal of Social Behavior and Personality, 10*, 741–745.

Furnham, A., & Rawles, R. (1999). Correlations between self-estimated and psychometrically measured IQ. *Journal of Social Psychology, 139*, 405–410.

Furnham, A., Shahidi, S., & Baluch, B. (2002). Sex and culture differences in perceptions of estimated multiple intelligences for self and family: A British-Iranian comparison. *Journal of Cross-Cultural Psychology, 33*, 270–285.

Furnham, A., & Ward, C. (2001). Sex differences, test experience, and the self-estimation of multiple intelligence. *New Zealand Journal of Psychology, 30*, 52–59.

Gardner, H. (1983). *Frames of mind: A theory of multiple intelligences*. New York: Basic Books.

Hogan, H. (1978). IQ self-estimates of males and females. *Journal of Social Psychology*, *106*, 137–138.

Hogan, H. (1980). German and American authoritarianism, self-estimated intelligence, and value priorities. *Journal of Social Psychology, 111,* 145–146.

Paulhus, D., Lysy, D,. & Yik, M. (1998). Self-report measures of intelligence: Are they useful as proxy IQ tests. *Journal of Personality, 66*, 523–555.

Petrides, K.V., & Furnham, A. (2000). Gender differences in measured and self-estimated trait emotional intelligence. *Sex Roles, 42*, 449–461.

Petrides, K.V., Furnham, A., & Martin, G.N. (2004). Estimates of emotional and psychometric intelligence: Evidence for gender-based stereotypes. *Journal of Social Psychology, 144,* 149–162.

Rammstedt, B., & Rammsayer, T. (2000). Sex differences in self-estimates of different aspects of intelligence. *Personality and Individual Differences, 29*, 869–880.

Rammstedt, B., & Rammsayer, T. (2001). Gender differences is self estimated intelligence in children and early adolescents. *German Journal of Educational Psychology, 15*, 207–217.

Rammstedt, B., & Rammsayer, T. (2002). Self-estimated intelligence: Gender differences, relationship to psychometric intelligence, and moderating effects of level of education. *European Psychologist, 7*, 275–284.

Reilly, J., & Mulhern, G. (1995). Gender difference in self-estimated IQ: the need for care in interpreting group data. *Personality and Individual Differences, 18*, 189–192.

Sternberg, R.J. (1996). *Successful intelligence.* New York: Simon & Schuster.

Zhang, Y., & Gong, Y. (2001). Self-estimated intelligence and its related factors. *Chinese Journal of Clinical Psychology, 9*, 193–195.

About the author

Adrian Furnham is Professor of Psychology at University College London, where he has taught for over 20 years. He has written 40 books and 500 peer-reviewed journal articles and is currently president of the International Society for the Study of Individual Differences (ISSID).

Address for correspondence

Professor A. Furnham
Department of Psychology
University College London
26 Bedford Way
London WC1H OAP
UK
Tel. +44 20 7679-5395
Fax +44 20 7436-4276
E-mail a.furnham@ucl.ac.uk

