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Parental estimates of five types of intelligence

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Abstract
British adults ($N = 239$) provided estimates of their own and their children's general, emotional, analytic, creative, and practical intelligence. Men (fathers) rated their own levels of analytic and practical intelligence significantly higher than women (mothers) rated theirs. In contrast, women rated their emotional intelligence significantly higher than men. Two-way ANOVAs (gender of parent by gender of child) on the estimates of the five types of intelligence showed that fathers tended to give higher estimates than mothers for their first child's general, analytic, and creative intelligence. There were no significant effects for second-born children. The ANOVAs indicated that parents rated their third-born female children higher than their third-born male children on emotional, analytic, and practical intelligence. Explanations for these findings are discussed.

Parental estimates of five types of intelligence

The definition and measurement of intelligence remains hotly debated in psychology (Mackintosh, 1998; Sternberg, 1990). A relatively new area of research into implicit views of intelligence is concerned with self- and other-estimates of IQ (Beloff, 1992; Bennett, 1996, 1997; Furnham, 2000; Furnham & Gasson, 1998; Rammstedt & Rammsayer, 2000, 2001). Nearly all studies in this area have shown that male subjects give higher self-estimates on general intelligence and on certain specific intelligence facets (particularly mathematical and spatial) than female subjects. These findings have been cross-culturally replicated with data from across the world (Furnham, 2001; Furnham, Hosoe, & Tang, 2002), including China (Zhang & Gong, 2001), Germany (Rammstedt & Rammsayer, 2001), Hong Kong (Furnham, Rakow, & Mak, 2002), and Iran (Furnham, Shahidi, & Baluch, 2002).

Studies in which participants were asked to estimate the intelligence of their relatives (e.g., grandparents, parents, siblings) or of third persons (e.g., celebrities) have also revealed similar results, although with less pronounced differences. With respect to children, parents tend to rate their sons as brighter than their daughters (Furnham, 2000; Furnham, Reeves & Budhani, 2002). If directly or indirectly communicated to children, this may have harmful consequences, especially for girls, in terms of their self-confidence, achievement, and school subject choices (Beyer, 1999; Beyer & Bowden, 1997). It should be pointed out, however, that all studies in the area of self-estimated intelligence rely on correlational data, which do not provide a suitable basis for causal interpretations and statements.

Researchers acknowledge that parental beliefs about children's cognitive abilities are a potentially important area of research due to the effect that these beliefs can have on parental rearing styles and expectations (Goodnow, 1980; Goodnow & Collins, 1990). Dweck and Bempechat (1983) noted that although personal beliefs about intelligence may not be strongly related to actual ability, they can have pronounced behavioural and cognitive effects in academic settings. Beyer (1995, 1998, 1999) has demonstrated that perceptions of competence are intimately tied to aspirations, preference for challenging tasks, curiosity, intrinsic motivation, persistence, and task performance. Inaccurate self-perceptions may have positive or negative consequences for both genders (Mueller & Dweck, 1998; Taylor & Brown, 1988, 1994).

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Estimates of general and multiple intelligences

Research into self-estimates of general intelligence was sparked by Hogan (1978). With few exceptions (e.g., Byrd & Stacey, 1993), studies based on student samples have revealed that male subjects give higher self-estimates than female subjects, for example, 127 versus 121 (Beloff, 1992), 114 versus 105 (Reilly & Mulhern, 1995), 118 versus 112 (Furnham & Rawles, 1995), and 117 versus 109 (Bennett, 1996). Less accentuated differences in the same direction persist on adult samples too, for example, 108 versus 104 (Furnham & Gasson, 1998), and 110 versus 105 (Furnham, 2000). With respect to relatives, most studies have focused on estimates of parental general intelligence and have revealed the standard male-favouring differences, for example, 126 versus 119 (Beloff, 1992), and 125 versus 110 (Byrd & Stacey, 1993). Studies on parental estimates of children's general intelligence have shown that both parents tend to estimate the general intelligence of their sons as being higher than that of their daughters, for example, 109 versus 102 (Furnham & Gasson, 1998), and 115 versus 107 (Furnham, Reeves, & Budhani, 2002).

A related line of research has concentrated on self- and other-estimates of the multiple intelligences in Gardner (1983) (Bennett 1997, 2000; Furnham, Clark, & Bailey, 1999). These comprise, in Gardner's terminology, object-related (logical–mathematical, visuo-spatial, and bodily–kinesthetic), object-free (verbal and musical), and personal (interpersonal and intrapersonal) intelligences. This research, reviewed in Furnham (2001), has shown that the most consistent and widespread gender differences (male-favouring) are confined to estimates of logical–mathematical and visuo-spatial intelligence.

The present study

This paper attempts to replicate and extend findings from studies on parents' estimates of their own and their children's intelligences. In addition to general intelligence, the study looks at self-estimated emotional intelligence (Salovey & Mayer, 1990). Previous studies on self-estimates of emotional intelligence (Petrides & Furnham, 2000; Petrides, Furnham, & Martin, in press) have produced mixed results, with female subjects showing a tendency to give higher self-estimates than male subjects.

The study also investigates self- and other-estimates on the three dimensions of ''successful'' intelligence, as outlined by Sternberg (1996). These are based on the ''triarchic'' theory of intelligence of Sternberg (1984), which posits that human intelligence comprises three aspects, that is, componential, experiential, and contextual. The componential aspect refers to a person's ability to learn new things, to think analytically, and to solve problems. This aspect of intelligence is manifested through better performance on standard intelligence tests, which require general knowledge and ability in areas such as arithmetic and vocabulary. The experiential aspect refers to a person's ability to combine different experiences in unique and creative ways. It concerns original thinking and creativity in both the arts and the sciences. Finally, the contextual aspect refers to a person's ability to deal with practical aspects of the environment and to adapt to new and changing contexts. This aspect of intelligence resembles what lay people sometimes refer to as ''street smarts''. Sternberg (1996) popularised these concepts and refers to them as analytic, creative, and practical intelligence.

In addition to self-estimates, the study also investigates parents' estimates of their children's scores on the five types of intelligence mentioned earlier, that is, general, emotional, analytic, creative, and practical. The size of the sample allowed for analyses to be conducted for up to the third-born child. The focus of the analyses is on the effects of parental gender, children's gender, and their interactions. Based on the existing literature, the following hypotheses were advanced.

1. Fathers will give higher self-estimates for general, analytic, and practical intelligence, but lower self-estimates for emotional intelligence than mothers. With few exceptions, previous studies have demonstrated that male subjects of different ages and nationalities give higher general intelligence self-estimates than female subjects (Furnham, 2001). Furthermore, studies on multiple intelligences suggest that male subjects also give higher self-estimates on logical/analytical and dextrous/practical intelligence (Furnham, Crawshaw, Rawles, & Spencer-Bowdage, in press). In contrast, studies on emotional intelligence suggest that female subjects tend to give higher self-estimates than male subjects (Petrides et al., in press).
2. Self-estimated analytic intelligence will be the strongest incremental predictor of self-estimates of general intelligence. This hypothesis is based on the fact that the analytic intelligence of Sternberg (1996) is conceptually very close to the verbal, mathematical, and spatial intelligences of Gardner (1983), which, in turn, are the strongest correlates of self-estimated general intelligence (Furnham, 2001).
3. First-born boys will be given higher ratings on general and analytic intelligence than first-born girls. This hypothesis was based on work indicating that parents are likely to give higher

estimates to their first-born sons than to their first-born daughters on types of intelligence that involve logical analysis and general reasoning ability (Furnham, 2000).

Method

Participants

In all, 239 adults participated in the study, of whom 124 were male and 115 were female. The average age of participants was 39.49 years ($SD = 9.81$ years). One hundred and sixty participants (66.9%) were married, 32 (13.4%) were cohabiting with their partners, 20 (8.4%) were divorced or separated, 15 (6.3%) were single, and six (2.5%) were widowed. In terms of education levels, 92 participants (38.5%) were educated up to 10th grade, 59 (24.7%) had 12th grade qualifications, and 60 (25.1%) had post-school qualifications. All participants had at least one child, 165 participants (69.0%) had two or more children, and 46 participants (19.2%) had three or more children.

Questionnaire

Participants completed a short questionnaire that was divided into two parts. The first part described the purpose of the questionnaire and presented a normal distribution, which showed a graph with IQ scores spanning six standard deviations (-3 to $+3$). The anchor scores ranged from 55 to 145. In the second part of the questionnaire, participants were asked to estimate their own and their children's scores on the five intelligences. They were also asked to specify the age and gender of each of their children.

Procedure

A market research company was instructed to collect data from parents with children between the ages of 4 and 21 years and to follow a stratified sampling design controlled for gender, age, and social class. Participants were recruited from around big cities in England. Questionnaires were delivered to participants by hand and were collected the following day. Researchers asked that only one parent complete the questionnaire, alternating between mothers and fathers. The response rate (proportion of contacted parents who returned the questionnaire) was approximately 90.0%.

Results

Parental self-estimates

A series of 2 (gender of parent) $\times$ 2 (gender of child) ANOVAs were performed on the five types of intelligence self-estimates (see Table 1 for details). Four of those tests were significant (three of which beyond the .01 level), with men rating themselves higher on general, analytic, and practical intelligence, but lower on emotional intelligence. The differences on general, analytic, and emotional intelligence self-estimates were significant even after a Bonferroni correction, whereas that on practical intelligence was not. Overall, these results provide support for the first hypothesis (H1). As has been found in previous studies the effect sizes for these differences were small to moderate (see Table 1). Following Huberty and Morris (1989), a matrix presenting the intercorrelations between the five dependent variables for self-estimates and first-child estimates is presented in Table 2. As would be expected, the values in this Table reveal a positive manifold, with the various intelligence estimates being positively intercorrelated.

Subsequently, the general intelligence self-estimate was regressed on the self-estimates of emotional, analytic, creative, and practical intelligences. The regression was significant ($F(4,234) = 68.68$, $p < .01$, $R^2_{adj} = .53$). All four predictors reached significance levels, with analytic intelligence

Table 1. ANOVAs with parental gender as the independent variable and self-estimates of the five types of intelligence as the dependent variables

	Type of intelligence				
	General	Emotional	Analytic	Creative	Practical
Male subjects	110.44	107.14	111.53	109.49	111.43
($n = 124$)	(14.59)	(16.15)	(14.85)	(15.49)	(15.32)
Female subjects	105.77	111.97	106.21	106.32	107.84
($n = 115$)	(10.87)	(11.36)	(11.52)	(10.58)	(10.84)
$F(1,237)$	7.77**	7.06**	9.47**	3.36	4.31*
	(0.32)	(0.29)	(0.38)		(0.18)

Note. Parentheses under statistically significant F values indicate effect sizes (η^2 values).
*$p < .05$, **$p < .01$.

having a substantially larger standardised coefficient ($\beta = .374$, $t = 5.63$, $p < .01$) than emotional ($\beta = .154$, $t = 3.00$, $p < .01$), practical ($\beta = .145$, $t = 2.29$, $p < .05$) and creative intelligence ($\beta = .211$, $t = 3.20$, $p < .01$), which supports the second hypothesis (H2). With parental gender, age, and education added to the regression ($F(7,202) = 35.91$, $p < .01$, $R^2_{adj} = .54$), analytic ($\beta = .300$, $t = 4.12$, $p < .01$), emotional ($\beta = .196$, $t = 3.35$, $p < .01$) and creative ($\beta = .192$, $t = 2.68$, $p < .01$) intelligence remained significant predictors, whereas practical intelligence did not ($\beta = .124$, $t = 1.81$, $p = .07$). Education ($\beta = .108$, $t = 2.14$, $p < .05$) and gender ($\beta = -.118$, $t = 2.37$, $p < .05$) also reached significance, with male subjects giving significantly higher estimates than female subjects.

ANOVAs for parents' estimates of their children's intelligences

In order to examine the main effects of parent and child gender as well as their interactions, we performed five 2 × 2 ANOVAs for the first, second, and third child, respectively. To protect against an inflated family-wise error and bearing in mind that the nature of many analyses was exploratory rather than confirmatory, in the sense that they were not intended to test specific hypotheses, we applied the stringent Bonferroni correction in every case. Thus, each ANOVA was evaluated at an alpha level of .01, as opposed to the traditional .05.

Child 1. Table 3 presents the results of the five ANOVAs for first-born children. As can be seen, there were three main effects of parental gender, with father ratings of their first child's general, analytic, and creative intelligence higher than the corresponding mother ratings. None of these effects was significant at the more stringent alpha of .01, although that of parental gender on creative intelligence approached significance levels ($p = .01$). As can be seen in Table 3, children's gender did not have a significant effect in any of the analyses, which does not support the third hypothesis (H3). There were no significant interactions between the two independent variables.

Child 2. There were no significant main effects or interactions in any of the analyses based on second-born children (see Table 4 for details).

Table 2. Correlations between self-estimates (above the diagonal) and estimates for the first-born child (below the diagonal) on the five intelligence types

	1	2	3	4	5
1. General intelligence	–	.46★	.67★	.63★	.59★
2. Emotional intelligence	.55★	–	.39★	.50★	.36★
3. Analytic intelligence	.65★	.64★	–	.67★	.68★
4. Creative intelligence	.57★	.54★	.59★	–	.63★
5. Practical intelligence	.58★	.54★	.71★	.71★	–

Note. ★$p < .01$.

Table 3. Gender of parent by gender of first-born child ANOVA results for parental estimates on the five intelligence types

		Parent						*F*		
		Male			Female					
	Child 1	Male	Female	Total	Male	Female	Total	Gender of parent	Gender of child	*P* × *c*
	n	61	52	113	62	53	115			
General	*M*	112.37	109.40	111.01	105.96	107.96	106.73	5.60★	0.14	1.81
	SD	12.47	12.84	12.67	12.44	14.26	13.28	(0.24)		
Emotional	*M*	107.29	106.44	106.90	103.14	106.13	104.52	1.50	0.34	1.11
	SD	14.59	13.33	13.97	10.83	15.70	13.32			
Analytic	*M*	108.77	106.21	107.59	104.19	102.54	103.43	4.90★	1.27	0.06
	SD	15.15	14.24	14.73	11.84	14.69	13.20	(0.21)		
Creative	*M*	110.00	108.28	109.21	104.43	105.18	104.78	6.56★	0.08	0.53
	SD	13.29	13.19	13.21	10.71	13.72	12.14	(0.28)		
Practical	*M*	107.37	104.73	106.15	103.87	103.30	103.60	2.02	0.86	0.34
	SD	14.84	12.76	13.93	11.50	12.78	12.05			

Note. Parentheses under statistically significant *F* values indicate effect sizes (η^2values).
★$p < .05$, ★★$p < .01$.

Child 3. In spite of the small sample size in the analyses involving third-born children (few parents in the sample had three children or more), gender of child had significant effects on emotional, analytic, and practical intelligence (see Table 5 for details). The latter two effects remained statistically significant after the application of the Bonferroni correction. In all three cases, third-born girls were rated as more intelligent than third-born boys.

Discussion

The results of the present study replicate and extend many, but not all, findings from previous research. In accordance with most other studies in the literature, men (fathers) gave significantly higher self-estimates of general intelligence than women (mothers). This gender difference is a very consistent finding in the literature (see Furnham, 2001, for a review). An important question is whether the self-estimates that participants provide reflect reality. The literature focusing on the correlations between actual and self-estimated intelligence scores suggests values in the region of $r = 0.20$ to $r = 0.30$ (e.g., Paulhus, Lysy, & Yik, 1998). However, this correlation seems to be moderated by gender, with female subjects tending to underestimate their actual scores and male subjects tending to overestimate them (Reilly & Mulhern, 1995). It should be noted that intelligence tests were designed to show no gender differences and even the proponents of the existence of such differences (e.g., Lynn, Allik, & Must, 2000) suggest that they are small (approx. 4 IQ points) and largely confined to specific first-order factors (e.g., spatial

Table 4. Gender of parent by gender of second-born child ANOVA results for parental estimates on the five intelligence types

		Parent						
		Male		Female		*F*		
	Child 2	Male	Female	Male	Female	Gender of parent	Gender of child	$P \times c$
	n	38	42	43	33			
General	*M*	109.26	107.26	110.81	107.27	0.12	1.59	20
	SD	14.55	13.84	13.71	12.18			
Emotional	*M*	102.76	106.78	102.71	105.30	0.10	2.02	0.11
	SD	12.92	17.06	14.15	11.78			
Analytic	*M*	106.10	103.57	106.16	101.96	0.10	1.97	0.12
	SD	13.30	16.75	15.50	13.10			
Creative	*M*	106.10	106.90	106.69	105.15	0.06	0.03	0.25
	SD	14.24	18.14	13.34	10.03			
Practical	*M*	104.86	103.45	104.30	106.81	0.36	0.09	0.72
	SD	11.59	17.76	14.70	12.61			

Table 5. Gender of parent by gender of third-born child ANOVA results for parental estimates on the five intelligence types

		Parent								
		Male		Female		Total				
	Child 3	Male	Female	Male	Female	Male	Female	*F*		
	n	10	11	13	11	23	22	Gender of parent	Gender of child	$P \times c$
General	*M*	107.10	107.72	103.07	110.45	104.82	109.09	0.43	1.62	1.15
	SD	11.53	8.76	10.71	10.82	11.00	9.71			
Emotional	*M*	95.50	104.54	100.38	109.54	98.26	107.04	2.07	7.02⋆	0.00
	SD	15.17	11.71	10.29	8.20	12.57	10.19		(0.15)	
Analytic	*M*	95.00	105.90	98.07	105.99	96.73	105.90	0.23	8.53⋆⋆	0.23
	SD	11.05	12.00	9.90	9.95	10.29	10.76		(0.17)	
Creative	*M*	100.00	106.36	98.84	104.54	99.34	105.45	0.16	2.75	0.00
	SD	13.54	13.61	13.09	10.88	12.99	10.56			
Practical	*M*	90.50	103.18	98.46	103.18	95.00	103.18	1.73	8.30⋆⋆	1.73
	SD	10.65	12.50	9.96	9.73	10.00	10.95		(0.17)	

Note. Parentheses under statistically significant *F* values indicate effect sizes (η^2 values).
⋆$p < .05$, ⋆⋆$p < .01$.

intelligence). In this study, as in others, there was no difference in education levels between male and female participants and therefore this factor could not account for the male-favouring difference in self-estimated scores. Nor is there any empirical evidence that (British) male subjects have higher IQs than (British) female subjects.

Male subjects also gave higher self-estimates than female subjects for two of the three ''successful'' intelligences of Sternberg (1996), namely, analytic and practical. With respect to emotional intelligence, in line with previous findings (Petrides et al., in press), female self-estimates were significantly higher than male self-estimates. It was noted in the introduction that there seems to be a tendency for female subjects to give higher self-estimates on emotional intelligence than male subjects, although, as is the case with other cognate ''intelligences'', for example, intrapersonal and interpersonal, this difference does not always emerge clearly (see Furnham et al., 1999; Furnham, 2001; Rammstedt & Rammsayer, 2000).

The multiple regression involving self-estimated intelligence scores showed that participants perceived analytic intelligence at the epicenter of the concept of general intelligence, which supports hypothesis 2 (H2). However, inspection of the zero-order correlations (see Table 2) shows that creative and practical intelligence were also very strongly related general intelligence self-estimates. The weakest relationship was with emotional intelligence ($r = .46$). This finding suggests that in spite of the considerable popular interest in new types of intelligence, lay people still believe that analytic and creative reasoning abilities are at the heart of general intelligence.

The third hypothesis, namely, that first-born boys would be rated higher in general and analytic intelligence than first-born girls, was not supported by the data. However, there were parental gender effects on these two types of intelligence. Although these effects were not significant following a Bonferonni correction, fathers did show a clear tendency to give higher ratings to their first-born children than mothers. It should be noted that the absence of child gender effects is inconsistent with previous findings in the literature. For example, Furnham and Gasson (1998) found a small, albeit significant, male-favouring difference in estimates of general intelligence for first-born children (male subjects = 112 vs. female subjects = 109). Furnham (2000), in another study on self-estimates of the multiple intelligences of Gardner (1983), found two instances of significant gender differences, that is, on mathematical and spatial intelligence, with boys once again rated higher than girls. There were, however, no significant gender differences on types of multiple intelligence that are less closely related to general reasoning and analytic ability (e.g., musical, bodily–kinesthetic, interpersonal).

For second-born children, none of the independent variables was related to the estimated scores. In contrast, for third-born children, child gender was related to ratings of emotional, analytic, and practical intelligence, with female children rated as more intelligent than male children in all instances. At least as far as analytic intelligence is concerned, the results in this case do not accord well with previous findings that would support an expectation of male-favouring differences. This discrepancy could be due to gender differences in the maturational process in the sense that young girls tend to be more mature, socially skilled, insightful, and practical than boys of the same age (Goodnow & Collins, 1990; Lynn et al. 2000). In the present study, the mean age for the youngest children was 7.26 years, when some of these differences are more apparent. Overall, the results on the topic of parent and child gender effects on intelligence estimates seem to be somewhat inconsistent across different studies. This could be because the effects are weak or subject to other extraneous factors, such as prior experience with intelligence tests.

Research into self- and other-estimates of different types of intelligence has revealed many robust findings, including specific gender differences, hubris and humility effects, and cross-cultural differences and similarities (for a review see Furnham, 2001). This research may be extended to address three outstanding issues. First, it is important to examine parental differences in ratings of the same child's intelligence (in the present study, only one of the parents provided ratings in each case), while taking into account relevant variables such as personal experience of intelligence testing.

A second issue to address is the extent of accuracy of the estimates. While some work has tried to determine the overlap between self-estimated and actual general intelligence scores (Borkenau & Liebler, 1993; Furnham & Fong, 2000; Paulhus et al., 1998), few empirical studies have concentrated on the accuracy of judgments of other people's IQ (e.g., the accuracy of parental estimates of their children's IQ) or on cross-cultural differences in degrees of accuracy. It should also be noted that for many types of nontraditional intelligence, for example, emotional intelligence, such work is not even possible at present because they cannot be operationalised as cognitive abilities (Petrides & Furnham, 2001, 2003).

Last, but perhaps most important, research in this area should investigate the impact of self- and other-estimates on one's own and other people's behaviour. Ideally, this would involve longitudinal

investigations, which are more likely than isolated correlational studies to elucidate causal links between variables. There is evidence that inaccurate self-perceptions can have both positive and negative effects on an individual's behaviour (Beyer & Bowden, 1997; Mueller & Dweck, 1998; Taylor & Brown, 1988). However, this research has not yet been extended to the area of self-estimates of different types of intelligence. It is also important to investigate the extent to which people's beliefs about others' intelligence (especially parental ratings of their children) affect the way they act towards them. Such research may uncover specific effects, such as attitude biases and self-fulfilling prophecies, with important consequences for the mental health, socialisation, and achievement patterns of individuals, especially young people.

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