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Sex Differences in Parents' Estimations of their Own and their Children's Multiple Intelligences: A Portuguese Replication

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In this study, 148 Portuguese adults (M = 45.4 years) rated themselves and their children on overall IQ and on H. Gardner (1999) 10 intelligence subtypes. Men's self-estimates were not significantly higher than women's on any of the 11 estimates. The results were in line with previous studies, in that both sexes rated the overall intelligence of their first male children higher than the first female children. Higher parental IQ self-estimates correspond with higher IQ estimates for children. Globally parents estimated that their sons had significantly higher IQs than their daughters. In particular, parents rated their son's spiritual intelligence higher than those of their daughters. Children's age and sex, and parents' age and sex were all non-significant predictors of the overall "g" score estimates of the first two children. Participants thought verbal, mathematical, and spatial intelligence were the best indicators of the overall intelligence for self and children. There were no sex differences in experience of, or attitudes towards, intelligence testing. Results are discussed in terms of the growing literature in the self-estimates of intelligence, as well as limitations of that approach.
Keywords: gender differences, parental perceptions, multiple intelligences, self-estimates.

En este estudio, 148 adultos portugueses (M = 45.4 años) evaluaron su CI general y el de sus hijos y los 10 subtipos de inteligencia de H. Gardner (1999). La auto-estimación de los hombres no fue significativamente más alta que la de las mujeres en ninguna des las 11 estimativas. Los resultados estuvieron en línea con estudios previos, en que ambos los sexos evaluaron la inteligencia global de su primogénito masculino más elevadamente que la de su primogénita hembra. El elevado CI parental auto-estimado correspondió con el CI estimado de los hijos. Globalmente los padres estimaron que sus hijos tenían un CI significativamente más elevado que el de sus hijas. En particular, los padres evaluaron la inteligencia espiritual de sus hijos más elevadamente que la de sus hijas. Ni el sexo y edad de los jóvenes, ni el sexo y edad de los padres fueron predictores de la puntuación general "g" estimada de los dos primeros hijos. Los participantes consideraron que la inteligencia verbal, matemática y espacial eran los mejores predictores de la inteligencia global tanto para ellos propios como para sus hijos. No hubo diferencias significativas de género en la experiencia, o actitudes en relación, al test de la inteligencia. Los resultados y las limitaciones fueron discutidos en términos de la creciente literatura sobre el enfoque de la auto-estimación de la inteligencia.
Palabras clave: diferencias de género, percepciones parentales, inteligencias múltiples, auto-estimación.

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Intelligence is of considerable interest to academics and lay people alike (Cattel, 1987; Eysenck, 1981; Flynn, 1987; Gardner, 1999; Mackintosh, 1998; Sternberg, 1985). Over the past decade there have been a number of studies concerned with self-estimates of intelligence. Although various other studies predated it (e.g. Hogan, 1978), it has been Beloff's (1992) study on sex differences in estimated IQ that has provoked most papers since (Bennett, 1996, 1997, 2000; Byrd & Stacey, 1993; Furhnam, 2000; Furnham & Baguma, 1999; Furnham, Clark, & Bailey, 1999; Furnham & Fong, 2000; Furnham, Fong, & Martin, 1999; Furnham, Hosoe, & Tang, 2002; Furnham & Rawles, 1995; Neto & Furnham, 2006; Neto, Ruiz, & Furnham, 2008; Petrides & Furnham, 2000). Studies have nearly all observed higher male estimations (by themselves and others), for overall, as well as various facets of intelligence. Of perhaps greater importance is the finding that parents think their (first born) sons are brighter than their daughters (Furnham, 2000; Furnham, Reeves, & Budhani, 2002). This may have deleterious consequences for females, especially female children, in terms of self-confidence, achievement, and school subject choices. That is, parents beliefs may affect their expectations, what they communicate to their children, even how much they are prepared to pay for their children's education.

Researchers acknowledge that parental beliefs about children's intelligence are a potentially important area of research due to the effect these ideas have on parental rearing and expectations (Goodnow & Collins, 1990; Sigel, 1985). Beyer (1995) noted that perceptions of competence are intimately tied to aspirations, preference for challenging tasks, curiosity, intrinsic motivation, persistence, and task performance. Thus, inaccurately negative self-perceptions may have damaging behavioural consequences. Positive self-perceptions have also been shown to be related to psychological health (see e.g. Taylor & Brown, 1988, though it may lead people to be complacent and underestimate the role of effort over ability in the performance of particular tasks (Furnham, 2001; Mueller & Dweck, 1998).

Most studies on self-estimates of intelligence involved measuring overall intelligence or "*g*". However many researchers have made distinctions between various types of intelligence, which is the preferred view of most laypeople (Furnham, 2001). Gardner (1983, 1999) has argued that although the standard IQ is often successful in predicting ability in school subjects, it does not take into account an individual's potential or competence in particular fields of expertise. He initially identified seven subtypes of intelligence that every normal individual should develop to some extent (linguistic, logical/mathematical, spatial, interpersonal, intrapersonal, musical, and bodily-kinesthetic). Owing to a combination of heredity, early training, and learning opportunities, certain individuals will develop some subtypes far more than other subtypes. In his latest book, Gardner (1999) added one but proposed two other types of intelligence (naturalistic, spiritual, and existential). Although the multiple intelligence theory has little or no published empirical evidence, it has generated a great deal of interest among educators (Gardner, 1999). The idea of the specific multiple intelligences proposed by Gardner (definitively the 7, possibly the 10) seems to agree with laypeople's understanding of the concept of intelligence.

More recent studies have looked at estimates of multiple intelligence rather than g (Bennett, 1996; Furnham & Baguma, 1999; Furnham, Hosoe, & Tang, 2002; Neto, Furnham, & Pinto, 2009). Furnham, Clark, and Bailey (1999), who asked male and female participants to rate themselves for each of the seven intelligences, found a sex difference only on the Mathematical/Numerical (logical) factor. However, the participants' self-ratings of the seven intelligences factored onto three interpretable dimensions labelled Interpersonal Intelligence (interpersonal, intrapersonal, and verbal intelligence), Musical Intelligence (body-kinesthetic and musical), and Mathematical Intelligence (mathematical and spatial). Furnham, Fong, et al. (1999) repeated this study on a larger sample and found three significant differences: female participants rated themselves lower on mathematical, spatial, and bodily-kinesthetic intelligence. The authors confirmed the three-fold factor structure for ratings of others but not for self-estimates. Neto and Furnham (2006), showed that men believed they were more intelligent than were women on mathematical (logical), spatial, and naturalistic intelligence. Those who had previously completed an IQ test gave higher self-estimates on 2 of the 10 estimates. Factor analysis of the 10 and then 8 self-estimated scores did not confirm Gardner's 3-factor classification of multiple intelligences in this sample.

There is also an interesting and potentially important literature on parents estimating the intelligence of their children.

Table 1 shows the results of thirteen studies in the area which have been conducted in a number of countries and the results remain equivocal. There are however some relatively consistent findings. They show first, that fathers tend to give higher self-estimates than mothers especially for overall (g), spatial and mathematical intelligence. Next, where there are significant differences, parents tend to estimate sons higher than daughters. Third, parental beliefs about their own intelligence are clearly related to their beliefs about their child's intelligence indicating either or both beliefs about the inheritance of intelligence or manifesting simply a rating style.

Despite the fact that parental estimates of their children studies have been done in countries of Europe (England, Iceland) Africa (Namibia, South Africa, Zambia, and Zimbabwe), and Asia (Hong Kong – China, Japan), in Europe the studies have only been done in two countries, England and Iceland. This study extends the work of Furnham and colleagues on parental estimates of children's

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Table 1
Summary of the salient intelligence estimate studies in the area

Authors	Nationality of Participants	Parents *N*		Mean age Of 1st Child	No of Children Estimated	Estimation	Analysis	Main Finding
		Male	Female					
Furnham & Gasson (1998)	British	72	112	14.15	3	'g'	ANOVA regression	Fathers had higher self estimates than mothers (108 vs 104).Both parents rated their male children higher than female children (109 vs 102). Sex of child rather than sex of parent was the best predictor of estimates.
Furnham (2000)	British	46	66	18.27	3	'multi'	ANOVA regression	Fathers rated themselves significantly higher on Mathematical (112 vs 102) and Spatial intelligence (112 vs 105) compared to mothers. Mothers rated children higher on Math/ Spatial than did fathers. Both parents thought sons more numerate than daughters.
Furnham, Reeves & Budhani (2002)	British	72	84	20.02	3	'g' 'multi'	ANOVA regression	Fathers rated themselves higher than mothers on g (110 vs 104) the overall mean of 7 multiple intelligence (109 vs 104) Mathematical (109 vs 97) and Spatial (113 vs 101) intelligence. Both parents thought their 1st born sons had higher IQ than their 1st born daughters. Sex of child rather than sex of parent was the best predictor of estimates.
Furnham & Budhani (2002)	British	58	93	15.4	3	'g' 'multi'	ANOVA regression	Boys rated their Mathematical (102 vs 96) and Spatial (106 vs 102) higher but Musical (88 vs 93) and Intrapersonal (107 vs 101) than girls. Parents showed no significant sex differences in their estimates of their children. Correlations between child self-estimates were modest.
Furnham, Rakow & Mak (2002	Chinese (Hong Kong)	79	114	?	3	'g' 'multi'	ANOVA regression	Fathers had higher self-estimates for Mathematical (104 vs 98) and Spatial intelligence (105 vs 102) than mothers. The child's age and the self-rated overall IQ of both parents were best predictors of child's overall IQ estimate.
Furnham & Mkhize (2003)	Zulu (South Africa)	0	133	20.28	3	'g' 'multi'	ANOVA regression	Mothers showed few significant differences in their estimates of their sons and daughters' overall or multiple intelligences. They rated their daughters' interpersonal intelligence higher than those of their sons (122 vs 113), and their sons' bodily-kinesthetic intelligence higher than those of their daughters (125 vs 119). They believed that overall their children were about 6 IQ points more intelligence than themselves. Although mothers estimated their own spatial, inter-, and intrapersonal intelligence to be higher than those of their children, they believed that their children had higher mathematical intelligence.
Furnham & Akande (2004)	Namibian South African Zambian Zimbabwean	54 53 52 25	74 73 37 53	?	3	'multi'	ANOVA regression	There were consistent country and sex differences in self-estimates on all seven estimates. Namibians tended to give lowest self-estimates and Zambians highest self-estimates. Contrary to previous findings from other continents females gave higher self estimates on all seven multiple intelligences than males on all seven multiple intelligences. These results were mirrored in the estimation of children: females gave higher scores than males and Zambians gave highest estimates and Namibians lowest.

Table 1 (Cont.)
Summary of the salient intelligence estimate studies in the area

Authors	Nationality of Participants	Parents *N*		Mean age Of 1st Child	No of Children Estimated	Estimation	Analysis	Main Finding
		Male	Female					
Furnham, Mkhize & Mndweni (2004)	Indian/Zulu South Africans	41 46	63 55	?	3	'multi'	ANOVA regression	Parents of Indian origin gave higher self-estimates on all 7 multiple intelligences than isiZulu speaking parents. Fathers gave higher self-estimates than mothers on verbal, spatial, musical, bodily-kinesthetic and interpersonal intelligences. Parents of Indian origin showed a greater gender difference discrepancy than isiZulu –speaking parents on spatial, musical and bodily-kinesthetic intelligence. Estimates of the intelligence of all the first-, second-, and third-born children showed a similar pattern. While there were few sex differences in the estimations, parents of Indian origin tended to give higher estimates than isi-Zulu speaking parents.
Furnham & Petrides (2004)	British	124	115	?	3	'g' 'multi'	ANOVA regression	Fathers rated their own levels of general (110 vs 106) analytic (112 vs 106) and practical (111 vs 106) intelligence significantly higher than mothers rated theirs. In contrast, mothers rated their emotional intelligence (112 vs 107) significantly higher than fathers. 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. Parents rated their third-born female children higher than their third-born male children on emotional, analytic, and practical intelligence.
Furnham & Thomas (2004)	British	141	90	14.21	3	'multi'		Fathers rated their Verbal (115 vs 113), Mathematical (114 vs 107) and Spatial (114 vs 109) intelligence higher than mothers. Parents tended to rate their children's IQ higher than their own. Regressions revealed specific personality dimensions such as Openness and Agreeableness to be relatively powerful predictors of estimated intelligence, more so than demographic variables. Results showed that personality had a great predictive role for self-estimations of IQ compared to the estimations of other members in the family.
Furnham, Trichot & Chamorro-Premuzic (2006)	British	55	54	14.33	1	'g'		There was no difference in children's self estimates of overall IQ. Children estimated their own overall IQ, whilst parents and teachers estimated the child's overall, mathematical, spatial and verbal IQ. Children also completed an IQ test. Correlational analysis showed participants were 'reasonably' accurate at estimating the child's intelligence – teachers significantly more so than parents, and mothers and children significantly more so than fathers. Female students were most accurate, whilst male students overestimated their IQ. Although both parents significantly overestimated their child's IQ, this overestimation was more pronounced in fathers.
Furnham & Valgeirsson (2007)	British South Africans	57 46	65 55	?	3	'g' 'multi'	ANOVA regression	A comparison between English and Icelandic parents showed few differences except that Icelandic parents estimates were lower than English parents' estimates. Fathers estimated their own overall intelligence higher than mothers estimated theirs and sons were estimated higher than daughters on overall intelligence.
Furnham & Fukumoto (2007)	Japanese	74	124	?	2	'g' 'multi'	ANOVA regression	Japanese parents' self-estimates were lower than those found in the Western populations but fathers rated their own overall 'g' score and seven Gardner multiple intelligences, significantly higher than did mothers. There were few sex differences when parents rated sons and daughters. Parents own IQ estimate was the best predictor of the first (oldest) child's estimated IQ. A number of cultural differences compared to the other studies in the Western countries were found.

intelligence to another European country, Portugal. This study extended the above studies by looking at sex differences in estimated multiple intelligences for children. The aim was to look at parental estimates of their children's multiple intelligence to explore whether the same pattern of sex differences is noticeable as in other western studies (Furnham, 2000). 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:

H1 Fathers will give higher self-estimates for general (overall), mathematical and spatial intelligence than mothers (Furnham, 2001). This finding has been well established, but predominantly with student-age populations who rate themselves approximately one standard deviation above average (Neto & Furnham, 2006).

H2 Factor analyses of the multiple intelligences would reveal a three-factor solution as set out by Gardner (1999), namely "traditional intelligence" (linguistic and logical), "artistic intelligence" (musical, body, spatial), and "personal intelligence" (interpersonal and intrapersonal).

H3 Parents will attribute greater overall intelligence to their sons than to their first child daughter (Furnham, 2000). According to the principle of primogeniture in many societies the eldest child (nearly always the son) exclusively inherits the parents' wealth (and title). This makes the ability of the eldest child particularly important to parents (especially fathers) who may seem over-eager to find evidence of intelligence (Bjorklund & Kipp, 1996). Further there is evidence to support Zajonc's confluence model of the relationship of birth order to intelligence (Rutherford & Sewell, 1991).

H4 The higher parents estimate their own overall IQ, the higher they will estimate the overall IQs of their children. We investigated the idea that parents' sense of genetic determinism would result in a relationship between parents' perception of their own intelligence and their perception of their children's intelligence.

H5 Parents would rate the intelligence of their children higher than their own intelligence (Furnham & Gasson, 1998). Previous studies have found evidence of the Flynn effect indicating beliefs that each generation is brighter than the preceding generation (Flynn, 1987).

H6 The best predictors of the parental overall IQ score estimate will be verbal, logical/mathematical, and spatial intelligence (Furnham, 2000). Furnham (2000) speculated that it is mathematical and spatial (and to some extent verbal) intelligence that lie at the heart of a layperson's conception of intelligence.

Method

Participants

In this study, we included 148 participants, 66 men (mean age = 47.48 years, *SD* = 10.92 , range 29 - 75 years) and 82 women (mean age = 43.67 years, *SD* = 12.63 , range 22 - 75 years). There was no significant age differences by gender, $F(1,146) = 3.70$, $p > .05$. All participants were white Portuguese citizens who all lived in Porto, Portugal. Most of the participants were high school graduates and many were graduates and professionals. They were approached in a middle class suburb which suggests they were from a middle class socio-economic background. The age recorded was the age at the time of the survey. All respondents who rated children were biological parents of the children they rated.

Questionnaire

Participants completed a one-page questionnaire that showed a normal distribution curve with a mean and six standard deviations. Under each standard deviation, there was an intelligence score and description (e.g., +2, 130 superior, or -2, 70 retardation). As part of the instructions, participants were told that the average or mean score was 100 and about two thirds of the population score between 85 and 115, with very bright people scoring around 130. This questionnaire has been used in 30 studies done in 20 different countries and appears to be easily understood by a wide variety of people. Subsequently, they were shown a grid with the ten intelligence types labelled and described (e.g., *verbal* or linguistic intelligence is the ability to use words; *spatial* intelligence is the ability to find your way around the environment and form mental images). Using the normal distribution curve, participants were asked to rate their own intelligence by estimating scores for each of the ten types of intelligences and also giving an overall estimated intelligence score. The ten intelligences were taken from Gardner (1999) (verbal, mathematical, spatial, musical, body-kinesthetic, interpersonal, intrapersonal, existential, spiritual, and naturalistic).

In addition, parents provided eleven estimates for their children. Parents were asked the age and gender of their children and then were asked to estimate the intelligence of each child in turn: "Considering each of your children, one at a time please indicate their age, sex, and what you would estimate their current IQ to be". Finally, six questions were added concerning their beliefs and experience of IQ testing. These have been used in most studies in the area (Neto, Furnham & Paz, 2007), (see Table 7.

Procedure

The Portuguese version of the questionnaire was used (Neto & Furnham, 2006). Parents were contacted by a small research team and asked if they would take part in the study. In all 95% agreed and the same number completed the questionnaire. Either parent, but not both, completed the questionnaire. The participants answered individually in the presence of the experimenter. It took between 15 to 30 min to complete the task.

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Results

All participants had at least one child. For the first children, there were 81 boys and 67 girls, with a mean age of 18.6 years (*SD* = 11.5). For the second children, there were 45 boys and 40 girls, with a mean age of 16.1 (*SD* = 11.9). Due to the small number of third and fourth children, they were excluded from this study and only data of first and second children were analysed. Because of the large number of analyses performed on these data there is an increased risk of Type I errors. Attempts to guard against these errors included carrying out multivariate analysis of variance where appropriate.

Parental self-estimates

The first issue to be examined was whether parents of either sex differed in their estimates of their own intelligences. Table 2 shows the estimates for the overall "g" score and for all ten multiple intelligences for self-estimates. Parents' overall self-ratings were *M* = 106.68 (*SD* = 14.56). These results are similar to those of Western parents. For example, in a study of Furnham, Hosoe and Tang (2002), American participants gave themselves the highest rating overall (108.73), followed by the British (106.78) and then the Japanese (101.73). McCrae (1990) notes that rarely do individuals rate themselves as below population average which is fixed at 100 points. This "above-average" effect has been called the "Lake Wobegon effect" (Kruger, 1999). Believing themselves to be above average may be due to the fact that so far the majority of studies have been conducted using student and educated adult participants.

A one-way MANOVA was completed across the ten intelligences estimates, which was not significant, $F(10,137) = .94$, $p > .05$. Contrary to our first hypothesis no sex differences in self - estimates were found.

Overall, participants awarded highest scores for interpersonal (*M* = 115.3), and intrapersonal (*M* = 112.3) intelligences, and lowest scores for spiritual (*M* = 101.1), musical intelligences (*M* = 100.9) for self. For the first child participants awarded highest scores for spatial (111.5), verbal and logical (110.0) intelligences, and lowest scores for naturalistic (103.5) and spiritual intelligences (99.0). For the second child participants awarded highest scores for intrapersonal (111.3), and verbal (110.7) intelligences, and lowest scores for naturalistic (103.7) and spiritual intelligences (101.1).

The ten self-estimates were then evaluated with a principle components analysis as well as orthogonal and oblique rotations. In all analyses two clear factors emerged, with all items loading greater than .60 in each factor (eigenvalue 4.71 for the first factor, and 1.43 for the second factor). Verbal, spatial, musical, body kinaesthetic, spiritual, and naturalistic intelligence loaded on the first factor. Logical, interpersonal, intrapersonal, and existential intelligence loaded on the second factor. This result meant that there was no evidence for the second hypothesis.

Parental estimates of children

The main focus of the study was parental sex differences in the estimates of the multiple intelligences of their male and female children. In order to examine sex difference effects, a series of ANOVAs was performed with the overall score and the ten specific intelligence estimates being the dependent variable (see Table 2). First, however, a 2 (sex of parent) x 2 (sex of child) MANOVA was computed on the data from the first and second children. For the first child, there was no significant sex of parent effect, $F(10,134) = .61$, $p > .01$), but a significant sex of child effect $F(10,134) = 2.47$, $p < .01$. No significant interaction between the factors was found. What this indicated was that sons were given

Table 2
Estimates of self and first two children

	Self (*N* = 148)		Child 1 (*N* = 148)		Child 2 (N = 85)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Overall	106.68	14.56	110.58	10.29	109.47	10.88
Verbal	107.16	12.56	109.97	11.82	110.67	12.28
Logical	106.96	14.76	109.97	14.26	110.00	12.65
Spatial	107.23	13.57	111.52	12.03	110.41	11.88
Musical	100.88	16.89	107.97	15.34	108.82	14.83
Body-K	102.71	15.71	106.25	13.56	109.81	15.48
Inter-P	115.30	13.43	109.23	14.35	111.32	12.10
Intra-P	112.30	14.19	109.93	12.84	110.41	12.98
Existential	112.16	14.26	104.59	14.36	106.67	14.65
Spiritual	101.14	16.12	98.95	16.35	101.07	16.17
Naturalistic	102.41	16.23	103.45	14.46	103.65	14.81

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Table 3
Parents' estimates for their children's IQ scores with two-way (sex of parent, sex of child) ANOVA results

	Child 1 (N = 148)						
	Father		Mother		*F* value		
Variable	Son	Daughter	Son	Daughter	Parent	Child	P X C
Verbal	111.32	107.19	111.06	109.71	.33	1.95	.50
Logical	110.00	111.72	110.11	108.14	.53	.01	.60
Spatial	112.12	108.22	110.96	114.71	1.81	.01	3.72
Musical	107.21	104.84	109.68	109.29	1.83	.29	.15
Body-kinesthetic	104.41	107.34	104.89	108.86	.20	2.33	.05
Interpersonal	109.41	107.53	108.72	111.29	.41	.02	.86
Intrapersonal	111.47	108.91	109.04	110.57	.03	.06	.91
Existential	103.53	103.90	105.96	104.41	.37	.06	.16
Spiritual	103.09	94.84	101.17	95.59	.05	6.59*	.24
Naturalistic	105.00	102.19	104.04	102.29	.03	.89	.05

higher ratings than daughters (Table 3). For the second child the MANOVA yielded no significant main effect, nor a significant interaction effect. ANOVAs were conducted for each of the ten intelligences, these analyses were carried out for first–born children. There was only one significant main effect for sex of the child: first-born male children were given higher ratings than first-born female children for spiritual intelligence, $F(1,145) = 6.54$, $p < .05$.

In order to look at the effect of sex and age on intelligence estimates, a series of multiple regressions were run, following Furnham and Gasson (1998). Sex and age of parents and of child were regressed on to each of estimated scores for each child. Three of the regressions were found to be significant for the first child. The results of the 10 regressions for IQ estimates of the first child are given in Table 4.

As can be seen from Table 4, the F level for the regression onto musical, body-kinethetic, and spiritual was significant at $p < .05$. The pattern was very clear: sex of parents was not relevant. In all, 12% of the variance in estimates of musical intelligence was explained primarily by parental age and child's age: youngest parents estimated oldest children' IQ higher than did oldest parents. For body-kinesthetic intelligence, youngest parents estimated children' IQ higher than oldest parents. For spiritual intelligence parents estimated oldest children' IQ higher than youngest children.

Only one of the 10 regressions was significant for the second child: intrapersonal intelligence $F(4,78) = 2.56$, $p < .05$, $R^2 = .12$, and child's age (beta = .55) was the best predictor.

Subsequently, two regressions were calculated with the child's overall estimated IQ as well as sex and age of parents and of child as the dependent variable, and parent's self-estimated overall IQ as the independent variable (Table 5). For Child 1, the regression was significant, $F(5,129) = 3.33$, $p < .01$ ($R^2 = .11$). The only significant predictor (Beta = .29) was child's overall estimated IQ. The same result occurred for the second child (B = .32), although the regression was not significant overall, $F(5,68) = 1.62$, $p > .05$ ($R^2 = .11$). The results indicated that the higher the parents adjudged their own intelligence, the higher they adjudged the intelligence of their first child and second child. The findings that self-estimated overall IQ was a significant predictor of parents'' estimates of their children's overall IQ confirmed the fourth hypothesis.

Comparisons of parental self-estimates and estimates of children

In order to consider whether parents believe their children are more intelligent than themselves, ANOVAs were calculated looking at the difference between parent and first child. The overall score yielded a difference $F(1,160) = 6.28$, $p < .05$ with parents thinking their first child significantly more intelligent than themselves ($M = 111.02$, $SD = 10.32$ vs $M = 107,20$, $SD = 14.45$). Eight of the ten analyses for multiple intelligences were statistically significant. Parents believed their first child had greater verbal ability ($M = 109.97$, $SD = 11.81$ *vs.* $M = 107, 16$, $SD = 12.56$; $F(1,147) = 6.51$, $p < .05$), greater mathematical ability ($M = 109.97$, $SD = 14.26$ *vs.* $M = 106.96$, $SD = 14.76$; $F(1,147) = 5.92$, $p < .01$), greater spatial ability ($M = 111.52$, $SD = 12.03$ *vs.* $M = 107, 23$, $SD = 13.57$; $F(1,147) = 13.34$, $p < .001$), greater musical ability ($M = 107.97$, $SD = 15.34$ *vs.* $M = 100.88$, $SD = 16.89$; $F(1,147) = 26.07$, $p < .001$), greater body-kinesthetic intelligence ($M = 106.425$, $SD = 13.56$ *vs.* $M = 102.71$, $SD = 15.71$; $F(1,1147) = 11.39$, $p < .001$), but lower interpersonal intelligence ($M = 109.23$, $SD = 14.35$ *vs.* $M = 115.30$, $SD = 13.43$; $F(1,147) = 20.10$, $p < .001$), lower intrapersonal intelligence ($M = 109.93$, $SD = 12.84$ *vs.* M

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Table 4
Results of regressions for ten factors with respect to first child

	Verbal		Mathematical		Spatial		Musical		Body-kinesthetic	
	Beta	*t*	Beta	*t*	Beta	*t*	Beta	*t*	Beta	*t*
Parental sex	.01	.15	-.07	-.71	.03	.33	-.01	-.17	-.03	-.35
Parental age	-.09	-.45	-..06	-.24	-.31	-1.49	-.69	-3.55***	-.43	-2.16*
Child's sex	-.12	-1.37	-.02	-.20	-.01	-.07	-.05	-.62	.13	1.52
Child's age	.19	.91	.09	.44	.28	1.39	.46	2.37*	.22	1.09
F value	.87	.	20		.84		4.87***		2.91*	
R^2	.02		.01		.02		.12		.08	

	Interpersonal		Intrapersonal		Existential		Spiritual		Naturalistic	
	Beta	*t*	Beta	*t*	Beta	*t*	Beta	*t*	Beta	*t*
Parental sex	.04	.40	-.01	-.05	.01	.11	-.07	-.74	-.06	-.65
Parental age	-.01	-.02	.14	.67	-.14	-.66	-.13	-.64	-.23	-1.09
Child's sex	-.01	-.02	-.03	-.31	-.06	-.67	-.24	-2.92**	-.10	-1.18
Child's age	.25	1.23	.08	.40	.32	1.60	.24	1.19	.20	.97
F value	2.56		1.62		1.70		2.53*		.61	
R^2	.06		.05		.05		.07		.02	

Table 5
Regression of parents and childs' sex and age and parents self estimated IQ on the total estimated IQ for 1st and 2nd child

	Child 1		Child 2	
	Beta	t	Beta	t
Child's Sex	.09	.84	-.06	-.48
Child's Age	-.09	-.77	.05	.35
Parent's Sex	-.11	-1.21	-.01	-.08
Parent's Age	.07	.61	-.02	-.14
Parent's IQ	.29	3.33***	.32	2.63**
F (5,129) =	3.06*		1.62	
Adj Rs	.07		.04	

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

= 112.29, *SD* = 14.19; $F(1,147) = 4.81$, $p < .05$), and lower existential intelligence (*M* = 104.59, *SD* = 14.36 *vs.* *M* = 112.24, *SD* = 14.28; $F(1,147) = 40.14$, $p < .001$).

The same analysis was computed for the second child. The overall score yielded no significant differences $F(1,75) = .95$, $p > .05$ between parents and their second child (*M* = 107.56, *SD* = 17.09 vs M = 109.47, *SD* = 10.88). This yielded fewer significant differences. Parents believed their second child had greater musical ability (*M* = 108.8, *SD* = 14.83 *vs.* *M* = 102.88, *SD* = 16.94; $F(1,84) = 14.49$, $p < .001$), greater body-kinesthetic intelligence (*M* = 109.81, *SD* = 15.48 *vs.* *M* = 104.29, *SD* = 15.76; $F(1,84) = 16.46$, $p < .001$), but lower interpersonal intelligence (*M* = 111.27, *SD* = 12.19 *vs.* *M* = 114.32, *SD* = 13.06; $F(1,84) = 5.05$, $p < .05$), and lower existential intelligence (*M* = 104.59, *SD* = 14.36 *vs.* *M* = 112.24, *SD* = 14.28; $F(1,84) = 40.14$, $p < .001$).

Multiple intelligence prediction of general intelligence

Table 6 shows the regressional results where the overall score was the criterion variable and the ten multiple intelligences the predictor variables. Verbal intelligence was a significant predictor of the overall score for self, first child, and second child. For the first child, verbal, but also logical intelligence were significant predictors of overall "g". For the second child, verbal, but also spatial

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Table 6
Regressions of the ten multiple intelligences onto the total self-estimated "g" score

	Self		Child 1		Child 2	
	Beta	*t*	Beta	*t*	Beta	*t*
Verbal	.34	2.87**	.30	2.96**	.48	4.48***
Logical	.03	.30	.27	3.08**	-.14	-1.46
Spatial	.09	.86	.12	1.26	.39	3.42**
Musical	.01	.12	-.08	-.87	.06	.55
Body-K	-.03	-.31	.14	1.58	-.01	-.09
Inter-P	-.14	-1.09	-.01	-.13	.07	.55
Intra-P	.12	.98	-.01	-.12	.08	.65
Existential	.15	1.36	.08	.62	-.23	-1.79
Spiritual	-.14	-1.31	-.07	-.67	.13	1.01
Naturalistic	.09	.90	.02	.21	.16	1.36
	$F(10,129) = 3.76$***		$F(10,128) = 7.68$***		$F(10,65) = 13.40$***	
	Adj $R^2 = .17$		Adj $R^2 = .33$		Adj $R^2 = .62$	

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

intelligence were significant predictors of overall "g". This tends to confirm the sixth hypothesis.

Beliefs about intelligence

The results for the six questions are shown in Table 7. There were no significant sex differences. They indicated that around 30% of the sample had taken an IQ test and also about 50% of the sample appears to be suspicious regarding the validity of IQ tests. Both Portuguese males and females do not believe that, on average, males are more intelligent than females (8% did, but 92% did not). A third of the participants believed that intelligence is primarily inherited. In all 79% of these respondents believed that IQ tests are useful in educational settings. Thirty-six percent of participants claimed that some races are more intelligent than others.

Discussion

The results of the present study replicate and extend many, but not all, findings from previous research done in this area. A noticeable difference from mostly other studies on the subject was in the self-estimates. The first prediction was that, as in nearly all other studies in this area, men rated themselves higher than females on overall "g" intelligence, as well as on various multiple "intelligences", particularly on their numerical and spatial intelligence. The results obtained did not provide evidence for sex differences in self-estimation of IQ. Male participants did not rate their own overall, mathematical, and spatial intelligence higher than female participants. Thus, our first hypothesis was not confirmed. One possible explanation for these findings could be because previous studies have used above all students. Probably, the current sample was composed of a very middle class liberal group where women are more equal to men. Whatever the explanation for these different patterns, the other results were in line with nearly all previous studies.

Our factor analysis did not confirm Gardner's (1999) three-factor classification. However, we did find that participants' scores clustered around two factors. Our results do not confirm or disconfirm Gardner's (1999) theory of multiple intelligences because we studied self-estimated skills and abilities that may not be related to general intelligence.

The third hypothesis was that parents would rate the intelligence of their first son higher than that of their first daughter. For the first child the MANOVA was significant indicating that first sons were given higher ratings than first daughters. Furthermore, first-born male children were given higher ratings than first-born female children for spiritual intelligence. These results tend to confirm the second hypothesis. For second child parents appear not to believe that their children of different sex are differentially intelligent. These results pointed out the effects of birth order, with largest sex differences between first-born boys and girls. There may be different explanations for this: parents may be more accurate with the first (older) child because they have more data. Equally, it could be a belief in the genetic, heredity or primogeniture principle.

The higher parents estimated their own overall intelligence, the higher they estimated the overall intelligence of their children. The child's sex and age and the parents' sex and age were not significant predictors. These results supported the fourth hypothesis. They are in

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Table 7
Experience and beliefs about intelligence tests

			Male	Female	X^2
Q1	Have you ever taken an intelligence test?	Y	21	22	.34
		N	44	57	
Q2	Do you believe they measure intelligence?	Y	31	42	.31
		N	34	37	
Q3	Do you believe that males are more intelligent than females?	Y	7	5	.26
		N	58	73	
Q4	Do you believe intelligence is primarily inherited?	Y	21	28	.41
		N	44	51	
Q5	Do you believe that IQ tests are useful in educational settings?	Y	52	62	.50
		N	13	17	.15
Q6	Do you believe that some races are more intelligent than others?	Y	27	25	.50
		N	38	54	

agreement with previous research showing that the more highly participants rate their own intelligence, the more highly they tend to rate that of others (Furnham, 2000; Neto & Furnham, 2006). Indeed the results are similar to those of Furnham, Rakow and Mak (2002) who found parents' self-rated IQ (rather then sex or age of either parent or child) the best predictor of the child's parentally estimated IQ. However, the results did not replicate the British study by Furnham and Gasson (1998) who found sex of child a significant predictor of the parents' estimate of their overall intelligence. It is not clear whether this is essentially the result of rating style or a belief in heredity. That is, it could be that bright parents have bright children and vice versa and rate accurately. On the other hand, it could be that some people tend to give over optimistic or pessimistic estimations both for themselves and others.

The fifth hypothesis was that Portuguese parents, like their British and Chinese counterparts, would rate the IQ of their children as higher than their own. This hypothesis was partially confirmed. Parents rated overall, academic (verbal, mathematical, and spatial intelligence) and cultural intelligence (musical and body-kinesthetic intelligence) higher than their own. Specifically, the overall rating difference was around 4 IQ points for first child. However, parents rated personal intelligence (intrapersonal, interpersonal, and existential intelligence) of their children lower than their own. For the second child the parents estimated fewer differences than for the first child. Parents believed their second child had greater cultural intelligence (musical and body-kinesthetic intelligence), but lower personal intelligence (interpersonal and existential intelligence). Thus, this picture shows an overall similar result for the first child and second child concerning cultural and personal intelligence, but a different one concerning academic intelligence. This, no doubt, is no more than the hope of all parents down the ages. Second it could be that parents recognize their children are better educated than they were and that education can influence some aspects of intelligence. Third, it may actually be true as there is indisputable evidence that over the past 50 years there have been significant gains in IQ across many nations (Flynn, 1987).

It was interesting to note which of the multiple intelligences best predicted overall intelligence as revealed by the multiple regression. Furnham (2000) hypothesized in the study of parents' estimates of their children's multiple intelligences the lay concept of (general, overall) intelligence is male normative in that it is those mathematical and spatial intelligences that are conflated with overall intelligences. He notes: "It is possible that it is mathematical and spatial intelligence, as defined by Gardner (1983) that lie at the heart of most people's conception of intelligence… Indeed, precisely what is novel about Gardner's model is that most people do not think of musical ability and intra/interpersonal skills as part of general intelligence" (p. 592). In this study when the 10 self-estimated intelligences were regressed onto the total, three proved significant: verbal, mathematical/logical, and spatial. Verbal intelligence emerged as a significant predictor for the self, and for both children. For the first child, verbal, but also logical intelligence were significant predictors of overall "g". For the second child, verbal, but also spatial intelligence were significant predictors of overall "g". These results tend to confirm previous regressional studies (Furnham, & Fong,

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2000), which show that it is the male normative of verbal, mathematical, and spatial intelligence that people believe is at the heart of "real" intelligence. This tends to confirm the sixth hypothesis. In this sense lay people tend to view intelligence as most psychologists do and do not feel that many of Gardner's multiple intelligences actually concern fundamental intelligence.

In the current study, the results for the first-born child were clearer than they were later born children. There are a number of possible explanations for these results. First, the subsample size decreased from first to second child, thereby rendering the results of the latter unstable. Second, parents have more data on the first child who is, by definition, the oldest. Third, the principle of primogeniture, still prevalent in many societies, may have altered parents' perceptions, causing them to differentiate mostly clearly the sex-linked talents of first-born sons and daughters.

In addition to data for the hypotheses in this study, there were extra questions about experience and beliefs about intelligence and intelligence testing. These questions have also been used in studies that Furnham, Rakow, & Mak (2002) conduced with a Hong sample, as well as for Zulu mothers (Furnham & Mkhize, 2003). Overall, the results from these questions were similar to Portuguese fathers and mothers. Half of the participants believed IQ tests "measure intelligence fairly well". This could be seen to be evidence of healthy scepticism on the part of participants or, on the other hand, cynicism about the validity of the measures they have been exposed to or read about. However, the parents believed more that the IQ tests are more useful in educational settings than they are to measure intelligence. Similar results have been found previously (Furnham & Baguma, 1999).

This study adds to the accumulating evidence on estimated intelligence, particularly cross-cultural studies on parents' estimates of their children's multiple intelligence. However, the study did have limitations that may limit generalisations and make interpretations difficult. The sample was small, possibly unrepresentative and opportunistic, rather than planned. Another obvious limitation of this study is that there is no direct way of relating the estimates of intelligence to the actual levels of intelligence possessed by the individuals assessed. It is conceivable to have obtained the actual test scores from participants and even their children. However, this poses a great problem because while there are many valid tests of overall intelligence, it remains uncertain as to whether there are many sensitive and accurate measures of what Gardner (1999) called the artistic or personal intelligences (Petrides & Furnham, 2000; Visser, Ashton, & Vernon, 2006). In addition, remember that participants in the present study were adults, who might have different conceptions of intelligence and gender roles from younger people with different educational backgrounds and experiences.

Nevertheless, the theoretical and social significance of the results of the study are worth contemplating. Many researchers have pointed out that there may be important academic and work-related consequences of the sex difference in self-rated abilities. Whilst some researchers seem concerned to study and help females who are seen to be biased in favour of modesty and lower-than actual estimations (Beloff, 1992; Beyer, 1999), others believe it is more important to examine male biases and the potentially negative consequences of hubris in self-estimated intelligence (Mueller & Dweck, 1998). Certainly this area of research provides an excellent theoretical and practical area for the study of such things as self-fulfilling prophecies and the effect of self-estimations of intelligence on academic performance all around the world.

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