Short stature—the role of intelligence in psychosocial adjustment

Jane Gilmour, David Skuse

Abstract

Short children are often described as having psychosocial problems. These reports may be inaccurate as former studies have relied largely on parental report. Psychosocial functioning of short children was assessed with the aim of using them and their peers as informants.

Twenty two short (mean (SD) height -2.53 (0.28) SD score) prepubertal children aged between 6 and 11 years were recruited from growth clinics. Comparison children were recruited from each case child's class at school. Cognitive and psychosocial functioning was assessed. Peer relationships were measured using sociometry.

There were no significant group differences in terms of peer acceptance, self perception, and social competence. Although cases described themselves as receiving less social support from teachers, no differences were evident in other areas of social support.

Little evidence was found to suggest clinic referred prepubertal short children are psychosocially maladjusted. Further analysis revealed cognitive ability was a better predictor than height for most aspects of behavioural and emotional adjustment.

(*Arch Dis Child* 1996;75:25-31)

Keywords: short stature, peer relationships, self perception, cognitive ability.

Anecdotal reports and study based data suggest that there is a positive correlation between height and social advantage. Taller people are more likely to have higher status employment.¹ Individuals of equivalent stature who appear to be in a prestigious job may be perceived as taller than those who are apparently in lower status occupations.² For adults 'short stature causes social disadvantage'.³ Potentially, the disadvantage associated with exceptionally short stature could affect parental and societal expectations from toddlerhood⁴ to adulthood.

For the past 30 years of research into the psychosocial adjustment of children with exceptionally short stature studies have relied largely on parental or teacher reports. Parental perceptions of stature are important.⁵ Children are often aware of their parents' views and parental dissatisfaction can lead to children's own dissatisfaction with their body image⁶ and low self esteem.⁷ They may regard themselves as unpopular⁸ and be perceived by others as emotionally immature.⁹

There are numerous reports of externalised behavioural disturbance, including attention deficit disorder with hyperactivity¹⁰ and other behavioural problems^{8 11} in exceptionally short children. However, the literature on scholastic, emotional, and behavioural adjustment is inconsistent.¹²⁻¹⁴ Many studies reporting difficulties, as opposed to appropriate adjustment, in short children have used samples of children who have short stature with an organic basis. Findings are often interpreted as representative of all short children. Further insensitive or non-standardised instruments have been employed. Largely parental report has been employed, rather than direct assessment of the child. There may not be complete agreement between parent and child perceptions. When a prepubertal child presents for treatment of short stature, it is invariably the parents who are responsible for making the appointment, and it is they who are usually doing the asking.

We aimed to make the first investigation into how short children were perceived by their peers and to examine adjustment in terms of peer relationships and social competence. Good peer relationships are a useful indicator of long term adjustment.¹⁵ Rejection by peers can predict delinquency and antisocial behaviour.¹⁶ Internalising psychopathology has also been linked to poor peer relationships.¹⁷

Social competence and peer relations have a complex reciprocal relationship; social skills are required to interact, and interactions are required to form developmentally appropriate social skills. Children rejected by their peers have poorer social skills than accepted children^{18 19} and factors such as obesity and physical attractiveness can influence social acceptance.²⁰⁻²²

We used standardised measures of academic attainment and intelligence because short stature has been associated, both directly and indirectly, with poor scholastic accomplishment in clinic referred samples.^{12 23} This may be because of low teacher expectations, short children being treated as the age they appear rather than in a way that is commensurate with their chronological age.²⁴ Accordingly, we have also interviewed their teachers.²⁵

We deliberately selected a group of cases referred from a clinic because they were more likely to exhibit emotional and behavioural difficulties than a population sample²⁶; and are representative of the population who will be offered growth hormone treatment. We limited the age range to avoid the potentially confounding influence of puberty and excluded those with an organic (physiological) aetiology of their growth disorder to increase group homogeneity. Children with general hormone

Behavioural Sciences Unit, Institute of Child Health, 30 Guilford Street, London WC1N 1EH
J Gilmour
D Skuse

Correspondence to:
Ms Gilmour.

Accepted 24 April 1996

deficiency may have psychosocial and behavioural problems because of endocrinological disorders associated with pituitary dysfunction.²⁷

Subjects and methods

SUBJECTS

Subjects were recruited from growth clinics at teaching hospitals in London and Oxford. A paediatric endocrinologist approached families initially. Those who expressed interest were subsequently contacted by telephone or letter with further information. All parents provided written consent. Children were asked for verbal consent. Inclusion criteria were: age between 6 and 11 years, prepubertal, height below -2 SD score,²⁸ height velocity over the last year above -1.5 SD score, and a bone age delayed not more than two years. None of the case children had an organic basis for their short stature. None was receiving any medical treatment for their growth retardation. A total of 31 families were approached and 22 agreed to participate in the project of whom, 15 were 'short normal' children. A further seven had the Silver-Russell low birthweight syndrome,²⁹ in view of the evidence that children with this condition generally have lower than average IQs,³⁰ we selected only those with scores above 72 (range 72 to 130).

Comparisons were chosen from each case child's class at school. A total of 25 families were approached, and 22 agreed to participate. The total sample was 44 children. The groups were matched by age, sex and sociometric status, but there was no attempt to match pairwise. In other words, the choice of comparison was by a pseudorandom procedure, with the aim of balancing the groups' composition overall in terms of demographic characteristics.

MEASURES

Anthropometric measures were obtained using standard clinic equipment by trained personnel. Bone age was estimated using the Tanner-Whitehouse method.³¹ We also used the Tanner-Whitehouse method to calculate height velocities over a six month period.²⁸

The Wechsler intelligence scales for children, version III were used to assess cognitive ability.³² The test has been recently restandardised in the UK. The Harter Self Perception Profile for Children was administered to each child individually.³³ There are six subscales: global self worth, social competence, athletic competence, behavioural competence, scholastic competence, and physical appearance. Social support was measured using a similar format, developed by Harter.³⁴ Children reported perceived social support from teachers, classmates, friends, and parents. The Harter pictorial scale of perceived competence and social acceptance for young children was administered to children under 8 years.³⁵ It is equivalent to the self perception profile as it taps many of the same domains. In both the younger and the older children's measures, the scales for cognitive competence and athletic/physical competence are directly comparable (S Harter, personal communication).

The Body Image Perception and Attitude Scale for Children (BIPAS) is a measure of self perception particularly suitable for this physically different group.³⁶ First, children were presented, in a random order, with five (gender appropriate) images of differing height. The images were numbered 1 to 5, the shortest image numbered 1 (see figs 1 and 2). They were encouraged to identify the image they thought described them best. This procedure was repeated with body shape, the five images in this instance ranged from extremely underweight to obese. The children were then asked to nominate the picture that best described how they would like to be, ideally. The two variables, actual and ideal, can be used to calculate an index of satisfaction with body shape and height. The image number associated with actual body image is subtracted from the image number indicating desired body image to produce a body image satisfaction score. A score of zero would indicate that the child is satisfied with his/her body image because their desired and present perceived image are the same. The greater the difference between perceived and desired scores, the greater the child's dissatisfaction.

Sociometry measures the extent to which an individual is accepted by their peer group and

Figure 1 Range of body shapes and statures for boys used in the administration of BIPAS.

is distinct from measures of one-to-one friendship. We used the peer rating methodology developed by Asher and Dodge which classifies children into one of six mutually exclusive categories: popular, rejected, neglected, controversial, average, and other.³⁷ The classification is made on the basis of two dimensions: social preference (the degree to which the individual is liked) and social impact (the extent to which the individual is socially visible). The exercise was carried out in school. Each member of the class took part simultaneously, allowing us to determine both how the children viewed their peers and how each of their peers viewed them. No reference was made to the 'target' children during administration to the class.

We measured social competence using the Children's Interpersonal Problem Solving Scale (CHIPS) which comprises three story roots describing hypothetical interpersonal problems, for example 'Jill wants Pamela to be her friend. What can Jill do so that Pamela will be her friend?'³⁸ Children were encouraged to provide up to 10 alternative relevant (as distinct from irrelevant) solutions to solve the problem posed by each story root. The number of relevant solutions is indicative of social competence. The CHIPS is also scored according to the style of solution proposed. Possible styles included: forceful (verbally or physically),

avoidant (such as hiding from a friend who is pestering the child), and aid seeking (asking another person's help to solve the problem). Reliability of scoring was calculated according to the method specified by Shure and Spivak³⁸ on 30% of data selected at random, giving 98.5% inter-rater agreement on whether a solution was relevant or irrelevant. A range of solution styles for each story root was possible (the mean was 34); exact agreement on the style of solutions chosen was 85%. As there were such a large number of alternative solution categories for each story root; chance agreement was extremely unlikely, therefore percentage agreement, as opposed to the κ coefficient was an appropriate measure.

STATISTICS

Categorical data were analysed using standard non-parametric procedures. Parametric analyses were used when the data were continuously distributed, or the data fitted an interval scale which was approximately normally distributed. Two tailed tests of significance were consistently employed in all analyses.

Results

DEMOGRAPHY, ANTHROPOMETRY, AND COGNITION

Data presented in table 1 show that the groups were closely matched in age, although there was a slightly higher proportion (non-significant) of girls in the comparison group. About two thirds of both groups came from relatively advantaged and professional sociodemographic backgrounds, which reflects the population who are motivated to seek specialist help for their children's short stature. Significant differences were found between the groups in terms of full scale intelligence, and this difference was also reflected in the performance subscales.

PEER RELATIONSHIPS

Using the data generated by all the children in each of the case and comparisons' classroom, case and comparison children were classified into one of six mutually exclusive categories³⁷: popular, neglected, rejected, controversial, plus average or other.³⁹ Data were available for 18 case and 21 comparison children. Similar proportions of cases and comparisons were rated as popular by their peers (44% *v* 40%) and as controversial (6% *v* 10%). There was a trend for more case than comparison children to be regarded as average/other (50% *v* 25%). No case child was rejected (15% comparisons) or neglected (10% comparisons). There were no statistically significant differences between the groups.

PEER BEHAVIOURAL DESCRIPTIONS

The sociometric technique specified by Asher and Dodge allows peer nominated assessments of one another's behaviour to be scored.³⁷ There are six behavioural categories, covering behavioural and emotional adjustment. The behavioural nominations are standardised within each peer group (that is school class), rather than across the data set. Children more

Figure 2 Range of body shapes and statures for girls in the administration of BIPAS.

Table 1 Demographic, anthropometric, and cognitive characteristics

Variable	Cases (n=22)	Comparison group (n=22)
Age (years)		
Range	6.0-10.8	6.9-11.3
Mean (SD)	8.1 (1.5)	8.9 (1.4)
Sex (% girls)	27.3	36.4
Socioeconomic status (%)		
Managerial/professional	59.1	63.6
Clerical/craft	13.6	9.1
Sales/personal	9.1	4.5
Manual/other	18.2	22.7
Mean (SD) anthropometry		
Height (SD score)**	-2.53 (0.28)	-0.31 (1.13)
Weight (SD score)**	-1.90 (0.96)	0.28 (0.92)
Mean (SD) IQ scores†:		
Full scale*	95.8 (18.8)	107.4 (17.4)
Verbal	95.4 (20.4)	104.9 (17.4)
Performance*	96.6 (16.8)	108.1 (16.8)

Statistically significant differences between groups only when indicated: * $p < 0.05$, ** $p < 0.001$. Because children were not weighed at consistent ages, weight and height were standardised for age and expressed as a SD score (SD). The SD score indicates the degree of distance above or below the mean of weight or height for age. A SD score of -1.88 corresponds to the third centile.

† Data was unavailable for one comparison child.

than 1 SD score above the mean for their class on one of these variables would fall into the appropriate category. The categories are not mutually exclusive. Similar proportions of cases and comparisons were rated as shy by their peers (5% *v* 5%). Other categories included disruptive (5% *v* 9%), easy to push around (27% *v* 18%), starts fights (5% *v* 9%), trustworthy (18% *v* 31%), unable to take a teasing (5% *v* 9%), and cooperative (28% *v* 18%). Fewer case than comparison children were judged to be kind (5% *v* 27%). No statistically significant differences were found between the groups.

SOCIAL COMPETENCE

Cases did not, on whole, generate as many relevant solutions to the three interpersonal problems posed them on the CHIPS³⁸ as did the comparisons (mean (SD) 11.3 (5.5) and 14.7 (4.0) respectively). Exploratory analyses showed these figures were positively correlated with IQ in both the case ($r = 0.4$, $p = 0.03$) and the comparison ($r = 0.06$, $p = 0.8$) groups. Entering IQ as a covariate in an analysis of variance, group differences in terms of social competence were not sustained. Case and comparison children were also similar in terms of social problem solving style, as judged by the nature of their solutions; group means for forceful (1.9 (2.4) *v* 1.7 (2.1)), aid seeking (1.5 (1.6) *v* 1.5 (1.1)), and avoidant solutions (1.6 (1.9) *v* 1.6 (1.2)) were almost identical in each case.

PERCEIVED SOCIAL SUPPORT

We analysed the data for boys and girls separately for cases and comparisons. They rated the support they perceived they were getting from teachers, classmates, friends, and parents. Table 2 shows the means for boys and girls are, in the main, similar to the age appropriate norms reported by Harter.³⁴ Short children and their comparisons described themselves as being equally well supported by parents, classmates and friends, although short children reported having less support from their teachers ($F = 4.14$, $df\ 1,35$, $p < 0.05$). We found no evidence for either a significant effect

Table 2 Children's perceived social support from parents, classmates, teachers, and friends*; results are mean (SD)

Source of support	Cases	Comparison group	Harter's data
Boys			
Parental	3.3 (0.7)	3.5 (0.6)	3.4 (0.7)
Classmate	2.9 (0.6)	3.2 (0.5)	3.1 (0.7)
Teacher	3.0 (0.6)	3.4 (0.7)	3.4 (0.7)
Friend	3.4 (0.6)	3.4 (0.5)	3.0 (0.7)
Girls			
Parental	3.6 (0.6)	3.7 (0.4)	3.5 (0.5)
Classmate	3.0 (0.5)	3.3 (0.3)	3.3 (0.7)
Teacher	3.1 (0.4)	3.6 (0.5)	3.4 (0.6)
Friend	3.5 (0.5)	3.6 (0.4)	3.2 (0.7)

* Data was missing for five case children.

Table 3 Children's self perception in various domains; results are mean (SD)

Competence domain	Cases (n=22)	Comparison group (n=22)	Harter's data
Boys			
Conduct	3.1 (0.5)	3.1 (0.7)	3.2 (0.6)
Global	3.1 (0.8)	3.3 (0.5)	3.0 (0.7)
Physical	3.0 (0.6)	3.2 (0.6)	3.0 (0.7)
Athletic	3.1 (0.7)	3.1 (0.5)	2.8 (0.5)
Social	2.7 (0.6)	2.9 (0.7)	2.8 (0.8)
Scholastic	2.9 (0.8)	3.1 (0.5)	2.8 (0.8)
Girls			
Conduct	3.0 (0.6)	3.1 (0.7)	3.2 (0.6)
Global	3.0 (0.8)	2.9 (0.2)	3.0 (0.8)
Physical	2.7 (0.9)	2.8 (0.5)	2.9 (0.9)
Athletic	2.7 (0.8)	2.9 (0.5)	2.8 (0.8)
Social	3.1 (0.5)	3.1 (0.5)	2.8 (0.8)
Scholastic	2.7 (0.7)	3.1 (0.6)	2.8 (0.9)

of sex or of a sex by group interaction but the power to detect such an effect was low owing to such a small sample size.

SELF PERCEPTION

Data from the Harter self perception profile for children³³ are given on table 3 with group means of each competence domain for girls and boys separately, compared with the age standardised scale norms. There were no case and comparison group differences for any of the six scales, no main effect of sex, and no interaction effects between sex and group status.

BODY IMAGE PERCEPTION ASSESSMENT SCALE

There were significant group differences in terms of stature only (table 4). Short children accurately perceived themselves as shorter than peers of normal height. There was no significant difference in the mean heights that both case and comparison children desired to be but, on average, short children's desired height tended to be taller than the comparison children's desired height. The comparison group reported being relatively content with their height while short children were dissatisfied with their body height. Further, in relation to comparison children, the case group were significantly more dissatisfied with their body shape.

IQ AS AN EXPLANATORY VARIABLE

In order to test the hypothesis that intelligence might be a better predictor of adjustment than stature, height (in SD score) and IQ were entered stepwise as independent variables in a series of multiple linear regressions on the

Table 4 Comparison between anthropometric characteristics and children's perception of their body image (BIPAS); results are mean (SD)

	Cases (n=22)	Comparison (n=22)	t Value (significance)
Body shape			
Actual body mass index (SD score)*	-0.8 (1.7)	-0.21 (0.9)	-1.3 (p = 0.20)
Perceived body shape	2.3 (1.2)	2.8 (0.9)	-1.58 (p = 0.12)
Desired body shape	2.9 (0.8)	2.7 (0.7)	0.81 (p = 0.42)
Body shape satisfaction	-0.5 (1.2)	0.1 (0.7)	-2.18 (p = 0.04)
Height			
Actual height (SD score)†	-2.5 (0.3)	-0.3 (1.2)	-8.93 (p = 0.000)
Perceived height	1.4 (0.7)	2.5 (1.2)	-3.83 (p = 0.001)
Desired height	4.1 (1.5)	3.4 (1.5)	1.41 (p = 0.17)
Height satisfaction	-2.7 (1.6)	-0.8 (1.8)	-3.37 (p = 0.02)

* Body mass index is calculated by the equation kg/m^2 . It is an accurate indicator of body shape.⁴⁷ The values are presented in SD scores for chronological age.

† These values are presented in SD scores for chronological age. The remainder are BIPAS scores (1-5). See text for details.

Table 5 Relative importance of stature and IQ in the prediction of social competence and global self worth

	B	SE B	Beta	T	Significance of T
Social competence					
Stature	0.5	0.57	0.14	0.93	p = 0.35
IQ	0.8	0.04	0.32	2.07	p = 0.04
Global self worth					
Stature	-0.14	0.07	-0.32	-2.05	p = 0.05
IQ	0.02	0.004	0.54	3.41	p = 0.002

combined case and comparison groups, with three alternative dependent variables: peer perception (in terms of the social preference score),³⁷ self concept ('global self worth'),³³ and social competence.³⁸ Forced entry ensures the first step removes the effect of IQ in isolation; the effect of height is calculated in the next step. The combined effect of IQ and height was not significant for the prediction of social preference ($R^2 = 0.03$, $p = 0.58$). In other words, the degree to which children were accepted by their peers was not associated to a significant degree with either stature or IQ. In the prediction of social competence IQ and stature together explained 16% of the variance ($R^2 = 0.16$, $p = 0.03$). As the beta values (table 5) illustrate, an increase in IQ score of 1 SD score was associated with an increase in social competence of approximately one third of a standard deviation. The contribution of height to this prediction was not significant. With global self worth as a dependent variable the joint contribution of predictor variables explained 26% of the variance ($R^2 = 0.259$, $p = 0.005$). IQ again proved to be a better predictor variable than stature. Both variables made significant contributions, but surprisingly they were in opposite directions. This suggests that among the sample as a whole, self worth decreased with increasing height, so that being 1 SD score taller was associated with about one third of a SD score decrease in global self worth. An increase in IQ of 1 SD score was associated with about half a SD score increase in this characteristic.

We explored the idea that there may be an interaction between stature and IQ in the prediction of these three measures of social adjustment and integration. No statistically significant interactions were found. But for children with IQ scores more than 1 SD score below the population mean (< 85) there was a trend (on scatterplots) for a linear correlation

between stature, self concept, and social competence. No such trend existed for children with IQ scores in the normal (85–115) or superior (> 115) range.

Discussion

Our study design offered a rigorous test of the hypothesis that psychosocial adjustment is impaired in short children for three reasons. First the sample was clinic referred, therefore height was an important issue for these families. Second, the instruments used in this study are sensitive and have well described psychometric properties. Finally, using children and their peers as informants increases the likelihood that our data are more meaningful in a daily social context than information given by parents and teachers alone.

The significant group difference in terms of cognitive abilities is compatible with Lee and Rosenfeld's summary: 'children with short stature have normal intelligence, although tending to score lower than peers on standardised tests' (p853).¹³ (The magnitude of the case comparison group difference was equivalent for both the Silver-Russell and the short normal children.) The comparison children scored a little above the population mean, reflective perhaps of the relatively socially advantaged milieu from which both groups were recruited. Wilson *et al* suggest the relationship between IQ and stature is mediated by external variables such as social responses and expectations.⁴⁰ In a population survey of short normal children, Voss and Mulligan found no significant relationship between height and IQ, but cases did have an excess of minor learning difficulties.⁴¹

It is in the peer group context that the issue of height abnormality is at its most acute: 'size is relative and height generally has no meaning other than in comparison to others' (p370).⁴² One might have predicted, bearing in mind the existing literature, that an excessive proportion of short children would have been neglected or rejected by their peers. We found no evidence of this. We can therefore reject the hypothesis that short children experience 'aesthetic discrimination' by other children, at least during the prepubertal period. We also demonstrated that short children have social skills that are equivalent to those of their peers. There is a strong association between social competence and acceptance in a peer group.¹⁸

The issue of problem solving style, as distinct from social problem solving ability, was also explored. We examined the possibility that short children may solve interpersonal problems differently when compared with their peers on three dimensions: using force to solve a problem, avoiding the problem situation, and seeking help from another person in order to solve a problem. Using the CHIPS³⁸ there were no differences in the quality of solution style selected by cases and comparison children. Former reports describing social withdrawal⁸ are not replicated by our data. Assessing children directly, rather than relying on parental report is the most probable explanation for this inconsistency.

Short children reported comparable social support to children of normal height from peers, parents and friends, but they believed they were receiving less support from teachers. This finding may be a true reflection of teachers' reactions to the short children's underachievement at school.²⁵ Our results suggest that those in the comparison group were not particularly favoured: teacher support means for boys and girls respectively were almost identical to Harter's norms.³³

Short children did not appear to possess a negative self concept on any of the six domains measured in Harter's scales, including 'physical appearance'. Our sample was not lacking in confidence and self esteem, in contrast to previous findings based on parental report.^{7, 8} Yet short children did accurately perceive their height relative to others, and they did want to change according to the BIPAS findings.³⁶ Indeed, they wanted to be taller than average. Evidently physical appearance caused short children dissatisfaction. Further, case children were significantly more dissatisfied than the comparison group with their body shape.

As our sample size was small it may be argued that we were at risk of making a type II error in statistical analyses. Differences between the groups in perceived social support or self perception rarely exceeded 0.3 SD score in the direction compatible with the hypothesis that cases would score lower than comparisons. We assume both samples were truly representative of the population from which they were drawn. Taking Harter's³³ data to estimate the probable SD in the general population of children on the measures used, for a two tailed test of significance with 80% power and the probability of a type I error set at 0.05, samples of nearly 100 per group would be required to demonstrate statistical significance.⁴³ We argue that the clinical significance of such small differences is trivial.

In conclusion, comparing stature and cognitive abilities as predictors of psychosocial adjustment, we found IQ was a better predictor than height for self concept and social competence. However, for a group of short children with low IQ, height *does* seem to have a direct linear relationship on adjustment. In other words, height may be a significant factor in adjustment for a subgroup of vulnerable children who have poor cognitive ability. This finding should be replicated with a larger sample. Our findings are compatible with those of Hoy *et al* who showed low birthweight children (in a similar study with peers as informants) were rated significantly higher than comparisons on a 'dislike' item (they were not rated significantly lower on the peer 'like' item) but this difference did not remain significant when IQ was covaried.⁴⁴ Some have advocated using growth hormone treatment to treat psychological difficulties in healthy short children.⁴⁵ Our data suggests that growth hormone treatment cannot be justified on that basis.

A final note of caution: Stabler noted that short children may develop increasing disturbance when they enter adolescence and young adulthood.⁷ A similar picture of increasing

adjustment difficulties was also described by Young-Hyman,⁴⁶ although both these studies were cross sectional designs. Sexual maturity and stature may both be relevant predictors of adjustment, but are potentially confounded variables. Prospective longitudinal evidence on this matter is awaited.

We would like to thank Children Nationwide and Pharmacia Kabi Peptide Hormones for their financial support for the project and also Dr Peter Hindmarsh, Dr David Dunger, Dr Lynne Ahmed, Professor Charles Brook, Dr Richard Stanhope, Dr Martin Savage, and the families who participated in the project. Thanks also to Jennifer Smith for her administrative support.

- MacIntyre S. Social correlates of human height. *Scientific Program* 1988; 72: 493-510.
- Wilson PR. Perceptual distortion as a function of ascribed academic status. *J Soc Psychol* 1968; 74: 97-102.
- Albertsson-Wikland K, Bischofberger E, Brook CGD, *et al*. Growth hormone treatment of short stature. *Acta Paediatr Scand (Suppl)* 1989; 349: 35-41.
- Eisenberg N, Roth K, Bryniarski KA, Murray E. Sex differences in the relationship of height to children's actual and attributed social and cognitive competencies. *Sex Roles* 1984; 11: 719-34.
- Belfer M. *The development and sustenance of self-esteem in childhood*. New York: International Universities Press, 1983.
- Pierce JW, Wardle J. Self-esteem, parental appraisal and body size in children. *J Child Psychol Psychiatry* 1993; 34: 1125-36.
- Stabler B. Growth hormone insufficiency during childhood has implications for later life. *Acta Paediatr Scand (Suppl)* 1991; 377: 9-13.
- Gordon M, Crouthamel C, Post EM, Richman RA. Psychosocial aspects of constitutional short stature: social competence, behavior problems, self-esteem and family functioning. *J Pediatr* 1982; 101: 477-80.
- Gordon M, Post EM, Crouthamel C, Richman RA. Do children with constitutional delay really have more learning problems? *Journal of Learning Disabilities* 1984; 17: 291-3.
- Siegel PT, Hopwood NJ. The relationship of academic achievement and the intellectual functioning and affective conditions of hypopituitary children. In: Stabler B, Underwood LE, eds. *Slow grows the child*. London: Erlbaum, 1986: 57-71.
- Money J, Pollitt E. Studies in the psychology of dwarfism II. Personality maturation and response to growth hormone treatment in hypopituitary dwarfs. *J Pediatr* 1966; 68: 381-90.
- Holmes CS, Thompson RG, Hayford JT. Parents' and teachers' differing views of short children's behaviour. *Child Care Health Dev* 1982; 8: 3.
- Lee PDK, Rosenfeld RG. Psychosocial correlates of short stature and delayed puberty. *Paediatric and Adolescent Endocrinology* 1987; 34: 851-63.
- Boulton TJ, Dunn SM, Quigley CA, Taylor JJ, Thompson L. Perceptions of self and short stature; effects of two years of growth hormone treatment. *Acta Paediatr Scand (Suppl)* 1991; 377: 20-7.
- Parker JG, Asher SR. Peer relations and later personal adjustments: are low-accepted children at risk? *Psychol Bull* 1987; 102: 357-89.
- Kupersmidt JB, Coie JD. Preadolescent peer status, aggression and school adjustment as predictors of externalizing problems in adolescence. *Child Dev* 1990; 61: 1350-62.
- Parker JG, Asher SR. Friendship and friendship quality in middle childhood: links with peer group acceptance and feelings of loneliness and social dissatisfaction. *Developmental Psychology* 1993; 29: 611-21.
- Dodge KA, Asher SR, Parkhurst JT. Social life as a goal coordination task. *Child Dev* 1989; 63: 1344-50.
- Brochin HA, Wasik BH. Social problem solving among popular and unpopular children. *J Abnorm Child Psychol* 1992; 20: 377-91.
- Banis HT, Varni JW, Wallander JL, *et al*. Psychological and social adjustment of obese children and their families. *Child Care Health Dev* 1988; 14: 157-73.
- Kennedy JH. Determinants of peer social status: contributions of physical appearance, reputation, and behaviour. *Journal of Youth and Adolescence* 1990; 19: 233-4.
- Willard D (1975). As cited in Burnes DA. The physically unattractive child. *Childhood Education* 1987; Dec: 80-5.
- Holmes CS, Thompson RG, Hayford JT. Factors related to grade retention in children with short stature. *Child Care Health Dev* 1984; 10: 159-210.
- Alley TR. Growth-produced changes in body shape and size as determinants of perceived age and adult care-giving. *Child Dev* 1983; 54: 241-8.
- Skuse D, Gilmour J, Tian CS, Hindmarsh P. Psychosocial assessment of children with short stature: a preliminary report. *Acta Paediatr Scand (Suppl)* 1994; 406: 11-6.
- Voss L, Bailey BJR, Mulligan J, Wilkin TJ, Betts PR. Short stature and school performance—the Wessex growth study. *Acta Paediatr Scand (Suppl)* 1991; 377: 29-31.

- 27 Skuse DH. The psychological consequences of being small. *J Child Psychol Psychiatry* 1987; 28: 641-50.
- 28 Tanner JM, Whitehouse RH. Clinical longitudinal standards for height, weight, height velocity, weight velocity, and stages of puberty. *Arch Dis Child* 1976; 51: 170-9.
- 29 Patton MA. Russell-Silver syndrome. *J Med Genet* 1988; 25: 557-60.
- 30 Lai KYC, Skuse D, Stanhope R, Hindmarsh P. Cognitive abilities associated with the Silver-Russell syndrome. *Arch Dis Child* 1994; 71: 490-6.
- 31 Tanner JM, Whitehouse RH, Cameron N, Marshall WA, Healy MJR, Goldstein H. *Assessment of skeletal maturation and prediction of adult height (TW2) method*. New York: Academic Press, 1983.
- 32 Wechsler D. *Wechsler intelligence scales for children - IIIR (UK)*. New York: Psychological Corporation, 1991.
- 33 Harter S. *The self-perception profile for children*. Denver, Colorado: University of Denver, 1985.
- 34 Harter S. *Manual for the social support scale for children*. Denver, Colorado: University of Denver; 1985.
- 35 Harter S, Pike R. The pictorial scale of perceived competence and social acceptance for young children. *Child Dev* 1984; 55: 1969-82.
- 36 Dowdney L, Woodward L, Pickles A, Skuse D. The body image perception and attitude scale for children: reliability in growth retarded and community comparison subjects. *International Journal of Methods in Psychiatric Research* 1995; 5: 29-40.
- 37 Asher SR, Dodge KA. Identifying children who are rejected by their peers. *Developmental Psychology* 1986; 22: 444-9.
- 38 Shure MB, Spivack G. *Children's interpersonal problem solving manual*. Philadelphia: Hahneman University, 1985.
- 39 Salzinger S, Feldman RS, Hammer M, Rosario M. The effects of physical abuse on children's social relationships. *Child Dev* 1993; 64: 169-87.
- 40 Wilson DM, Hammer LD, Duncan PM, et al. Growth and intellectual development. *Pediatrics* 1986; 78: 646-50.
- 41 Voss LD, Mulligan J. The short normal child in school: self-esteem, behaviour and attainment before puberty (the Wessex Growth Study). In: Stabler B, Underwood L, eds. *Growth stature and adaptation: behavioural, social and cognitive aspects of growth delay*. Chapel Hill: University of North Carolina at Chapel Hill, 1994: 47-64.
- 42 Kelnar CJH. Pride and prejudice—stature in perspective. *Acta Paediatr Scand (Suppl)* 1990; 370: 5-15.
- 43 Cohnen J. *Statistical analysis for the behavioural sciences*. London: Erlbaum, 1988.
- 44 Hoy EA, Sykes DH, Bill JM, Halliday HL, McClure BG, Reid MM. Social competence very low-birthweight children: teacher, peer and self-perceptions. *J Abnorm Child Psychol* 1992; 20: 123-50.
- 45 Underwood LE, Rieser PA. Is it ethical to treat healthy short children with growth hormone? *Acta Paediatr Scand (Suppl)* 1989; 362: 18-23.
- 46 Young-Hyman D. Effects of short stature on social competence. In: Stabler B, Underwood LE, eds. *Slow grows the child*. London: Erlbaum, 1986: 27-45.
- 47 Cole TJ, Freeman JV, Preece MA. Body mass index reference curves for the UK, 1990. *Arch Dis Child* 1995; 73: 25-9.