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REVIEW PAPER

Psychological Impact of Significantly Short Stature

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The psychological problems associated with short stature include a societal bias towards tallness, poor achievement in competition with siblings and peers, failure to attain developmental skills because of juvenilization, and difficulty in coping with the physical environment (1). The societal bias towards tall males ranges from preference being given to taller candidates for higher paying jobs, to electing tall presidents and choosing tall husbands (2). Short girls and boys are reportedly vulnerable to developmental delays and low self-esteem, because they are treated according to their size rather than their chronological age (3). From adolescence, many are physically unable to compete socially or in sports with their age-peers, and then as adults, they are less likely to marry or live independently (4, 5).

A psychological profile of children with significantly short stature (height below the 3rd centile) resulting from various biological conditions (e.g. growth hormone deficiency (GHD), Turner's syndrome, constitutional delay of growth and adolescence) has emerged from almost three decades of research. Although little effort has been made to differentiate any aetiology-specific psychological effects of growth delay, most investigations have focused on two major areas: cognitive functioning and psychosocial adjustment. Studies in the cognitive domain have focused on intelligence and academic achievement, while studies in psychosocial adjustment have addressed social competence and behavioural problems.

COGNITIVE FUNCTIONING

The intellectual functioning of children with significantly short stature has generally been reported as falling within the average range (6), with recent studies identifying a minority of children with specific cognitive deficits similar to those in children with learning disabilities (7, 8). Despite average intelligence, a high incidence of academic underachievement and failure has been reported in several studies of children with significantly short stature (7, 9). The high incidence of academic failure among these children has been explained by three theories: the cognitive underfunctioning theory, the low ability theory, and the cognitive deficit theory (Siegel, unpublished data).

Several studies report findings that support the cognitive underfunctioning theory (7, 11, 12), according to which there is a discrepancy between ability and academic achievement. Poor school performance is considered to be secondary to environmental and psychosocial factors, including overprotective parenting and low self-esteem resulting from the impact of short stature. Support for the low ability theory, which conceptualizes poor achievement as commensurate with a compromised intellectual potential secondary to endocrine pathology, has been reported in a number of independent studies (7, 13, 14). Several recent investigations have assessed underachievement in terms of the cognitive deficit theory, which postulates that learning problems in children with idiopathic GHD may be due to specific cognitive deficits associated with neurodevelopmental immaturity or dysfunction (7, 8). Visual spatial and visual scanning and tracking problems, poor short-term and long-term memory, and inattention have all been identified as possible factors contributing to learning problems among groups of significantly short children with various aetiologies.

To date, the only clear conclusion is that many significantly short children have learning problems in school, and that a combination of cognitive, physiological and psychosocial factors appear to contribute. However, it has not yet been determined whether specific learning profiles are more likely to be associated with specific diagnostic classifications. Similarly, particular environmental, medical and psychological factors may interact to cause some significantly short children to be more vulnerable to learning problems. Finally, there has been little or no agreement between investigators on how academic underachievement is defined.

PSYCHOSOCIAL ADJUSTMENT

The widespread belief that children with significantly short stature are vulnerable to a variety of psychosocial adjustment problems has prompted research in social competence and behavioural problems. Social competence can be defined as a person's ability to accomplish developmentally appropriate tasks successfully, and the term behavioural problems refers to personality characteristics associated with poor emotional development (15).

Studies investigating social competence among significantly short children have focused on coping with the physical environment, interaction and competition with peers, and level of participation in age-appropriate activities. Several studies report marked immaturity and inefficient problem-solving skills, a lack of assertiveness and social awareness, and delays in psychosexual development compared with age-peers (5, 16, 17). Other studies reveal a significant decline in social functioning with age, especially for those with the greatest height deficiency, such as children with isolated GHD and Turner's syndrome (5, 18). A lower level of participation in competitive team sports and organized group activities, along with lower rates of dating and sexual behaviour, were found among children with isolated GHD as they entered adolescence and young adulthood.

The emotional adjustment of children with significantly short stature has been examined by assessing self-perception and by the ratings of parents and teachers. Several studies have investigated the self-perception of children with significantly short stature with regard to popularity, attractiveness, physical satisfaction, feelings of social isolation, and levels of assertiveness and anxiety (16, 19–22). Results suggest that until adolescence these children rate their physical appearance and popularity as satisfactory (22), but that during adolescence feelings of internal conflict associated with short stature commonly develop (19, 21). Pre-adolescent children with significantly short stature do not typically report feelings of helplessness and anxiety (19), though they do acknowledge being less aggressive and assertive than their age-peers (16). In contrast, parent and teacher ratings suggest that these children are perceived as psychologically vulnerable (9). Varying degrees of social maladjustment in terms of peer relationships, self-esteem, school performance and social maturity have been reported (16, 18, 22). Problems with hyperactivity and inattention have also been identified (7, 8). Perceived psychological vulnerability may lead to inconsistent limit setting, overprotection and a tendency to the juvenilization of the child on the part of some parents (5, 21, 22).

The data describing the psychosocial adjustment of children with significantly short stature suggest a progression from early positive self-acceptance to an eventual dissatisfaction with physical appearance and some self-denial of limitations. Interpersonal relationships also appear to span a wide continuum, ranging from relatively positive experiences in early childhood to gradual social withdrawal and isolation as young adults. Although it is possible that family practices play an integral role in shaping psychosocial adjustment, the relationship between specific family characteristics and adjustment profiles remains unclear.

Psychological adjustment research. The psychological profile of children with significantly short stature is emerging as one characterized by cognitive, social and behavioural

vulnerabilities. However, methodological limitations, including small samples of diagnostically heterogeneous groups, lack of standardized test instruments, and differences in operational definitions of psychological constructs, suggest that it is premature to draw authoritative conclusions about this profile. It is particularly important to note that there have been no large-scale longitudinal studies of the effects of growth-promoting therapy on the psychosocial adjustment of patients with significantly short stature, and few that have assessed family interaction patterns.

FUTURE DIRECTIONS – THE NATIONAL CO-OPERATIVE GROWTH STUDY

In 1988, a prospective, longitudinal National Co-operative Growth Study (NCGS) was initiated in the USA to study the psychosocial effects of biosynthetic GH treatment on a large cohort of children with clearly defined significantly short stature. The primary objectives of the NCGS are to assess academic underachievement, social competence, behavioural problems, and patterns of family interaction.

Academic achievement was assessed using a significant discrepancy formula derived from measured IQ (Slosson IQ Test) (23) and achievement (Wide Range Achievement Test – Revised) (24). The criteria for diagnosis of underachievement were intelligence within the average range (IQ > 80), below average achievement (< 85) and an IQ score at least 15 points higher than the achievement score. Social competence and behavioural problems were assessed with the Child Behavior Checklist (25). Using the non-clinical norms, reduced social competency was defined as maternal ratings below the 2nd centile in school performance, activities, and social relationships. Behavioural problems were identified as maternal ratings above the 98th centile for the Total Behavior Problems, Internalizing (anxiety, depression) and Externalizing (hyperactivity, aggression) scales.

Baseline data are currently available for 142 school-age children (93 boys, 49 girls; mean age, 11.3 years) with various aetiologies, including idiopathic isolated GHD (n = 62), idiopathic short stature (n = 60) and Turner's syndrome (n = 20). Diagnoses of subjects with idiopathic isolated GHD and idiopathic short stature were made using two provocation tests of GH secretion. Patients with idiopathic isolated GHD had peak stimulated GH responses of less than 10 ng/ml, while patients with idiopathic short stature had GH responses of 10 ng/ml or more. The diagnosis of Turner's syndrome was made using standard clinical criteria. All the children were below the 3rd centile for height (mean height SDS, −2.7; height, 127.7 cm), English was their primary language, and they had never received GH therapy.

The three groups were homogeneous with respect to social background, as measured by the Hollingshead Four Factor Index of Social Position (26), with almost 75% of each group coming from professional or semi-professional families. Parental ratings of family interaction patterns, as measured by the Family Adaptability and Cohesiveness Scale III (27), indicated that the families of the three groups of patients had a high level of cohesion (emotional bonding and supportiveness) and adaptability (response to situational and developmental stress) in their family relationships.

Preliminary data analyses indicate that despite average IQ (mean 108), each diagnostic group had a higher than expected number of children underachieving in at least one academic area (idiopathic isolated GHD: spelling and arithmetic ($p < 0.02$); Turner's syndrome: spelling and arithmetic ($p < 0.05$); and idiopathic short stature: arithmetic ($p < 0.05$)). This finding is heightened in importance when one considers that the children studied are from upper/middle-class, well-educated backgrounds, where academic performance is likely to be greatly valued. In addition, maternal reports indicate that both idiopathic isolated GHD and idiopathic short stature groups had higher than expected rates of behavioural problems ($p < 0.0005$ and $p < 0.002$, respectively) and that the idiopathic isolated GHD group

had a higher than expected rate of reduced social competence ($p < 0.01$). Patients with Turner's syndrome were not reported to have significant behavioural or social competence problems.

SUMMARY

These baseline data confirm that many children with significantly short stature are vulnerable to diverse developmental, social and educational problems, and substantiate the importance of a multidisciplinary treatment approach that includes a comprehensive psychological and medical assessment. The psychological assessment should focus on the early detection of problems in academic achievement and psychosocial development, in order that appropriate educational and counselling interventions can be provided. The paediatrician can also foster a positive relationship with patients and their families to facilitate treatment compliance and improve overall outcome in several ways. These include a simple explanation of the aetiology of the child's short stature and how the diagnosis was made, a review of the treatment protocol that includes information about potential side-effects and suggestions for minimizing conflicts about injections, and an open discussion of prognosis to help families develop realistic expectations. It is further suggested that paediatricians stress that treatment outcome should be assessed in psychological terms, such as increased responsibility, as well as physical growth. These anticipatory interventions will help to ensure that the eventual outcome of comprehensive treatment is an optimally functioning young adult.

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