

ASSESSMENT OF PSYCHOSOCIAL ASPECTS OF SHORT STATURE

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INTRODUCTION

The evidence is clear that growth hormone (GH) therapy can virtually eliminate the predicted height deficit for individuals with classic GH deficiency (GHD) if treatment is initiated at a sufficiently young age.¹ The unlimited availability of biosynthetic growth hormone (rhGH) has also made it possible to extend treatment to children who do not have GHD, but nonetheless exhibit short stature (SS) or poor growth. Consequently, the treatment of SS has become dissociated from its causes. Conditions for which rhGH is efficacious in promoting faster growth and taller stature include a diverse set of conditions: Turner syndrome,² chronic renal insufficiency,³ Prader-Willi syndrome,⁴ children born small for gestational age⁵ and, most

Highlights In This Issue

Islet Cell Transplantation in T1DM	page 25
GH Receptor: Cytoplasmic Signaling Domains	page 25
Letter to the Editor: Pregnancy in T1DM Adolescents ...	page 26
Anthropometry, Metabolic Control, and Thyroid Autoimmunity in T1DM with Celiac Disease	page 27
Movement and Energy Expenditure in Obesity	page 28
The Many Faces of <i>PTHR1</i> Mutations	page 30
Developmental Transcriptional Regulators	page 30
Sex Differences in Patients Evaluated for Poor Growth	page 31
Visfatin – A New Visceral Fat Adipokine.....	page 32

E-Abstracts (Abstracts On-line)

Congenital Hypothyroid Patients and Siblings
GH Provocation Tests and Response to GH
Orlistat Treatment in Severe Obesity
Psychological Benefits of GH in SGA
ROMA - A New Addition to Cytogenetic Analysis
Regulation of Stat3 Dimerization

From The Editor's Desk

Dear Colleague:

The increased number of abstracts and editorial comments published online has been very well received by readers of *GGH* journal. The feedback was praiseworthy, and there were a large number of viewers who accessed the e-abstracts. Both of these aspects are very rewarding to the Editorial Board. This issue also includes an expanded format; there are 8 abstracts published in the print version of the journal, plus one letter to the editor pertaining to the lead article dealing with pregnancy in T1DM patients (published in Volume 20, Number 4 of *GGH*). In addition, there are 6 papers published in the e-version, (accessed at www.GGHjournal.com). Altogether the Editorial Board canvassed and reviewed some of the most pertinent papers in the current literature. Finally, the lead article in this issue addresses a most important topic, one that pediatric endocrinologists deal with on a daily basis; namely, the evaluation of children with short stature. The paper by Sandberg and Colsmán is an erudite review of the facts and pitfalls of the reports dealing with the psychosocial issues of short stature. They discuss the science and evidence and/or the lack of it, regarding the "heightism" prejudice that is so prevalent in our society. It constitutes an important contribution for those in practice dealing with short children, as well as for those interested in psychosocial research.

In May, 1985, I received an urgent call alerting me to the CJD association with the growth hormone that was used to treat hypopituitary patients. This hormone, extracted from cadaver pituitary glands, was immediately pulled off the market and we were left without any options to treat these patients. Fortunately, recombinant human growth hormone was in the pipeline and was soon available for clinical use. The 20th anniversary of this landmark accomplishment by Genentech is worthy of recognition.

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recently, idiopathic short stature (ISS), ie, short, but without diagnosable pathology.⁶ In addition to eliciting improved growth velocity, rhGH has also been shown to produce metabolic benefits in particular conditions, eg, GHD, Prader-Willi syndrome, and chronic renal insufficiency.

The primary rationale for rhGH treatment has traditionally rested on the assumption that SS, in the extreme, may constitute a physical disability, and otherwise serves as a significant psychosocial burden for the individual. Furthermore, treatment is predicated on the belief that rhGH-induced increases in height will improve quality of life (QOL). Allen and Fost⁷ infer from the growing number of conditions for which rhGH is prescribed that “the cause of short stature is not morally relevant in deciding who is entitled to treatment.” These authors proposed that rhGH therapy is indicated when a “disability” in adaptation attributable to SS is identified (rather than by virtue of a medical diagnosis), and that treatment should be aimed at correcting this disability up to the point that an adult height within the “normal range” is attained, ie, 5th percentile.

This review summarizes what is known about the psychosocial aspects of SS and the QOL benefits of rhGH treatment. Stereotypes and assumptions about SS are evaluated in light of empirical findings. As described elsewhere,⁸ studies and reviews were identified on MEDLINE[®] and PsychINFO[®] and The Cochrane Database of Systematic Reviews[®] using the terms “short,” “stature,” “height,” or “growth hormone” combined with “psychological,” “psychosocial,” or “quality of life.”

EVALUATING PSYCHOLOGICAL RESEARCH ON SS Analogue versus “real world”

Research on stereotypical beliefs about those with SS is often conducted by assessing participants’ perceptions in “analogue” studies. Social scientists employ analogue studies to answer well-defined research questions by isolating aspects of everyday life and assessing them within a controlled setting. The validity of findings stemming from such research designs has been questioned when used to investigate complicated social phenomena. Analogue studies of the psychosocial concomitants of SS that constrain information about the individual, or which place emphasis on stature, may unwittingly tap the stereotypes held by participants, but may be poor predictors of how participants perceive or treat an individual in the “real world.”⁹

Descriptive cross-sectional studies

A common strategy is to use standardized questionnaires or interviews to assess psychological characteristics of individuals with SS, and then compare findings to those of individuals of average height. Such descriptive studies typically assess research participants at only

one point in time and do not include an evaluation of an intervention, eg, response to a treatment such as rhGH. Validity of cross-sectional studies can be threatened by sample selection biases and participant reactivity.

a) Sample selection biases. Ascertainment of the psychosocial adaptation of individuals with SS depends on the composition of the targeted group. To evaluate the generalizability of the findings to all individuals with SS, research must provide details regarding the representativeness of the sample, ie, the proportion of those individuals eligible for study, based upon anthropometric criteria, who participate relative to those who do not. Factors resulting in an over-representation of better or poorer functioning individuals would bias the findings. Examples of clinic-based studies in which sample representativeness cannot be ascertained, and which report greater behavioral dysfunction among children and adolescents with SS, include 2 large studies.^{10,11} Investigations that have more carefully recruited clinically representative samples of referred short youths have shown these groups to be similar in behavioral adjustment to population-based norms^{12,13} and classmates.¹⁴

b) Comparison samples. The composition of comparison or control groups for individuals with SS is no less important than the selection of the target group when the goal is to make statements regarding the prevalence of problems. Factors contributing to recruiting a comparison sample that is functioning better than the general population would result in the SS group appearing less well-adapted.¹⁵ Participant recruitment techniques which result in generally better functioning individuals include reliance on volunteers who are generally better adapted than those in the general population.¹⁶ As an alternative to recruiting a control group, it is common to compare the target group (ie, youths with SS) with “norms” for the standardized method(s) administered. This practice is fraught with risks, including differences in inclusion and exclusion criteria and demographic characteristics that are related to participants’ scores.¹⁷

c) Reactivity of assessment. An additional potential threat to the validity of a study stems from the subject’s awareness of being studied.⁹ The individual’s motives and interpretations of the study can influence responses. For example, participants in clinic-based studies of the psychological adaptation of individuals with SS might assume that their role is to describe the liabilities associated with diminutive size, since they are being evaluated for short stature. If the participant’s awareness of the assessment leads to a different response from usual, the measure is said to be *reactive*. Studies that have masked the examination of participant’s height have failed to detect an association between height and psychosocial adaptation.^{14,18}

d) Sources of information about the individual's psychosocial adaptation. Limited concordance in the reports of psychological adaptation across informants (child, parent, peers, others) is common and serves as a caution to readers of psychosocial literature regarding SS.¹⁹ Stronger research designs involve the collection of data from multiple sources.²⁰ The most valid source of information about the social relationships of youths with SS would derive from studies utilizing peers as informants.²¹ This strategy has been adopted in only 2 studies, one examining the social status of clinic-referred youth¹⁴ and a community sample.¹⁸

Treatment studies

Studies that examine the influence of medical treatments (such as rhGH therapy) on psychological outcomes are vulnerable to threats stemming from evaluation bias introduced through either the informant's (often the parent) or examiner's knowledge that the patient is receiving the treatment, or placebo effects. In most research, the minimal experimental conditions include one group that receives an intervention and another group that does not (control group). The purpose of adopting a no-intervention group is to rule out alternative explanations for change in the intervention group, eg, placebo effects or regression toward the mean.

To the best of our knowledge, there has been only one clinical trial of the psychological effects of rhGH in children and adolescents that employed a randomized, placebo-controlled research design.²² A recent meta-analysis suggests that placebo effects are stronger in clinical trials employing continuous *subjective* outcomes (such as measures of psychosocial adaptation) as compared to large trials employing dichotomous *objective* outcomes.²³

The "regression toward the mean" should also be considered. This concept refers to the tendency of extreme scores on any measure to regress toward the mean of the distribution when the measure is re-administered. If individuals are selected for a study in a manner that they are more likely to generate extreme scores on a given measure, one can predict on statistical grounds that scores will tend to revert toward the mean on subsequent retesting.¹⁵ To rule out this phenomenon as an explanation, changes observed in the treated group need to be compared with changes seen over the same time interval in a sample with similarly elevated baseline scores.²⁴

Expectation biases may also be introduced into the data by relying on parent reports of

children's behavioral adaptation. Parents' worries about their children's psychological adjustment to SS likely contribute to the referral to a pediatric endocrinologist and acceptance of a recommendation for rhGH therapy. These same worries may also be associated with an expectation (bias) that rhGH therapy results in reduced behavior problems. It is important to validate parental reports of psychological problems against other sources of information (eg, patients, teachers, or peers). Studies that have adopted this approach have demonstrated few differences between patients with SS and comparison or control groups.^{12,18,20}

STATURE-RELATED STEREOTYPES

Stereotyping refers to a process in which identical characteristics are assigned to all individuals within a group, regardless of the actual variation among group members. Negative stereotypes regarding experiences and characteristics of individuals with SS are plentiful and categorized as: accompanying psychological characteristics, differential treatment by others, social relationships, and education/occupation (Table 1). Children's and adults' beliefs about height reliably demonstrate a bias toward the notion that "taller is better." With few exceptions, both children and adults attribute significantly less favorable characteristics to short individuals compared to those of tall or average height.²⁵⁻²⁸ It is thus not surprising that youths and adults of both genders prefer to be taller.²⁹⁻³¹

It has been suggested that individuals with SS experience disadvantages in the way they are treated due to stature-related societal perceptions.³² As early as preschool age, mothers differentially treat girls based upon height.³³ Two studies in adults investigated the relationship between a person's height and "personal

Table 1. Empirical status of stature-related stereotypes

Stereotype	Evidence
Children and adults with SS are more poorly adjusted psychosocially	Generally supported by analogue (laboratory-based) research ²⁵⁻²⁸ Not supported by general population- or clinic-based studies ^{12,13,20}
Children and adults with SS are treated poorly due to their stature	Mixed results from analogue studies ³³⁻³⁵ Evidence of teasing and juvenilization from clinic-based studies ^{13,45}
Short men are less attractive and desirable to women as dates or husbands	Generally supported by analogue research ^{27,36,37} Limited support in population-based studies: effect attenuated when statistically controlling for confounding variables ^{53,58}
Children and adults with SS do less well at school/are less intelligent	Generally supported by analogue studies ^{33,40} Not supported by general population- or clinic-based studies of children ⁴⁷⁻⁴⁹ or adults ^{52,62}
Adults with SS hold lower status occupations and are paid less	Supported by analogue studies ^{27,41,42} Limited support in population-based studies: effect attenuated when statistically controlling for confounding variables ⁵²⁻⁵⁷

space.” Results were mixed: in one, the taller individual was afforded more space³⁴; in the other, differences were not found.³⁵ Research on the effects of height on social relationships focuses on heterosexual dating and partner selection. For dating relationships, findings support the conventional notion that taller is more attractive, and this appears particularly true for males,^{27,36-38} but less so for females.^{27,38} Regarding the importance of height in partner selection, the man’s height is more important a consideration for women than the reverse.^{28,39}

When asked to evaluate classmates’ competence, preschool boys rated small boys as better at “art” than tall boys; girls rated tall boys as smarter than small boys; but girls’ height did not correlate with ratings.³³ Mothers rated tall boys and girls as more competent than small boys in the majority of domains,³³ and had greater expectations for mastery and achievement from taller children.⁴⁰ With regard to adults’ occupational status, undergraduates judged individuals who have more prestigious occupations as taller than those of less prestige.^{41,42} They also expected taller people to have a higher professional status than shorter people.²⁷

QOL ASSUMPTIONS REGARDING SS

Assumption 1: Patients with SS experience chronic psychosocial stress (Table 2). Early studies showed that SS is associated with teasing and juvenilization.⁴³ These investigations were generally restricted to patients with complex medical conditions with little attention directed toward bias introduced by subject selection factors.⁴⁴ Two relatively recent clinic-based studies found that approximately 60% to 70% of patients referred to pediatric endocrinologists for a growth evaluation had experienced teasing or juvenilization, and that these stressors were experienced with some regularity.^{13,45} Contrary to expectations, however, the child’s relative height

(–3.1 to –0.2 height SD) was not significantly related to the incidence of these negative experiences.¹³ Furthermore, the presence of psychosocial stress does not imply that SS constitutes a “disability”.⁷ To rise to this threshold, it would be necessary to provide clear evidence that these stressors are associated with clinically significant impairment in social, academic, or occupational functioning.

Assumption 2: Patients with SS exhibit clinically significant problems of psychosocial adaptation.

It is commonly believed that patients with SS exhibit clinically significant behavioral or emotional problems.⁴³ Implicit in this assumption is the expectation that psychiatric problems are significantly more common among patients with SS than in the general population (rates of childhood psychiatric disorders fall between 18% and 22%).⁴⁶ However, this does not appear to be the case when selection biases in participant recruitment are minimized. For example, self-esteem scale scores for short youths referred for evaluation of SS were higher (ie, more positive) than questionnaire norms, despite reports that the majority of these individuals experienced teasing and juvenilization.¹³ The same was true for behavior disturbance: patients reported significantly fewer problems than questionnaire norms, and parental reports indicated that patients were indistinguishable from the norms in behavioral and emotional functioning.¹³ Similar findings were reported in other clinic-based studies.^{12,20} In contrast, other studies report significantly more behavioral and emotional problems among children with SS relative to norms as measured by self- and parental-report.^{10,11} Unfortunately, key details essential to gauge the representativeness of these samples^{10,11} were not provided, such as the total number of eligible patients and the method of targeting participants for behavioral studies.²⁴ Studies featuring clinically representative samples show behavioral adjustment is comparable to classmates¹⁴ and to population-based norms.^{12,13}

Table 2. Assumptions underlying growth-promoting therapies

Assumption	Evidence
Patients with short stature experience chronic psychosocial stress	Supported by clinic-based studies ^{13,45}
Patients with short stature exhibit clinically significant problems of psychosocial adaptation	Not generally supported ^{10,12,13,20,22}
Short youths and adults in the general population are similarly at risk for problems of social adjustment	Not supported in children, adolescents ^{18,48,50,51} or adults ^{52,56,58}
Stature-related social stress results in significant problems of psychosocial adjustment	Limited support: though teasing and juvenilization were related to behavior problems, ⁴⁵ overall psychosocial adaptation was equivalent to community norms ¹²
Increases in growth velocity and height induced by rhGH therapy result in an improved QOL	Not supported ^{20,22,31,62}

Corollary of Assumptions 1 and 2: Individuals with SS in the general population also exhibit significant problems of psychosocial adaptation. Although rarely articulated, it follows from both preceding assumptions that short youths who are *not* referred for a medical evaluation are similarly at risk for psychosocial adaptation problems. In the prospective, longitudinal Wessex Growth Study, in which the sample comprised short, healthy children from the general population, no evidence of serious psychosocial or academic disadvantage was found.⁴⁷⁻⁵⁰ Although individuals in the SS group preferred to be taller, and reported more bullying than their taller peers,²⁹ neither the desire for physical change nor bullying

had measurable effects on school performance or self-esteem,^{47,48,50} suggesting that stigmatized individuals use self-protective cognitive mechanisms that allow self-esteem to remain intact.¹²

In the largest study of its type, and the only one conducted on a national probability sample of the U.S. population, Wilson and colleagues⁵¹ assessed the relationship between stature, IQ, and academic achievement. Statistically controlling for potentially confounding background characteristics, subjects' height contributed significantly (approximately 2%) to the prediction of both indices. The Wessex Growth Study replicated this general finding. However, as in the U.S. study, height explained only 2% of the variance in IQ. Socioeconomic factors, rather than stature, best predicted psychosocial and academic outcomes.⁴⁸

In a recent study using a novel research design, the influence of height on students' (N=956, grades 6–12; approximately 11–18 years old) psychosocial adaptation was assessed using peer informants.¹⁸ Statistically significant relationships were not detected between height and measures of friendship, popularity, or most aspects of reputation among peers, despite substantial statistical power. Findings did not vary by participant gender, peer- or self-report, whether data from the entire sample were used, or when subgroups of very short (≤ -2.25 height SD; 1st percentile) or very tall students (≥ 2.25 height SD; 99th percentile) students were contrasted with average height (25th–75th percentile) classmates. In the lower grades, classmates perceived shorter students as younger than their age. However, this perception was not meaningfully related to measures of social acceptance or other aspects of reputation among peers. The authors concluded that extremes of stature in the general population—either short or tall—have minimal detectable influence on peer perceptions of social behavior, friendship, or acceptance.¹⁸

A statistically significant relationship between men's heights and the likelihood of completing college was not found.⁵² Taller men were not more likely to achieve higher professional status when analyses controlled for educational attainment.⁵² Studies of the relationship between height and income often report that tall men and women earn more than their shorter colleagues.⁵²⁻⁵⁶ However, when potentially confounding variables such as age, health, education, and family of origin characteristics are controlled for statistically, the relationship between height and income is attenuated.^{52,56} In a cohort study of all healthy Swedish military conscripts in 1994, short conscripts (< -2 height SD) exhibited more physical and mental health problems and scored lower on tests of intellectual performance than taller men.⁵⁷ The investigators raised the possibility that the association between height and physical and

psychological adaptiveness are indirectly linked. For example, biological factors that contribute to poorer growth may also be responsible for poorer physical performance and more limited intellectual aptitude.

The relationship between height and marriage rates varies by study. In the National Child Development Study (a longitudinal study of British citizens), the probability of being married was 7% lower for short men ($< 9^{\text{th}}$ percentile) and 5% lower for tall women ($> 90^{\text{th}}$ percentile) than for adults of average height (20th–79th percentiles), when statistically controlling for social class, education, health, race, and region of residence.⁵³ Contrasting findings were derived from the U.S. National Longitudinal Survey of Youth, a study featuring a comparable research design. Although short men exhibited lower rates of first marriage than those of average height, this effect disappeared once family-of-origin variables (parental education, poverty status, and region of the country) were taken into account; no consistent relationship was found between women's height and marriage rates.^{58,59}

Assumption 3: Height-related social stress results in significant problems of psychological adjustment. As both teasing^{60,61} and psychological adaptation problems⁴⁶ are relatively common among children and adolescents, support for Assumption 3 should come from a demonstrated statistical link between stressful stature-related experiences and psychosocial dysfunction. In the only study that specifically addressed this issue, parental report of stature-related teasing significantly predicted increased emotional problems.⁴⁵ The proportion of unique variance in problem scores attributable to teasing was approximately 2% and increased (to between 4% and 5%) when the frequency of teasing was taken into account. Juvenilization also contributed unique explanatory value, and summated with teasing as a negative influence on psychosocial adaptation.

To interpret the clinical significance of these effects, one must view them within the context of the mean level of behavior problems in this sample. As noted earlier, the psychological adaptation of short youths in this same clinic-referred cohort was comparable to community norms.¹² Thus, the possibility exists that stature-related stresses may contribute to variability in adaptation that falls within the "normal range."

Assumption 4: Increased growth velocity and height induced by rhGH therapy result in improved QOL. There are very few randomized, controlled trials of the QOL benefits of rhGH treatment (and only one randomized placebo-controlled trial²²). In the Wessex Growth Study, rhGH-treated children with ISS were compared with those in an untreated control group at recruitment and after 3 and 5 years.⁶² Despite a significant increase in

height in the treatment group, there were no differences between the groups on the behavioral measures at any of the 3 assessments. Comparable results were found in a more recent study in which, despite increased height in the treated group, no improvement on self- or parental-report measures of psychosocial adaptation and self-esteem were found.²⁰ In a recently published report on the psychological benefits of rhGH therapy, youths with ISS were randomly assigned to either treatment or a control group which received placebo injections.²² At baseline, the behavioral/emotional adjustment and self-esteem scores for children with ISS were within the normative range. Furthermore, no systematic relationship was observed between attained height SDs, or the change in height SDs from baseline and annual changes in behavior problem or self-esteem scores. Finally, in a retrospective study of young adults who either had or had not been treated with rhGH therapy for ISS, no differences in education level or QOL were found,³¹ though the treated patients had a romantic partner less often than participants who did not receive rhGH therapy in childhood.

Although the focus of the “treat or not to treat” debate is directed at rhGH therapy, androgen treatment of boys with constitutional growth delay has long been a strategy to accelerate growth velocity, hasten the onset of secondary sex characteristics and, thereby, ameliorate perceived psychological distress, without sacrificing adult height.⁶³⁻⁶⁵ There has never been a comparison of the psychological benefits of rhGH versus androgen therapy. A direct comparison is tantalizing considering the differences in the objective

of treatment (ie, hastening pubertal progression versus achievement of taller adult height), duration of treatment, and cost.

RECOMMENDATIONS

Practice guidelines for the use of rhGH therapy in children with SS state that decisions regarding “instituting or continuing therapy should be individualized...and be guided by the goal of improving the quality of life of the child and future adult.”⁶⁶ These recommendations are echoed by Allen and Fost⁷ who emphasize that access to rhGH therapy should be guided by the identification and amelioration of disability stemming from SS. Identifying those who experience SS as a “disability” is a challenging task. The fact that the child or adolescent experiences teasing or juvenilization, or that the family is seeking a consultation from a pediatric endocrinologist, are insufficient reasons to make this determination. Psychosocial stress is a common phenomenon in child development and, by itself, does not imply psychiatric dysfunction or even significant problems of psychosocial adaptation. Noeker and Haverkamp⁶⁷ developed a useful conceptual framework to guide the psychological assessment of SS which can be used to inform clinical management decisions. Three hierarchical levels of assessment are identified: stress exposure due to SS (Level I), quality of coping responses (Level II), and occurrence of psychopathology (Level III) (Table 3).

Clinical management is facilitated by a thorough psychosocial evaluation designed to delineate specific stressors experienced by the child, the pattern of coping, and psychosocial adaptation. Because of the salience of SS and its potential to serve as a lightning rod diverting attention from other stressors, clinicians must be watchful of misattributions by the child, parents, or others (including oneself²⁰). This influence may direct attention away from prescribing psychosocial interventions for maladaptive coping.⁶⁸ This evaluation serves to assess individual characteristics (eg, intelligence, temperament) and social-ecologic factors (eg, degree of stress in the child’s environment, salience of height to the family, social support from peers) that could moderate the influence of height on psychosocial adaptation. Finally, identifying adaptive coping strategies as an

Table 3. Psychological assessment of the short child (adapted from reference 67)

Target of Assessment	Information Collected
Level I	
<ul style="list-style-type: none"> Stress associated with condition 	<ul style="list-style-type: none"> Stigmatization and juvenilization associated with SS Other stressors associated with the medical syndrome <ul style="list-style-type: none"> Experiences of stress (Level I) do not imply psychiatric dysfunction (Level III)
Level II	
<ul style="list-style-type: none"> Quality of adaptive coping responses 	<ul style="list-style-type: none"> Behavioral and emotional propensities in response to stresses Individual and family characteristics serving to attenuate or amplify maladaptive responses to stress (ie, risk and protective factors)
Level III	
<ul style="list-style-type: none"> Occurrence of behavioral or emotional adaptation problems Impairment in family, peer, or educational functioning 	<ul style="list-style-type: none"> Range and intensity of problems and their coalescence into psychiatric syndromes Presence of “impairment” in key psychological development domain: family, peer, or educational functioning <ul style="list-style-type: none"> “Dissatisfaction” with height does not imply impairment in function

alternative (or adjunct) to rhGH therapy is an additional goal. Gathering such detailed information is prudent in view of the clinical evidence showing that the adult height of formerly treated GH-sufficient individuals often remains substantially below average.^{6,69-71}

The comprehensive nature of this evaluation implies that it should be conducted by a mental health professional—ideally by a member of the pediatric endocrinology team, knowledgeable in both the medical and psychosocial aspects of SS. The team member is in a position to delineate predictable psychosocial experiences related to SS and to offer anticipatory guidance to patients and families. The entire team should reassure parents that SS does not have to limit their child's current or future happiness, success, or productivity. However this is an ideal model that most often is not applied in clinical practice, even in most academic centers. Thus, the practicing physician caring for children with SS needs to balance the “do's and don'ts” (Table 4) before casting assumptions for the consequences of SS and the recommendations for treatment.

Parents may evaluate factors for and against rhGH therapy differently from physicians.^{72,73} Factors parents consider (in order of descending importance) include risk of long-term side-effects, out-of-pocket costs, the child's attitude toward wanting rhGH therapy, the likelihood of a height increase, the magnitude of the height increase, and the route of rhGH administration.⁷² Given the importance of these to families, it is prudent to gear interactions toward addressing these priorities. To this list, we would add the importance of making explicit the assumptions that the child, family, and physician hold concerning the liabilities of SS and the expected benefits of rhGH therapy (Table 4).

CONCLUSION AND SPECULATION

Commonly held beliefs and attitudes serve as implicit assumptions in the QOL rationale for applications of rhGH therapy beyond the traditional role of hormone replacement. In view of the findings on stereotypes, particularly research findings gleaned from laboratory studies, it is understandable that parents of children with SS may be concerned about their child's psychosocial and educational adaptation. However, findings from clinic- and general population-based research on the real-world experiences of youths and adults with SS do not generally support the view that SS is associated with psychological dysfunction, ie, constitutes a “disability”.⁷ Similarly, research on the QOL benefits of rhGH therapy does not demonstrate efficacy for this outcome.

What might account for the stability of negative stereotypes and assumptions regarding SS despite contradictory evidence? Schkade and Kahneman⁷⁴ proposed that a “focusing illusion” potentially accounts for such a phenomenon. Assuming (with considerable evidence to support it^{8,26}) most believe that SS is associated with multiple negative characteristics, it follows that evaluations of an individual's QOL that focus on this isolated trait would be overly negative. The focusing illusion occurs “when a judgment about an entire object or category is made with attention focused on a subset of that category, . . . whereby the attended subset is overweighted relative to the unattended subset.”⁷⁴ Schwarz and colleagues (as cited in ⁷⁴) described one instance of the focusing illusion. In their study, college students were asked 2 questions: “How happy are you?” “How many dates did you have last month?” The correlation between responses to the questions depended on which question was asked first. When the happiness question came first, the correlation was

0.12. However, when the dating question preceded the one on happiness, the correlation rose to 0.66. Thus, focusing on one aspect of life to the exclusion of others results in overweighting of that factor in the experience of well-being. In the case of the individual with SS who is being queried about social experiences they believe are linked to height, the context of questioning encourages the respondent to focus on this one aspect of their life to the exclusion of others. Under these circumstances, responses are likely to be overweighted in the negative direction because of the shift of focus away from compensating factors. The focusing illusion thus serves as a potential explanation for why our perceptions of the QOL of others—in this case those with SS—seems to be off the mark. The existence of a focusing illusion may also serve as a cautionary

Table 4. Recommendations for clinicians

Do's	Don'ts
Conduct a comprehensive psychosocial assessment ^{44,67}	If problems of psychosocial adaptation are detected, do not assume that these are attributable to SS
Recommend psychosocial strategies to directly address predictable social challenges associated with SS ⁶⁸	Do not neglect the psychosocial implications of features other than SS associated with particular syndrome
Balance medical recommendations with suggestions to address any psychosocial stress associated with SS ⁶⁷	Do not assume the parent or patient wants rhGH therapy
Discourage the expectation that taller stature is associated with changes in QOL ^{18,20,31,62}	Do not restrict discussion of side effects (known and unknown) while emphasizing safety
Be aware of and address factors the parent and patient use in making their decision ^{72,73}	Do not minimize potential monetary costs of rhGH therapy; discuss these prior to initiating therapy
Discuss treatment efficacy in terms of the degree of certainty and magnitude of effects ⁶	

note for parents and clinicians. The possibility exists that by focusing on height, this characteristic becomes overvalued relative to less salient ones. Ironically, the treatment with rhGH of individuals who are destined to be shorter than average, and the attendant focusing of attention and energy over years, may potentially amplify the negative influence of this cognitive phenomenon.

In conclusion, the data summarized indicate that most individuals with SS adapt psychologically to the common psychosocial stresses associated with height. These positive findings notwithstanding, family and physician concerns for the child may be influenced by prevalent stature-related stereotypes and prejudices. Furthermore, the conclusion that individuals generally make positive adaptations to difficult circumstances should not be used as a justification to ignore stresses that may be remediable. It is worth remembering that subgroups of children (and households) are already facing multiple challenges to healthy psychological function, and that the burden of teasing or juvenilization may push the balance from adaptive to maladaptive coping. Valid "remedies" for children experiencing stress (and distress) related to SS will likely come about through individualized treatments involving both psychosocial and medical interventions, including the use of growth-promoting medications.

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ABSTRACTS FROM THE LITERATURE

Islet Cell Transplantation in T1DM

Islet cell transplantation has succeeded in restoring insulin independence in type 1 diabetes (T1DM) patients. However, islet allografts from 2 to 4 donors have been required to transplant an appropriate cell mass. This paper described the safety and efficacy of a single-donor, marginal-dose islet transplant protocol in 8 women with T1DM, nocturnal hypoglycemia, and advanced secondary complications. Each patient received a small dose of islet cell allotransplants from a single cadaver donor pancreas after antithymocyte globulin, daclizumab, and etanercept, and were immunosuppressed with mycophenolate mofetil, sirolimus, and no- or low-dose tacrolimus. All 8 patients achieved insulin independence and freedom from hypoglycemia; 5 remained insulin-independent for longer than 1 year. Graft failure occurred in 3 patients preceded by sub-therapeutic sirolimus trough levels (<9 ng/mL) in the absence of tacrolimus trough levels (<9 ng/mL). The authors concluded that improved islet cell engraftment was secondary to the peritransplant administration of antithymocyte globulin and etanercept.

Hering B J, Kanadaswamy R, Ansite JD, et al. Single-donor, marginal-dose islet transplantation in patients with type 1 diabetes. *JAMA*. 2005; 293:830-835.

Editor's Comment: *Transplanting insulin producing cells from fresh cadavers into T1DM patients is known to reverse the disease, but the procedure has been too costly and fraught with difficulties for widespread use. The authors of this study showed that their protocol was effective, safe, and less costly, as a single donor cadaver was sufficient to produce an appropriate dose of islet cells for transplantation. These allografts took residence in the liver of the patients and started producing insulin. Although 3 patients rejected the transplant, they achieved insulin-independence and freedom from hypoglycemia for 127, 76, and 7 days. In previous trials there was a need to utilize 2 to 4 cadavers, and each infusion of cells cost about \$75 000, including follow-up treatments. In the new trial there was a cost saving, since only one pancreas was needed and there was a need for less diabetogenic immunosuppressants. These findings are of interest and may have implications for a not very distant day when this type of therapy will be routine in clinical care of T1DM patients.*

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Growth Hormone Receptor: In Vivo Analysis of the Cytoplasmic Signaling Domains

In vitro studies of the growth hormone receptor (GHR) have identified multiple post-receptor signaling pathways including JAK2 tyrosine kinase, STAT5, ERK1/2, PI3-kinase, a JAK2-independent calcium signaling element, SHP2 phosphatase, SOCS and CIS. Although STAT5 is primarily responsible for GH-induced expression of insulin-like growth factor (IGF)-I, STAT5b^{-/-} mice have less severe growth retardation than GHR^{-/-} mice, indicating a physiologic significance of alternative pathways.

Rowland and colleagues undertook the impressive task of teasing apart the GHR signaling domains *in vivo*. They created 2 knockin mice bearing truncated GHR mutants: m569 was truncated at residue 569 (wild-type GHR contains 650 amino acids) and had site-directed mutations of tyrosines 539 and 545 in order to delete 70% of the STAT5 docking sites, while m391 was truncated at residue 391, thereby also deleting the proximal STAT5 sites (0% STAT5 signaling left) while retaining 100%