

SRS HRQL Bibliography

This annotated bibliography of the Scoliosis Research Societies HRQL effort that was initiated by Tom Haher and his group is prepared to assist HRQL researchers. I apologize and accept responsibility for inaccuracies and oversights. Editorial input is encouraged! This will "always" be a work in progress.

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January 7, 2008

SRS-24

Crawford JR, Izatt MT, Clayton A, Labrom RD, Askin, GN. A prospective assessment of SRS-24 scores after endoscopic anterior instrumentation for scoliosis [Health Services Research]. Spine 2006;31:E817-E822.

Eighty three (74 F, 9M) consecutive patients, mean age at surgery 16.4 years, mean curve 52.6° were evaluated before and at periodic intervals up to 2 years after surgery. Pain, general self image and function from back condition improved significantly ($p < 0.05$) after surgery. None of the domains improved after one year.

Haheer TR, Gorup JM, Shin TM, Homel P, Merola AA, Grogan DP, Pugh L, Lowe, TG, Murray, M. Scoliosis Research Society instrument for evaluation of surgical outcome in adolescent idiopathic scoliosis: A multi-center study of 244 patients. Spine 1999;24:1435-40.

Describes development of the original SRS questionnaire which consisted of 24 items divided into 7 domains. Internal consistency as determined by Cronbach's α was greater than 0.6 for each domain. Test-retest intraclass correlation coefficients were greater than 0.68.

Helenius I, Lamberg T, Österman K, Schlenzka D, Yrjönen T, Tervahartiala P, Seitsalo S, Poussa M, Remes V. Scoliosis Research Society outcome instrument in evaluation of long-term surgical results in spondylolysis and low-grade isthmic spondylolisthesis in young patients. Spine 2005;30:336-41.

SRS-24 and Oswestry Disability Index scores correlated significantly. Percentage slip correlated inversely with cosmetic question on SRS-24.

Merola AA, Haheer TR, Brkaric M, Panagopoulos G, Mathur S, Kohani O, Lowe TG, Lenke LG, Wenger DR, Newton PO, Clements DH, Betz RR. A multicenter study of the outcomes of the surgical treatment of adolescent idiopathic scoliosis using the Scoliosis Research Society (SRS) outcome instrument. Spine 2002;27: 2046-51.

Two hundred forty two patients studied pre operative and two years post-operative. Baseline preoperative pain level improved from 3.68 to 4.63 ($p < 0.001$). General self image, function from back condition, and level of activity also all significantly improved ($p < 0.001$) at follow up. Satisfaction score averaged 4.67 ± 0.03 . Results did not correlate with magnitude of curve progression, gender or surgical procedure (Posterior versus Anterior). Patients with pre

operative curves less than or equal to 54° were slightly more satisfied than those with curves greater than 55° pre operative, 4.77 versus 4.55 (p 0.05).

Petcharaporn M, Pawelek J, Bastrom T, Lonner B, Newton P. The relationship between thoracic hyperkyphosis and the Scoliosis Research Society outcome instrument. Spine 2007;32:2226-31.

Fifty (25 female and 25 male) adolescents with Scheuermann's kyphosis or adolescent postural hyperkyphosis and 50 adolescents without hyperkyphosis studied. "Significant negative correlations were found between kyphosis magnitude and the total pain, general self-image, general function, overall level of activity and total SRS scores (P<0.0001)." As the r values of these correlations were relatively high (0.40-0.66) authors suggest that instrument may discriminate better for hyperkyphosis than scoliosis.

Watanabe K, Hasegawa K, Hirano T, Uchiyama S, Endo N. Use of the Scoliosis Research Society outcome instrument to evaluate patient outcome in untreated idiopathic scoliosis patients in Japan. Part I: Comparison with nonscoliosis group: Preliminary/limited review in a Japanese population. Spine 2005;30:1197-1201.

One hundred forty-one females and males mean age 13.6 (10-17) whose thoracic curves averaged 36° (13-73) and who had not yet been treated were studied. "Internal consistency using Cronbach's alpha for all domains was considerably low".

Watanabe K, Hasegawa K, Hirano T, Uchiyama S, Endo N. Use of the Scoliosis Research Society outcomes instrument to evaluate patient outcome in untreated idiopathic scoliosis patients in Japan. Part II: Relation between spinal deformity and patient outcomes. Spine 2005;30:1202-5.

Patients with thoracic Cobb >40° or rotation angle (Perdriolle) >20° had negative self-image due to their back deformity.

Watanabe K, Hasegawa K, Hirano T, Uchiyama S, Endo N. Evaluation of postoperative residual spinal deformity and patient outcome in idiopathic scoliosis patients in Japan using the Scoliosis Research Society outcomes instrument. Spine 2007;32:550-4.

Eighty-one patients studied >2 years after surgery. General self-image was inversely correlated with the Cobb angle and rotation angle. Self image after surgery was directly correlated with the degree of Cobb correction. Although these findings were significant at p<0.05, the r_s values were less than 0.3.

Watanabe K, Lenke LG, Bridwell KH, Hasegawa K, Hirano T, Endo N, Cheh G, Kim YJ, Hensley M, Stobbs G, Koester L. Cross-cultural comparison of the Scoliosis Research Society outcome instrument between American and Japanese idiopathic scoliosis patients. Spine 2007;32:2711-2714.

The SRS-24 responses of two matched pre-operative groups of 100 idiopathic scoliosis patients were compared. American patients had significantly lower scores in the Pain (P < 0.0001, A: 3.7 ± 0.8 vs. J: 4.3 ± 0.4), function (P < 0.01, A: 3.9 ± 0.6 vs. J: 4.2 ± 0.5), and activity (P < 0.0001, A: 4.5 ± 0.8 vs. J: 4.9 ± 0.3) domains compared with Japanese patients.

Japanese patients had significantly lower scores in the self-image ($P < 0.0001$, $A: 4.0 \pm 0.7$ vs. $J: 3.5 \pm 0.5$) domain.

Weigert KP, Nygaard LM, Christensen FB, Hansen ES, Bungler C. Outcome in adolescent idiopathic scoliosis after brace treatment and surgery assessed by means of the Scoliosis Research Society Instrument 24. *Euro Spine J* 2006;15:1108-17.

One hundred nineteen patients followed a minimum of two years after treatment. Forty-four had brace treatment only, 41 surgery alone and 33 brace treatment prior to surgery. Sixteen (21.6%) of the operated patients had re-operation. Danish translation of SRS-24 used. Overall patients did well and those with brace and then surgery treatment did as well as those with brace or surgery only.

White SF, Asher MA, Lai S-M, Burton DC. Patient's perceptions of overall function, pain and appearance following primary posterior instrumentation and fusion for idiopathic scoliosis (IS). *Spine* 1999;24:1693-9.

Of 168 eligible patients operated before age 21 and followed an average of 94 months (26 202), 121 (72%) completed the original SRS outcome questionnaire. Females reported better outcomes in the function after surgery domain ($p=0.005$) and the self image after surgery domain ($p=0.01$). White patients reported experiencing less pain in follow up than did black patients ($p=0.0098$).

Wilson PL, Newton PO, Wenger DR, Haher T, Merola A, Lenke L, Lowe T, Clements D, Betz R. A multicenter study analyzing the relationship of a standardized radiographic scoring system of adolescent idiopathic scoliosis and the Scoliosis Research Society outcomes instrument. *Spine* 2002;27: 2036-40.

Three hundred fifty four data points for 265 patients some having had surgically treated curves, analyzed for correlation with SRS-24 questionnaire responses. Some radiographic deformity measurements including the Cobb angle measure of the major deformity had small but statistical significant correlations with total body pain, general self image and general function. No radiographic measures correlated with post operative domain scores. Authors conclude that "variables other than the radiographic appearance of the deformity (e.g. psychosocial, functional) must also be affecting these scores."

SRS-23

Asher MA, Lai SM, Burton DC. Further development and validation of The Scoliosis Research Society (SRS) Outcomes Instrument. *Spine* 2000;25:2381-6.

Following experienced based modification, the modified SRS outcome instrument and short form 36 questionnaires were administered to 35 previously surveyed post operative idiopathic scoliosis patients. Thirty (86%) average age 25 years responded at an average of 10 years post operative. Distribution of scores was acceptable. Internal consistency utilizing Cronbach's α was 0.80, 0.81, 0.77, 0.89, and 0.88 for pain, self image/appearance, function/activity, mental health, and satisfaction with surgery

respectively. Validity, determined by Pearson correlation coefficients was comparable SF36 domains was 0.70 or greater for 13 of the 14 relevant domains between SF 36 and MRSRS ($p < 0.001$).

Berven S, Deviren V, Demir-Deviren S, Hu SS, Bradford DS. Studies in the Modified Scoliosis Research Society outcomes instrument in adults: validation, reliability and discriminatory capacity. Spine 2003;28:2164-9.

Full length report of the two abstracts (Berven 2002 and Deviren 2002) below.

Sanders JO, Harrast JJ, Kuklo TR, Polly DW, Bridwell KH, Diab M, Dormans JP, Drummond DS, Emans, JB, Johnston II CE, Lenke LG, McCarthy RE, Newton PO, Richards S, Sucato DJ and the Spinal Deformity Study Group. The spinal appearance questionnaire: Results of reliability, validity and responsiveness testing in patients with idiopathic scoliosis. Spine 2007;32:2719-2722.

Eighty-three patients were studied with the SAQ and modified SRS-30 pre- and one year postoperative. Seven of eight SAQ domains had an effect size ranging from 1.1 to 1.7. Only the SRS appearance had an effect size larger than 1 (1.4). Authors conclude that "The SAQ provides more detail than the SRS appearance domain and explanation of spinal deformity's concerns and improvements."

(Editor's comment: Believe it was the SRS-23 that was used based on the reference cited.)

Abstracts

Berven S, Deviren V, Demir-Deviren S, Hu S, Bradford D. Validation of the modified Scoliosis Research Society outcomes instrument (SRS-22) for adult deformity. The Spine Journal 2002;2:80S.

In 146 adults of average 47.1 years (range 18-60) Cronbach α analysis of internal consistency within each domain demonstrated inter-correlation values (μ) greater than 0.75 for each domain. Pearson correlation coefficient with compatible domains within the SF36 demonstrated a high correlation in domains representing pain, $r=0.8$, function $r=0.85$, mental health, $r=0.89$, and self image, $r=0.63$. Total score correlates highly with every domain of the SF36 ($r=0.6-0.8$) Test-retest in 36 patients showed high correlations for each domain, ($r = 0.83$ to 0.94). Floor effect was seen in less than 2% of patients in each domain and ceiling effect was seen in less than 10% of the patients. MSRS is valid, reliable and reproducible outcomes instrument for adult deformity.

Deviren V, Berven S, Demir-Deviren S, Hu S, Bradford D. Discrimination validity of the modified Scoliosis Research Society outcomes instrument in adults with scoliosis. The Spine Journal 2002;2:79S.

The modified Scoliosis Research Society (MSRS) and SF 36 questionnaires significantly discriminated between 146 adults with scoliosis and 34 without. Within the scoliosis group there were no significant correlations between any radiographic process measure and any specific domain of the HRQL.

SRS-22

Alanay A, Cil A, Berk H, Acaroglu RE, Yazici M, Akcali O, Kosay C, Genc Y, Surat A. Reliability and validity of adapted Turkish version of Scoliosis Research Society (SRS-22) questionnaire. Spine 2005;30:2464-8.

Fifty-four of 82 patients (66%) age 19.8 (14 - 31) years and two or more years after surgical treatment of idiopathic scoliosis returned mailed SRS-22(s) and SF-36(sf) transculturally adapted questionnaires. Forty-seven returned the second set of questionnaires. Internal consistency (Cronbach α) was good for Pain, 0.72; Self-Image, 0.80; Mental Health, 0.72, and Satisfaction/Dissatisfaction, 0.83; but poor for Function, 0.48. Test/Retest reproducibility intraclass correlation coefficients (ICC's) were F 0.76, P 0.63, SI 0.82, MH 0.78, and S/D 0.81. Concurrent validity comparing (s) to (sf) domains (Pearson Correlation Coefficient) was excellent for Mental Health vrs. Mental Health Index, 0.81 and Pain vrs. Pain Index, 0.75; good for Self-Image vrs General Health Perceptions, 0.65; Function vrs Physical Functioning 0.63; and moderate for Satisfaction/Dissatisfaction vrs General Health Perceptions, 0.50 Based on this study the Function domain was slightly altered, #18 ("going out") was modified and question 15 ("financial difficulties") eliminated and the 30 AIS patients age 13 (10 - 18) years tested. The Function domain internal consistency increased to 0.81.

Asher M, Lai SM, Burton D, Manna B. The reliability and concurrent validity of the SRS-22 patient questionnaire for idiopathic scoliosis. Spine 2003;28: 63-9.

Of 83 mail surveys 58 (70%) returned the first questionnaire at an average of 10.8 years after surgery at an average of 14.6 years. Fifty-one (88%) also returned a second set of questionnaires an average of 21 days later. The psychometric attributes of the instrument were comparable: the score distribution, SRS-22 56.9% ceiling and 1.7% floor, SF 36 79.3% ceiling and 1.7% floor; internal consistency (Cronbach α), SRS-22 0.92 to 0.75, SF 36 0.91 to 0.36; and reproducibility (Intra class correlation coefficient) SRS-22 0.96 to 0.85, SF 36 0.92 to 0.61. Concurrent validity was 0.70 or greater ($p < 0.0001$) for 17 relevant comparisons.

Asher M, Lai SM, Burton D, Manna B. Scoliosis Research Society-22 patient questionnaire responsiveness to change associated with surgical treatment. Spine 2003;28:70-3.

Self image significantly improved at 3 months post operatively and this was maintained through 24 mo. Function was significantly decreased at 3 months but returned to baseline at 6 months. Pain was significantly worse at 3 months but returned to baseline thereafter.

Asher M, Lai SM, Burton D, Manna B. Discrimination validity of the Scoliosis Research Society-22 patient questionnaire: Relationship to idiopathic scoliosis (IS) curve pattern and curve size. Spine 2003;28:74-8.

SRS-22 does not discriminate between patients with no or moderate scoliosis but does separate these two groups from those with large scoliosis.

Bago J, Climent JM, Ey A, Perez-Grueso FJS, Izquierdo E. The Spanish version of the SRS-22 patient questionnaire for idiopathic scoliosis: Transcultural adaptation and reliability analysis. Spine 2004;29:1676-80.

Transcultural adaptation was carried out using two translations and two back-translations as recommended by the International Quality of Life Assessment Project guidelines, with a committee of experts to decide on the final version. One hundred seventy-five (152 F; 23 M) patients; 85 operated, 45 braced, and 45 observed, mean age 18.9 years (range 8 - 48 years); and mean thoracic Cobb 29 completed the questionnaire. One week later thirty completed the questionnaire the second time. Internal consistency (Cronbach's α) was function, 0.67; pain, 0.81; self-image, 0.73; mental health, 0.83; and satisfaction/dissatisfaction 0.78. The test/retest intraclass correlation coefficients were function, 0.82; pain, 0.93; self-image, 0.94; mental health, 0.94; and satisfaction/dissatisfaction, 0.98.

Bridwell KH, Berven S, Glassman S, Hamill C, Horton WC II, Lenke LG, Schwab F, Baldus C, Shainline M. Is the SRS-22 instrument responsive to change in adult scoliosis patients having primary spinal deformity surgery? Spine 2007;32:2220-5.

Fifty-six consecutive patients from multiple centers having primary surgery were tested with SRS-22, ODI and SF-12 preoperatively and 1 and 2 years post operative. All domain scores except SF-12 mental health were significantly improved at follow-up. The order from greatest to least improvement was SRS self-image, SRS total, SRS pain and ODI.

Bridwell KH, Cats-Baril W, Harrast J, Berven S, Glassman S, Farcy J-P, Horton WC, Lenke LG, Baldus C, Radake T. The Validity of the SRS-22 instrument in an adult spinal deformity population compared with the Oswestry and SF-12. Spine 2005; 30:455-61.

Two hundred twenty eight patients studied. SRS-22 --demonstrated change in health status more effectively than the SF-12 and in more domains than the Oswestry. The SRS-22 showed high criterion validity with the SF-12 and Oswestry based on Pearson's coefficients. High Cronbach's alpha scores suggested a high internal consistency within each domain of the SRS-22 except for pain (0.67). Test/retest reliability was excellent.

Cheung KMC, Cheng EYL, Chan SCW, Yeung WK, Luk KDK. Outcome assessment of bracing in adolescent idiopathic scoliosis by the use of the SRS-22 questionnaire. International Orthopaedics (SICOT) 1st Aug, 2006 (published online ahead of print)

Matched case series of underarm braced patients with progressive curves (B) and patients with similar size curves but not progressive and observed (O). The B patient's mean age was 16 years (11-20) and mean Cobb was 28.8° (10°-50°). The O groups mean age was 18 years (12-22) and mean Cobb 28.8° (10°-50°). O patients had significantly better Function and Self-Image domain scores the B patients, especially those with curves under 20°. "The scores did not improve significantly with duration of brace wear, suggesting little adaptation."

Cheung KMC, Senkoylu A, Alanay A, Lau S, Luk KD. Reliability and concurrent validity of the adapted Chinese version of Scoliosis Research Society-22 (SRS-22) Questionnaire. Spine 2007; 32:1141-5.

For 50 patients aged 21 years (12-51), percent with ceiling effect was 2 to 44% for SRS-22 and 2 to 54% for SF-36. Internal consistency reliability (Cronbach's α) for SRS-22 was 0.78 to 0.87 for Function, Pain, Self-image and Mental Health, and 0.53 for Satisfaction with management; and 0.74 to 0.90 for SF-36. Concurrent validity (Pearson r) of SRS-22 with relevant SF-36 domains ranged from 0.62 for Self-image to 0.77 for Function; except for Satisfaction with management where it was 0.25. For thirty-six of 48 patients aged 16.5 years (8-28) the SRS-22 test/retest reproducibility (Intraclass Correlation Coefficient) was 0.76 to 0.84. Authors conclude that the Chinese version of SRS-22 is "ready for clinical studies on idiopathic scoliosis in Chinese-speaking societies."

Climent JM, Bago J, Ey A, Perez-Grueso FJS, Izquierdo E. Validity of the Spanish version of the Scoliosis Research Society (SRS-22) patient Questionnaire. Spine 2005; 30:705-9.

One hundred seventy five patients (152 females, 23 males), mean age 19 years (8-48) years with idiopathic scoliosis of varying severity managed by observation, bracing or surgery studied. Factor analysis was coherent with instrument domains and responses consistent with the known severity characteristics of the disease.

Lai SM, Asher MA, Burton DC. Estimating SRS-22 quality of life measures with SF-36: Application in idiopathic scoliosis. Spine 2006; 31:473-8.

Eighty-three patients age 24 (18-34) years operated 9 years 3 months (4+9 - 23+11) earlier studied. As predicted because of their common origin, the mental health domains are highly correlated ($cc=0.90$) and convertible ($R^2=0.81$). Conversion of SF-36(sf) to SRS-22(s) is excellent for bodily pain (sf) and pain (s) ($cc=0.87$, $R^2=0.79$), and very good for physical component scale (sf) and function (s) ($cc=0.80$, $R^2=0.64$). Conversion is poor for general health (sf) and self image (s) ($cc=0.72$, $R^2=0.52$), and general health (sf) and satisfaction/dissatisfaction (s) ($cc=0.72$, $R^2=0.52$).

Monticone M, Carabalona R, Negrini S. Reliability of the Scoliosis Research Society - 22 questionnaire (Italian version) in mild adolescent vertebral deformity. Eur Med Phys 2004;40:191-7.

Thirty-five patients (22 females), age 8.5 to 19 years, 28 with idiopathic scoliosis, Cobb $17^\circ \pm 7^\circ$ were administered the Italian version of the SRS-22 that had undergone pretest forward-backward translation; and 20 of the patients were re-tested one week later. To produce the final version of the questionnaire questions 1, 2, 7, 12, 13, 19, and 20 required slight modification; questions 5, 6, and 11 were completely changed, while keeping the general structure of the questionnaire. Ceiling effect was function 48.6%, pain 74.3%, self-image 8.6%, mental health 34.3%, and satisfaction/dissatisfaction with treatment 20.0%. Minimum scores were function 3, pain 4, self-image 2, mental health 3, and satisfaction/dissatisfaction with treatment 2. Total score maximum was 94 (out of 110 possible), achieved by 2.9%, and total minimum score was 68 (22 lowest possible), achieved by 5.7%. Test/retest reliability determined by Spearman rank test, was ρ 0.5 to 1 except for question #12 --best describes

appearance of your trunk---, #21 --satisfied with the results of your back management-- where it was 0.4 and 0.2 respectively, and question #11 which was not reported.

Abstracts

Bago J, Climent JM, Ey A, Perez-Gruoso FS, Izquierdo E. Factors influencing patient satisfaction and well-being in idiopathic scoliosis. *Eur Spine J* 2002;11(Suppl 1): S13-4. *Spanish version of SRS-22 administered to 175 patients surgery treated group had higher self- image score than conservatively treated groups and a higher score in satisfaction compared to orthosis. No differences otherwise. Findings thought to be due to deformity correction as all SRS-22 scales and the total score correlated with curve magnitude.*

Bago J, Climent JM, Ey A, Perez-Gruoso S, Izquierdo E. Internal consistency and reproducibility of the Spanish version of the SRS-22 patient questionnaire for idiopathic scoliosis. *Scoliosis Research Society 37th Annual Meeting 2002*: page 230. *The Spanish version of SRS-22 patient questionnaire was evaluated in 175 patients. "Cronbach's α estimating internal consistency, was 0.89 and test-retest reproducibility, evaluated with intraclass correlation coefficient was 0.96".*

Bago J, Climent J, Pineda S, Gilperez C. Subjective perception of spine deformity in patients with idiopathic scoliosis. Reliability of the Walter Reed Visual Assessment Scale and its relationship with the SRS-22 questionnaire. *Euro Spine J* 2005;14(Supplement 1):S7. *For 32 (27F/5M) patients age 17.9 (13-40) years with maximum Cobb of 35.9°(±21.2°) the mean WRVAS mean score was 15.4 and SRS-22 scores F 4.4, P 4.3, SI 3.5, MH 3.9 and total score 67.5WRVAS internal consistency (Cronbach alpha) was 0.88 and there were no signs of collinearity among the seven questions (tolerance <0.5). WRVAS correlated significantly with maximum Cobb (0.4 to 0.77) as did the SRS-22 (-0.44 to-0.55). Correlation between total WRVAS and SRS-22 scores was -0.63 (P=0.0001).*

Bagó J, Climent JM, Pérez CG, Pineda S. Self-perceived deformity in patients with idiopathic scoliosis. Reliability of the Walter Reed Visual Assessment scale and relationship with the SRS-22 questionnaire. *Euro Spine J* 2006;15:124 (Abstract). *Believe same study as above.*

Berven SH, Deviren V, Polly D Jr, Ondra S, Glassman S, Hu S, Bridwell K. Minimal clinical difference in spinal deformity: Defining a threshold of change that matters. Poster #4; 40th Annual Meeting of the Scoliosis Research Society; Miami, Florida; October 27-30, 2005. *The range of changes, from lowest to highest, that may be interpreted as showing a Minimally Important Clinical Difference are: Pain = 0.2-0.85, Function = 0.1-0.5, Self-image = 0.45-0.8 and Mental Health = 0.3-0.5.*

Bridwell KH, Baldus C, Harrast J, Edwards C II, Glassman SD, Horton WC, Lenke LG, Lowe TG, Mardjetko S, Ondra SL, Schwab FJ, Shaffrey CI. Age-gender matched comparison of SRS instrument scores between adult deformity and normal adults: Are ass

SRS domains disease specific? Pater # 35; 42nd Annual Meeting of the Scoliosis Research Society; Edinburgh, Scotland; September 5-8, 2007.

Compared to age and sex matched normal persons, patients with primary adult deformity scored significantly ($p < 0.0001$) lower in all 4 domains, the one exception being mental health in males 60-80 years where there was no difference. "Average overall SRS score for each of the age-gender subgroups within the non-surgical, surgical and combined groups was less than the tenth percentile in the corresponding normative population, indicating substantial differences in pain, appearance and activity of adult deformity patients."

Hussain N, Freeman BJC, Watkins R, Webb JK. Does the SRS-22 outcome questionnaire correlate with radiological outcome following anterior correction of thoraco-lumbar scoliosis? *Euro Spine J* 2005;14(Supplement 1):S6.

For 30 patients at 2 years follow-up SRS-22 scores did "not correlate with most of the radiographic parameters commonly used by clinicians to assess patient outcome".

Mehlman CT, Wall EJ, Foad SL. Patients who've been told they have scoliosis score the same on the SRS-22 as scoliosis patients requiring treatment. *Euro Spine J* 2005;14(Supplement 1):S6-7.

Group 1, 30 (16F/14M) patients age 13+11 (6+9-17+1) years+months and 10.7° (5° - 15°) Cobb scored the same as Group 2, 22 (19F/3M) patients age 13+11 (7+8 - 17+2) and 32.1° (25° - 59°) Cobb: 4.38 and 4.28. Authors interpret findings as either being "due to the psychological impact of being told they had scoliosis prior to their orthopaedic visit of a ceiling effect associated with the SRS instrument". (Editorial comment: Another explanation is the mild effect small scoliosis on HRQL.)

SRS-22r

Asher MA, Lai SM, Glattes RC, Burton DC, Alanay A, Bago J. Refinement of the SRS-22 health-related quality of life questionnaire function domain. *Spine* 2006;31:593-7.

Low internal consistency in the Function domain of SRS-22 in patients age <18 years was noted in the original English and in Spanish and Turkish transcultural translations. The problem was traced principally to question #18 and seemed related to the response choice hierarchy describing frequency of going out with friends. After minor revision, the SRS-22r questionnaire was administered to 111 outpatients with spinal disorders, 52 of them <18 years old (7yrs. 3 mos. to 17 yrs. 7 mos.). Function domain internal consistency (Cronbach α) for patients <18 years increased from 0.67 to 0.78 for patients with idiopathic scoliosis and from 0.60 to 0.80 for patients with other spinal disorders. Domain internal consistency remained high, 0.77 to 0.96 for all other domain-patient groupings.

Bago J, Climent JM, Ey A, Perez-Grueso FJ, Izquierdo E. Letter to the Editor re. Asher, et al. Refinement -----. *Spine* 2006;31:1758.

Spanish version of question # 18 provided and preliminary findings that this question improved the Function domain internal consistency (Cronbach α) in patients less than age 18 years from 0.47 to 0.65 reported.

Glattes RC, Burton DC, Lai SM, Frasier E, Asher, MA. The reliability and concurrent validity of the Scoliosis Research Society-22r patient questionnaire compared with the Child Health Questionnaire-CF87 patient questionnaire for adolescent spinal deformity. *Spine* 2007;32:1778-84.

Seventy patients age 14.1 years (8-18), 48 of them with un-operated adolescent idiopathic scoliosis, studied. Comparing SRS-22r to CHQ-CF87, ceiling effect averaged 27% and 36%, internal consistency (Cronbach α) 0.81 and 0.82, and test-retest reproducibility (ICC), (n=54) 0.73 and 0.61. Concurrent validity (Pearson r) was ≥ 0.68 or more for relevant Function, Pain and Mental Health domains. The SRS Self-image and particularly the Satisfaction/Dissatisfaction with Management domains did not correlate well with any CHQ-CF87 domains; thus providing health-related quality-of-life information not provided for by the CHQ-CF87.

Hashimoto H, Sase T, Arai Y, Maruyama T, Isobe K, Shouno Y. Validation of a Japanese version of the Scoliosis Research Society-22 patient questionnaire among idiopathic scoliosis patients in Japan. *Spine* 2007;32:E141-E146.

The SRS-22r HRQL was translated from USA English to Japanese following a recommended cross-cultural adaptation process. Responses to it and a SF-36 questionnaire were evaluated in 114 patient's age 15 (11-17.9) years. Management was observation in 37, bracing in 38 and post-surgery in 28. A four factor structure was found with Cronbach α 0.65 to 0.84. However, five items were not loaded as theoretically expected and when the items were ordered as suggested by factor analysis the Cronbach α improved to 0.75 to 0.88. Function, Pain and Mental Health domains were concurrently valid with appropriate SF-36 domains; Self Image was not, similar to the findings of others. The Function domain discriminated by Cobb angle and treatment. Paradoxically post-surgical patients with curves $>40^\circ$ had higher Self Image scores than those with curves $<40^\circ$. The postulated explanation was that patients with larger curves pre-operatively may have lower expectations. The authors conclude that "The Japanese SRS-22r is valid and may be useful for clinical evaluation of Japanese scoliosis patients", but recommend further psychometric of the Self Image domain.

Scoliosis Quality of Life Index (SQLI)

Feise RJ, Donaldson S, Crowther ER, Menke JM, Wright JG. Construction and validation of the scoliosis quality of life index in adolescent idiopathic scoliosis. *Spine* 2005;30:1310-5.

The purpose was to focus a HRQL questionnaire for scoliosis on children 10 to 18 years of age. Using the SRS-22 as the starting point, questions 15 and 18 were refocused, 14 of the

remaining questions were reworded to some extent and the domains re-defined. The questionnaire was administered by touch screen technology. Eighty-four subjects were tested. Internal consistency (Cronbach's α) ranged from 0.82 to 0.89; test-retest reliability (ICC) was 0.46 to-0.85; validity compared to the Quality of Life Profile for Spine Deformities (Spearman's ρ) was 0.46 -0.81; AIS patients were successfully partitioned from their sibling controls; and the ceiling effect was low at 1.4 to 32.8%. (Editorial comment: While it is true that the ceiling effect has been lowered, the changes made may limit the questionnaires usefulness in adults and those using wheelchairs.)

Parent EC, Hill D, Moreau M, Mahood, J, Raso J, Lou E. Score distribution of the Scoliosis Quality of Life Index questionnaire in different subgroups of patients with adolescent idiopathic scoliosis. Spine 2007;32:1767-77.

Ninety-five females, age 14.7 (8 – 20) years with un-operated AIS had ceiling effects of 1.1 to 22.1%. Ceiling effects were “significantly most prevalent in young patients, those with low or moderate curve severity and those treated less aggressively.”

Related HRQL Studies

Howard A, Donaldson S, Hedden D, Stephens D, Alman B, Wright J. Improvement in quality of life following surgery for adolescent idiopathic scoliosis. Spine 2007;32:2715-2718.

Forty-two observed patients and 119 operated patients studied with the Climent Quality of Life for Spinal Deformities Scale at baseline and at two years follow-up. Operated group's quality of life increased 4.3 points. Although statistically significant this was less than the 5.5 point cutoff the authors had defined a priori as clinically significant.

Pellisé F, Vidal X, Hernández A, Cedraschi C, Bagó J, Villanueva C. Reliability of retrospective clinical data to evaluate the effectiveness of lumbar fusion in chronic low back pain. Spine 2005;30:365-8.

Not accurate and may overestimate the effectiveness of surgery.

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MA/p