

# Discriminative characteristics of the Early Onset Scoliosis-24-item Questionnaire (EOSQ-24) and its usefulness in follow-up examinations

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# Disclosures

This project received funding from Stiftelsen Sophies Minde.

The authors declare no conflicts of interest

# Background

The overall goal in the treatment of children with early onset scoliosis (EOS) is to improve their quality of life (QOL)



Early Onset Scoliosis-24-item Questionnaire (EOSQ-24) reflects issues important for the patients and their relatives  
(*Vitale, 2010*)



# Can we use the EOSQ-24 in clinical practice?

- 1) Does it discriminate between subgroups of patients and clinical characteristics?
- 2) Is it useful for evaluating patients over time?



# Priori hypotheses

To test the EOSQ-24's convergent and discriminant construct validity, we formulated 8 priori hypotheses

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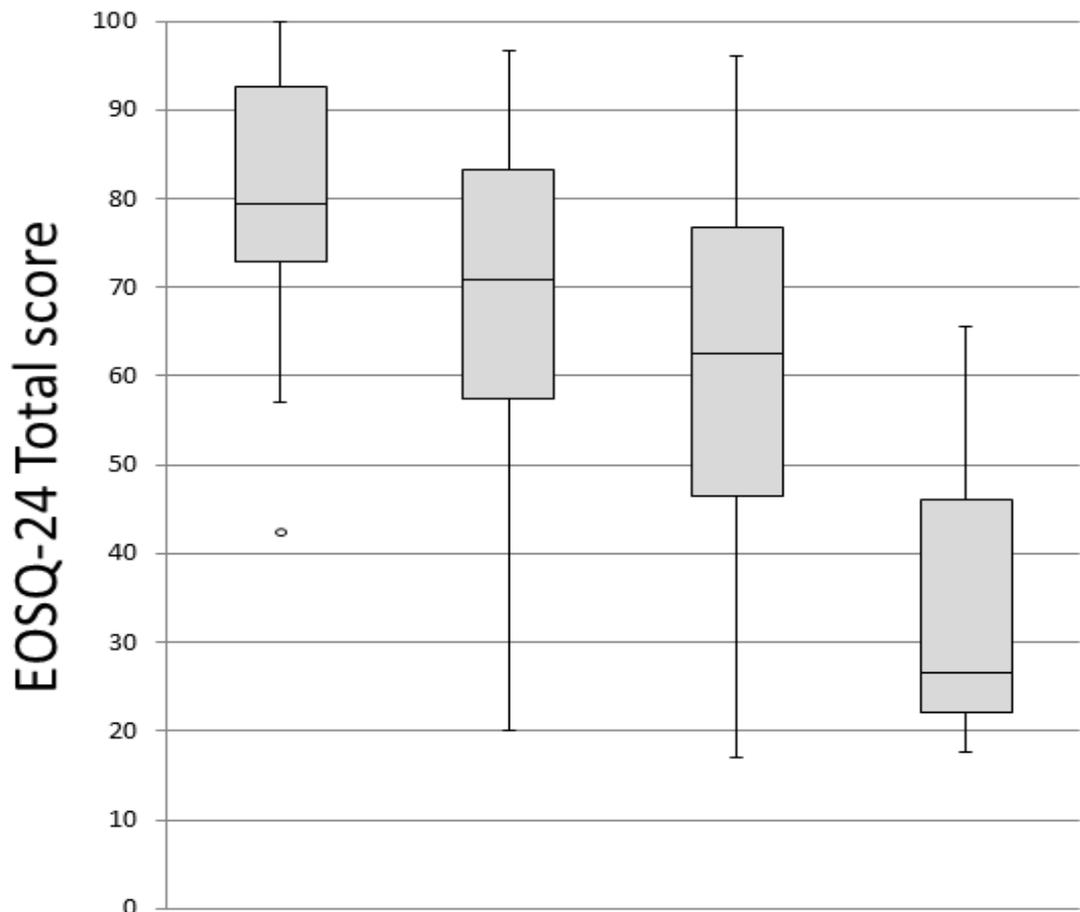
## A priori hypotheses

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1. The total score will decrease with increasing deformity from major curve angle group 1 ( $<20^\circ$ ) to major curve angle group 4 ( $>90^\circ$ ).
  2. Patients with the most complex etiologies (neuromuscular or syndromic) will report a significantly lower total score than patients with other EOS etiologies (idiopathic or congenital).
  3. Patients treated with long-lasting surgery will report a significantly lower total score than those with conservative treatments.
  4. No significant differences in total score will be observed between genders.
  5. A correlation  $<-0.6$  will be found between the subdomain score for general health and Numeric Rating Scale (NRS) of general health score.
  6. A correlation  $<-0.6$  will be found between the subdomain score for pain and NRS pain score.
  7. A correlation  $<-0.6$  will be found between the subdomain score for physical function and NRS function score.
  8. A correlation  $<-0.6$  will be found between the EOSQ-24 total score and each of the three NRS scores.
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Hypothesis 1 confirmed:

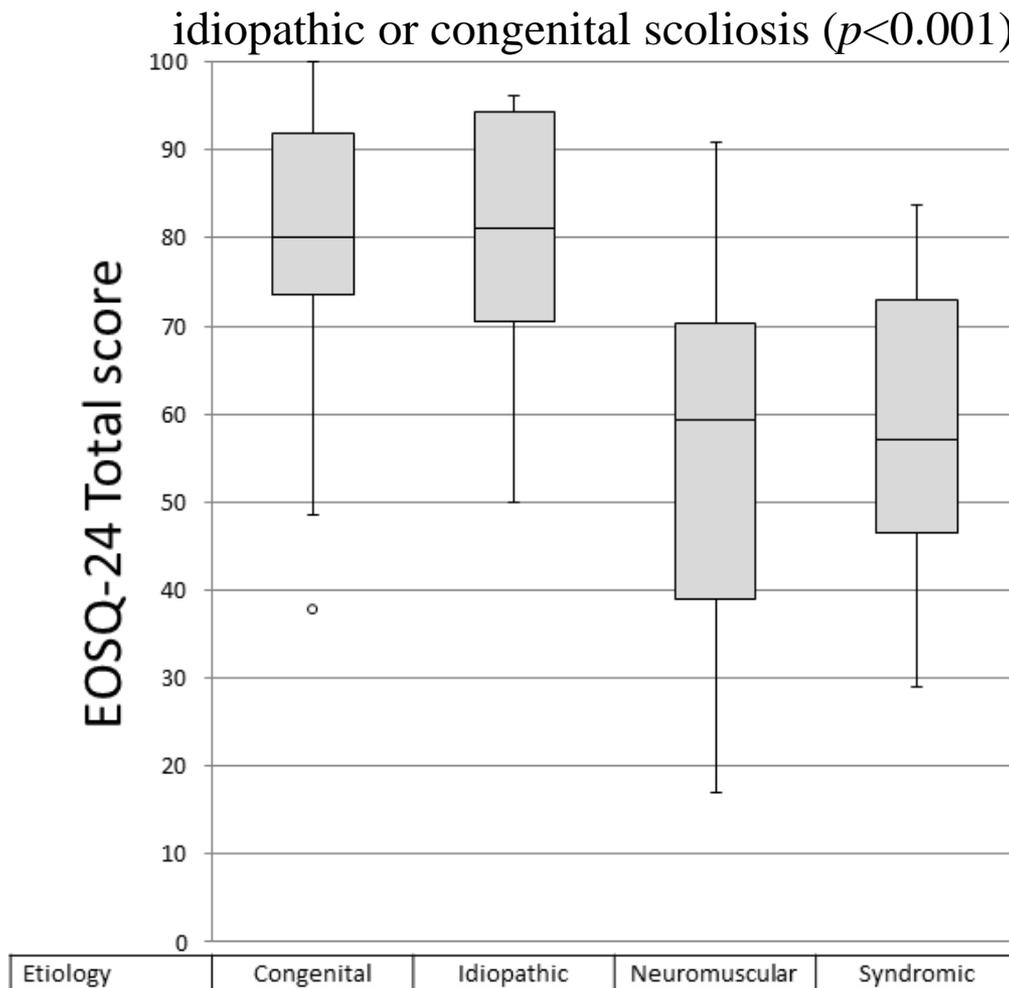
EOSQ-24 total score decreased with increasing deformity ( $p= 0.006$ )



Major Curve Angle group	1	2	3	4
Cobb angle	<20°	20-50°	51-90°	>90°

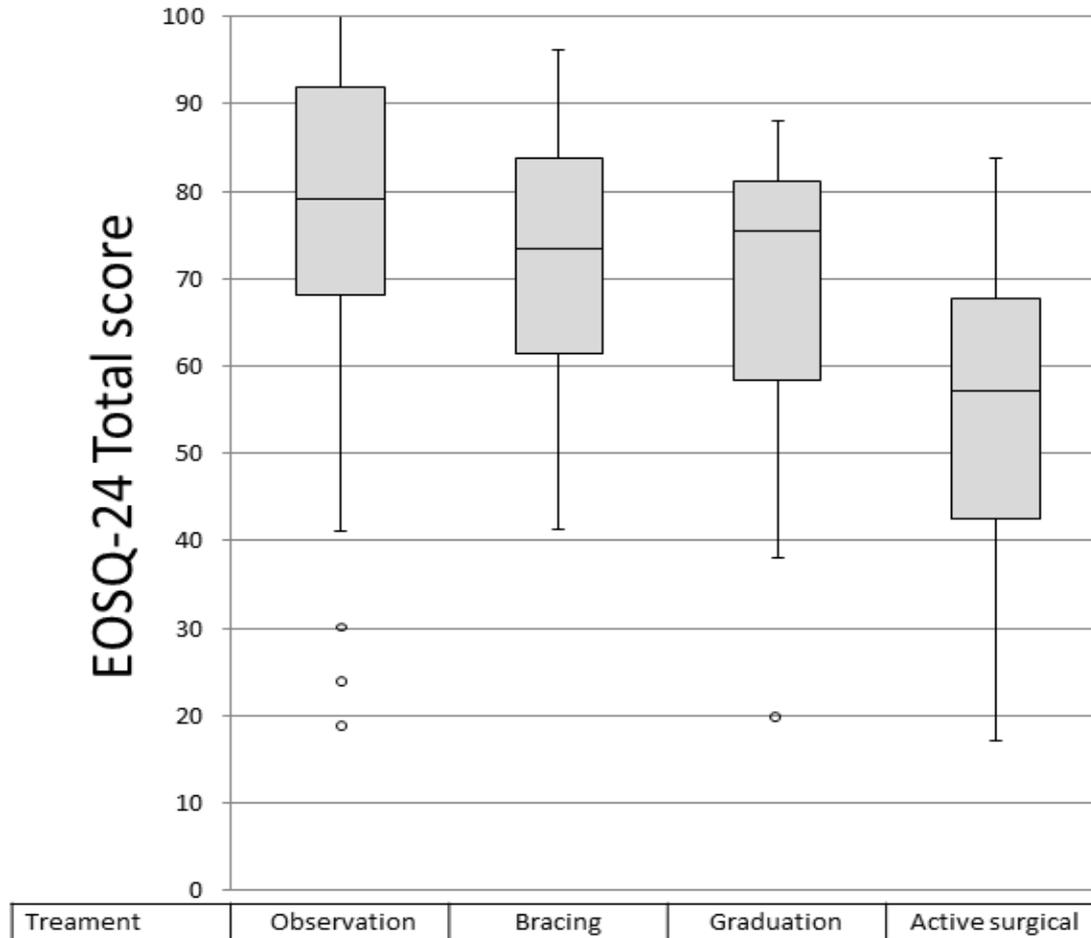
## Hypothesis 2 confirmed:

EOSQ-24 total score decreased with increasing etiology complexity, whereby patients with neuromuscular or syndromic scoliosis had a significantly lower score than those with idiopathic or congenital scoliosis ( $p < 0.001$ )



### Hypothesis 3 confirmed:

EOSQ-24 total score decreased with increased treatment complexity. Children who were in an active surgical treatment period had a significantly lower total score than children who were conservatively treated ( $p < 0.001$ )

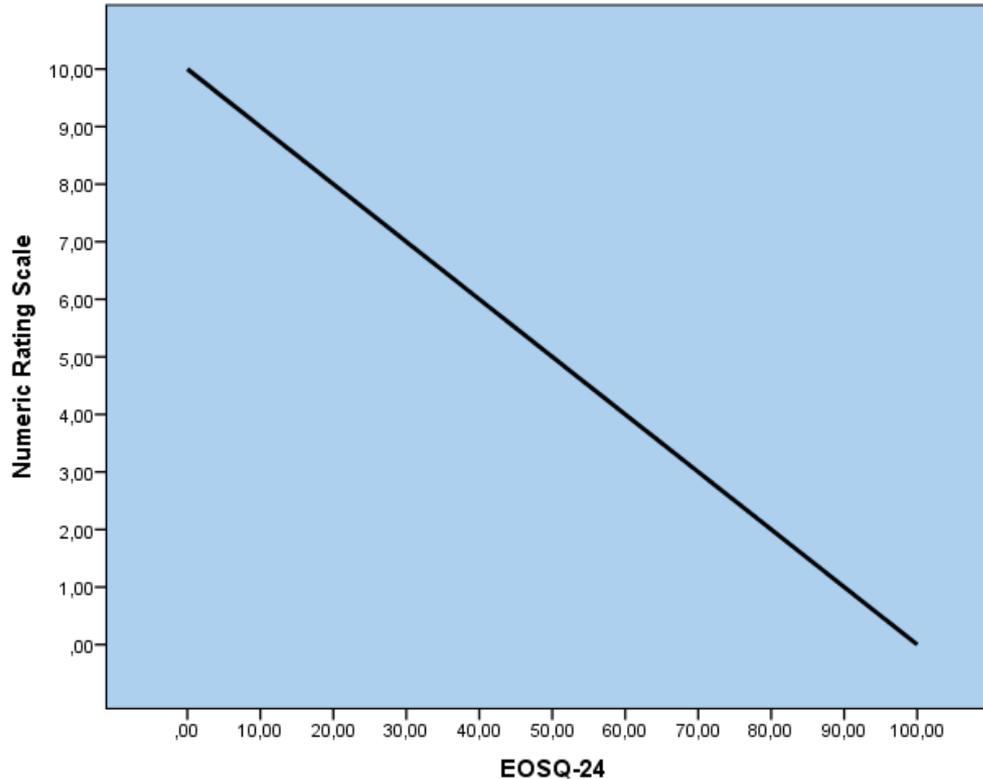


Hypothesis 4 confirmed:

No differences between genders



Hypotheses 5-8 confirmed:  
Correlations between EOSQ-24 and Numeric Rating Scales (NRS)



**EOSQ-24 total score and...**

NRS General health ( $r=-0.7$ )\*

NRS Pain ( $r=-0.6$ )\*

NRS Physical function ( $r=-0.8$ )\*

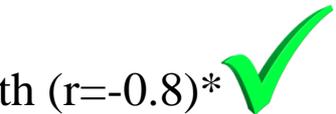


**Corresponding subdomains in the EOSQ-24 and...**

NRS General Health ( $r=-0.8$ )\*

NRS Pain ( $r=-0.7$ )\*

NRS Physical Function ( $r=-0.7$ )\*



\*( $p<0.001$ )

# Is it useful in follow-up examinations?

Intraclass correlation coefficient of agreement, mean differences, standard error of the mean agreement, and minimal detectable change between test and retest (n=55)

	ICC <sup>a</sup> (95% CI)	Mean Difference (SD)	SEM <sup>b</sup>	MDC <sub>ind</sub> <sup>c</sup>	MDC <sub>group</sub> <sup>d</sup>
Total score	0.93 (0.89-0.96)	-1.17 (7.82)	5.48	<b>15.19</b>	2.05
<b>Subdomains</b>					
General health	0.84 (0.73-0.90)	-0.91 (14.0)	9.84	27.28	3.68
Pain	0.88 (0.81-0.93)	-0.23 (11.15)	7.79	21.59	2.91
Pulmonary function	0.86 (0.77-0.91)	-0.45 (13.81)	9.77	27.08	3.65
Mobility	0.76 (0.62-0.85)	-1.82 (15.85)	11.01	30.52	4.12
Physical function	0.90 (0.83-0.94)	-3.09 (15.04)	10.89	30.19	4.07
Daily living	0.93 (0.88-0.96)	-1.59 (12.97)	9.24	25.61	3.45
Fatigue	0.82 (0.71-0.89)	-0.23 (16.40)	11.60	32.15	4.34
Emotion	0.84 (0.73-0.90)	0.91 (16.81)	11.90	32.98	4.45
Parental burden	0.88 (0.81-0.93)	-0.91 (11.39)	8.02	22.23	3.00
Financial burden	0.82 (0.71-0.89)	-3.64 (18.89)	11.53	31.96	4.31
Satisfaction	0.86 (0.77-0.92)	0.45 (13.39)	9.47	26.25	3.53



- ICC<sub>agreement</sub>: two-way random effects model (absolute agreement)
- SEM<sub>agreement</sub>:  $\sqrt{\text{within person residual mean square}}$
- MDC<sub>ind</sub> = SEM x 1.96 x  $\sqrt{2}$
- MDC<sub>group</sub> = MDC<sub>ind</sub> /  $\sqrt{n}$
- CI= Confidence interval. SD=Standard deviation. ind= individual.

Measurement error is the systematic and random error of the score that is not attributed to true changes of the patient's score. MDC indicates the smallest score change in score that, with a  $p < 0.05$ , can be interpreted as a real change above measurement error.



# Can we use it in clinical practice?

EOSQ-24 discriminates between subgroup of patients and clinical characteristics.



EOSQ-24 is useful for evaluating patients over time.



# Conclusion

The EOSQ-24 has acceptable discriminate capabilities, and high correlations with corresponding NRS ratings.

Our results suggest that the EOSQ-24 total score is useful for evaluating patients over time.

