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# Comparison of the Performance of the Dry Eye Questionnaire (DEQ-5) to the Ocular Surface Disease Index (OSDI) in Children Aged 5 to 18 Years

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## PURPOSE

To compare those results obtained from the Dry Eye Questionnaire-5 (DEQ-5) to those obtained from a modified Ocular Surface Disease Index (OSDI) survey in pediatric patients aged 5 to 18 years

- A DEQ-5 survey cut-off score was **determined to differentiate symptomatic from asymptomatic children**

## METHODS

A total of **116 children** seen at the Illinois Eye Institute for a comprehensive exam were recruited into the study between May and July 2021.

Participants were surveyed on dry eye symptoms using both the Dry Eye Questionnaire (DEQ-5) as well as a modified, “child-friendly” Ocular Surface Disease Index (OSDI) with 11 questions total (standard survey is 12).

- Each survey question was delivered verbally; questions were repeated as needed
- Modified OSDI questions:**
  - Q2: (“Eyes that feel gritty”) was modified to “feels like something is inside your eyes”
  - Q7: (“Driving at night”) was left as “not applicable” as majority of study population does not drive
  - Q8: (“Working with a computer or bank machine (ATM)”) was adjusted to “using an iPad or tablet”
  - Standard OSDI calculation was used (sum of scores for all questions answered x 25 divided by 11 questions answered (since Q7 was “skipped” for all participants)<sup>1</sup>
- Spearman rank correlation was performed** to determine any relationships between DEQ-5 and modified OSDI responses.
- An ROC (receiver operating characteristic) curve was generated** to determine the sensitivity and specificity of the DEQ-5 questionnaire for identifying dry eye symptoms in children.

## RESULTS

Of the 116 children included in the study, 57 (49%) were male and 69 (51%) were female (mean age = 12.2 years, range 5.2 to 17.8 years). The average results for each survey can be seen in Table 1. DEQ-5 scores stratified (asymptomatic, mild, moderate, and severe) based on OSDI are noted in Table 2.

**TABLE 1**  
Demographics of Pediatric Patients

Age	Mean: 12.2 years (5.2 – 17.8)
Gender	Male: 57 (49%) Female: 69 (51%)
Race/Ethnicity	Non-Hispanic White: 0 (0%) Asian: 19 (16%) African American: 64 (53%) Hispanic-White: 37 (31%)

**TABLE 2**  
OSDI Scores Compared to DEQ-5 Scores in Pediatric Patients

	OSDI Score	DEQ-5
Mean ± SD	12.5 ± 12.6	4.0 ± 3.5
Range	0-61	0-13

**TABLE 3**  
Mean DEQ-5 score stratified by OSDI severity

Participants (percentage) n=116	OSDI Score Categories <sup>3</sup>	DEQ-5 grading ± SD
Asymptomatic: 77 (66%)	Asymptomatic (0-12)	2.7 ± 2.6
Mild: 21 (18%)	Mild (13-22)	4.8 ± 3.8
Moderate: 7 (6%)	Moderate (23-32)	6.7 ± 3.4
Severe: 11 (10%)	Severe (33-100)	10.3 ± 3.1

- The AUC (area under curve) for the ROC for DEQ-5 was 0.79 (95% CI: 0.70-0.87) and was statistically significant ( $P < 0.0001$ )
- A DEQ-5 threshold of 5.5 yielded maximum sensitivity (82.4%) and specificity (76.8%) to differentiate symptomatic from asymptomatic dry eye
- A statistically significant positive correlation was found between OSDI and DEQ-5 ( $R_s = 0.52$ ,  $p < 0.0001$ )

**FIGURE 1**

Unadjusted receiver operating characteristic (ROC) curve analysis for DEQ-5. The unadjusted area under the curve (AUC) for the DEQ-5 is 0.79 (95% confidence interval: 0.70 - 0.87). The optimal cutoff value for DEQ-5 is 5.5 - at this point, sensitivity is 82.4% and specificity is 76.8%.

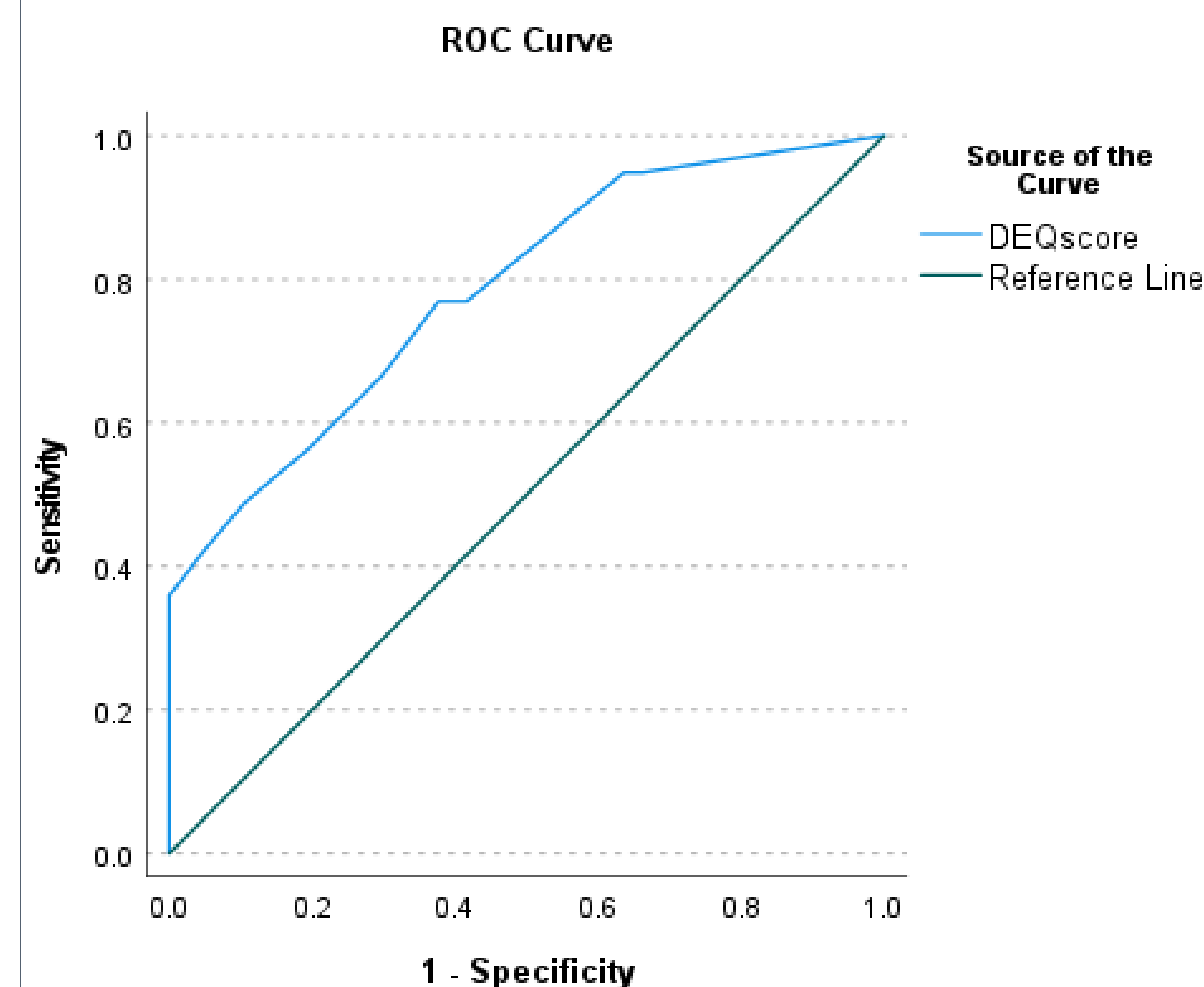


Figure 1: Unadjusted receiver operating characteristic (ROC) curve analysis for DEQ-5. The unadjusted area under the curve (AUC) for the DEQ-5 is 0.79 (95% confidence interval: 0.70 - 0.87). The optimal cutoff value for DEQ-5 is 5.5 - at this point, sensitivity is 82.4% and specificity is 76.8%.

## DISCUSSION

The current diagnostic cut-off score for DEQ-5 in adults is  $>6$ . Thus, the 5.5 threshold in the current study is comparable to the diagnostic cut-off value recommendation for DEQ-5 and similar to that obtained in other studies of children<sup>3</sup>.

## CONCLUSIONS

- DEQ-5 is able to be delivered verbally to children between 5 and 18 years old**
- DEQ-5 is a valid measurement of dry eye symptoms in children aged 5 to 18 years**
- The DEQ-5 questionnaire was comparable to the modified OSDI questionnaire in this study for determining the presence of dry eye symptoms in pediatric population**
- A DEQ-5 cut-off score of 5.5 demonstrates good sensitivity (82.4%) and specificity (76.8%) in differentiating symptomatic from asymptomatic children**

## REFERENCES

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## CONTACT

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