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OBJECTIVES

➤ To evaluate and compare the measurement properties of the EQ-5D-Y-3L and Child Health Utility instrument (CHU-9D) among Chinese high school students with myopia.

METHODS

➤ This cross-sectional survey was carried out in 2023. Adolescents with myopia were recruited from high schools in three representative regions of North China, East China, and Northwest China.

➤ Sociodemographic characteristics, self-reported EQ-5D-Y-3L, CHU-9D and National Eye Institute Visual Functioning Questionnaire-25 (VFQ-25) responses were collected through the online survey.

➤ The agreement was assessed using intraclass correlation coefficients (ICC) and paired Wilcoxon signed-rank test. Convergent validity was examined using Spearman's rank correlation. Known-group validity and discriminate validity were assessed using the effect sizes among different subgroups divided by degree of myopia and VFQ-25 scores, respectively. Sensitivity was compared using relative efficiency (RE) and receiver operating characteristic (ROC) curves.

RESULTS

➤ Socio-demographic characteristics of respondents

- A total of **2,198** respondents were included in the study. **53.1% (N = 1167)** of total respondents were male, the mean (SD) age was **16.7 (0.8)** years.
- Respondents with low myopia and high myopia accounted for **75.8%** and **18.8%**, respectively.

➤ Ceiling effects

- As shown in Figure 1, the ceiling effect across dimensions of EQ-5D-Y-3L was higher than CHU-9D.
- The overall ceiling effects of EQ-5D-Y-3L and CHU-9D were **69.7%** and **28.2%**, respectively.

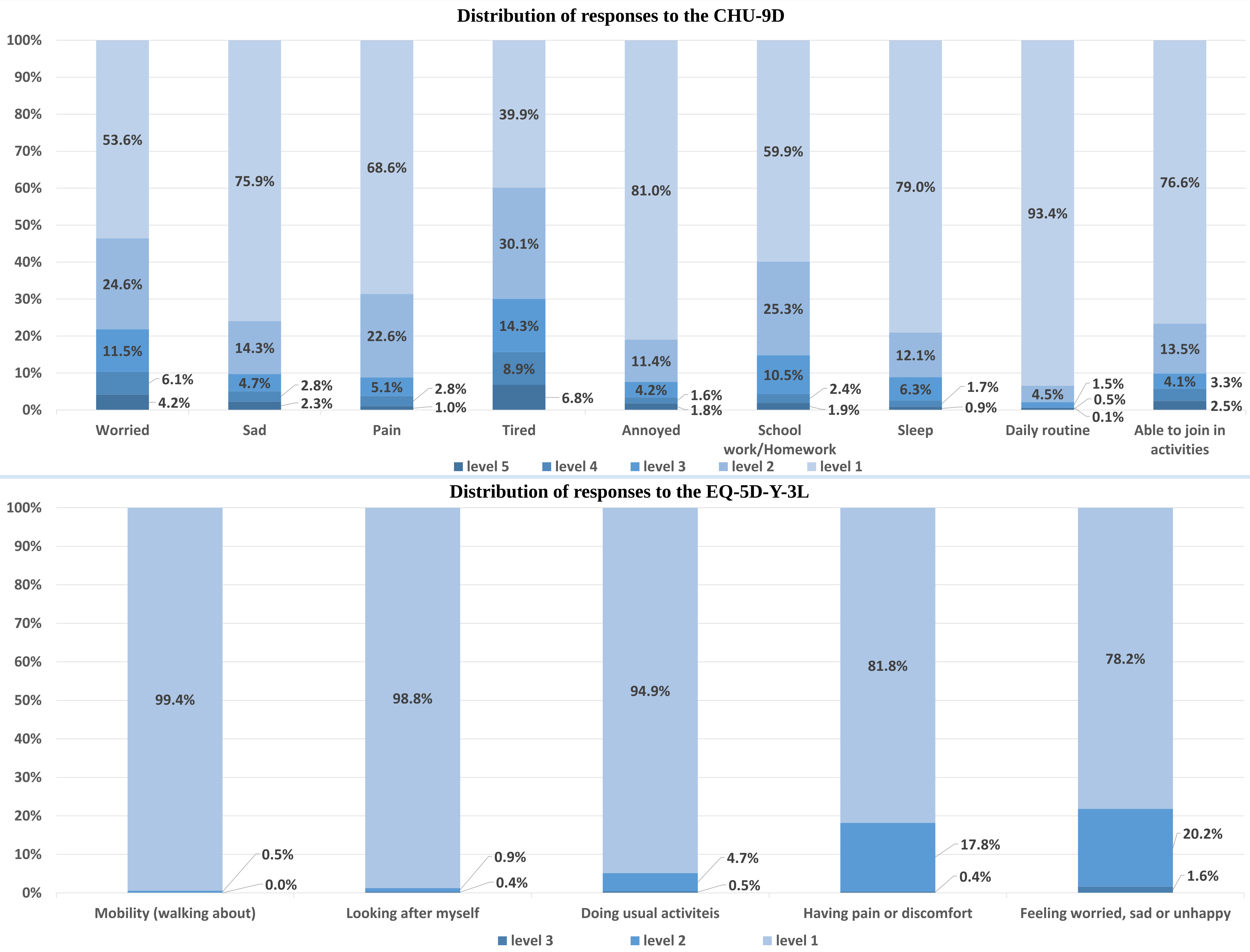


Figure 1 Distribution of responses to the EQ-5D-Y-3L and CHU-9D
Table 1 Convergent validity: Spearman's correlation coefficient

EQ-5D-Y-3L	CHU-9D								
	Worried	Sad	Pain	Tired	Annoyed	School work/homework	Sleep	Daily routine	Activities
Mobility	0.0726***	0.0985***	0.1066***	0.0653**	0.0554**	0.0831***	0.0673**	0.1479***	0.1269***
Self-care	0.0823***	0.1140***	0.1238***	0.0712***	0.1123***	0.0822***	0.1415***	0.2738***	0.1402***
Usual activities	0.1974***	0.2447***	0.2021***	0.1991***	0.1801***	0.2078***	0.2293***	0.2974***	0.2961***
Pain/discomfort	0.3527***	0.3347***	0.5638***	0.3570***	0.2946***	0.3177***	0.3022***	0.2442***	0.3347***
Anxiety/depression	0.5755***	0.5594***	0.3659***	0.4743***	0.4608***	0.4373***	0.3887***	0.2915***	0.3434***

Notes: *** indicates p < 0.001, ** indicates p < 0.01
r > 0.5 represents a strong correlation

Table 2 Discriminative capacity and univariate analyses for EQ-5D-Y-3L and CHU-9D utility

	EQ-5D-Y-3L			CHU-9D		
	Mean(SD)	p value	Scheffe post hoc test	Mean(SD)	p value	Scheffe post hoc test
Degree of myopia		0.553			0.473	
I:Pre-myopia (N=117)	0.957(0.094)		I<II,	0.843(0.181)		I<II,
II:Low-myopia (N=1667)	0.962(0.069)		I<III,	0.851(0.156)		I<III,
III:High-myopia (N=414)	0.967(0.062)		II<III	0.854(0.170)		II<III
VFQ-25 scores		< 0.001			< 0.001	
I: VFQ-25 ≥ 90 (N=1518)	0.976(0.052)		I>II***,	0.892(0.131)		I>II***,
II: 80 ≤ VFQ-25 < 90 (N=428)	0.941(0.077)		I>III***,	0.772(0.170)		I>III***,
III: VFQ-25 ≤ 80 (N=252)	0.918(0.112)		II>III***	0.741(0.197)		II>III*

Notes: *** indicates p < 0.001, * indicates p < 0.05.
One-way analyses of variance and Scheffe post hoc tests were performed to compare the EQ-5D-Y-3L and CHU-9D utility among different sub-groups The effect size was calculated as the difference between the mean scores of two sub-groups divided by the pooled standard deviation. An effect size of 0.8 is defined as large, 0.5 to 0.79 as moderate, and 0.2 to 0.49 as small.

➤ Agreement

- The ICC between EQ-5D-Y-3L and CHU-9D was **0.348**. The p value of paired Wilcoxon signed-rank test was <0.001.

➤ Convergent validity

- As shown in Table 1, most of the dimensions of EQ-5D-Y-3L and CHU-9D were **positively associated**, with Spearman's rank correlation coefficient ranging from **0.0554 to 0.5755**.

➤ Known-group validity

- As reported in Table 2, both the EQ-5D-Y-3L and CHU-9D utility values were significantly different (p < 0.001) across groups defined by VFQ-25.
- However, the difference between groups defined by degree of myopia were not significant.

➤ Sensitivity

- The RE of CHU-9D when measuring the high myopia was **0.07** compared with EQ-5D-Y-3L.
- The area under the ROC curve (AUC) of the EQ-5D-Y-3L and CHU-9D instruments were **0.5169** and **0.5189**, respectively, when measuring the high myopia.

CONCLUSION

- EQ-5D-Y-3L showed higher ceiling effect than CHU-9D among Chinese high school students with myopia.
- EQ-5D-Y-3L and CHU-9D showed comparable validity when using among adolescents with myopia in China.
- Both EQ-5D-Y-3L and CHU-9D showed suboptimal sensitivity when measuring high myopia.
- Neither EQ-5D-Y-3L nor CHU-9D may be good choice to measure health utility among adolescents with myopia in China.