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**Introduction** The DLQI is the most widely used tool for clinicians and researchers to understand the impact of skin diseases on patients' physical and psychosocial functioning as well as to assess the effectiveness of interventions. The DLQI has been used in >454 randomised controlled trials<sup>1</sup> (as primary outcomes in >24)<sup>2</sup>, as a benchmark for validating >100 PROs<sup>3</sup>, is incorporated in guidelines or registries in >45 countries and is available in 138 translations, with 207 studies describing validation aspects of the DLQI.<sup>4</sup>

**Aim** This study examined the psychometric properties of the DLQI across 13 European languages.

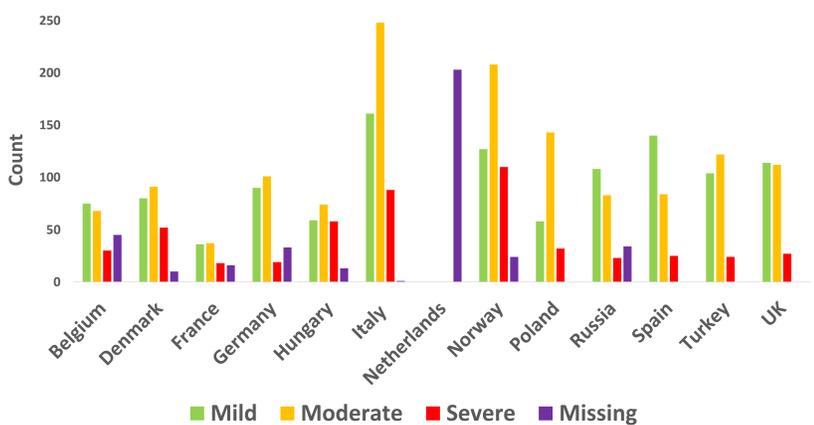
**Methods** Data were analysed from a cross-sectional study conducted in 13 European languages where up to 250 consecutive adult out-patients were recruited from 15 dermatology clinics<sup>5</sup>. Parallel analysis, confirmatory factor analysis (CFA) and VSS was performed for datasets of each country and multigroup CFA (MGCFA) across all countries. Known-group analysis was performed of DLQI sum-score against physician assessed severity, and EQ-5D-VAS score quartiles by country using the Jonckheere-Terpstra test.

**Results** From 3,635 patients, 3,408 patients completed the DLQI questionnaire with no missing data. The commonest conditions reported were psoriasis (17.4%), non-melanoma skin cancer (10.8%), infection of the skin (6.7%), hand eczema (6.2%), acne (6.2%), nevi (5.0%), atopic dermatitis (4.5%), benign skin tumors (4.2%), and eczema (contact dermatitis) (4.1%). Parallel analysis scree plots, CFA, VSS, Wayne's Velicer's MAP criterion and single group CFA showed unidimensionality across all the languages.<sup>6</sup>

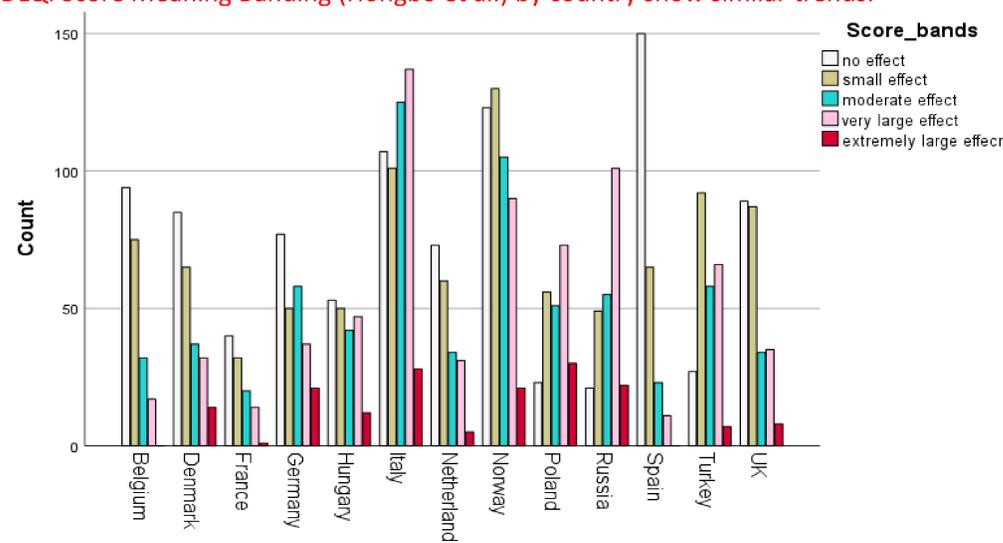
**Distribution of mean DLQI, EQ-5D-VAS and physician assessed severity scores, and age**

Country	N	Mean DLQI (range)	Mean EQ-5D VAS (range)	Mean age	Mean severity
Poland	233	10.7 (0-30)	62.9 (0-100)	44.0	1.9 (1-3)
Russia	248	10.5 (0-30)	63.4 (0-100)	48.8	1.4 (1-3)
Italy	498	8.2 (0-29)	69.6(10-100)	43.6	1.9 (1-3)
Hungary	204	7.4 (0-30)	47.8 (2-100)	48.2	1.9 (1-3)
Germany	243	7.0(0-30)	64.4 (0-100)	52.2	1.4 (1-3)
Spain	249	6.8 (0-20)	76.4 (12-100)	45.0	1.5 (1-3)
Norway	469	6.7 (0-30)	69.3 (0-100)	49.6	1.9 (1-3)
Turkey	250	6.0 (0-25)	73.6 (20-100)	30.7	1.7 (1-3)
Denmark	233	5.6 (0-30)	67.9 (30-100)	52.9	1.8 (1-3)
Netherlands	203	5.1 (0-25)	56.1 (8-100)	52.2	-
UK	253	5.0 (0-29)	75.4 (10-100)	45.9	1.7 (1-3)
France	107	4.5 (0-26)	63.9 (30-100)	49.0	1.5 (1-3)
Belgium	218	3.5 (0-19)	69.6 (25-100)	48.4	1.4 (1-3)
Total	3408				

**Distribution of mean DLQI, EQ-5D-VAS and physician assessed severity scores, and age across the 13 European countries show large variations in severity.**



**DLQI Score Meaning Banding (Hongbo et al.) by country show similar trends.**



## Results continued

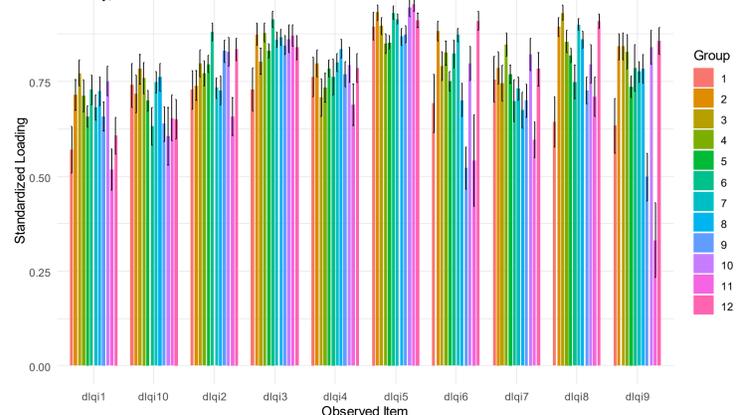
Multiple-group confirmatory factor analysis – fit measures and differences in fit measures.

Fit measures (model)	TLI scaled	CFI scaled	RMSEA scaled	ΔCFI scaled	ΔRMSEA scaled	SRMR
Configural (baseline) <sup>1</sup>	0.971	0.978	0.089	NA	NA	0.067
Metric (loadings equal) <sup>2</sup>	0.977	0.978	0.081	0.00	0.009	0.087
Scalar (intercepts equal) <sup>3</sup>	0.962	0.948	0.104	-0.03	0.023	0.079
Means (means equal) <sup>4</sup>	0.918	0.918	0.129	-0.03	0.025	0.079
Differences in Fit Indices	df scaled	ΔRMSEA scaled	ΔCFI scaled	ΔTLI scaled	SRMR	
fit.metric - fit.config <sup>5</sup>	99	-0.009	0.00	0.005	0.020	
fit.scalar - fit.metric <sup>6</sup>	209	0.023	-0.03	-0.015	-0.008	
fit.means - fit.scalar	11	0.025	-0.03	-0.021	0.00	

- 1 Good baseline fit
- 2 Metric invariance supported: ΔCFI ≤ 0.01 and ΔRMSEA ≤ 0.015
- 3 Scalar invariance not supported: ΔCFI = -0.03 (> 0.01), ΔRMSEA = +0.023 (> 0.015)
- 4 Means invariance not supported
- 5 Metric invariance (factor loadings equal) supported: ΔCFI = 0.000 (≤ 0.01) and ΔRMSEA = -0.009 (≤ 0.015).
- 6 Scalar invariance (intercepts/thresholds equal) not supported: ΔCFI = -0.030 (> 0.01), ΔRMSEA = +0.023 (> 0.015)

- At configural level, MGCFA indicated that these different country translations of the DLQI conceptualize the same construct and are all unidimensional.
- At the metric level, MGCFA indicated equality of factor loadings showing that items are equally related to the same latent factor across the groups
- However, at the scalar level (equal thresholds for ordinal data), MGCFA did suggest invariance across different groups.

Plot of standardised CFA loading by country, with error bars. Countries (Group): 1=Belgium, 2=Denmark, 3=Germany, 4=Hungary, 5=Italy, 6=Netherlands, 7=Norway, 8=Poland, 9=Russia, 10=Spain, 11=Turkey, 12=UK



**Correlations of variables averaged by country were significant with |R<sup>2</sup>| values >0.2 for all except age and severity.**

Spearman's Correlations	R <sup>2</sup>	test statistic	p-value
DLQI and EQ-5D VAS	-0.409	8.1E+09	<0.0001
DLQI and age	-0.119	7.0E+09	<0.0001
DLQI and severity	0.407	3.3E+07	<0.0001
EQ-5D VAS and age	-0.201	6.6E+09	<0.0001
EQ-5D VAS and severity	-0.270	6.8E+07	<0.0001
Age and severity	0.002	5.3E+07	0.963

**Known group validity analysis of DLQI total score by physician assessed severity and EQ-5D VAS quartiles was significant between groups for almost all country data.**

Country	N	Known-group DLQI vs severity		Known-group DLQI vs EQ-5D VAS quartiles		
		Std J-T statistic	p-value	N	Std J-T statistic	p-value
Belgium	173	2.67	<b>0.008</b>	208	-4.02	<0.001
Denmark	223	4.99	<0.001	227	-7.63	<0.001
France	91	7.58	<b>0.01</b>	95	-2.79	<b>0.005</b>
Germany	210	4.63	<0.001	235	-6.24	<0.001
Hungary	191	2.29	<b>0.022</b>	146	-5.87	<0.001
Italy	497	9.63	<0.001	498	-11	<0.001
Netherlands	203	-	-	152	-4.14	<0.001
Norway	445	4.03	<0.001	463	-7.47	<0.001
Poland	233	5.45	<0.001	233	-8.44	<0.001
Russia	214	3.51	<0.001	248	-4.55	<0.001
Spain	249	2.25	<b>0.025</b>	249	-1.90	0.057
Turkey	250	4.98	<0.001	250	-2.24	<b>0.025</b>
UK Cardiff	253	6.42	<0.001	251	-3.1	<b>0.002</b>
Total	3029	16.26	<0.001	3258	-22.15	<0.001

**Conclusions** Excellent psychometric properties were present across all 13 languages examined. Unidimensionality of the DLQI construct was confirmed and the DLQI is able to differentiate between levels of disease severity and EQ-5D levels across all these languages. This adds further confidence in the appropriateness of using the DLQI across this range of languages.

## References

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