Can the PROMIS®-29 profile be used to predict SF-36 physical and mental health summary scores in patients with cardiovascular disorders?

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Background

The domains of the MOS 36-ltem Short-Form Health Survey (SF-36) can be aggregated to physical (PCS) and mental (MCS) component summary scores, which are widely used measures of patient-reported health. PCS and MCS were originally derived using an uncorrelated factor model, potentially leading to problems with interpretation of results. Consequently, modified scoring algorithms for correlated SF-36 summary scores (PCSc and MCSc) have been suggested. The PROMIS-29 v2.0 is a newer generic health measure which is increasingly used as an alternative to the SF-36. Physical and mental summary scores can also be derived from individual PROMIS-29 domains. To date, it is not possible to translate PROMIS-29 scores to SF-36 summary scores**.**

Aim

To establish and validate algorithms to predict SF-36 summary scores from PROMIS-29 scores.

Methods

Data from n=713 participants of the Berlin Longterm Observation of Vascular Events (BeLOVE) study were used for establishing regression parameters. We estimated separate linear regression models, with either PROMIS-29 domain scores or PROMIS-29 physical/mental summary scores as predictors and SF-36 physical (PCS and PCSc) and mental (MCS and MCSc) summary scores as dependent variables.

Independent data from n=194 participants were used to validate these models. Pearson correlation coefficients (r) were calculated to determine the association between empirical and predicted SF-36 summary scores. Bland-Altman plots, root mean square errors (rmse), and mean absolute errors (mae) were used to determine the agreement between empirical and predicted scores.

Results

Individual PROMIS-29 domains as well as PROMIS-29 summary scores showed high predictive value for PCS, PCSc, and MCSc (R^2≥70%), and moderate predictive value for MCS (R^2=58% and R^2=41%, respectively). The association of empirical and predicted SF-36 summary scores in the validation sample was high for PCS, PCSc, and MCSc, but considerably lower for MCS. Consistent with this, the agreement between empirical and predicted SF-36 summary scores was higher for PCS, PCSc, and MCSc than for MCS (see Table 1, Table 2, and Figure 1).

Table 1: Agreement and association of empirical and predicted uncorrelated SF-36 summary scores

	PCS		MCS	
Statistics	**Empirical**	**Predicted**	**Empirical**	**Predicted**
PROMIS-29 domain score model				
Pearson correlation	0.87		0.71	
rmse	5.45		7.52	
mae	4.23		5.78	
PROMIS-29 summary score model				
Pearson correlation	0.83		0.64	
rmse	6.05		8.25	
mae	4.74		6.34	

Abbreviations: MCS, uncorrelated SF-36 mental component score; mae, mean absolute error; PCS, uncorrelated SF-36 physical component score; PROMIS-29, Patient-Reported Outcomes Measurement Information 29-item profile v2.0; rmse, root mean square error; sd, standard deviation

Table 2: Agreement and association of empirical and predicted correlated SF-36 summary scores

	PCSc		MCSc	
Statistics	**Empirical**	**Predicted**	**Empirical**	**Predicted**
PROMIS-29 domain score model				
Pearson correlation	0.87		0.82	
rmse	4.98		5.32	
mae	3.73		3.99	
PROMIS-29 summary score model				
Pearson correlation	0.81		0.84	
rmse	6.02		5.13	
mae	4.73		6.34	

Abbreviations: MCSc, correlated SF-36 mental component score; mae, mean absolute error; PCSc, correlated SF-36 physical component score; PROMIS-29, Patient-Reported Outcomes Measurement Information 29-item profile v2.0; rmse, root mean square error; sd, standard deviation

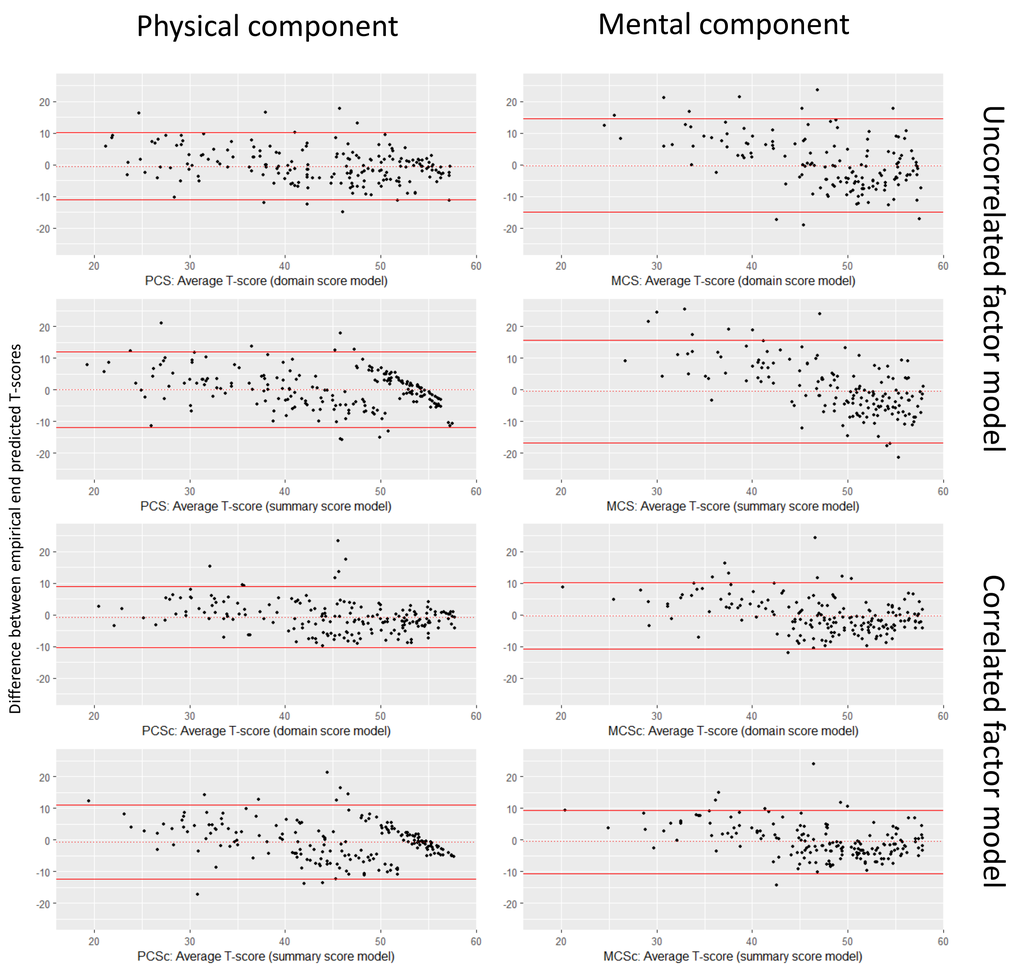

Fig. 1: Bland-Altman plots showing the agreement between empirical and predicted SF-36 summary scores (PCS, MCS, PCSc, MCSc) based on both the PROMIS-29 domain score model and the PROMIS-29 summary score model. The dotted red line indicates the obtained mean difference between empirical and predicted scores. The bold red lines indicate 95% limits of agreement.

Conclusion

Regression can be used to predict original (i.e., uncorrelated) and correlated SF-36 physical and mental summary scores from either individual PROMIS-29 domains or PROMIS-29 summary scores.

The prediction of SF-36 mental component summary scores was less precise and more biased for the uncorrelated than for the correlated factor model. Ceiling effects were found for PROMIS-29 physical summary scores.

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