

Evaluating the PROMIS-Anxiety to GAD-7 PROsetta crosswalk in Solid Organ Transplant Recipients

Introduction

- Anxiety is present and clinically relevant after solid organ transplantation (SOT).
- The 7-item Generalized Anxiety Disorder (GAD-7) scale is a widely used legacy screening tool for anxiety symptoms.
- The Patient-Reported Outcomes Measurement Information System – Anxiety (PROMIS-A) item bank also measures anxiety symptoms precisely.
- The PROMIS-A to GAD-7 PROsetta crosswalk enables the translation of scores between these two measures.
- This linking method enables scores collected with each measure to be comparable across clinical contexts, research settings, and health systems.
- However, the PROMIS-A to GAD-7 PROsetta crosswalk has not been evaluated in SOT recipients (SOTRs).

Objective

Evaluate whether PROMIS-A to GAD-7 PROsetta crosswalk derived scores agree with reported GAD-7 scores and preserve screening classification at GAD-7 ≥ 10 among SOTRs.

Methods

Sample

- Single-centre, cross-sectional, secondary analysis
- Convenience sample:

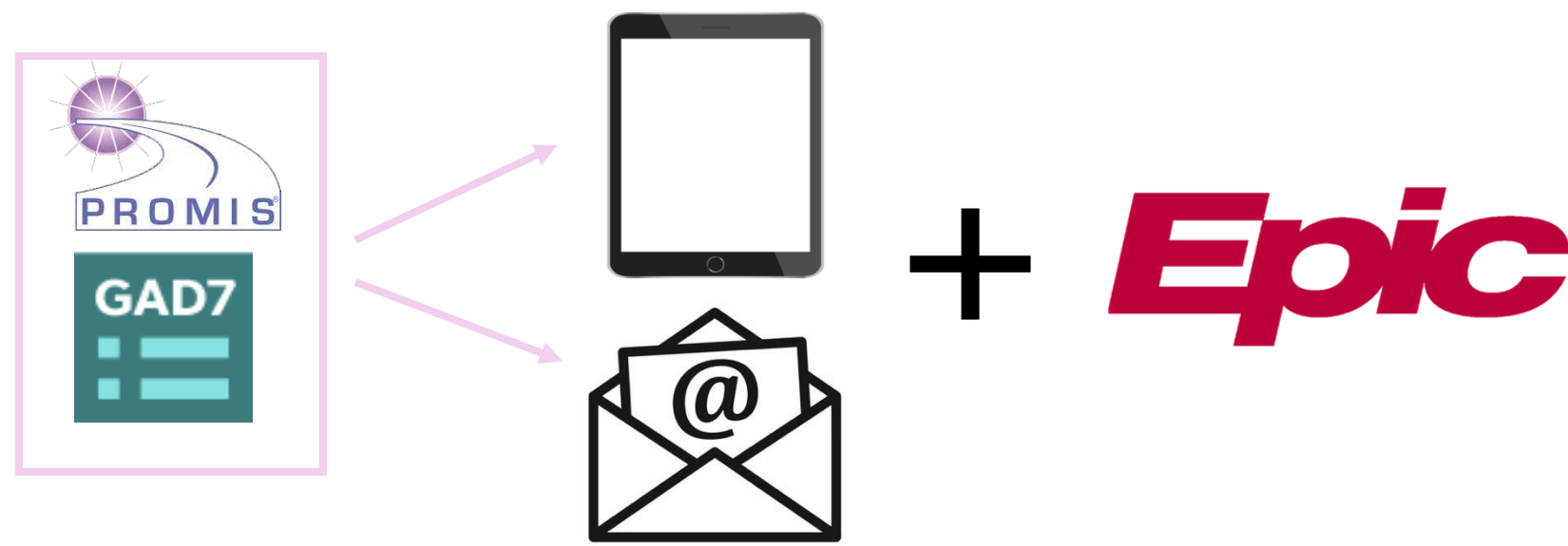
Inclusion Criteria

- Age ≥ 18
- Received kidney, kidney-pancreas, or liver transplant prior to enrollment
- Completed both GAD-7 and PROMIS-A questionnaires

Exclusion Criteria

- Unable to provide informed consent
- Grade 5 English Proficiency
- Cognitive dysfunction or severe illness

Questionnaire Administration & Data Collection



Analysis

- Derivation



- Outcomes
 - Difference = [Derived GAD-7] – [Reported GAD-7]
- Bias & individual error
 - Wilcoxon signed-rank test
 - MAE (95% CI), RMSE (95% CI); acceptable performance based on MAE < 2.1 and RMSE < 2.1 (based on 10% of the score range).
- Screening agreement at GAD-7 ≥ 10; indicating moderate to severe anxiety symptoms.
 - Cohen’s Kappa; $k > 0.40$ is considered moderate agreement.
 - Sensitivity, Specificity, PPV, NPV

Results

Characteristics	Total cohort (N=457)	KTR (N=247)	KPTR (N=41)	LTR (N= 175)	P-value
Age (SD)	54 (13)	54 (13)	52 (10)	54 (15)	P=0.489
Sex [N (%) Male]	275 (60%)	139 (57%)	25 (63%)	111 (64%)	P=0.319
Education N (%)					
Less than 12 years	133 (31%)	65 (28%)	11 (29%)	57 (36%)	P=0.281
More than 12 years	293 (69%)	164 (72%)	27 (71%)	102 (64%)	
Racialized status N (%)					
White	293 (67%)	133 (57%)	32 (82%)	128 (79%)	P<0.001
Asian	77 (18%)	56 (24%)	2 (5%)	19 (12%)	
Black	32 (7%)	25 (11%)	4 (10%)	3 (2%)	
Other	33 (8%)	1 (3%)	1 (3%)	13 (8%)	
Income N(%)					
< 30K	58 (18%)	31 (18%)	6 (19%)	21 (17%)	P=0.966
≥ 30K	270 (82%)	145 (82%)	25 (81%)	100 (83%)	
Charlson Comorbidity Index (CCI) N (%)					
< 4	262 (64%)	181 (81%)	4 (11%)	77 (52%)	P<0.001
≥ 4	147 (36%)	42 (19%)	33 (89%)	72 (48%)	
Diabetes (Yes) N (%)	132 (35%)	50 (25%)	39 (98%)	43 (32%)	P<0.001

Table 1. Socio-demographic and clinical characteristics by organ group.

SOT type	Median (IQR)	P value	MAE (95% CI)	RMSE (95% CI)
Kidney	1 (0,4)	P<0.001	3.008 (2.63, 3.386)	4.308 (3.833, 4.782)
Kidney-Pancreas	0 (-1,2)	P=0.162	2.225 (1.488, 2.962)	3.283 (2.23, 4.335)
Liver	1 (-2, 3)	P=0.013	3.104 (2.724, 3.483)	4.058 (3.638, 4.477)
Total	1 (-1, 3)	P<0.001	2.976 (2.721, 3.231)	4.133 (3.818, 4.449)

Table 2. Difference between derived and reported GAD-7 and error of derivation using PROsetta PROMIS-A to GAD-7 crosswalk by organ group.

	Agreement (%)	Expected agreement (%)	k	95% CI	P value
All SOTRs	82.71	67.09	0.475	0.384, 0.566	P<0.001

Table 3. Agreement between derived and reported GAD-7 at screening threshold (GAD-7 ≥ 10), using Cohen’s Kappa test.

Reported GAD-7	Derived GAD-7		Row total	Metric	Estimate (%)	95% CI
	<10	≥10				
<10	323	50	373	Sensitivity	65.5	54.3, 75.5
≥10	29	55	84	Specificity	86.6	82.7, 89.9
Column total	352	105	457	PPV	52.4	42.4, 62.2
				NPV	91.8	88.4, 94.4

Table 4. 2x2 classification table at GAD-7 ≥ 10: Derived vs reported GAD-7 scores.

T-score	Matching Classifications N (%)	Discordant Classifications N (%)
<55	232 (97.9)	5 (2.1)
55-59	81 (87.1)	12 (12.9)
60-69	51 (45.9)	60 (54)
≥70	14 (87.5)	2 (12.5)
Total	378 (82.7)	79 (17.3)

Table 6. Agreement between derived and reported GAD-7 by PROMIS-A T-score score category.

Metric	Estimate (%)	95% CI
Sensitivity	65.5	54.3, 75.5
Specificity	86.6	82.7, 89.9
PPV	52.4	42.4, 62.2
NPV	91.8	88.4, 94.4

Table 5. Screening performance of derived against reported GAD-7 at screening threshold (GAD-7 ≥ 10).

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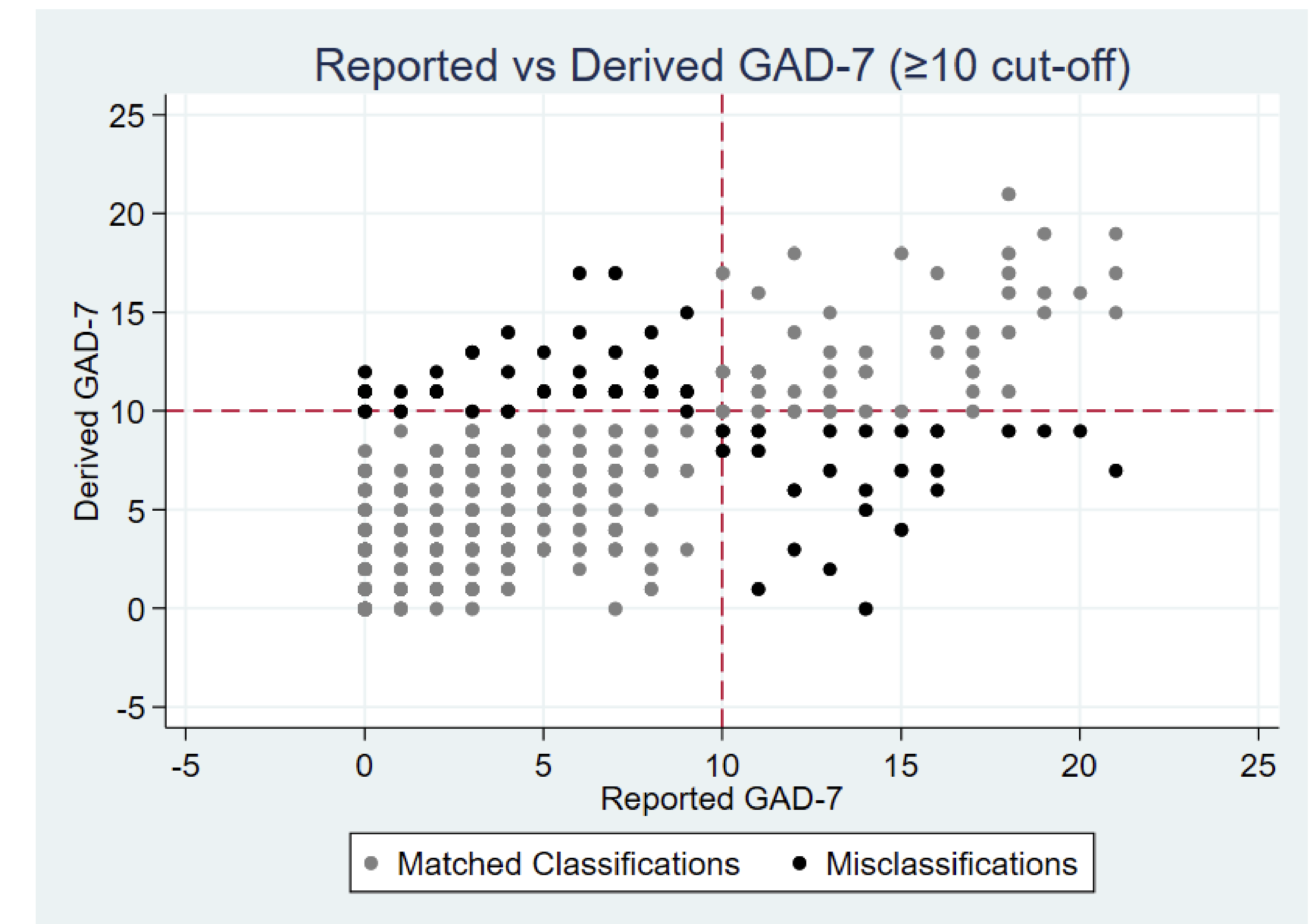


Figure 1. Screening agreement at GAD-7 ≥ 10: Derived vs reported.

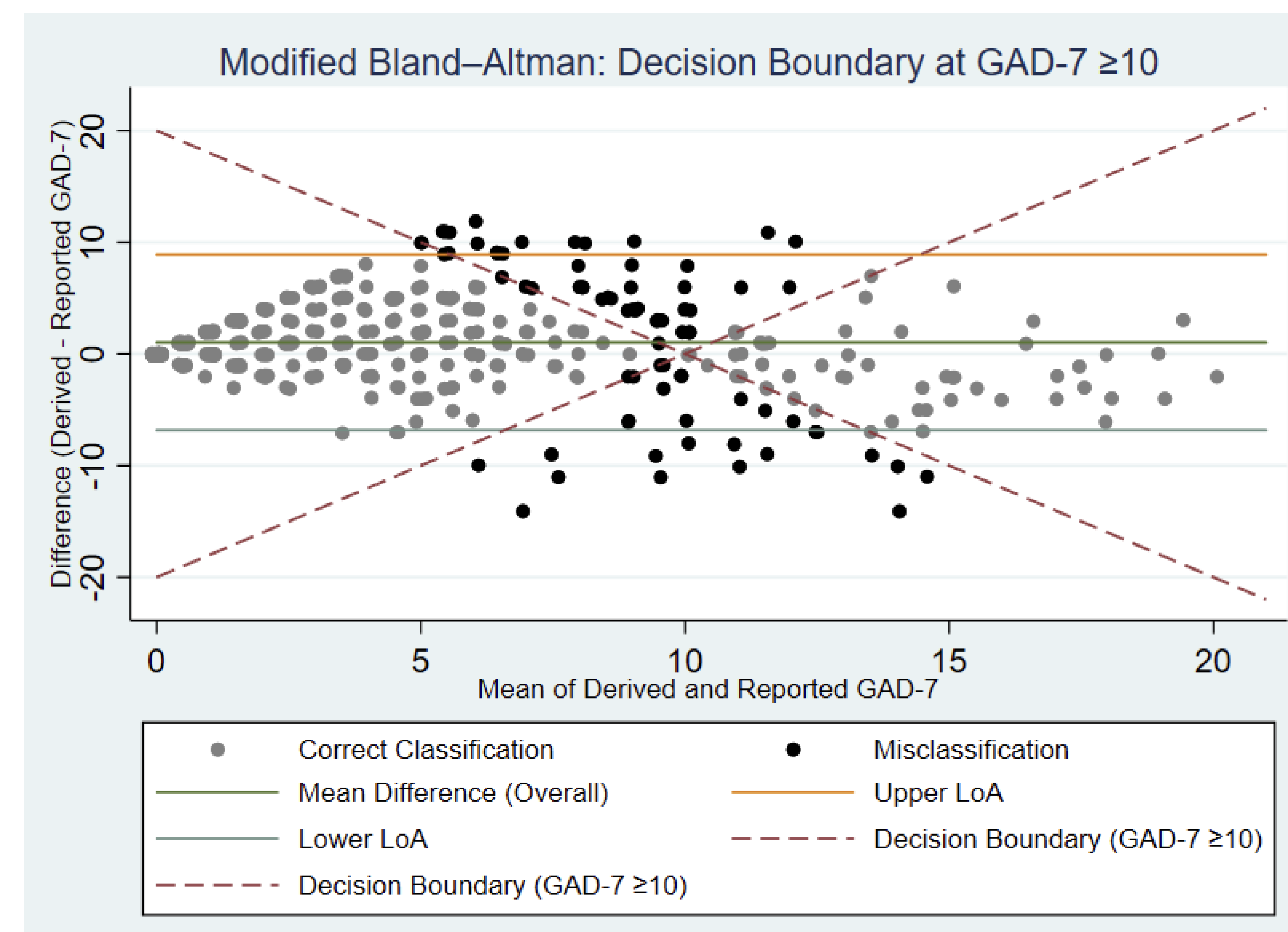


Figure 2. Bland-Altman (derived – reported) with screening boundary at GAD-7 ≥ 10, median difference, and LOAs.

Conclusion

- The PROsetta crosswalk derived GAD-7 scores tend to overestimate the reported GAD-7 by 1 point in the overall sample.
- Overall, agreement is good when scores are below 10 but more variable when scores are above 10.
- Misclassifications cluster around the cut-off threshold of 10.
- A low sensitivity and PPV but high specificity and NPV suggests the PROsetta crosswalk derived scores are more specific than sensitive; derived scores should not replace reported scores for screening in SOTRs without further validation.

Future Directions

Additional validation of the PROsetta PROMIS-A to GAD-7 crosswalk performance before its routine use in SOTRs.

Acknowledgments

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