Reproducing Table 1-2-3-5, and Figure 1 using the simulated data

July 6, 2016

1 Figures

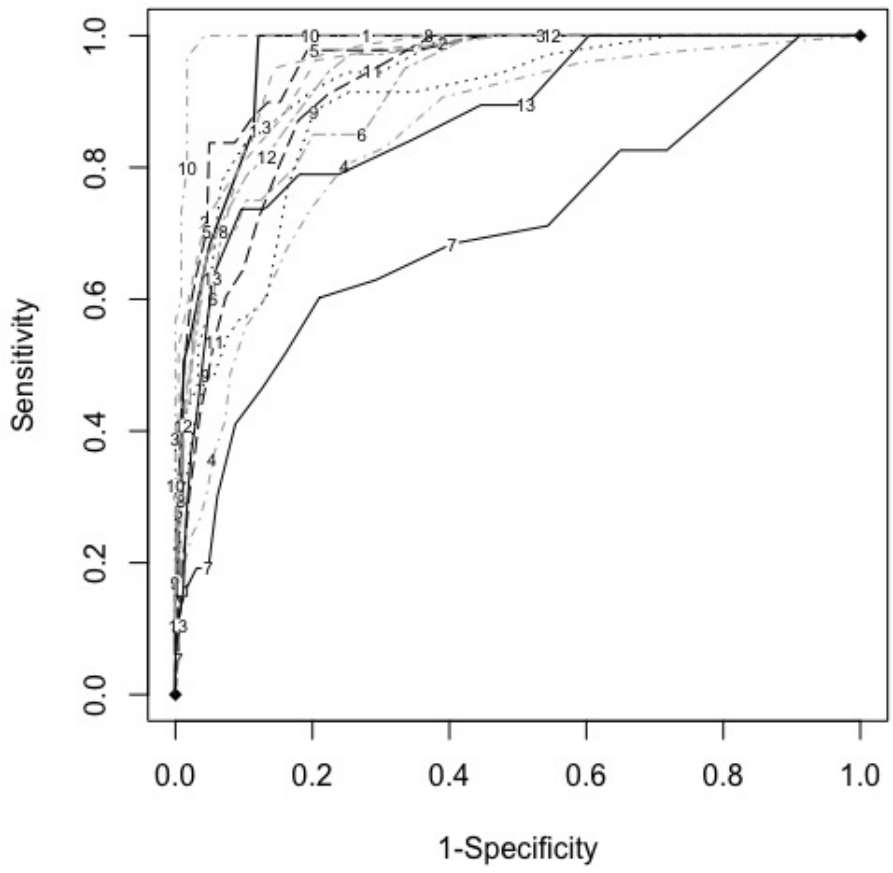

Figure 1: Individual ROC curves for the 13 studies investigating the diagnostic accuracy of the PHQ-9 questionnaire. Each line represents a study-specific empirical ROC curve based on estimated sensitivity and specificity for threshold 0 to 27. The study numbers found in Table 1 identified which ROC curve represented which study.

2 Tables

Table 1: Number of truly MDD/non-MDD patients with test result above/below the threshold of interest, for each threshold between 7 and 14 of PHQ-9 score categories in 13 studies

	Simulated Example Score								
Study	$\leqslant$7	8	9	10	11	12	13	$\geqslant$14	Total
1	0/1411	0/42	0/69	0/55	0/69	0/55	14/14	84/221	98/1936
2	2/144	1/12	1/11	9/10	6/10	5/7	6/7	76/9	106/210
3	0/32	0/4	2/6	0/3	1/3	1/2	1/2	31/8	36/60
4	59/642	13/27	18/28	9/21	16/18	16/6	13/15	80/43	224/800
5	0/91	2/4	0/2	0/2	1/3	0/4	3/0	15/5	21/111
6	3/334	1/11	1/21	0/9	1/7	0/8	2/5	12/23	20/418
7	14/161	1/19	3/11	2/8	2/9	4/6	4/3	7/11	37/228
8	1/413	1/34	1/21	1/27	9/19	2/9	9/14	57/41	81/578
9	8/132	6/5	1/5	0/1	1/3	2/3	0/2	17/7	35/158
10	0/103	0/4	0/2	0/3	2/3	6/0	4/0	48/2	60/117
11	55/2886	25/164	42/102	53/119	47/79	26/95	43/64	337/210	628/3719
12	0/236	1/45	1/33	0/21	2/15	5/23	4/17	58/60	71/450
13	2/144	1/26	1/28	0/15	1/13	0/9	2/11	12/14	19/260
Total	144/6729	52/397	71/339	74/294	89/251	67/227	105/154	834/654	1436/9045

Table 3: Parameter estimates (standard errors) obtained by the bivariate approach

Threshold	Logit (sensitivity)	Logit (1-specificity)	Correlations ρ_T
7	3.29 (0.60)	-1.00 (0.15)	0.42
8	2.65 (0.51)	-1.28 (0.14)	0.49
9	2.18 (0.43)	-1.58 (0.12)	0.48
10	1.95 (0.42)	-1.83 (0.12)	0.48
11	1.47 (0.35)	-2.12 (0.13)	0.54
12	1.14 (0.32)	-2.40 (0.13)	0.62
13	0.64 (0.25)	-2.68 (0.14)	0.76
14	0.33 (0.22)	-3.06 (0.15)	0.56

For thresholds $j = 7, .., 14$, sensitivity$_j$=expit(Logit sensitivity$_j$) and specificity$_j$=1-expit(Logit $(1 - \text{specificity}_j)$).

Table 5: Parameter estimates (standard errors) obtained by the Poisson approach

Threshold	Hazards Diseased	Hazards Healthy	Frailty Variances		Correlations	
7	0.04 (0.018)	0.19 (0.026)	ξ^1	0.92 (0.22)	ρ_{thres}	0.54 (0.15)
8	0.04 (0.021)	0.18 (0.025)	ξ^0	0.09 (0.02)	ρ_{dis}	0.29 (0.14)
9	0.06 (0.028)	0.21 (0.029)				
10	0.06 (0.029)	0.20 (0.026)				
11	0.09 (0.034)	0.20 (0.031)				
12	0.08 (0.036)	0.19 (0.032)				
13	0.11 (0.048)	0.24 (0.036)				
14	0.10 (0.043)	0.25 (0.040)				

For thresholds $j = 7, .., 14$, sensitivity$_j = \prod_{k=1}^{j}(1 - \text{Hazard Diseased}_k)$ and sensitivity$_j = 1 - \prod_{k=1}^{j}(1 - \text{Hazard Healthy}_k)$.

Table 2: Estimates (95% CI) of the pooled sensitivity and specificity from the three methods

	Bivariate approach		Ordinal approach		Poisson approach	
Threshold	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
7	0.96 (0.89-0.99)	0.73 (0.67-0.78)	NA	NA	0.88 (0.82-0.94)	0.73 (0.67-0.79)
8	0.93 (0.84-0.97)	0.78 (0.73-0.83)	NA	NA	0.85 (0.77-0.93)	0.78 (0.74-0.82)
9	0.90 (0.79-0.95)	0.83 (0.79-0.86)	NA	NA	0.79 (0.69-0.89)	0.83 (0.79-0.87)
10	0.88 (0.76-0.94)	0.86 (0.83-0.89)	NA	NA	0.74 (0.62-0.86)	0.86 (0.82-0.90)
11	0.81 (0.69-0.90)	0.89 (0.87-0.91)	NA	NA	0.68 (0.54-0.82)	0.89 (0.85-0.93)
12	0.76 (0.63-0.85)	0.92 (0.90-0.93)	NA	NA	0.62 (0.48-0.76)	0.91 (0.89-0.93)
13	0.65 (0.54-0.76)	0.94 (0.92-0.95)	NA	NA	0.55 (0.39-0.71)	0.93 (0.91-0.95)
14	0.58 (0.47-0.68)	0.96 (0.94-0.97)	NA	NA	0.50 (0.34-0.66)	0.95 (0.93-0.97)