

Supplementary Materials

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Supplementary Materials S1 - Full Search Strategy

PUBMED

("Depressive Disorder"[Mesh] OR "Depressive Disorder, Treatment-Resistant"[Mesh] OR "Bipolar Disorder"[Mesh] OR "Adjustment Disorders"[Mesh] OR "Affective Disorders, Psychotic"[Mesh] OR depress*[TIAB] OR ((bipolar[TIAB] OR affective[TIAB] OR adjust*) AND disorder*[TIAB])) AND ("Vision, Low"[Mesh] OR ((VISUAL[TIAB] OR vision[TIAB] OR ocular[TIAB] OR eye*[TIAB]) AND (IMPAIRMENT[TIAB] OR low[TIAB])))

EMBASE

('low vision'/exp OR ((visual:ab,ti OR vision:ab,ti OR ocular:ab,ti OR eye*:ab,ti) AND (impairment:ab,ti OR low*:ab,ti))) AND ('depression'/exp OR 'treatment resistant depression'/exp OR 'bipolar disorder'/exp OR 'adjustment disorder'/exp OR 'affective psychosis'/exp OR depress*:ab,ti OR ((bipolar:ab,ti OR affective:ab,ti OR adjust*:ab,ti) AND disorder*:ab,ti)) AND ('article'/it OR 'article in press'/it OR 'note'/it OR 'review'/it OR 'short survey'/it) AND [english]/lim

Supplementary Materials S2 - Risk of Bias Assessment

Details and operationalization of the risk of bias assessment

A maximum of 10 stars was assigned in five domains (max 2 for each domain).

Lack of generalizability bias

We assessed the lack of generalizability bias based on two criteria: sampling consistent with our study objectives and an available definition of visual loss used as criterion to be included (clinic-based, case only) or be diagnosed (population-based) as having low vision.

Regarding patient sampling and spectrum, we included (Question 1) consecutive patients attending low-vision rehabilitation services who are not affected by juvenile vision disorders; and subjects representative of the general adult or older population regardless of vision status (Question 2, cross-sectional), who were not affected by clinical depression at baseline (Question 3, longitudinal).

We decided to assign 2 stars to studies that reported the inclusion of such patients and did not exclude patients with co-morbidities. If study participants were selected against strict and selective inclusion criteria, the study was considered to be affected by lack of generalizability bias and, consequently, assigned 1 or no stars.

We decided *a priori* to downgrade randomized controlled trials for lack of generalizability. We included case-control studies (for questions 2 and 3) only if they were nested in population-based studies.

Record bias

We assigned two stars to prospective studies and one star to retrospective and registry-based studies.

Attrition bias

This assessment differed according to study design and considered the proportion and the characteristics of patients excluded or lost to follow-up.

For cross-sectional studies recruiting in low vision services we considered that the failure to include more than 10% of eligible patients was of concern, as was the fact that risk factors for depression, such as comorbidities, were more prevalent in patients who were lost.

For cohort studies the assessment of attrition bias was based on the rate of loss to follow-up: we assigned two stars if the proportion of withdrawals was less than 5%; one star if it was greater than or equal to 5%, but less than 10%; and no stars if the rate was greater than or equal to 10%.

We assigned one or no stars to studies with a moderate or severe imbalance in patient characteristics concerning loss to follow-up and no stars to studies not reporting such data.

Detection bias

This assessment differed according to study design.

For cross-sectional studies we assigned 2 stars to studies using the same diagnostic modality for all subjects and regardless of vision status.

For longitudinal cohort studies we judged a period of observation of at least 24 months as optimal (2 stars) to assess detection bias; at least 12 months as intermediate (1 star); and less than 12 months as poor (zero stars). Moreover, we downgraded by 1 or 2 stars if the same diagnostic modality was not used for all subjects regardless of vision status.

We downgraded 1 star if a masked assessment with respect to vision status was not used or unclear.

Reporting bias

Our assessment of reporting bias focused on the pre-specification of methods used to diagnose depression and analyses methods.

We assigned 2 stars to studies reporting analyses for all pre-specified diagnostic tools, including psychiatric examination or validated questionnaires, for which a protocol was available.

We assigned 1 star to registry-based studies or studies reporting only a subset of pre-specified diagnostic tools.

No stars were assigned to studies reporting only the number of patients who experienced depression with no details on the diagnostic process.

Supplementary Materials S3 - Characteristics of included cross-sectional population-based studies

Study	Country	Data type	N°	Mean age or range	Ocular disease	Definition of visual impairment	Criteria for depression	Comorbidities
Armstrong 2016 period 1	United States	clinical examination	2,591	53	NS	SR	CESD-5	CDC Healthy Days Core (included)
Armstrong 2016 period 2	United States	clinical examination	3,599	58	NS	SR	CESD-5, PHQ-9	CDC Healthy Days Core (included)
Bernabei, 2011	Italy	survey	7,389	72	NS	SR	ICD-9	CaVD, CeVD
Biddulph, 2014	United Kingdom	administrative database	1,085	≥65	NS	NEI-VF	MHIS	HTN, CaVD, PD, DM, OAD
Capella, 2005	United States	survey	6,089	≥55	NS	SR	SR	HL
Carabellese, 1993	Italy	clinical examination	1,191	70-75	NS	< 20/50	BDI	HL
Cheluvraj 2015	India	survey	254	>60	NS	<6/18	GDS-5	HTN, DM and refractive defects
Cho, 2015	Korea	survey	28,392	≥ 19	NS	<20/63	SR	DM, HTN
Court, 2014	United Kingdom	survey	291,169	≥65	NS	Read code	Read code	HTN, CaVD, Parkinson, MS, DM, epilepsy, stroke, HD, KD, PD, TD, others
Crews, 2017	United States	clinical examination	36,110	≥65	NS	SR	SR	HTN, CaVD, stroke, OAD, PD, cancer, DM, HD
Evans, 2007	United Kingdom	survey	13,900	81	AMD, cataract, refractive error, others	<6/18	GDS-15	CaVD, stroke, Parkinson, cancer, HL
Garin, 2014	Spain	survey	4,583	48	NS	SR	WHO-CIDI	CaVD, OAD, PD, DM, HTN, stroke
Guthrie, 2016	Canada, United States, Belgium, Finland	survey	550,360	≥65	NS	Clinical record	DRS	HL
Hamedani, 2019	United States	administrative database	47,582,342	≥65	NS	ICD-9	ICD-9	Anxiety, dementia, OAD
Harada, 2008	Japan	survey	644	≥65	NS	<0.5	GDS-5	HL, cancer, stroke, CaVD, DM
Hirai, 2002	United States	survey	484	50	DR	<20/40, severe <20/200	CES-D	CaVD, KD, limb amputation
Karlsson 1998	Iceland	survey	218	141 (18-69)-77 (70-97)	Younger group: hereditary diseases Older group: AMD	20/60-20/200 Legal blindness <20/200	SR	NS
Lee 2000	Latinos in USA e Puerto Rico	survey	3,938 (391, 1514, 527)	20-74	NS	20/50	CES-D	NS
Loprinzi 2013	United States	clinical examination	567	60	NS	SR	PHQ-9	arthritis, CaVD, stroke, cancer, emphysema, chronic bronchitis, HTN
Lupsakko, 2002	Finland	survey	437	>75	NS	<20/60	DSM-IV	HL
Lyness, 2006	United States	clinical examination	546	75	NS	SR	DSM-IV	OAD, cancer, PD, DM, HL, CaVD

Lyu, 2018a	Korea	survey	2,167	≥45	NS	SR	CES-D	HTN, DM, cancer, CeVD, HD, CaVD, psychiatric disorder, OAD
Lyu, 2018b	Korea	survey	1,664	≥45	NS	SR	CES-D	HTN, DM, cancer, CeVD, HD, CaVD, psychiatric disorder, OAD
Park, 2015	Korea	administrative database	18,779	49	Glaucoma 34%, cataract 24.9%, eye and adnexa diseases 90.2%	ICD-10	ICD-10	CaVD, dementia, DM, PD, CTD, HD, KD, cancer, AIDS
Rahman 2020	Bangladesh	survey	400	50%>71	NS	SR	GDS-15	CaVD, stroke, DM, HTN
Rovner, 1998	United States	survey	872	76	NS	SR	Modified CES-D	NS
Schuster, 2018	Germany	survey	7,780	≥18	NS	SR	PHQ-9	NS
Tsai, 2003	Taiwan	survey	1,352	≥65	NS	<6/12	GDS-15	NS
Van Nispen, 2015	Netherland	clinical examination	1,237	≥55	NS	Severe 0.52-2 logMAR, mild 0.30-0.51 logMAR	CES-D	NS
Wee, 2014	Singapore	survey	559	≥60	NS	NS	GDS-15	HTN, CaVD, CeVD, OAD
Zhang, 2013	United States	clinical examination	10,480	≥20	NS	<20/40	PHQ-9	DM, CaVD, HTN, cancer

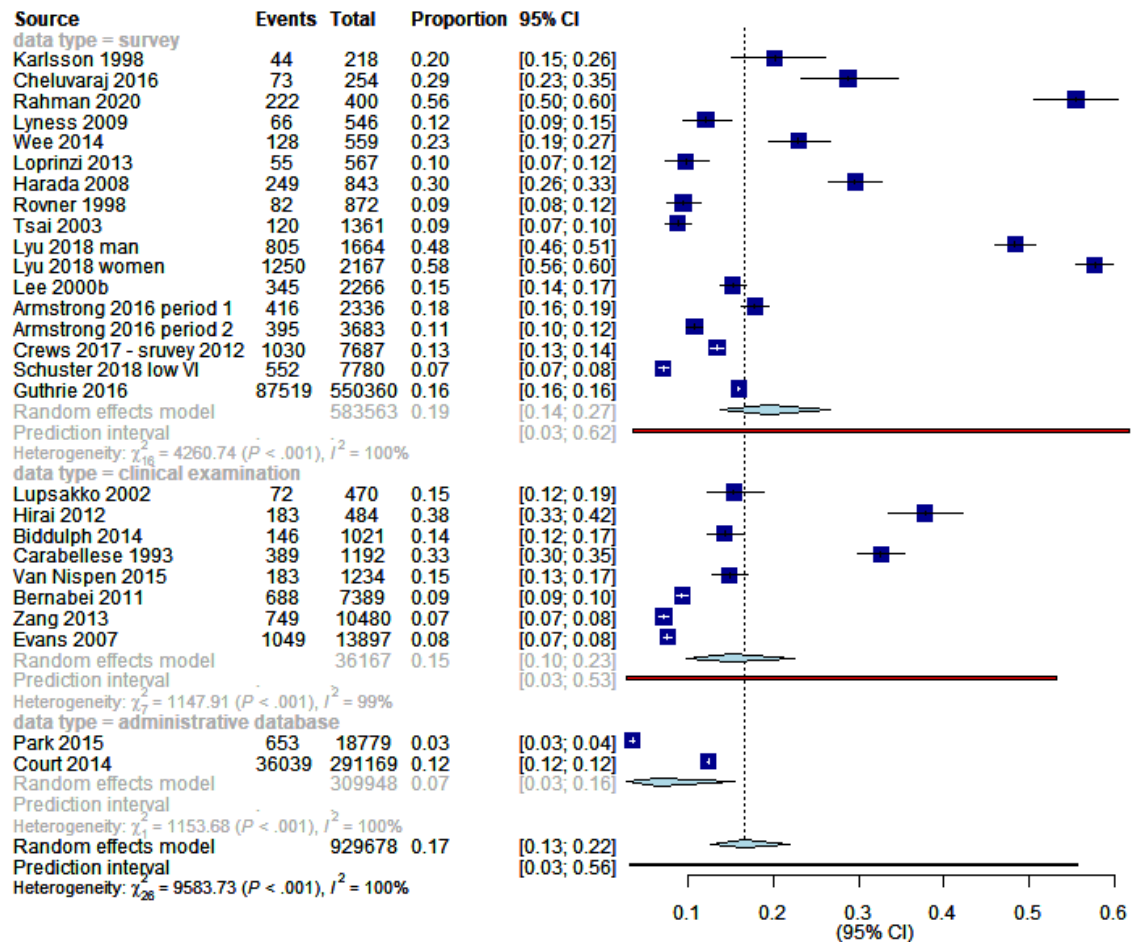
AMD= Age related Macular Degeneration; BDI= Beck Depression Inventory; CaVD= Cardiovascular Disease; CESDS= Center for Epidemiologic Studies Depression Scale; CeVD= Cerebrovascular Disease; CTD= Connective Tissue Disease; DM= Diabetes Mellitus; DRS= Depression Rating Scale; DR= Diabetic Retinopathy; DSM= Diagnostic and Statistical Manual of Mental Disorders; GDS= Geriatric Depression Scale; HD= Hepatic Disease; HL= Hearing loss; HTN= Hypertension; ICD= International Classification of Diseases; KD= Kidney Disease; OAD= Osteoarticular Disease; MD= Metabolic Disease; MHIS= Mental Health Inventory Screening; MS= Multiple Sclerosis; NEI-VF= National Eye Institute Visual Function; NS= Not specified; PD= Pulmonary disease; PHQ= Patient Health Questionnaire; SR= Self Report; TD= Thyroid Disease; VF= Visual Field; VI= Visual Impairment; WHO-CIDI= World Health Organization Composite International Diagnostic Interview.

Supplementary Materials S4 - Quality assessment of included studies

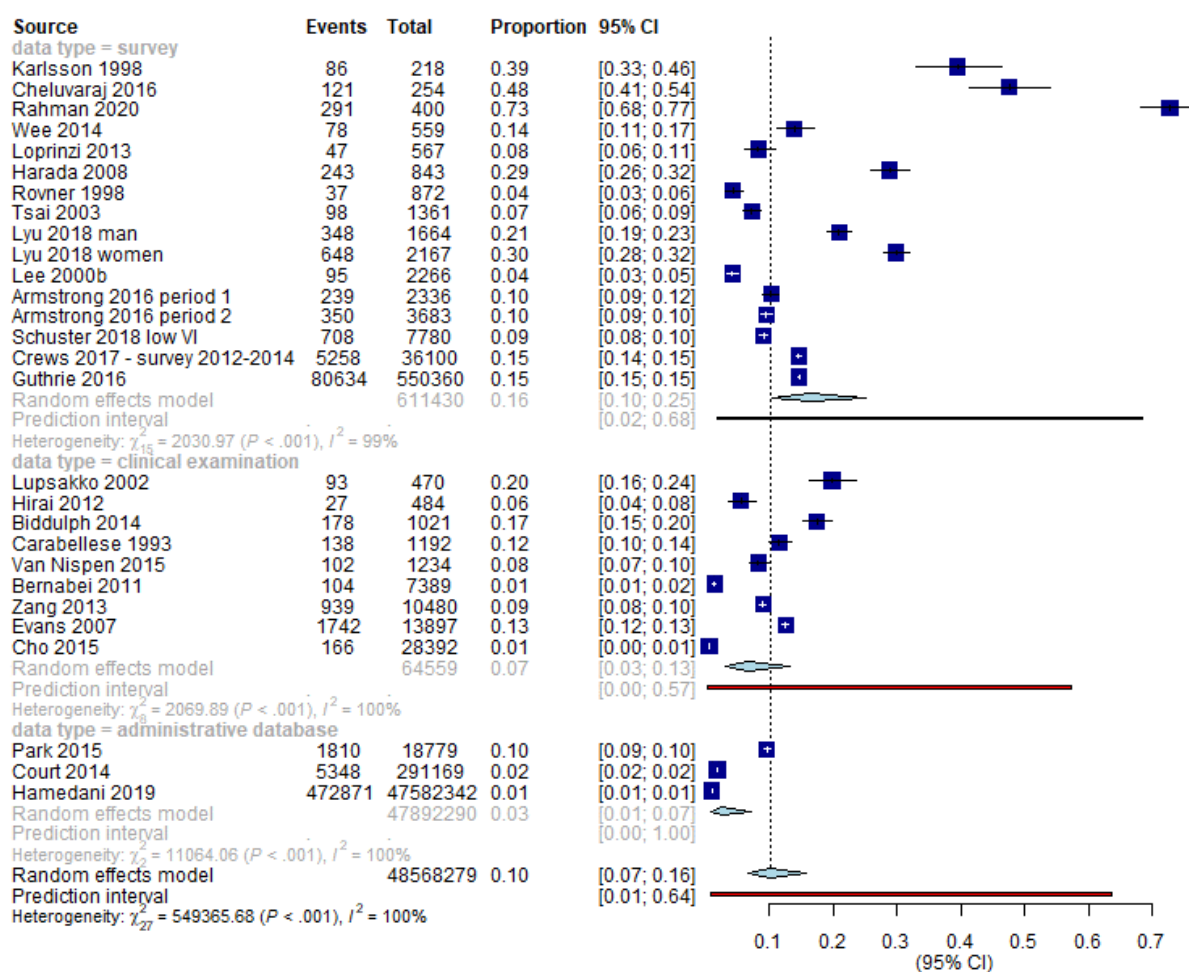
Study	Year	Lack of generalizability bias	Record bias	Attrition bias	Detection bias	Reporting bias	Total score
Armstrong	2016a	**	**	**	**	*	9
Armstrong	2016b	**	**	**	**	*	9
Bernabei	2011	*	**	*	*	**	7
Biddulph	2014	*	**	*	*	**	7
Capella	2005	*	*	**	*	*	6
Carabellese	1993	**	**	**	*	**	9
Cheluvaraj	2016	**	**	**	**	*	9
Cho	2015	**	**	*	*	*	7
Court	2014	**	*	**	*		6
Crews	2017	*	*	**	*	*	6
Evans	2007	*	**	**	*	**	8
Garin	2014	*	**	*	*	**	7
Guthrie	2016	*	*	**	*	**	7
Hamedani	2019	**	*	**	*	**	8
Harada	2008	**	**	*	*	**	8
Hirai	2012	*	**	**	*	**	8
Karlsson	1998	*	**	*	**	*	7
Lee	2000a	**	*	**	**	*	8
Lee	2000b	**	*	**	**	*	8
Loprinzi	2013	*	*	**	**	**	8
Lupsakko	2002	*	**	*	*	**	7
Lyness	2006	*	**	**	*	**	8
Lyu	2018	*	*	*	*	**	6
Park	2015	*	*	**	*	**	7
Rahman	2020	**	**	**	**	**	10
Rovner	1998	*	**	**	*	**	8
Schuster	2018	*	*	**	*	**	7
Tsai	2003	*	**	*	*	**	7
Van Nispen	2015	*	*	*	*	**	6
Wee	2014	*	**	*	*	**	7
Zhang	2013	**	**	*	*	**	8

(*): 'star', so as each domain is assigned 0, 1 or 2 * (stars), with higher score meaning better quality

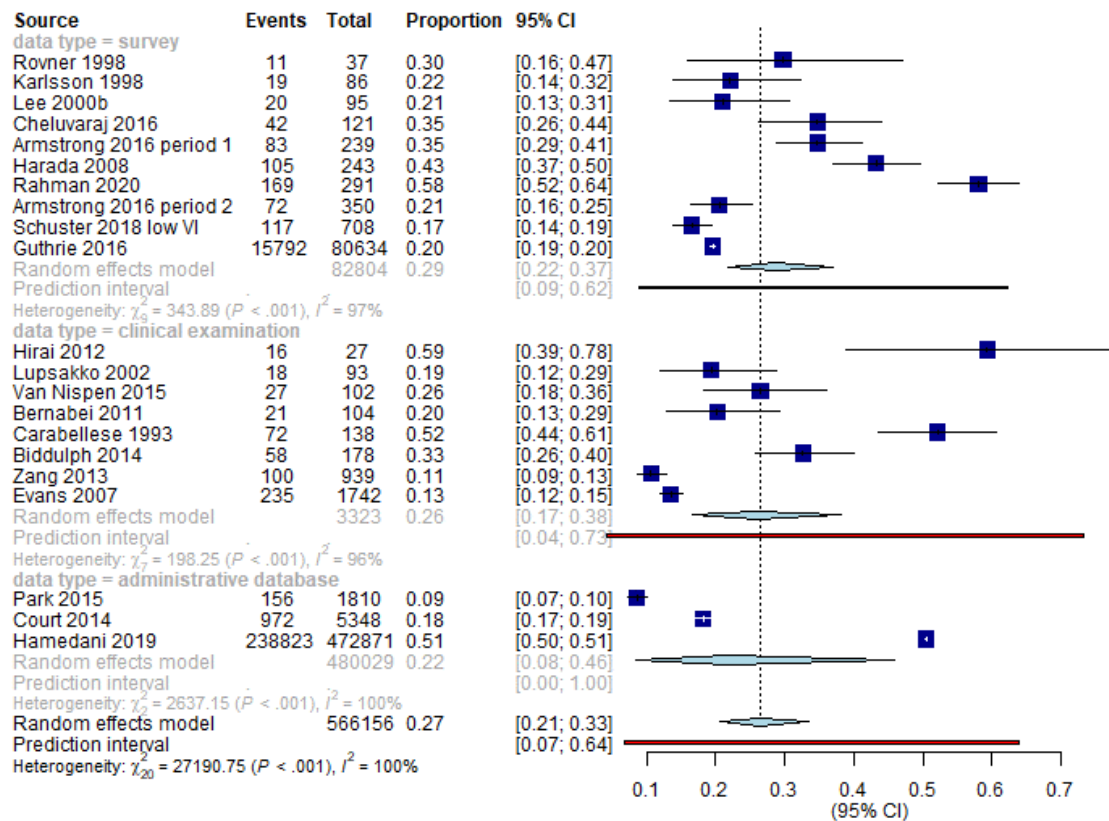
Supplementary Materials S5 - Forest plot of overall prevalence of depression



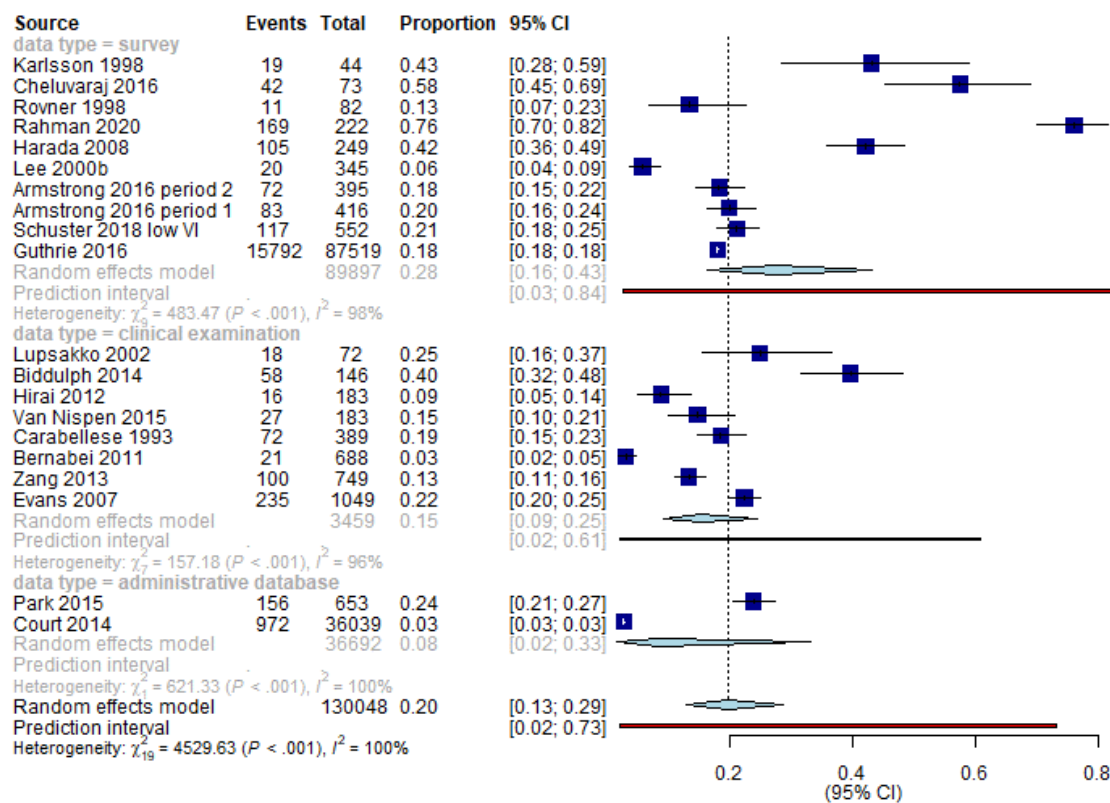
Supplementary Materials S6 - Forest plot of overall prevalence of visual impairment



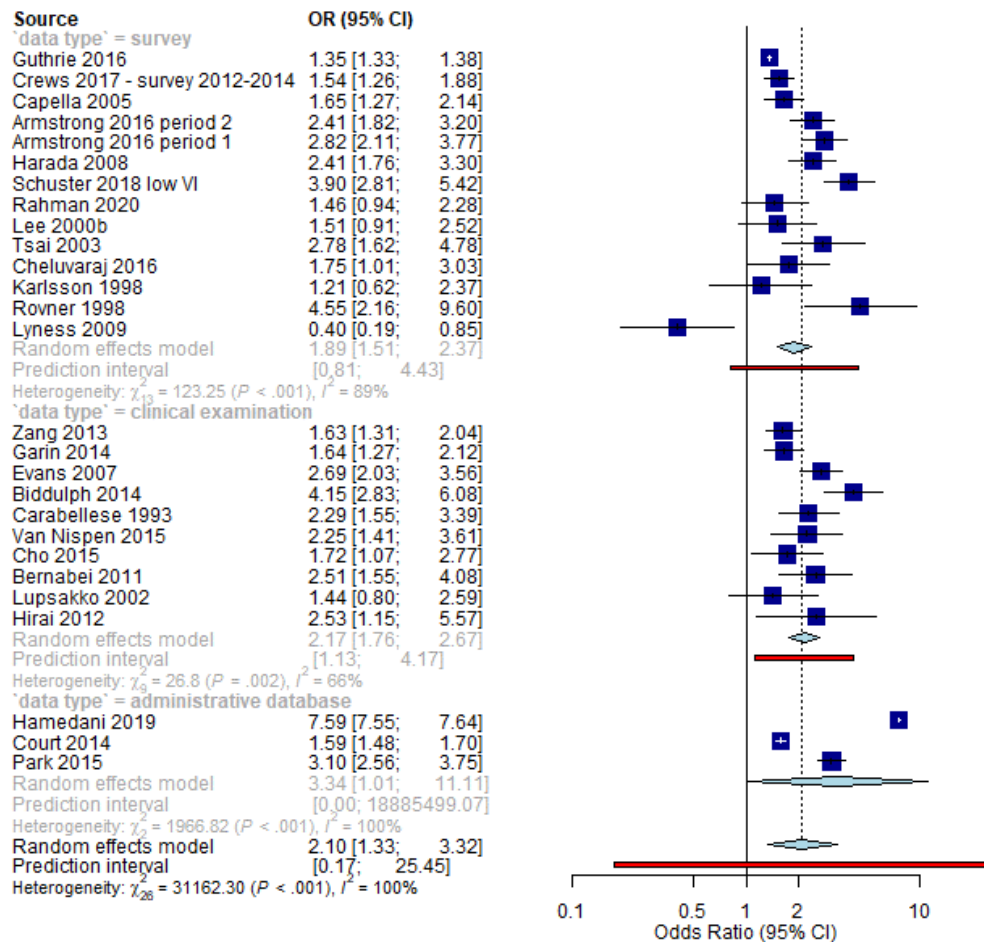
Supplementary Materials S7 - Forest plot of frequency of depression in visual impairment subjects



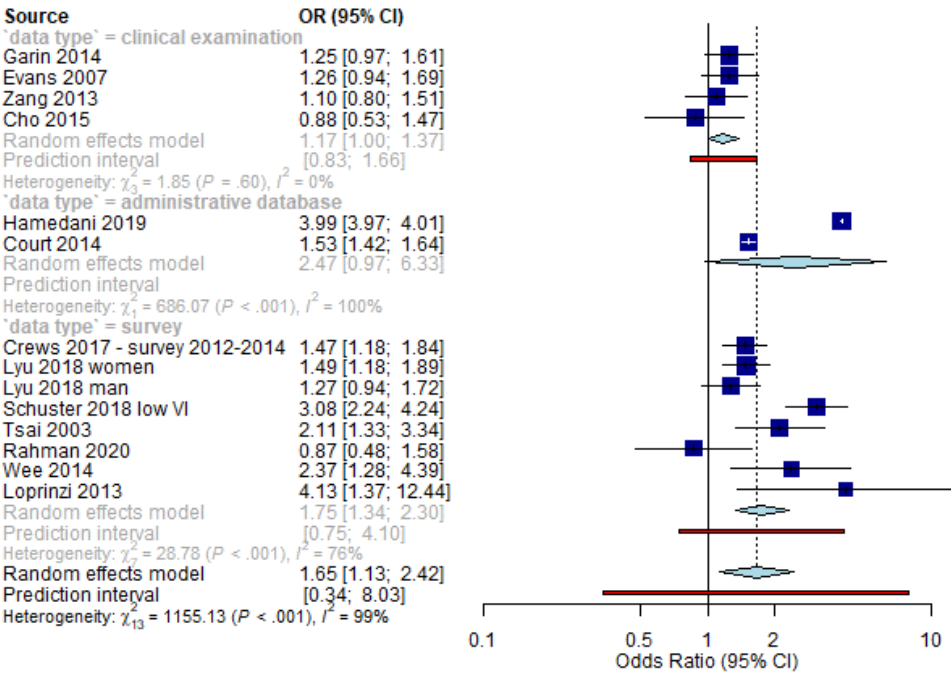
Supplementary Materials S8 - Forest plot of frequency of visual impairment in depressed subjects



Supplementary Materials S9 - Forest plot of unadjusted association between visual impairment and depression

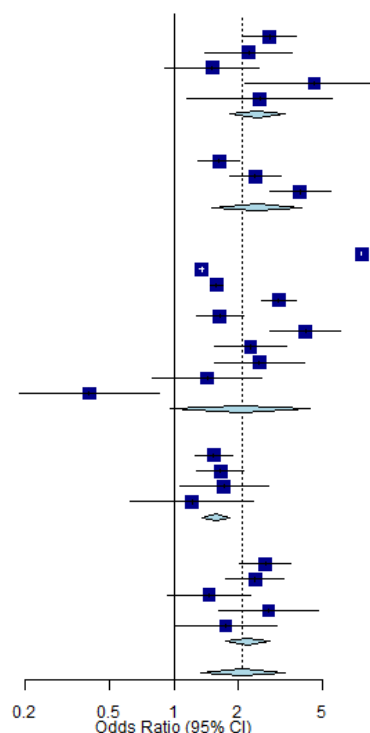


Supplementary Materials S10 - Forest plot of adjusted association between vision impairment and depression



Supplementary Materials S11 - Forest plot of unadjusted association between VI and depression by depression diagnostic tool

Source	OR (95% CI)
depression = CESD	
Armstrong 2016 period 1	2.82 [2.11; 3.77]
Van Nispen 2015	2.25 [1.41; 3.61]
Lee 2000b	1.51 [0.91; 2.52]
Rovner 1998	4.55 [2.16; 9.60]
Hirai 2012	2.53 [1.15; 5.57]
Random effects model	2.47 [1.82; 3.35]
Heterogeneity: $\chi^2 = 7.07$ ($P = .13$), $I^2 = 43\%$	
depression = PHQ	
Zang 2013	1.63 [1.31; 2.04]
Armstrong 2016 period 2	2.41 [1.82; 3.20]
Schuster 2018 low VI	3.90 [2.81; 5.42]
Random effects model	2.46 [1.51; 4.01]
Heterogeneity: $\chi^2 = 18.92$ ($P < .001$), $I^2 = 89\%$	
depression = other	
Hamedani 2019	7.59 [7.55; 7.64]
Guthrie 2016	1.35 [1.33; 1.38]
Court 2014	1.59 [1.48; 1.70]
Park 2015	3.10 [2.56; 3.75]
Garin 2014	1.64 [1.27; 2.12]
Biddulph 2014	4.15 [2.83; 6.08]
Carabellese 1993	2.29 [1.55; 3.39]
Bernabei 2011	2.51 [1.55; 4.08]
Lupsakko 2002	1.44 [0.80; 2.59]
Lyness 2009	0.40 [0.19; 0.85]
Random effects model	2.05 [0.96; 4.36]
Heterogeneity: $\chi^2 = 30364.28$ ($P < .001$), $I^2 = 100\%$	
depression = SR	
Crews 2017 - survey 2012-2014	1.54 [1.26; 1.88]
Capella 2005	1.65 [1.27; 2.14]
Cho 2015	1.72 [1.07; 2.77]
Karlsson 1998	1.21 [0.62; 2.37]
Random effects model	1.57 [1.36; 1.82]
Heterogeneity: $\chi^2 = 0.89$ ($P = .83$), $I^2 = 0\%$	
depression = GDS	
Evans 2007	2.69 [2.03; 3.56]
Harada 2008	2.41 [1.76; 3.30]
Rahman 2020	1.46 [0.94; 2.28]
Tsai 2003	2.78 [1.62; 4.78]
Cheluvraj 2016	1.75 [1.01; 3.03]
Random effects model	2.22 [1.76; 2.81]
Heterogeneity: $\chi^2 = 6.72$ ($P = .15$), $I^2 = 40\%$	
Random effects model	2.10 [1.33; 3.32]
Heterogeneity: $\chi^2_{26} = 31162.30$ ($P < .001$), $I^2 = 100\%$	



Supplementary Materials S12 - Forest plot of unadjusted association between VI and depression by age inclusion criteria

