



Supporting Information

Supplementary methods and results

This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.

Appendix to: McBride KE, Solomon MJ, Bannon PG, et al. Surgical outcomes for people with serious mental illness are poorer than for other patients: a systematic review and meta-analysis. *Med J Aust* 2021; doi: 10.5694/mja2.51009.

Table 1. Search strategy

EMBASE via Ovid (N=2578)	
1	schizophrenia.mp. or schizophrenia/
2	psychotic disorder.mp. or psychosis/
3	bipolar disorder.mp. or bipolar disorder/
4	personality disorder.mp. or personality disorder/
5	borderline.mp. or borderline state/
6	mood disorder.mp. or mood disorder/
7	major depression/ or severe depression.mp.
8	serious mental illness.mp.
9	"Schedule for Affective Disorders and Schizophrenia"/
10	severe anxiety.mp.
11	psychotic illness.mp.
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	surgery.mp. or surgery/
14	postoperative complication/
15	mortality/ or mortality.mp.
16	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word]
17	postoperative outcomes.mp.
18	post-operative outcome*.mp.
19	postoperative outcome*.mp.
20	surgical outcome*.mp.
21	14 or 15 or 16 or 17 or 18 or 19 or 20
22	12 and 13 and 21
23	limit 22 to human
MEDLINE via Ovid (N=646)	
1	SCHIZOPHRENIA/
2	Psychotic Disorders/
3	Bipolar Disorder/
4	Personality Disorders/
5	BORDERLINE PERSONALITY DISORDER/
6	Mood Disorders/
7	Depressive Disorder, Major/
8	serious mental illness.mp.
9	psychiatric illness.mp.
10	ANXIETY/ or ANXIETY DISORDERS/
11	severe mental illness.mp.

12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	Postoperative Complications/
14	MORTALITY/
15	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16	postoperative outcomes.mp.
17	post-operative outcome*.mp.
18	surgical outcome*.mp.
19	13 or 14 or 15 or 16 or 17 or 18
20	surgery.mp. or exp General Surgery/
21	Surgical Procedures, Operative/
22	20 or 21
23	12 and 19 and 22
24	Limit 23 to human
PsycINFO via Ovid (N=510)	
1	exp SCHIZOPHRENIA/
2	exp Psychosis/
3	exp Bipolar Disorder/
4	exp Personality Disorders/
5	borderline personality disorder/
6	exp Affective Disorders/
7	exp Major Depression/
8	serious mental illness.mp.
9	psychiatric illness.mp.
10	exp ANXIETY DISORDERS/ or exp ANXIETY/
11	severe mental disorder.mp.
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	surgery.mp. or exp SURGERY/
14	exp Postsurgical Complications/ or postoperative complication.mp.
15	mortality.mp. or exp "Death and Dying"/
16	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
17	exp TREATMENT OUTCOMES/
18	(postoperative outcome\$ or post-operative outcome\$ or surgical outcome\$).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
19	14 or 15 or 16 or 17 or 18
20	12 and 13 and 19

Figure 1. Flow diagram of study selection

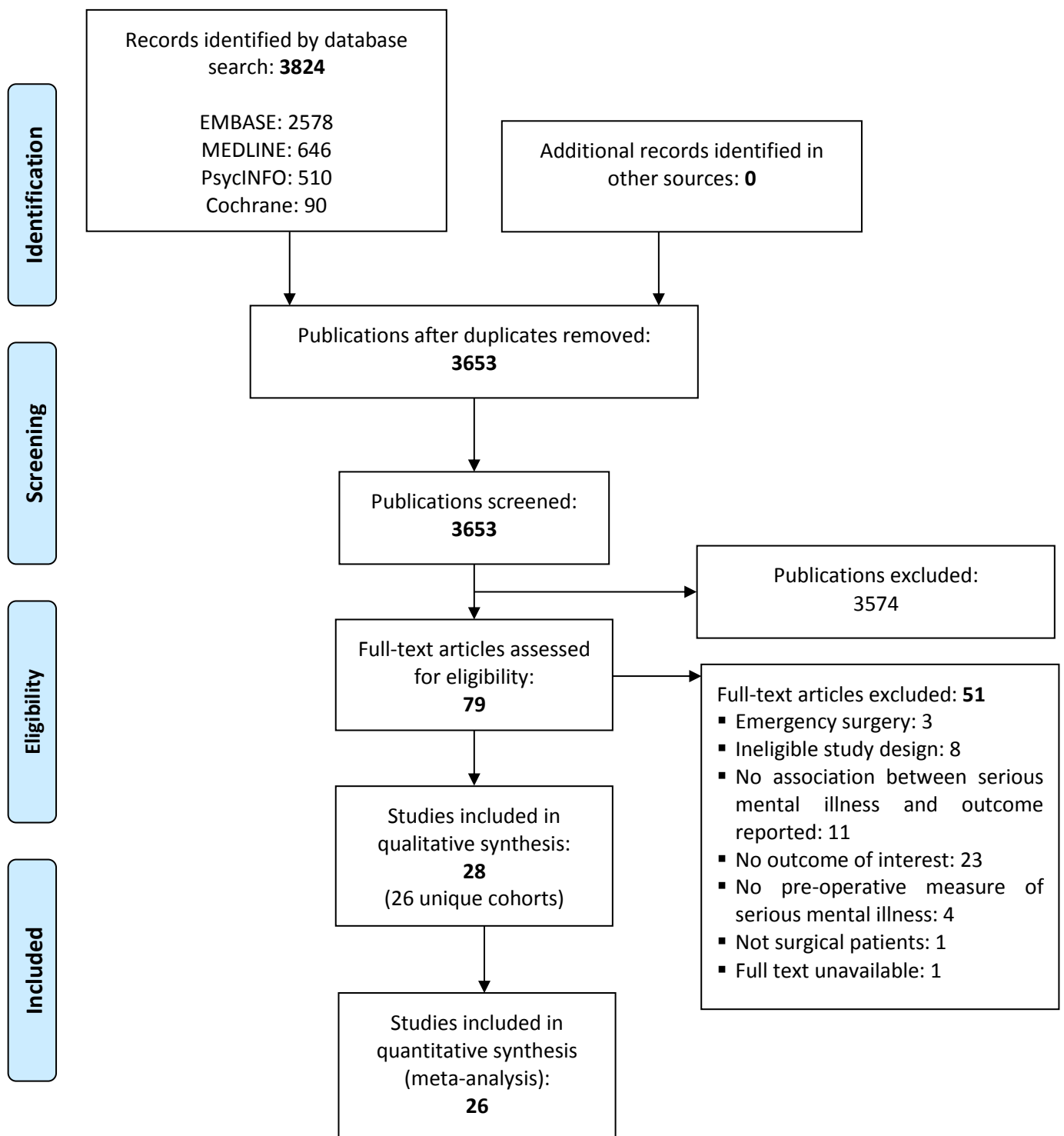


Table 2. Characteristics of the included studies

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Kudoh, 2000 ²⁷	Specialty: Orthopaedic Sample size: 75 Mean age (SD): NR Men: NR	Psychiatrist (objective)	Schizophrenia (50; 67%)	Complications	Blood loss (g)
				Pain	Visual analogue scale (VAS) pain scores
Aoyanagi, 2007 ¹⁹	Specialty: UGI/Colorectal Sample size: 568 Mean age (SD): 66.6 (11.3) Men: 284 (57%)	ICD-10 diagnosis codes (objective)	Any mental illness (86; 15%; schizophrenia; mood disorder; organic mental disorder; neurotic disorder; mental retardation; disorders due to psychoactive substance)	30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital
				Complications	Superficial site infection; pneumonia; bowel obstruction; anastomotic stricture; pulmonary embolism
Szekely, 2007 ³⁸	Specialty: Cardiothoracic Sample size: 180 Mean age (SD): 57.9 (10.1) Men: 119 (66%)	Spielberger State-Trait Anxiety Inventory state and trait scores; anxiety defined as STAI>45 (subjective)	Anxiety (76; 42%)	Complications	Postoperative MI; CHF; infection; arrhythmia
				ICU stay	Duration of days in ICU
				In-hospital mortality	Death due to cardiovascular events (angina, congestive heart failure, MI, percutaneous coronary angioplasty, survived cardiac arrest, and death due to cardiac causes)
				LOS	Days in hospital
Hashimoto, 2009 ²⁵	Specialty: Colorectal Sample size: 83 Mean age (SD): 70.7 (2.4) Men: 46 (55%)	Medical records review (objective)	Any mental illness (27; 33%) Schizophrenia (11; 41%) Depression (7; 26%)	Complications	complications; ileus; anastomotic stricture; surgical site infection; pneumonia; anastomotic failure; blood loss (mL)
				Adverse Event	Included physical restraint and resistant behaviour
				30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Abrams, 2010 ¹⁷	Specialty: Mixed Sample size: 35539 Mean age (SD): 65.0 (10.8) Men: 34402 (96.8%)	ICD-9 (objective)	Any mental illness (8922; 25.1%) Depression (5500; 15.5%) PTSD (2913; 8.2%) Anxiety (2473; 7.0%) Bipolar disorder (793; 2.2%) Psychosis (621; 1.8%)	In-hospital mortality	In hospital death
				30-day mortality	Death within 30 days of surgery
Torer, 2010 ³⁹	Specialty: Breast Sample size: 49 Median age (range): 51 (36–80) Men: 0	Hospital Anxiety and Depression Scale (HADS); anxiety defined as HADS > 11, depression as HADS depression score > 8 (subjective) Beck's Depression Inventory (BDI); depression defined as BDI > 17 (subjective)	Depression: BDI, 5/24 (21%); HADS, 20/47 (43%) Anxiety: HADS, 10/47 (21%)	Pain	Visual analogue scale (VAS) pain scores
				LOS	Days in hospital
Chaichana, 2011 ²¹	Specialty: Orthopaedic Sample size: 67 Mean age (SD): 41.0 (10.0) Men: 42 (63%)	Zung self-rating depression scale (subjective)	Depression: 7 (10%)	LOS	Days in hospital
		Modified somatic perception questionnaire (subjective)	Somatization: 12 (18%)		
Navarro-Garcia, 2011 ³⁵	Specialty: Cardiothoracic Sample size: 100 Mean age (range): 65 (25–83) Men: 72 (72%)	Hospital Anxiety and Depression Scale (HADS) (subjective)	Anxiety: 32 (32%) Depression: 19 (19%)	In-hospital mortality	Mortality prior to hospital discharge.
				Pain	Verbal numeric rating scale (VNRS)

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Fox, 2013 ²⁴	Specialty: Breast Sample size: 40202 Mean age (SD): NR Men: 0	ICD-9 (objective)	Any Mental Illness (1563; 3.9%; Including: major depression, generalized anxiety disorder, adjustment disorder, panic disorder, or PTSD)	Complications	Any of the following: in-hospital mortality; mechanical wound; infectious; urinary; pulmonary; gastrointestinal; cardiovascular; and intraoperative complications
				Cost	AHRQ cost-to-charge ratio file was used to convert charges to direct cost of care
				LOS	Prolonged LOS (LOS > 3 days)
Liao, 2013 ²⁹	Specialty: Mixed Sample size: 44835 Mean age (SD): 47.4 (15.9) Men: 23515 (52.4%)	ICD-9 (objective)	Schizophrenia (8967; 20%)	Complications	Complications; stroke; postop bleeding; pneumonia; septicemia; deep wound infection; acute MI; acute renal failure; pulmonary embolism
				ICU stay	Number and percentage of patients admitted to ICU
				Cost	Mean in-hospital medical expenditure
				LOS	Days in hospital
				30-day mortality	Death within 30 days of surgery
Maeda, 2014 ³¹	Specialty: Mixed Sample size: 5569 Median age (IQR): 57.0 (34.0) Men: 2435 (43.7%)	ICD-10 (objective)	Any mental illness (250; 4.5%) Schizophrenia (104, 1.9%) Mood disorder (69; 1.2%) Neurotic disorder (97; 1.7%)	Complications	Post-procedure complications
				In-hospital mortality	In-hospital death
				Cost	Total hospital cost billed at discharge, incl. physician fees, instrument costs, laboratory or imaging test costs, administration costs
				LOS	Days in hospital
Menendez, 2014 ³²	Specialty: Orthopaedic Sample size: 5339284 Mean age (SD): 54.0 (15.0) Men: 2691171 (50.0%)	ICD-9 (objective)	Depression (242205; 4.5%) Anxiety (134559; 2.5%) Schizophrenia (10765; 0.2%)	Complications	Blood transfusion
				Non-routine discharge	Discharge to a rehabilitation facility
				LOS	Days in hospital
				In-hospital mortality	In hospital death

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Mitchell, 2014 ³³	Specialty: Bariatric Sample size: 2146 Median (IQR): 46.0 (37 to 54) Men: 461 (21.5%)	Beck's Depression Inventory (BDI) (subjective)	Depression (708; 33%)	Complications	Any of the following: death; DVT or venous thromboembolism; reintervention using percutaneous, endoscopic, or operative techniques; or failure to be discharged from the hospital within 30 days of surgery
Poole, 2014 ³⁶	Specialty: Cardiothoracic Sample size: 310 Mean age (SD): 67.8 (9.2) Men: 264 (85.2%)	Beck's Depression Inventory (BDI) (subjective)	Depression (84; 30.3%)	LOS	Days in hospital
Radinovic, 2014 ³⁷	Specialty: Orthopaedic Sample size: 129 Mean age (SD): 76.6 (8.5) Men: 34 (26%)	Geriatric Depression Scale (subjective)	Depression (30; 23.2%)	30-day mortality	Death within 30 days of operation
				LOS	Days in hospital
				Complications	Hospital-acquired complications (UTI, diarrhoea, pulmonary embolism, DVT); re-intervention (cases in which further surgery and anaesthesia were needed)
Wimalawansa, 2014 ⁴²	Specialty: Plastics Sample size: 116597 Mean age (SD): 49.5 (16.7) Men: 17839 (15.3%)	ICD-9 (objective)	Any mental illness (4521; 3.9%; Including: anxiety disorder; multiple diagnoses; major depressive disorder; bipolar disorder	30-day readmission	Any hospital admission or emergency department visit without subsequent admission within 30 days post-operatively.
Copeland, 2015 ²²	Specialty: Mixed Sample size: 321131 Mean age (SD): 63.7 (12.2) Men: 305511 (95%)	ICD-9 (objective)	Schizophrenia (7155; 2.2%) Bipolar disorder (6795; 2.1%) PTSD (23178; 7.2%) Depression (8269; 2.6%)	Complications	Myocardial infarct; thromboembolytic events; pneumonia; respiratory failure; sepsis; wound infections
				Readmission within 30-days	Readmission within 30 days of discharge
				30-day mortality	Death within 30 days of surgery

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Floyd, 2015 ²³	Specialty: Orthopaedic Sample size: 256 Mean age (SD): 58.0 (10.7) Men: 129 (42.0%)	Medical records review (objective)	Anxiety (32; 8%)	LOS	Days in hospital
Ward, 2015 ⁴⁰	Specialty: Mixed Sample size: 1846 Mean age (SD): 52.7 (15.8) Men: 827 (44.4%)	Antidepressant use (objective)	Depression (380; 20.6%);	Complications	Return to operating room; infection (SSI, sepsis/shock, UTI, pneumonia); wound occurrence (superficial; deep; organ; space SSI; dehiscence); cardiac arrest (acute MI; CVA with deficit)
		Anxiolytic use (objective)	Anxiety (288; 15.6%)	LOS	Days in hospital
				30-day mortality	All-cause mortality
Wieghard, 2015 ⁴¹	Specialty: Colorectal Sample size: 23890 Mean age (SD): 63.4 (13.1) Men: 14134 (59.2%)	ICD-9 (objective)	Any mental illness (4862; 20.3%; Including: anxiety disorders; mood disorders: schizophrenia and other psychotic disorders; substance misuse	Complications	Any post-op complications; anastomotic leak; wound infection; intra-abdominal abscess; infected seroma; wound dehiscence; UTI; pneumonia; DVT; myocardial infarction
				LOS	Days in hospital
				Non-routine discharge	Routine discharge defined as discharge to home or self-care
				Discharge destination	Discharge disposition including home/self-care, home health care or transfer/other
Adogwa, 2016 ¹⁸	Specialty: Orthopaedic Sample size: 400 Mean age (SD): 57.3 (13.6) Men: 36/108 (33%)	Psychiatrist (objective)	Depression (29; 27%)	Readmission within 30-days	Unplanned readmissions within 30 days of discharge
				Complications	UTI; pneumonia; deep site infection; superficial site infection; other infection; DVT; pulmonary embolism; myocardial infarction
				LOS	Days in hospital

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Lee, 2016 ²⁸	Specialty: Mixed Sample size: 183 Mean age (SD): 61.3 (2.2) Men: 180 (98.4%)	Self-reported/medical records review (objective)	Any mental illness (76; 42%; including: depression; anxiety; PTSD)	Complications	Overall complications; surgical site infection; UTI; bleeding (>4U); wound classification
				30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital
				Readmission within 30 days	Readmission within 30 days of discharge
Mousavi, 2016 ³⁴	Specialty: Vascular Sample size: 21 Mean age (SD): 25.0 (4.8) Men: 3 (14%)	Self-reported/medical records review (objective)	Any mental illness (14; 67%; including: depression; anxiety)	Complications	Cerebral spinal fluid leak; meningitis; wound infection; stroke; other
Britteon, 2017 ²⁰	Specialty: Mixed Sample size: 176827 Mean age (SD): NR Men: NR	EQ-5D questionnaire/ICD-10 (objective)	Depression (2,842; 1.6%)	Complications	Wound; bleeding; urinary complications
Hassidim, 2017 ²⁶	Specialty: Upper gastrointestinal tract Sample size: 260 Mean age (SD): 52.0 (15.5) Men: 101 (39%)	ICD-9 (objective)	Any mental illness (52; 20%; including: schizophrenia; psychosis; drug dependence; Tourette syndrome; panic disorder; depressive disorder; bipolar disorder; obsessive compulsive disorder; alcohol dependence/misuse; anxiety)	Complications	Respiratory; infection; surgical wound; cardiovascular; other complications (intraoperative or postoperative unexpected outcomes, which affected hospitalization duration or led to recurrent emergency department visit within 30 days after surgery); intra-operative or post-operative complication
				LOS	Days in hospital

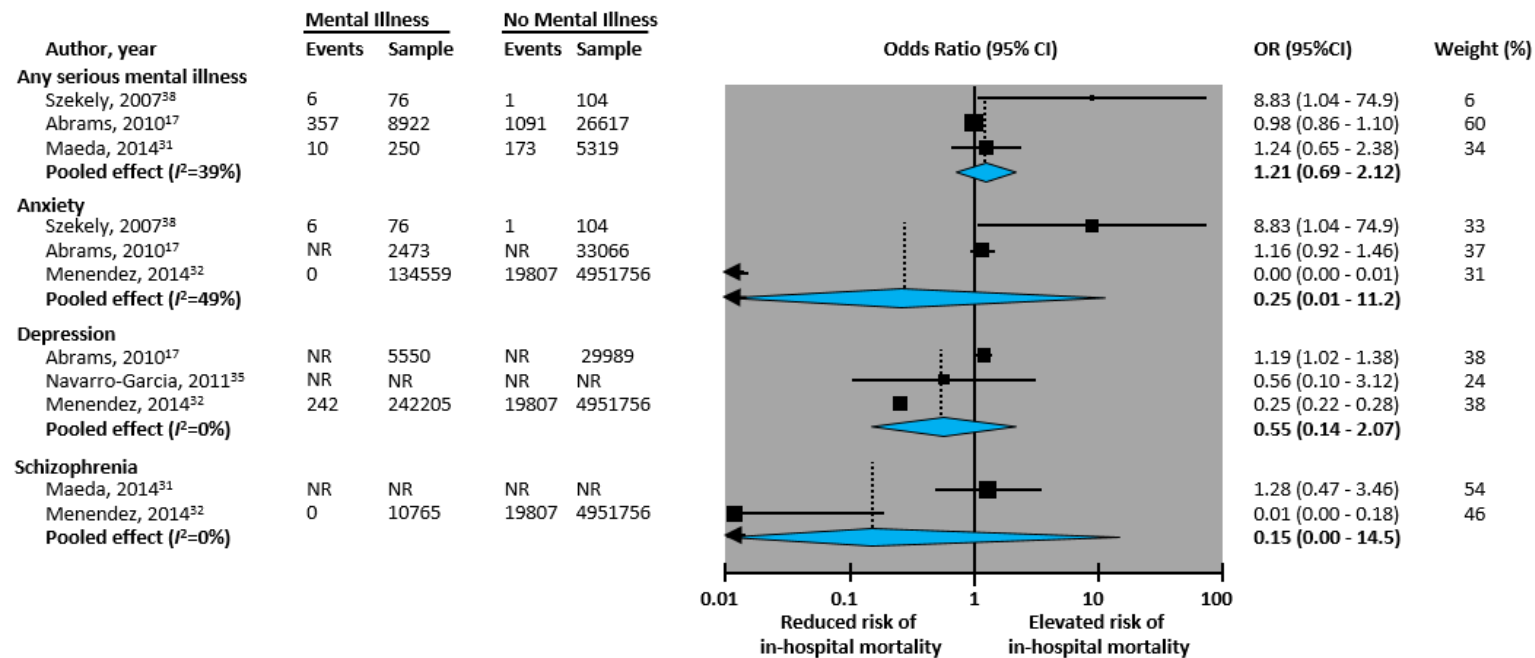
Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Litz, 2018 ³⁰	Specialty: Bariatric Sample size: 19259 Mean age (SD): 45.0 (NR) Men: 4334 (22.5%)	ICD-9 Diagnosis codes (Objective)	Any mental illness (7498; 38.9%; Including: major depressive disorder/bipolar disorder, minor affective disorder, anxiety, personality disorder, schizophrenia, organic brain disorder/Alzheimer, other psychosis, substance misuse-related mental health disorder, posttraumatic stress disorder)	Re-admission within 30 days	Re-admission within 30 days of discharge from the initial hospital stay
				LOS	Days in hospital

AHRQ = Agency for Healthcare Research and Quality; CHF = chronic heart failure; CVA = cerebrovascular accident; DVT = deep vein thrombosis; ICD = International Classification of Diseases; ICU = intensive care unit; IQR = interquartile range; LOS = length of stay; MI = myocardial infarction; NR = not reported; PTSD = post-traumatic stress disorder; SD = standard deviation; SSI = superficial site infection; UTI = urinary tract infection.

Table 3. Risk of bias assessment using the Quality in Prognosis Studies tool

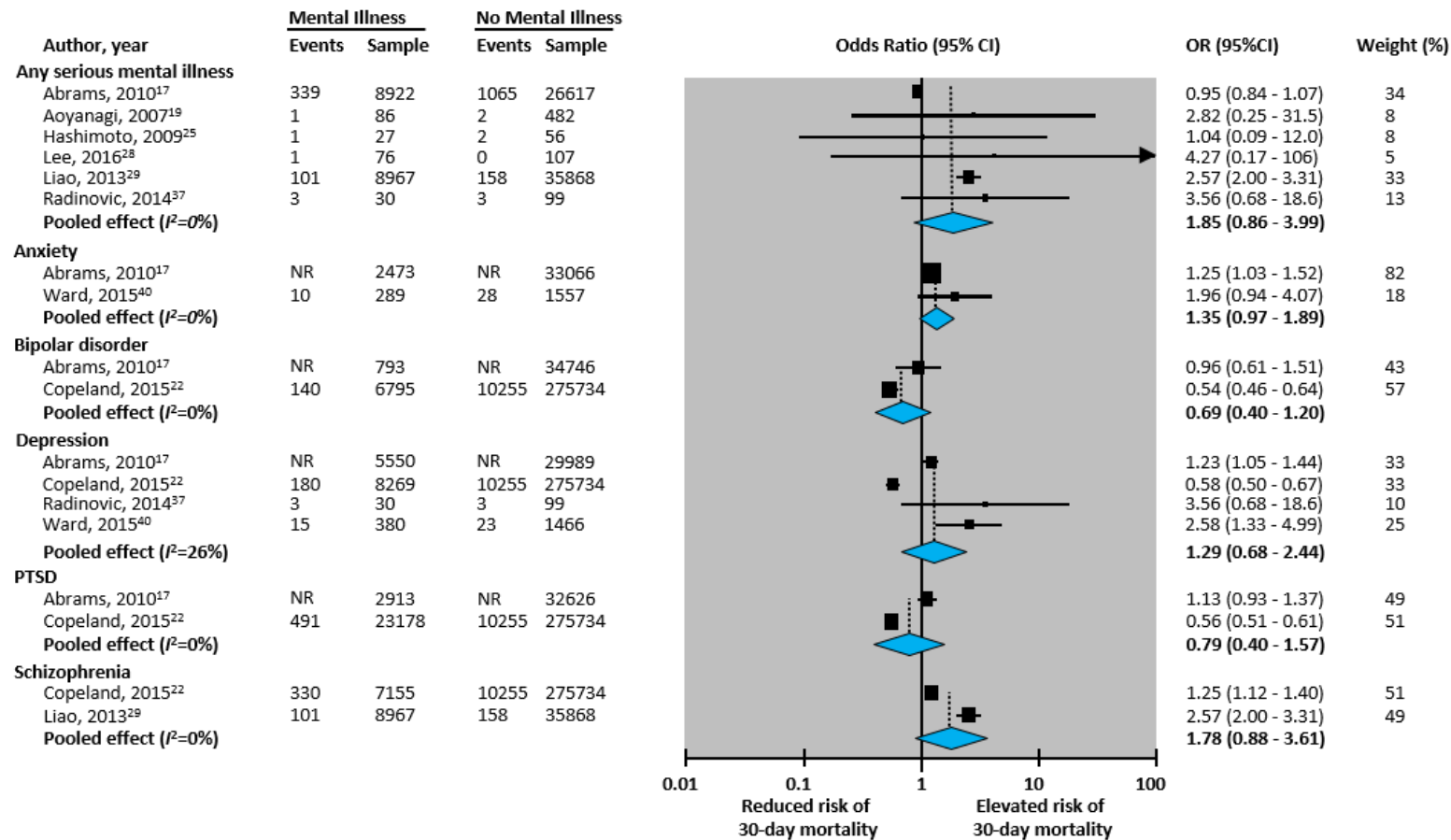
Study, year	Study participation	Study attrition	Prognostic factor measurement	Outcome measurement	Study confounding	Statistical analysis and reporting
Kudoh, 2000 ²⁷	Moderate	Low	Low	Low	High	High
Aoyanagi, 2007 ¹⁹	High	Low	Low	Moderate	Moderate	High
Szekely, 2007 ³⁸	Low	Low	Low	Low	Low	Low
Hashimoto, 2009 ²⁵	Low	Low	Low	Low	Low	Low
Abrams, 2010 ¹⁷	Moderate	Low	Low	Low	Low	Low
Torer, 2010 ³⁹	Low	High	Mod	Low	High	High
Chaichana, 2011 ²¹	Moderate	Low	Low	Low	Low	Low
Navarro-Garcia, 2011 ³⁵	Low	Low	Low	Low	High	Moderate
Fox, 2013 ²⁴	Moderate	Low	Low	Low	Low	Low
Liao, 2013 ²⁹	Low	Low	Low	Low	Low	Low
Maeda, 2014 ³¹	Low	Low	Low	Low	Low	Low
Menendez, 2014 ³²	Low	Low	Low	Low	Low	Low
Mitchell, 2014 ³³	Moderate	Low	Low	Low	Low	Low
Poole, 2014 ³⁶	Low	Low	Low	Low	Low	Low
Radinovic, 2014 ³⁷	Low	Low	Low	Low	Low	Low
Wimalawansa, 2014 ⁴²	Moderate	Low	Low	Low	Low	Low
Copeland, 2015 ²²	Moderate	Low	Low	Low	Low	Low
Floyd, 2015 ²³	Moderate	Low	Moderate	Moderate	Moderate	Moderate
Ward, 2015 ⁴⁰	Low	Low	Low	Low	Low	Low
Wieghead, 2015 ⁴¹	Low	Low	Low	Low	Low	Low
Adogwa, 2016 ¹⁸	High	Low	Low	Moderate	Low	Moderate
Lee, 2016 ²⁸	High	Low	Low	Low	Low	Low
Mousavi, 2016 ³⁴	Low	High	High	High	High	High
Britteon, 2017 ²⁰	Low	Low	Low	Low	Low	Moderate
Hassidim, 2017 ²⁶	Low	Low	Low	Low	Low	Moderate
Litz, 2018 ³⁰	Low	Low	Low	Low	Low	Low

Figure 2. Meta-analyses of the association between pre-operative serious mental illness diagnosis and in-hospital mortality



CI = confidence interval; NR = not reported; OR = odds ratio. OR >1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

Figure 3. Meta-analyses of the association between pre-operative serious mental illness diagnosis and 30-day post-operative mortality



CI = confidence interval; NR = not reported; OR = odds ratio; PTSD = post-traumatic stress disorder. OR > 1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

Table 4. Association between pre-operative serious mental illness and post-operative outcome measures

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<i>Any serious mental illness v No serious mental illness</i>			
<i>Post-operative complications</i>			
Torer, 2010 ³⁹	Breast	Pain at 8 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 16.8 (5.50 - 28.1)
Torer, 2010 ³⁹	Breast	Pain at 24 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 21.6 (7.90 - 35.3)
Hashimoto, 2009 ²⁵	Colorectal	Ileus v No ileus	OR, 1.63 (0.34 -7.84)
Hashimoto, 2009 ²⁵	Colorectal	Blood loss (ml)	MD, -218 (-274 to -172)
Hashimoto, 2009 ²⁵	Colorectal	Anastomotic failure v No anastomotic failure	OR, 1.04 (0.18 - 6.06)
Wieghard, 2015 ⁴¹	Colorectal	Anastomotic leak v No anastomotic leak	OR, 0.91 (0.83 - 1.01)
Wieghard, 2015 ⁴¹	Colorectal	Intra-abdominal abscess v No intra-abdominal abscess	OR, 1.01 (0.73 - 1.38)
Wieghard, 2015 ⁴¹	Colorectal	Deep venous thrombosis v No deep venous thrombosis	OR, 1.00 (0.73 - 1.38)
Wieghard, 2015 ⁴¹	Rectal	Wound dehiscence v No wound dehiscence	OR, 2.01 (1.57 - 2.57)
Hassidim, 2017 ²⁶	UGI	Pulmonary complication v No pulmonary complication	OR, 12.7 (1.29 - 124)
Mousavi, 2016 ³⁴	Vascular	Cerebral spinal fluid leak v No cerebral spinal fluid leak	OR, 1.00 (0.07 - 13.4)
Mousavi, 2016 ³⁴	Vascular	Major side effects v No major side effects	OR, 22.0 (1.86 - 261)
Mousavi, 2016 ³⁴	Vascular	Meningitis v No meningitis	OR, 3.00 (0.13 - 71.3)
Mousavi, 2016 ³⁴	Vascular	Minor side effects v No minor side effects	OR, 0.19 (0.01 - 2.62)
Mousavi, 2016 ³⁴	Vascular	Side effects v No side effects	OR, 8.00 (0.96 - 66.4)
Lee, 2016 ²⁸	Mixed	Bleeding (>4 units) v Bleeding (≤4 units)	OR, 4.27 (0.17 - 107)
Aoyanagi, 2007 ¹⁹	Mixed	Bowel obstruction v No bowel obstruction	OR, 0.71 (0.24 - 2.06)
Aoyanagi, 2007 ¹⁹	Mixed	Space/organ Wound infection v No Space/organ wound infection	OR, 1.12 (0.57 - 2.18)
Aoyanagi, 2007 ¹⁹	Mixed	Superficial/ deep Wound infection v No Superficial/ deep wound infection	OR, 0.86 (0.19 - 3.88)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Length of stay			
Litz, 2018 ³⁰	Bariatric	Length of hospital stay	Patients with serious mental illness did not have a longer LOS (P=0.92)
Wieghard, 2015 ⁴¹	Plastics	Length of hospital stay	No difference in LOS (P=0.07)
Maeda, 2014 ³¹	Mixed	Length of hospital stay	Patients with serious mental illness stayed longer in hospital (P<0.001)
Discharge			
Wieghard, 2015 ⁴¹	Plastics	Non-routine discharge v Routine discharge	OR, 1.13 (1.06 - 1.20)
Wieghard, 2015 ⁴¹	Plastics	Discharge to home health care v No discharge to home health care	OR, 0.88 (0.83 - 0.94)
Wieghard, 2015 ⁴¹	Plastics	Transfer to another facility/other v No transfer to another facility/other	OR, 1.00 (0.91 - 1.01)
Adverse event			
Hashimoto, 2009 ²⁵	Colorectal	Physical restraint v No physical restraint	OR, 5.60 (1.87 - 16.8)
Hashimoto, 2009 ²⁵	Colorectal	Resistant behaviour v No resistant behaviour	OR, 11.0 (3.35 - 36.1)
Anxiety v No anxiety			
Mortality			
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	In-hospital mortality v No in-hospital mortality	Anxiety was not associated with in-hospital mortality (p=0.06)
Post-operative complications			
Torer, 2010 ³⁹	Breast	Pain at 8 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 18.0 (5.90 - 30.1)
Torer, 2010 ³⁹	Breast	Pain at 48 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 0.80 (-0.10 to 1.70)
Szekely, 2007 ³⁸	Cardiothoracic	Arrhythmia v No Arrhythmia	OR, 0.53 (0.24 - 1.17)
Szekely, 2007 ³⁸	Cardiothoracic	Cardiopulmonary complication v No Cardiopulmonary complication	OR, 1.00 (0.46 - 2.33)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at 4 hours postoperative (scoring: 0 to 10, 10=worst pain)	MD, 2.00 (0.90 - 3.10)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at 12 hours postoperative (scoring: 0 to 10, 10=worst pain)	MD, 1.00 (-0.30 to 2.30)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at discharge from Intensive care unit (scoring: 0 to 10, 10=worst pain)	MD, 1.90 (0.60 - 3.20)
Menendez, 2014 ³²	Orthopaedic	Anemia v No anemia	OR, 0.70 (0.69 - 0.72)
Menendez, 2014 ³²	Orthopaedic	Acute renal failure v No acute renal failure	OR, 0.33 (0.28 - 0.40)
Menendez, 2014 ³²	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.58 (2.53 - 2.64)
Menendez, 2014 ³²	Orthopaedic	Complication v No complication	OR, 1.00 (0.98 - 1.02)
Menendez, 2014 ³²	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 1.25 (1.16 - 1.35)
Menendez, 2014 ³²	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.17 (0.14 - 0.20)
Menendez, 2014 ³²	Orthopaedic	Pneumonia v No Pneumonia	OR, 0.10 (0.08 - 0.12)
Menendez, 2014 ³²	Orthopaedic	Pulmonary embolism v No Pulmonary embolism	OR, 3.01 (2.72 - 3.33)
Menendez, 2014 ³²	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 0.30 (0.28 - 0.33)
Ward, 2015 ⁴⁰	Mixed	Return to operating room v No return to operating room	OR, 12.2 (5.86 - 25.2)
Ward, 2015 ⁴⁰	Mixed	Major complication v No major complication	OR, 1.86 (1.38 - 2.52)
Length of stay			
Szekely, 2007 ³⁸	Cardiothoracic	Length of Intensive care unit stay (days)	No difference in stay (P=0.52)
Floyd, 2015 ²³	Orthopaedic	Length of hospital stay (days)	Patients with anxiety stayed in hospital 1.8 days longer (P=0.003)
Discharge			
Menendez, 2014 ³²	Orthopaedic	Non-routine discharge v Routine discharge	OR, 1.20 (1.20 - 1.20)
Depression v No depression			
Post-operative complications			
Torer, 2010 ³⁹	Breast	Pain at 8 hours post-operative (scoring: 0 to 100, 100=worst pain) ^a	MD, 36.1 (15.5 - 56.7)
Torer, 2010 ³⁹	Breast	Pain at 8 hours post-operative (scoring: 0 to 100, 100=worst pain) ^b	MD, 13.8 (3.50 - 24.1)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at 4 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 12.0 (-4.00 to 28.0)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at 12 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 3.00 (-13.0 to 19.0)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at 48 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 2.00 (-11.0 to 15.0)
Navarro-Garcia, 2011 ³⁵	Cardiothoracic	Pain at discharge from intensive care unit (scoring: 0 to 100, 100=worst pain)	MD, 2.00 (-16.0 to 20.0)
Hashimoto, 2009 ²⁵	Colorectal	Wound infection v No wound infection	OR, 2.05 (0.41 - 10.3)
Adogwa, 2016 ¹⁸	Orthopaedic	Other infection v No other infection	OR, 1.89 (0.41 - 8.74)
Adogwa, 2016 ¹⁸	Orthopaedic	Deep wound infection v No deep wound infection	OR, 0.72 (0.04 - 12.9)
Adogwa, 2016 ¹⁸	Orthopaedic	Superficial wound infection v No superficial wound infection	OR, 1.13 (0.06 - 20.9)
Menendez, 2014 ³²	Orthopaedic	Anemia v No anemia	OR, 0.65 (0.64 - 0.67)
Menendez, 2014 ³²	Orthopaedic	Acute renal failure v No acute renal failure	OR, 2.01 (1.90 - 2.12)
Menendez, 2014 ³²	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.75 (2.71 - 2.79)
Menendez, 2014 ³²	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 0.38 (0.36 - 0.40)
Menendez, 2014 ³²	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.67 (0.62 - 0.71)
Menendez, 2014 ³²	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 0.75 (0.70 - 0.81)
Menendez, 2014 ³²	Orthopaedic	Pulmonary embolism v No Pulmonary embolism	OR, 6.00 (5.69 - 6.39)
Radinovic, 2014 ³⁷	Orthopaedic	Reintervention v No reintervention	OR, 0.64 (0.03 - 13.7)
Ward, 2015 ⁴⁰	Mixed	Cardiopulmonary complication v No Cardiopulmonary complication	OR, 5.90 (2.41 - 14.6)
Ward, 2015 ⁴⁰	Mixed	Infection v No infection	OR, 1.62 (1.16 - 2.26)
Ward, 2015 ⁴⁰	Mixed	Return to operating room v No return to operating room	OR, 1.13 (0.67 - 1.92)
Ward, 2015 ⁴⁰	Mixed	Major complication v No major complication	OR, 1.28 (0.96 - 1.72)
Discharge			
Menendez, 2014 ³²	Orthopaedic	Non-routine discharge v Routine discharge	OR, 1.40 (1.30 - 1.40)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Schizophrenia v No schizophrenia			
Post-operative complications			
Hashimoto, 2009 ²⁵	Colorectal	Wound infection v No wound infection	OR, 3.28 (0.87 - 12.4)
Hashimoto, 2009 ²⁵	Colorectal	Ileus v No ileus	OR, 4.88 (0.92 - 25.9)
Kudoh, 2000 ²⁷	Orthopaedics	Pain at 2 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, -10.5 (-18.0 to -3.00)
Kudoh, 2000 ²⁷	Orthopaedics	Pain at 5 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, -14.0 (-21.0 to -6.00)
Kudoh, 2000 ²⁷	Orthopaedics	Pain at 24 hours postoperative (scoring: 0 to 100, 100=worst pain)	No difference between groups
Kudoh, 2000 ²⁷	Orthopaedics	Pain at 5 days postoperative (scoring: 0 to 100, 100=worst pain)	No difference between groups
Kudoh, 2000 ²⁷	Orthopaedic	Blood loss (g)	MD, 12.5 (9.00 - 16.0)
Menendez, 2014 ³²	Orthopaedic	Anemia v No anemia	OR, 0.11 (0.09 - 0.14)
Menendez, 2014 ³²	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.17 (2.01 - 2.34)
Menendez, 2014 ³²	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 8.76 (7.89 - 9.74)
Menendez, 2014 ³²	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.01 (0.00 - 0.12)
Menendez, 2014 ³²	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 2.51 (2.25 - 2.79)
Menendez, 2014 ³²	Orthopaedic	Wound complication v No wound complication	OR, 8.64 (8.16 - 9.14)
Copeland, 2015 ²²	Mixed	30-day readmission v No 30-day readmission	OR, 1.40 (1.31 - 1.49)
Liao, 2013 ²⁹	Mixed	Septicemia v No septicemia	OR, 2.79 (2.05 - 3.80)
Liao, 2013 ²⁹	Mixed	Bleeding v No bleeding	OR, 1.35 (1.11 - 1.63)
Liao, 2013 ²⁹	Mixed	Deep wound infection v No deep wound infection	OR, 1.21 (0.78 - 1.88)
Liao, 2013 ²⁹	Mixed	Stroke v No stroke	OR, 1.42 (1.22 - 1.65)
Liao, 2013 ²⁹	Mixed	Intensive care Unit visit v No intensive care unit visit	OR, 1.65 (1.54 - 1.76)
Discharge			
Menendez, 2014 ³²	Orthopaedic	Non-routine discharge v Routine discharge	OR, 4.30 (4.00 - 4.60)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Cost			
Maeda, 2014 ³¹	Mixed	Total cost	Total cost was significantly higher for those with schizophrenia (P<0.001)
Bipolar disorder v No bipolar disorder			
Mortality			
Abrams, 2010 ¹⁷	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.79 (0.51 - 1.23)
Post-operative complications			
Copeland, 2015 ²²	Mixed	Complication v No complication	OR, 0.93 (0.85 - 1.02)
Re-admission			
Copeland, 2015 ²²	Mixed	30-day readmission v No 30-day readmission	OR, 1.14 (1.06 - 1.22)
PTSD v No PTSD			
Mortality			
Abrams, 2010 ¹⁷	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.99 (0.80 - 1.23)
Post-operative complications			
Copeland, 2015 ²²	Mixed	Complication v No complication	OR, 0.88 (0.84 - 0.93)
Re-admission			
Copeland, 2015 ²²	Mixed	30-day readmission v No 30-day readmission	OR, 0.91 (0.87 - 0.95)
Psychosis v No psychosis			
Mortality			
Abrams, 2010 ¹⁷	Mixed	In-hospital mortality v No in-hospital mortality	OR, 1.45 (0.95 - 2.21)
Abrams, 2010 ¹⁷	Mixed	30-day mortality v No 30-day mortality	OR, 1.12 (0.68 - 1.84)

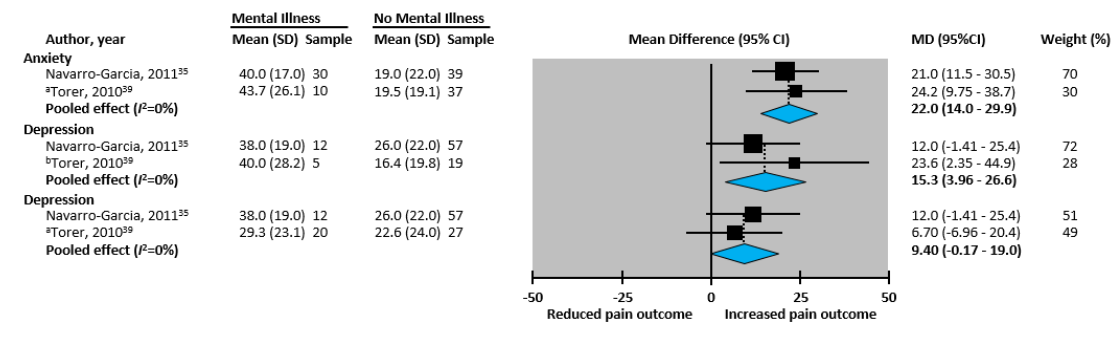
Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Neurotic disorders v No neurotic disorder			
Mortality			
Maeda, 2014 ³¹	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.74 (0.22 - 2.47)
Post-operative complications			
Maeda, 2014 ³¹	Mixed	Complication v No complication	OR, 0.15 (0.02 - 1.07)
Cost			
Maeda, 2014 ³¹	Mixed	Total cost	Total cost was significantly lower for those with neurotic disorders (P=0.014)
Mood disorders v No mood disorder			
Mortality			
Maeda, 2014 ³¹	Mixed	In-hospital mortality v No in-hospital mortality	OR, 1.21 (0.35 - 4.17)
Post-operative complications			
Maeda, 2014 ³¹	Mixed	Complication v No complication	OR, 0.81 (0.24 - 2.67)
Cost			
Maeda, 2014 ³¹	Mixed	Total cost	Total cost was significantly higher for those with mood disorders (P=0.015)

CI = confidence interval; MD = mean difference; OR = odds ratio; PTSD = post-traumatic stress disorder.

a Depression defined as Beck's Depression Inventory (BDI) score > 17.

b Depression defined as Hospital Anxiety and Depression Scale (HADS) score > 8.

Figure 4. Meta-analyses of the association between pre-operative serious mental illness diagnosis and post-operative day 1 pain scores.



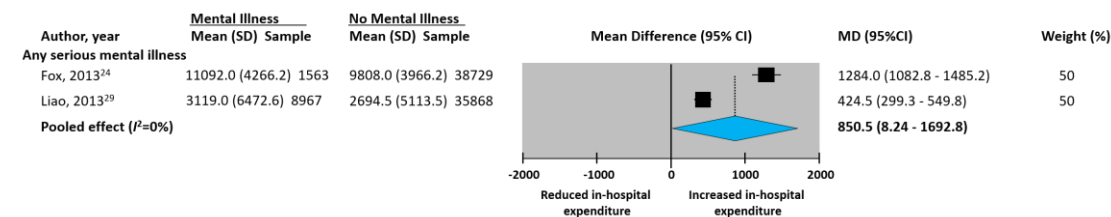
CI = confidence interval; MD = mean difference; SD=standard deviation.

Pain score ranges from 0 to 100 (100 = worst pain). MD > 0 indicates poorer outcome for patients with serious mental illness diagnosis.

a Hospital Anxiety and Depression Scale (HADS): scores range from 0 to 21; anxiety defined as scores > 11, depression as scores > 8.

b Beck's Depression Inventory (BDI): scores range from 0 to 63; depression was defined as scores >17.

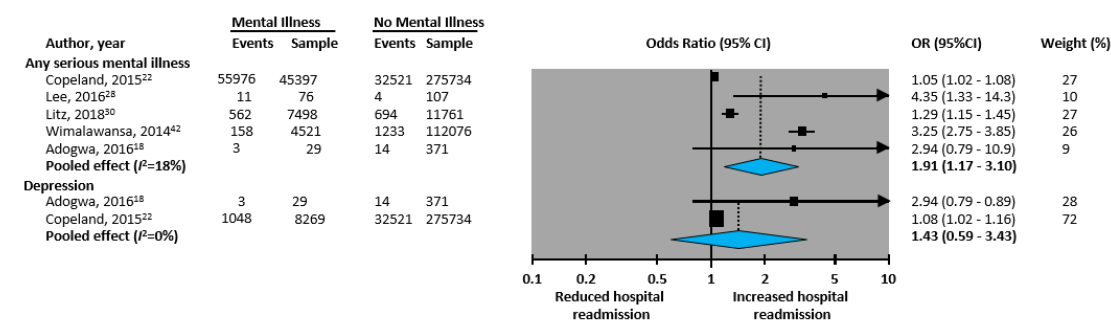
Figure 5. Meta-analyses of the association between pre-operative serious mental illness diagnosis and in-hospital medical expenditure in US dollars.



CI = confidence interval; MD = mean difference; SD=standard deviation.

MD > 0 indicates higher in-hospital expenditure for patients with serious mental illness diagnosis.

Figure 6. Meta-analyses of the association between pre-operative serious mental illness diagnosis and hospital re-admission



CI = confidence interval; OR = odds ratio.

OR > 1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

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