

## Search Strategy

### PubMed/MEDLINE from inception up to October 18<sup>th</sup>, 2017

((Physical activity[MESH] OR exercise OR sports OR leisure time) AND (Depression[MESH] OR Major depressive disorder[MESH] OR depressive disorder)) AND ((association OR follow-up OR risk factor OR protect\* OR prevent\* OR causal\* OR onset) OR (("Prospective Studies"[Mesh]) OR "Cohort Studies"[Mesh]) OR "Longitudinal Studies"[Mesh]))

Number of retrieved references=3371

### SPORTDiscus from inception up to October 18<sup>th</sup>, 2017

(physical activity or exercise or leisure time or sport\*) AND (depress\* or depression or major depression or major depressive disorder or depressive disorder) AND (prospective or longitudinal or cohort or association or risk or risk factor or protect\* or prevent\* or follow-up or onset)

Number of retrieved references=1590.

### EMBASE from inception up to October 18<sup>th</sup>, 2017

Search #1: (depress\$ or major depression or major depressive disorder or depressive disorder or unipolar depression).ti,ab

Search#2: (physical activity or exercise or leisure time or sport\$).ti,ab

Search#3: (prospective or follow-up or cohort or longitudinal or risk factor or prevent\$ or protect\$).ti,ab

Search#4: #1 and #2 and #3 and #4

Number of retrieved references=6919

## PsycINFO from inception to October 18<sup>th</sup>, 2017

Search #1: (depress\$ or major depression or major depressive disorder or depressive disorder or unipolar depression).ti,ab

Search#2: (physical activity or exercise or leisure time or sport\$).ti,ab

Search#3: (prospective or follow-up or cohort or longitudinal or risk factor or prevent\$ or protect\$).ti,ab

Search#4: #1 and #2 and #3

Number of retrieved references=1594

### Studies excluded in the full-text stage and reasons (items 1-12) and studies included in the meta-analyses (item 13)

#### 1) Cross-sectional studies:

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- France, C., Lee, C., & Powers, J. (2004). Correlates of depressive symptoms in a representative sample of young Australian women. *Australian Psychologist, 39*(3), 228-237.
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- Kantomaa, M. T., Tammelin, T. H., Ebeling, H. E., & Taanila, A. M. (2008). Emotional and behavioral problems in relation to physical activity in youth. *Med Sci Sports Exerc, 40*(10), 1749-1756.
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## 3) Included people with depression at baseline:

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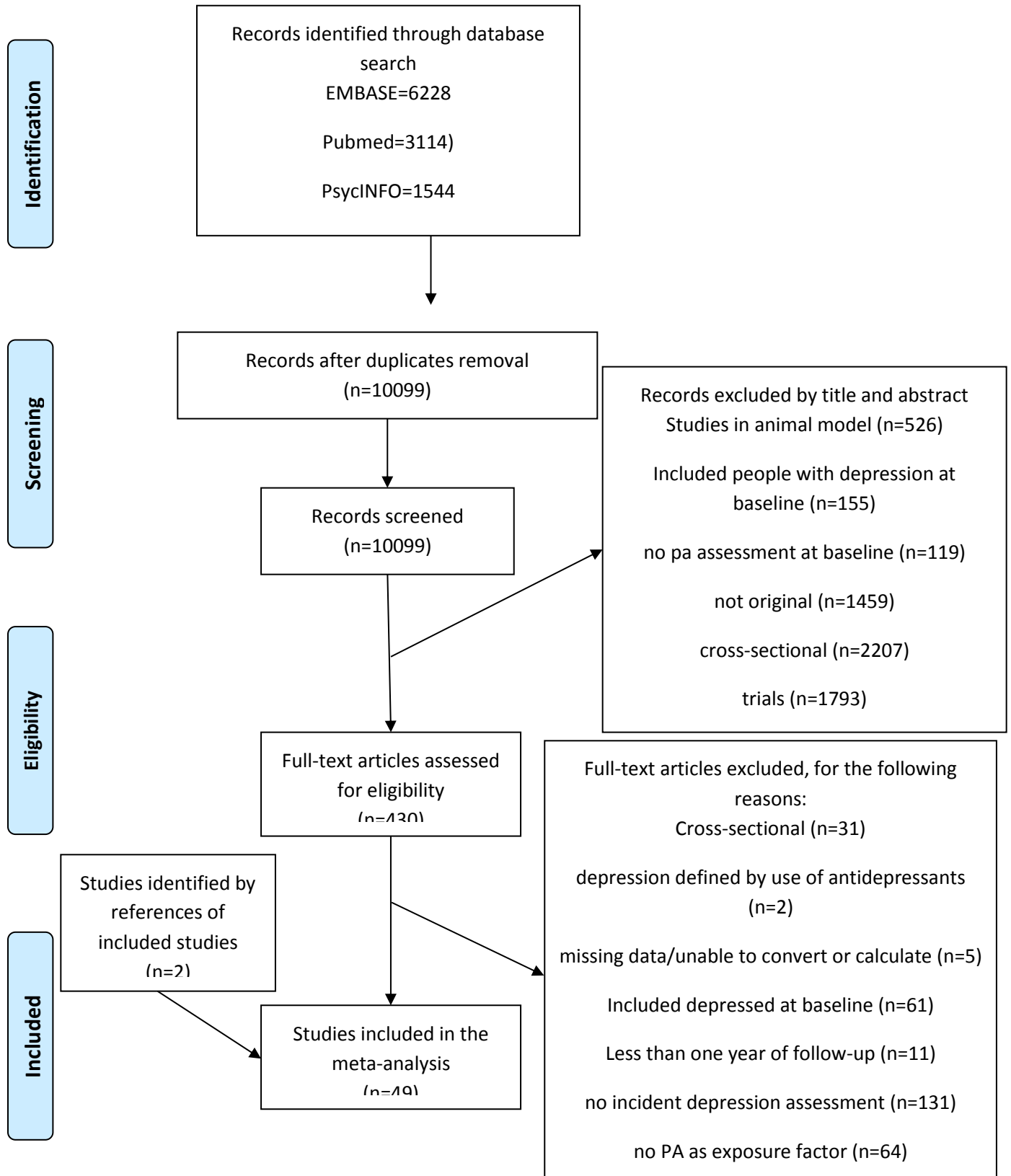
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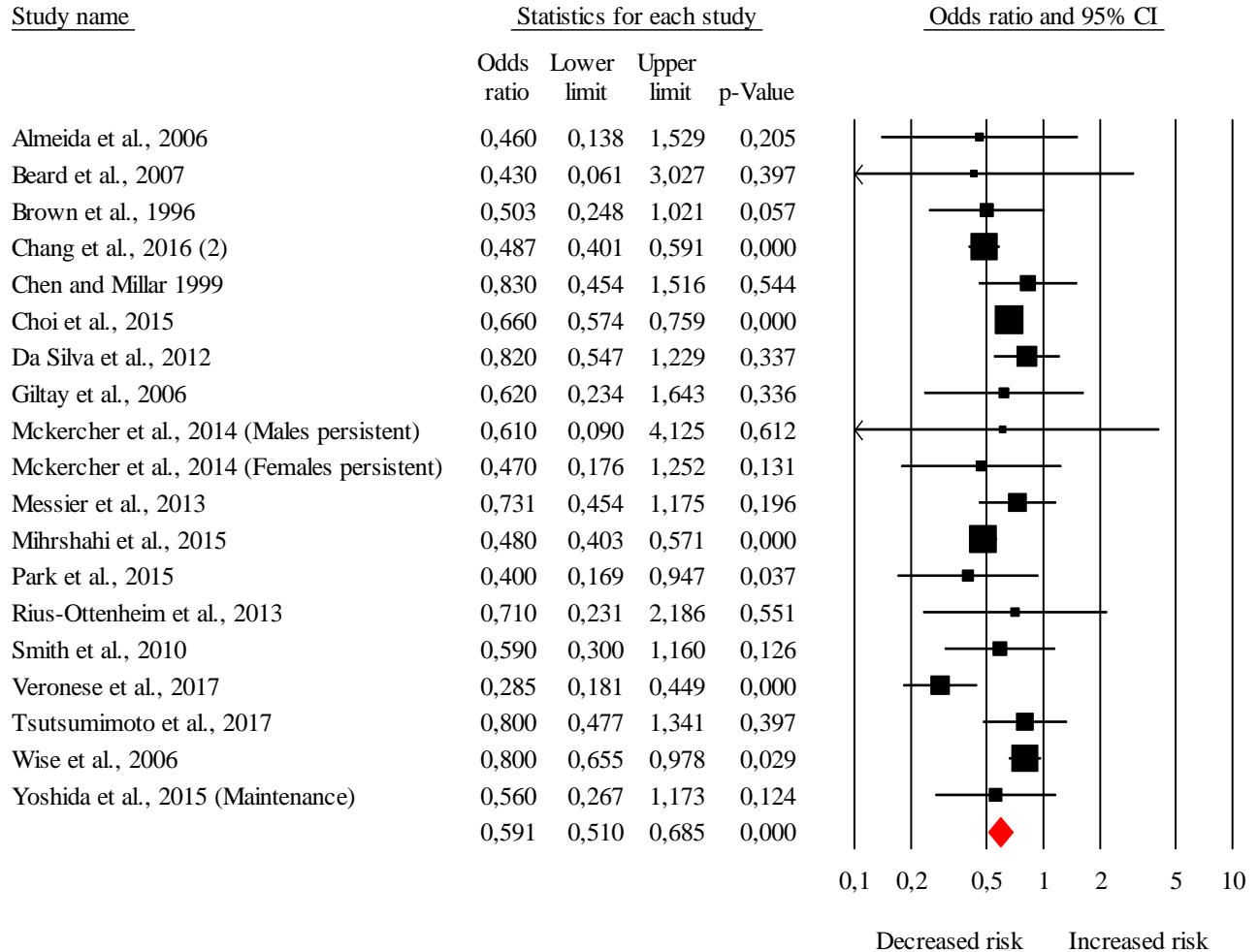
**FIGURE S1. PRISMA Flowchart of Study Selection**





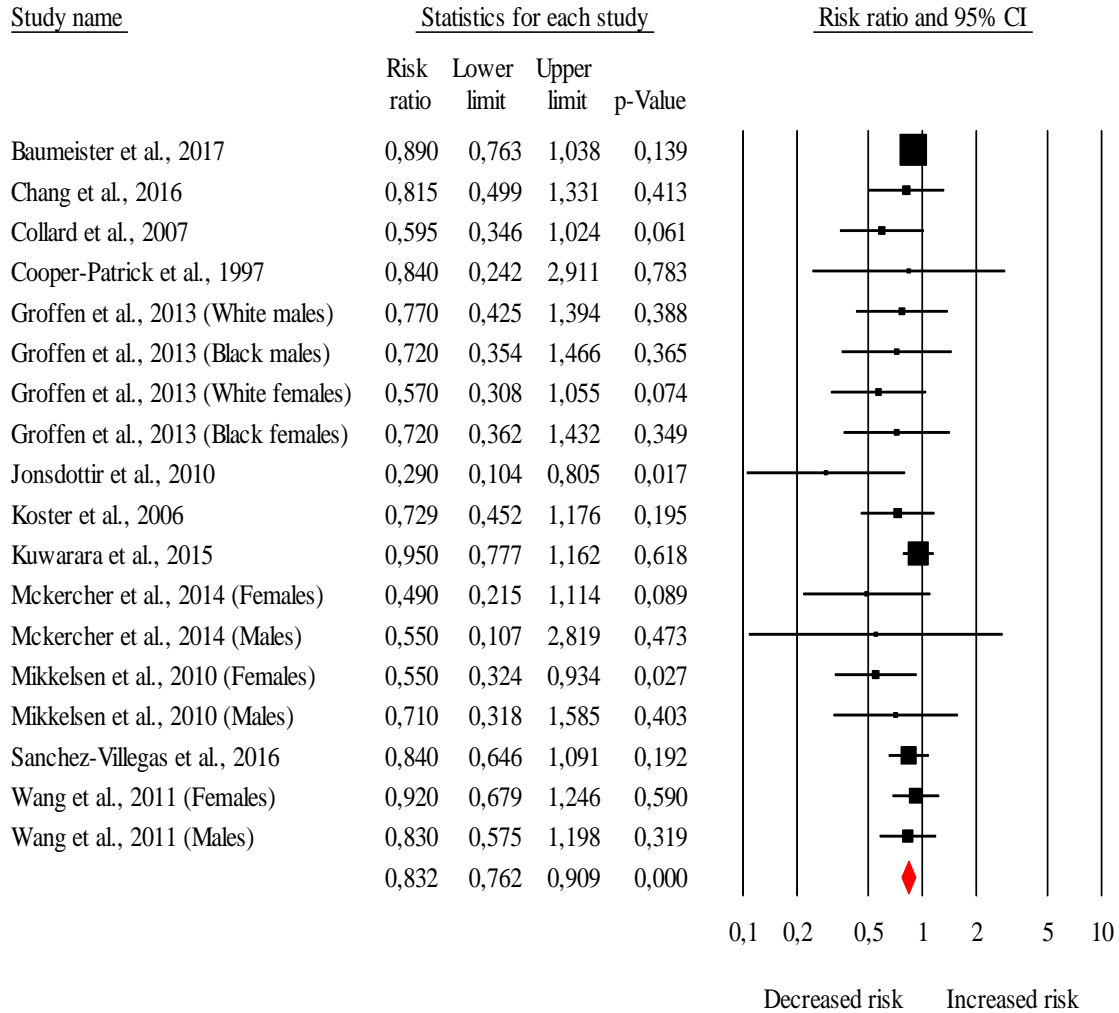
**FIGURE S2. Forest Plot of Studies Examining the Association of PA and Incident Depression.**

Effect size estimates are reported as crude odds ratios (ORs) and 95% confidence intervals (CI). Random-effects modeling was employed. Size of squares are proportional to sample size of individual studies, and diamond represents the summary effect size estimate.



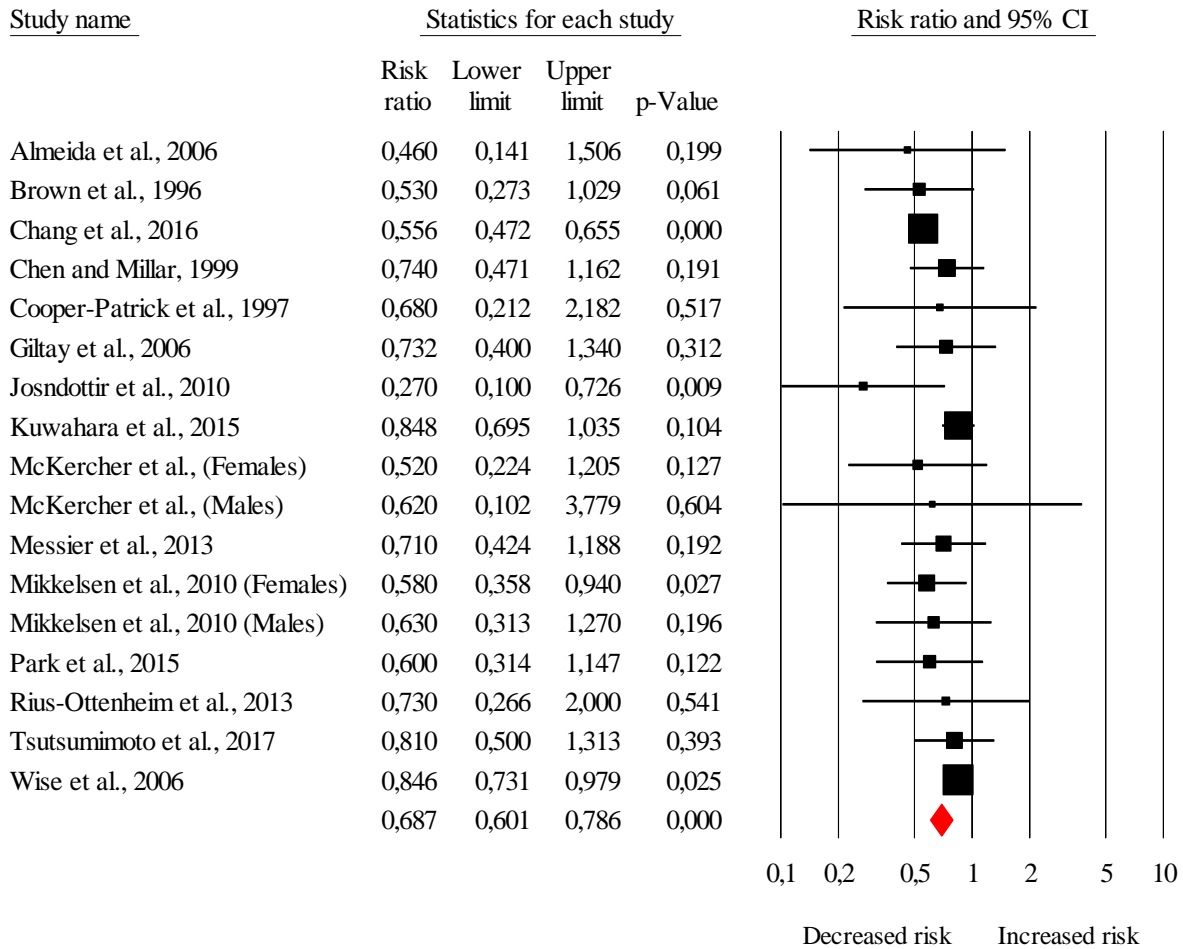
**FIGURE S3. Forest Plot of Studies Examining the Association of PA and Incident Depression.**

Effect size estimates are reported as adjusted relative risks (ARRs) and 95% confidence intervals (CI). Random-effects modeling was employed. Size of squares are proportional to sample size of individual studies, and diamond represents the summary effect size estimate.



**FIGURE S4. Forest Plot of Studies Examining the Association of PA and Incident Depression.**

Effect size estimates are reported as crude relative risks (RRs) and 95% confidence intervals (CI). Random-effects modeling was employed. Size of squares are proportional to sample size of individual studies, and diamond represents the summary effect size estimate.



**TABLE S1. Study Quality Assessment**

Study/item	Rep. of the exposed cohort	Selection of the non exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts on the basis of the design or analysis	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts	total
Almeida et al., 2006	A (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	C (0)	4
Augestad et al., 2008	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	D (0)	6
Baumeister et al., 2017	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	D (0)	6
Beard et al., 2007	B (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	B (+1*)	A (+1*)	B (+1*)	6
Brown et al., 1996	B (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Cabello et al., 2017	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Chang et al., 2016	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Chang et al., 2016 (2)	C (0)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1)	B (+1*)	6
Chen et al., 1999	A (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Choi et al., 2015	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Clark et al., 2007	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Collard et al., 2015	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Cooper-Patrick et al., 1997	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Da Silva et al., 2012	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
España-Romero et al., 2013	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	D (0)	6
Farmer et al., 1988	B (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Gallegos-Carrillo et al., 2013	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Garcia-Pena et al., 2013	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Giltay et al., 2007	B (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Groffen et al., 2013	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Hiles et al., 2015	A (+1*)	A (+1*)	A (+1*)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	7
Jerstad et al., 2010	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Jonsdottir et al., 2010	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7

Joshi et al., 2016	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Koster et al., 2006	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Ku et al., 2009	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Kuwahara et al., 2015	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	6
Mckercher et al., 2014	A (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Messier et al., 2013	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Mihrshahi et al., 2015	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Mikkelsen et al., 2010	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	A (+1*)	A (+1*)	B (+1*)	8
Mobily et al., 1996	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Park et al., 2015	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Pasco et al., 2011	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	A (+1*)	A (+1*)	C (0)	7
Rius-Ottenheim et al., 2013	C (0)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	6
Roh et al., 2015	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	7
Sanchez-Villegas et al., 2008	C (0)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	6
Sanchez-Villegas et al., 2016	C (0)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	6
Smith et al., 2010	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	C (0)	6
Strawbridge et al., 2002	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Strohle et al., 2007	A (+1*)	A (+1*)	C (0)	A (+1*)	B (+1*)	A (+1*)	A (+1*)	B (+1*)	7
Ten Have et al., 2011	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Tsai et al., 2013	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Tsutsumimoto et al., 2017	B (+1*)	A (+1*)	C (0)	A (+1*)	C (0)	C (0)	A (+1*)	B (+1*)	5
Veronese et al., 2017	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7
Wang et al., 2011	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	A (+1*)	A (+1*)	B (+1*)	8
Weyerer et al., 1992	A (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	A (+1*)	A (+1*)	B (+1*)	8
Wise et al., 2006	C (0)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	5
Yoshida et al., 2015	B (+1*)	A (+1*)	C (0)	A (+1*)	A (+2**)	C (0)	A (+1*)	B (+1*)	7

Key: The scoring of each item to the total of the study quality assessment is represented between each parenthesis. For the item "adequacy of follow up of cohorts", the criteria for scoring "C" (0) was a lost to follow up of 30% of the participants of the cohort.

**TABLE S2. Covariates Used in Each Study**

Study	Covariates
Almeida et al., 2006	none
Augestad et al., 2008	age, BMI, education, smoking, alcohol consumption and living arrangements
Baumeister et al., 2017	age, sex, years of schooling, alcohol consumption, smoking and waist circumference
Beard et al., 2007	none
Brown et al., 1996	none
Cabello et al., 2017	demographics, presence of a physical chronic condition, BMI, general health, status and country age, sex, education, BMI, systolic blood pressure, current smoking, cholesterol, coronary event, never smoked, and self-reported stroke, antidepressant medication use, memory, executive function and cognitive function
Chang et al., 2016	none
Chang et al., 2016	none
Chen et al., 1999	age
Choi et al., 2014	age, sex, educational level, marital status, household income, religion, region, employment status, the number of chronic disease, regular exercise and year
Clark et al., 2007	age, gender, gender*age, ethnicity, eligibility for free school meals, general health status, long-standing illness, overweight, health-risk behaviours
Collard et al., 2015	age, gender, level of education, smoking status, alcohol use, number of somatic diseases, cognition
Cooper-Patrick et al., 1997	gender, age, smoking status, and substance abuse prior to depression. sex, age, ethnicity, marital status, occupational position, stressful life events, satisfaction with work, alcohol intake, smoking status and self-reported respiratory disease
Da Silva et al., 2012	age, sex, baseline examination year, survey response year and alcohol consumption
España-Romero et al., 2013	age, sex, PA at baseline, education level, marital status, BMI, tobacco use, health problems in the last 6 months, number of chronic diseases, mobility problems, self-reported health status
Farmer et al., 1988	age, race, education, employment status, self-reported health, household income, and length of follow-up
Gallegos-Carrillo et al., 2012	age, sex, PA at baseline, education level, marital status, BMI, tobacco use, health problems in the last 6 months, number of chronic diseases, mobility problems, self-reported health status
Garcia-Pena et al., 2013	unclear
Giltay et al., 2006	none
Groffen et al., 2013	age, site, marital status, and prevalent disease
Hiles et al., 2015	unclear
Jerstad et al., 2010	baseline depression, body satisfaction, bulimic symptoms, social support, and previous year body mass index percentile
Jonsdottir et al., 2010	age, gender, body mass index, and educational level
Joshi et al., 2016	age, sex, race, income, and education
Koster et al., 2006	age and sex age, gender, educational level, marital status, living status, satisfaction with social support, satisfaction with income, drinking alcohol, activities of daily living and number of chronic diseases
Ku et al., 2008	age, gender, educational level, marital status, living status, satisfaction with social support, satisfaction with income, drinking alcohol, activities of daily living and number of chronic diseases

Kuwahara et al., 2015	age, sex, BMI, smoking, alcohol consumption, shift work, overtime work, job position, marital status, mutual relations and baseline depression scores
Messier et al., 2013	sex, age, education and marital status
Mckercher et al., 2014	Age, self-reported health status, language spoken at home in childhood, number of live births, current occupation, and depressed mood
Mikkelsen et al., 2010	age, income, smoking, education, alcohol intake, BMI, occupational physical activity and chronic disease
Mirshahi et al., 2015	education, marital status, BMI, physical activity, alcohol intake, fish and energy intake and comorbidities.
Mobily et al., 1996	age, marital status, smoking status at baseline, history of arthritis, hip fracture, stroke, cardiovascular disease, or emphysema at baseline and incidence of stroke, arthritis, cardiovascular disease, and emphysema between baseline and the 3-year follow-up
Park et al., 2015	age, sex, years of education, marital status, living arrangement, medical insurance, and employment
Pasco et al., 2011	Age, anthropometry, smoking, alcohol use and SES
Rius-Ottenheim et al., 2013	age, sex, education, marital status, smoking habits, alcohol use, diabetes mellitus, stroke, time since myocardial infarction, BMI, self-rated health, treatment group and cognition
Roh et al., 2015	age, gender, education, household income, smoking, alcohol intake, number of diseases, K-IADL score, cognition score and SGDS-K
Sanchez-Villegas et al., 2008	gender, age, employment status, body mass index, marital status, smoking, presence of any severe disease at baseline, alcohol intake and total energy intake
Sanchez-Villegas et al., 2016	age and sex, BMI, smoking, use of vitamin supplements, total energy intake, presence of cardiovascular disease, type 2 diabetes, hypertension, and dyslipidaemia at baseline, adherence to the Mediterranean diet, and socializing activities
Smith et al., 2010	age, education, marital status, BMI, hypertension, diabetes mellitus, alcohol use, smoking status, prevalent coronary heart disease, stroke, cancer, Parkinson's disease, dementia, cognitive impairment, functional impairment, 8-year incident dementia or cognitive impairment
Strohle et al., 2007	age and gender
Strawbrigde et al., 2001	age, sex, ethnicity, education, financial problems, neighborhood, disability, chronic conditions, health behaviors, and the social relation variables
Ten Have et al., 2011	gender, age, education, partner status, employment status, and presence of a somatic illness
Tsai et al., 2013	sex, age, level of education, psychological stress, diabetes, heart disease, IADL status, family support, and audio acuity
Tsutsumimoto et al., 2016	Age and sex
Veronese et al., 2017	age, gender, educational level, marital status, smoking habits, activities of daily living score, number of diseases at baseline, Center for Epidemiologic Studies Depression Scale (CES-D) score, and immediate word recall, delayed word recall, orientation in time, verbal fluency and recall summary score at baseline and at follow-up
Wang et al., 2011	age, BMI, marital status, working status, income, chronic diseases, social support, long-term disabilities or handicaps, restriction of activity, activity prevented due to pain, and self-rated health
Weyerer et al., 1992	sex, age, social class and physical disorder
Wise et al., 2006	age, education, occupation, marital status, geographic region, physical activity, BMI, preexisting health conditions, energy intake, smoking, current alcohol consumption, and child care responsibilities
Yoshida et al., 2015	sex, age, educational status, smoking status, alcohol consumption, outpatient visits, and higher-level competence

**TABLE S3. Incidence and Dropout Rates**

	exposed	non-exposed	%dropout
Almeida et al., 2006	15.1%	26.4%	unclear
Augestad et al., 2008	?	?	unclear
Baumeister et al., 2017	?	?	unclear
Beard et al., et al., 2007	?	?	31.0
Brown et al., 1996	6.0%	14.3%	36
Cabello et al., 2017	?	?	unclear
Chang et al., 2016	3.2%	6.1%	70
Chang et al., 2016	13.8%	24.7%	unclear
Chen and Millar 1999	3.6%	4.8%	6.4
Choi et al., 2015	?	?	52
Clark et al., 2007	?	44.5%	25
Collard et al., 2015	?	?	33.2
Cooper-Patrick et al., 1997	?	?	17
Da Silva et al., 2012	?	?	20
España-Romero et al., 2013	?	?	unclear
Farmer et al., 1988	?	?	21.8
Gallegos-Carrillo et al., 2013	10.6%	16.5%	unclear
García-Peña et al., 2013	?	?	29.42
Giltay et al., 2006	30.3%	41.2%	unclear
Groffen et al., 2013	?	?	12.4
Hiles et al., 2015	?	?	30
Jerstad et al., 2010	?	?	unclear
Jonsdottir et al., 2010	?	?	15
Joshi et al., 2016	?	?	33
Koster et al., 2006	?	?	19.2
Ku et al., 2009	?	?	18.8



Kuwahara et al., 2015	?	?	unclear
Mckercher et al., 2014	9% females / 3.6% males	14.9% females / 9.5% males	39
Messier et al., 2013	12.5%	16.9%	34
Mihrshahi et al., 2015	?	?	41
Mikkelsen et al., 2010	?	?	11.7
Mobily et al., 1996	?	?	43.3
Park et al., 2015	23.8%	58.4%	54.7
Pasco et al., 2011	?	?	39
Rius-Ottenheim et al., 2013	8.4%	11.3%	21.5
Roh et al., 2015	?	?	33.3
Sanchez-Villegas et al., 2008	?	?	10
Sanchez-Villegas et al., 2016	?	?	10
Smith et al., 2010	?	?	59.5
Strawbridge et al., 2002	1.7%	7.7%	9.8
Strohle et al., 2007	7.4%	10.6%	15.7
Ten Have et al., 2011	?	?	32.2
Tsai et al., 2013	15.1%	18.5%	29.5
Tsutsumimoto et al., 2017	7.3%	9%	13.2
Veronese et al., 2017			10
Wang et al., 2011	?	?	22.6
Weyerer et al., 1992	2.6%	3.4%	12.7
Wise et al., 2006	25%	29.5%	13
Yoshida et al., 2015	?	?	28.4