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Review article

Social support and protection from depression: systematic review of current findings in Western countries

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Background
Numerous studies report an association between social support and protection from depression, but no systematic review or meta-analysis exists on this topic.

Aims
To review systematically the characteristics of social support (types and source) associated with protection from depression across life periods (childhood and adolescence; adulthood; older age) and by study design (cross-sectional *v.* cohort studies).

Method
A systematic literature search conducted in February 2015 yielded 100 eligible studies. Study quality was assessed using a critical appraisal checklist, followed by meta-analyses.

Results
Sources of support varied across life periods, with parental support being most important among children and adolescents, whereas adults and older adults relied more on spouses, followed by family and then friends. Significant heterogeneity in social support measurement was noted. Effects were weaker in both magnitude and significance in cohort studies.

Conclusions
Knowledge gaps remain due to social support measurement heterogeneity and to evidence of reverse causality bias.

Declaration of interest
None.

Depression is a prevalent mental condition across the globe and a main contributor to the global burden of disease.[1] Although the risk factors for depression are well described, less is known about factors that enable individuals to bounce back from depression or even to avoid it altogether.[2] Social support is hypothesised to protect mental health both directly through the benefits of social relationships and indirectly as a buffer against stressful circumstances. Social support is a multidimensional concept which broadly refers to the emotional (e.g. providing encouragement), instrumental (e.g. helping with housekeeping) or informational (e.g. notifying someone of a job opportunity) assistance that is received from others.[3] It may also be characterised by the provider of support, including support from a spouse, relatives or friends, each thought to have independent protective effects against depression. Several reviewers have discussed aspects of social factors and mood problems in adult and elderly populations.[4–8] Previous reviews have been mostly narrative, however, and none focused specifically on depression. In spite of the wealth of literature on social support, several questions remain. It is not clear which sources or types of social support are most protective against depression, or whether the type and source of support that is optimal for mental health varies across the life course. For example, parental support may be more important during childhood than adulthood. Answers to these questions may be useful for both policy-makers and clinicians in crafting targeted messages and interventions on social support, and to orient future research in this area. The aim of this paper was therefore to conduct a systematic literature review to summarise existing knowledge on social support and protection from depression. We explored evidence for different types of social support and summarised findings according to broad life periods (childhood and adolescence, adulthood, older adulthood).

Method

We conducted a systematic search in February 2015 to identify relevant studies in the following databases: PubMed Medline, ISI Web of Science and PsycINFO. No limits were set on publication dates. Database-specific electronic search terms were developed in consultation with a librarian and included the following terms and their variants: social support, social network, social capital, social isolation, social contacts, social integration; depression, depressive symptoms. The PubMed search strategy (including MeSH terms) is given as an example in online supplement DS1. We further searched reference lists of primary studies and review articles to identify any additional eligible studies.

Study selection

We considered eligible any observational study from the general population, across any life period, that assessed the association between social support (independent variable) and depression or depressive symptoms (dependent variable). Papers were included if they were original publications based on individual-level data and provided a quantitative measure of association (risk ratio, odds ratio, etc.). We reported estimates from the fully adjusted model wherever available. Since we were interested in the inverse relationship between social support and depression in the general population, we excluded studies on specific subpopulations. Furthermore, since this association is likely to be culture-dependent,[9] we also limited this review to Western countries, including the USA, Canada and Europe (EU and member states of the European Free Trade Association), Australia and New Zealand. We reviewed only publications that were in English,

French or Finnish. Titles and abstracts were screened independently by two investigators (G.G. and H.H.) and disagreements were resolved by consensus or a third reviewer (A.Q.-V.). Interrater agreement was calculated using the agreement rate, simple kappa score and kappa score adjusted for prevalence and bias. We reported the last because the simple kappa score is sensitive to the proportion of studies eligible, which was low in this review (0.6%).[10]

Data extraction and quality assessment

Data extraction and quality assessment of eligible studies were performed independently by two investigators (G.G. and H.H.). For each study we extracted study information, instruments used to assess social support and depression, and association estimates. The authors were contacted for additional information when necessary. We conducted a quality assessment of the studies using a modified version of the Newcastle–Ottawa Scale.[11] The modified scale includes nine items about comparability, selection bias, information bias and control of at least three important confounders (see online supplement DS2 for items and rating criteria). Disagreements were resolved by discussion or by a third party (A.Q.-V.). We analysed studies by life periods (children and adolescents, adults and older adults) and study design (cross-sectional, cohort or case–control). Adult studies included samples restricted to adults and those from the general population mainly composed of adults.

Statistical analysis

We used meta-analytic methods to provide a general quantitative synthesis of the literature. Pooled results should be interpreted with caution because of the known high level of heterogeneity between studies. We included studies for which standard errors could be extracted or calculated (62 studies). We conducted separate analyses for dichotomous and continuous depression outcomes since they provide different effect estimates. We used odds ratios for dichotomous outcomes and standardised beta coefficients for continuous outcomes. We pooled estimates using the DerSimonian & Laird random effects model. For studies that presented associations across categorical levels of social support (rather than linear scales) we included estimates comparing the highest and lowest level of support. For studies that provided results categorised by subgroups (e.g. gender) we combined results using a fixed effects model and included the pooled result in the analysis. We reverse-coded associations between absence of (or negative) social support, such that all estimates described the associations between presence of (or positive) social support and depressive symptoms or depression. High heterogeneity between studies was expected and evaluated descriptively by life period, broad categories of social support (general support; support from partner, from family, from friends and from work or school; emotional, instrumental and informational support) and type of study design. Publication bias was not assessed using quantitative methods because these are not recommended under conditions of high heterogeneity.[12] Analyses were conducted in Stata version 12.1.

Results

The final selection comprised 99 articles, of which one presented results from two studies, resulting in a total of 100 studies (Fig. 1).[12–111] About two-thirds of studies were cross-sectional, a third longitudinal and none case–control (Table 1). These studies represent data from 504 966 individuals (sample sizes ranged from 83 to 95 103) and covered 27 years of published research

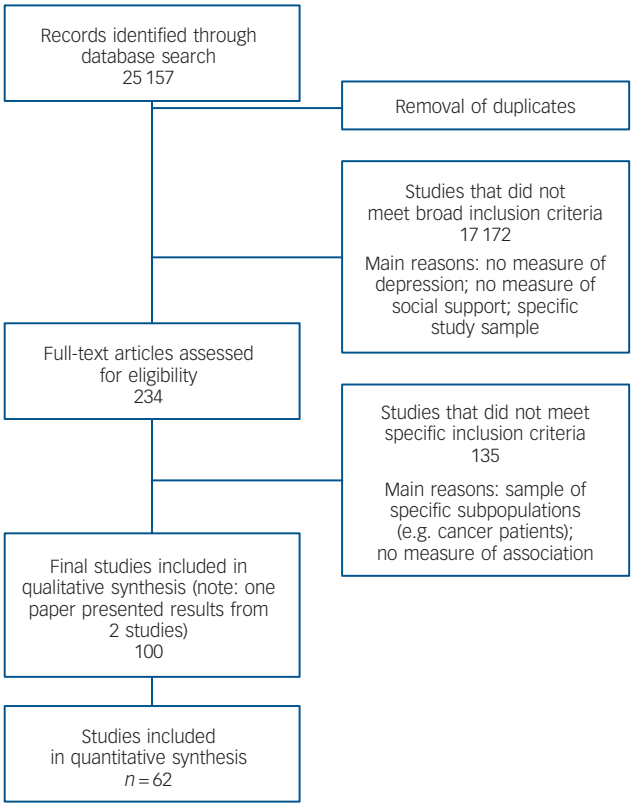

Fig. 1 Study selection.

(1988–2015). The majority of studies were from the USA (55 studies); the remainder were from Europe (33 studies), Canada (11 studies) and Australia (1 study). Interrater agreement for study screening was adequate (98%, $\kappa = 0.41$, adjusted $\kappa = 0.97$). Forest plots for the studies included in the quantitative analysis are shown in Figs 2 and 3. Online Table DS1 presents an overview of the social support and depression measures used in the research.

Children and adolescents

The search identified 31 studies that assessed social support and protection from depression in children and adolescents, ranging in age from 8 to 20 years (see online Tables DS2 and DS3 for study characteristics and details of ratings respectively). A significant association between at least one aspect of social support and protection from depression was reported in 84% of studies (Table 1). Evidence suggested a strong association between social support and absence of depression (pooled OR = 0.20, 95% CI 0.19 to 0.20). Odds ratios ranged from 0.12 to 0.82 (see Fig. 2). Findings from studies that used continuous depression scores were less consistent (pooled beta coefficient −0.06, 95% CI −0.09 to −0.03). Beta coefficients ranged from −1.73 to 0.06 (see Fig. 3). Estimates were generally stronger and more likely to be significant in cross-sectional studies than in cohort studies, and in low- or moderate-quality studies than in high-quality studies (Table 1). Removing low-quality studies from the meta-analysis did not affect pooled estimates. In studies that reported gender-specific estimates a significant association was found consistently for girls (all of 11 studies found a significant association) but not for boys (8 of 11 studies). Parents, teachers and family were sources of support most consistently found to be protective against depression in children and adolescents (80%, 86% and

Table 1 Studies reporting a significant association between social support and protection from depression, categorised by life period

	Children and adolescents[a]	Adults and general population[a]	Older adults[a]	All[a]
Overall	84% (26/31)	92% (33/36)	94% (31/33)	90% (90/100)
Study design				
Cross-sectional	83% (15/18)	89% (25/28)	100% (23/23)	91% (63/69)
Cohort	77% (10/13)	100% (8/8)	80% (8/10)	84% (26/31)
Study quality				
Low	100% (5/5)	100% (4/4)	0% (0/1)	90% (9/10)
Moderate	80% (16/20)	89% (24/27)	96% (25/26)	89% (65/73)
High	67% (4/6)	100% (5/5)	100% (6/6)	88% (15/17)
Gender				
Women	100% (11/11)	86% (6/7)	71% (5/7)	88% (22/25)
Men	73% (8/11)	80% (4/5)	100% (6/6)	82% (18/22)
Aspect of social support				
General perceived support	33% (1/3)	78% (14/18)	83% (15/18)	77% (30/39)
Source of social support				
Support from spouse		100% (9/9)	100% (6/6)	100% (15/15)
Support from family	86% (6/7)	88% (7/8)	36% (4/11)	65% (17/26)
Support from parents	80% (12/15)			80% (12/15)
Support from children		67% (2/3)	50% (3/6)	56% (5/9)
Support from friends	56% (9/16)	73% (8/11)	71% (5/7)	65% (22/34)
Support from teacher	86% (6/7)			86% (6/7)
Support from work		100% (1/1)		100% (1/1)
Type of social support				
Emotional support		86% (6/7)	50% (2/4)	73% (8/11)
Instrumental support		67% (6/9)	50% (2/4)	62% (8/13)
Informational support		100% (1/1)		100% (1/1)

a. Proportion of studies with significant results; number of studies with significant results/total number of studies in parenthesis.

86% of studies reported a significant association for each type of support respectively), whereas findings were less consistent for support from friends and general perceived support (56% and 33% of studies with significant findings respectively) (Table 1). In additional analysis we found that parental and family support was particularly important for girls (80% of studies reported a significant association) but less so for boys (40% of studies reported a significant association). No study on type of social support (emotional, instrumental, informational) in youth was found in this review. Measurement tools to assess social support varied broadly, with each of the 31 studies using a unique scale, of which less than half were validated (online Table DS1).

Adults

A total of 36 studies measured the association between social support and protection from depression in samples of adults (see online Tables DS4 and DS5 for study characteristics and details of ratings respectively). Ages ranged from 18 years and older, except for one study which included a general population sample of Germans aged 16 years and older,[48] and another of Canadians aged 12 years and older.[78] A majority of studies (89%) reported a significant association between social support and protection from depression among adults. In studies that used binary depression outcomes (pooled OR = 0.74, 95% CI 0.72 to 0.76) odds ratios ranged between 0.23 and 1.07 (see Fig. 2). In studies that used continuous depression scores (pooled beta coefficient −0.01, 95% CI −0.02 to −0.01) beta coefficients ranged between −4.90 and 0.21 (see Fig. 3). In studies that conducted gender-specific analyses findings were similarly significant in samples of women (86%) and men (80%) (Table 1). The numbers of statistically significant findings were also similar in cross-sectional and cohort studies and across studies of low, moderate and high quality. Excluding low-quality studies from the meta-analysis did not substantially change pooled estimates.

The source of social support most consistently associated with protection from depression in adults was spousal support (100% of studies reported a significant association) followed by support from family (88% of studies), friends (73% of studies) and children (67% of studies). The type of social support most consistently associated with protection from depression in adults was emotional support (75% of studies reported a significant association) followed by instrumental support (67% of studies); informational support was examined in one study and was not found to be significantly associated with protection from depression (Table 1). Each study used a unique instrument to measure social support, except for the Interpersonal Support Evaluation List, which was used in three studies (online Table DS1). About a third of studies used a previously validated social support scale.

Older adults

The search identified 33 studies examining social support and protection from depression specifically in samples of adults aged 50 years and older (see online Tables DS6 and DS7 for study characteristics and details of ratings respectively). Over 90% of studies found a significant association between some aspect of social support and protection from depression in older adults. In studies that modelled binary depression outcomes (pooled OR = 0.56, 95% CI 0.55 to 0.57), odds ratios ranged from 0.06 to 1.49 (see Fig. 2). In studies modelling continuous depression outcomes (pooled beta coefficient −0.11, 95% CI −0.13 to −0.08), beta coefficients ranged from −4.23 to 0.66 (see Fig. 3). Results were consistently significant in men (all of 6 studies

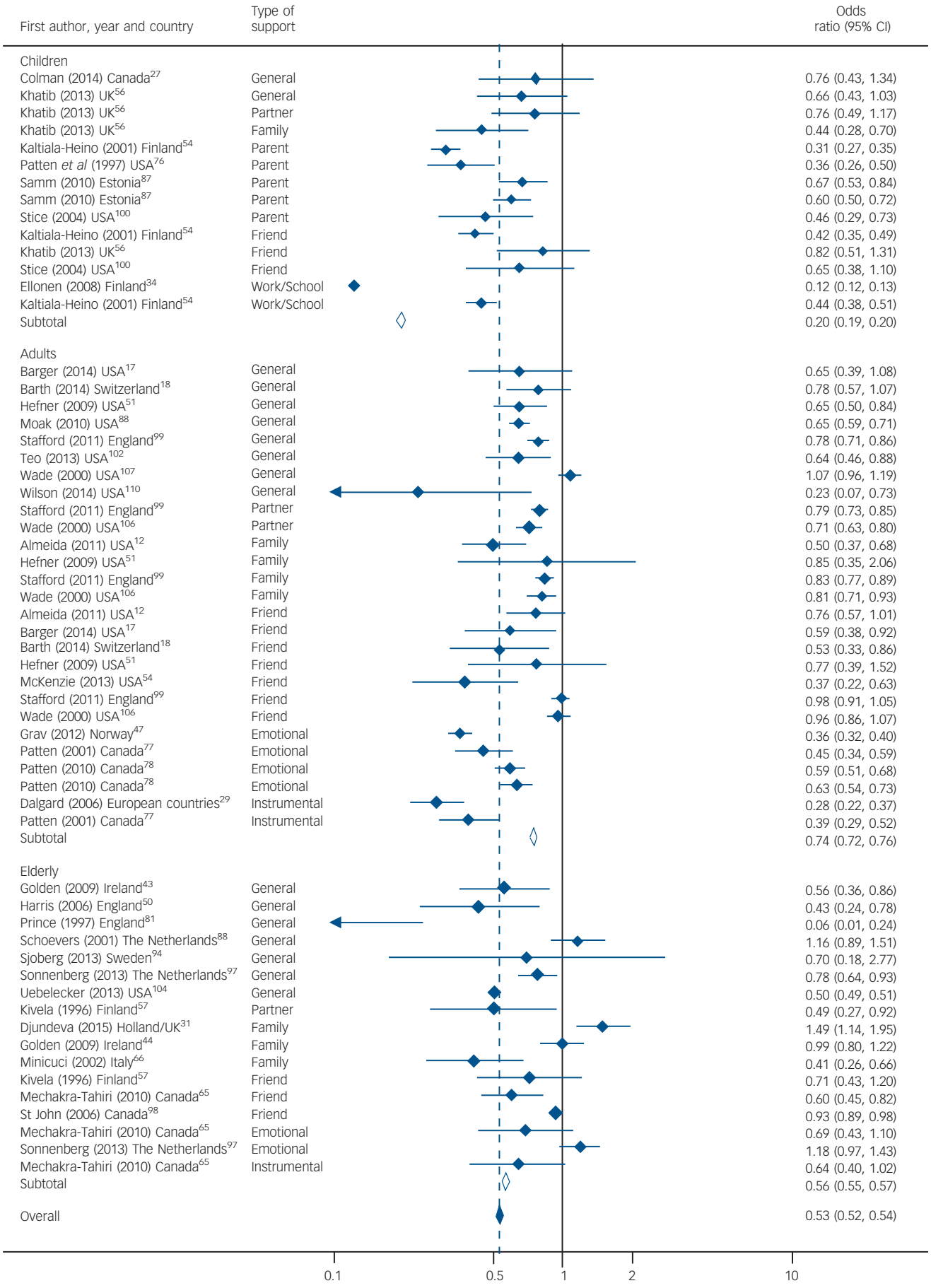

Fig. 2 Forest plot of studies using a dichotomous depression outcome, categorised by life period.

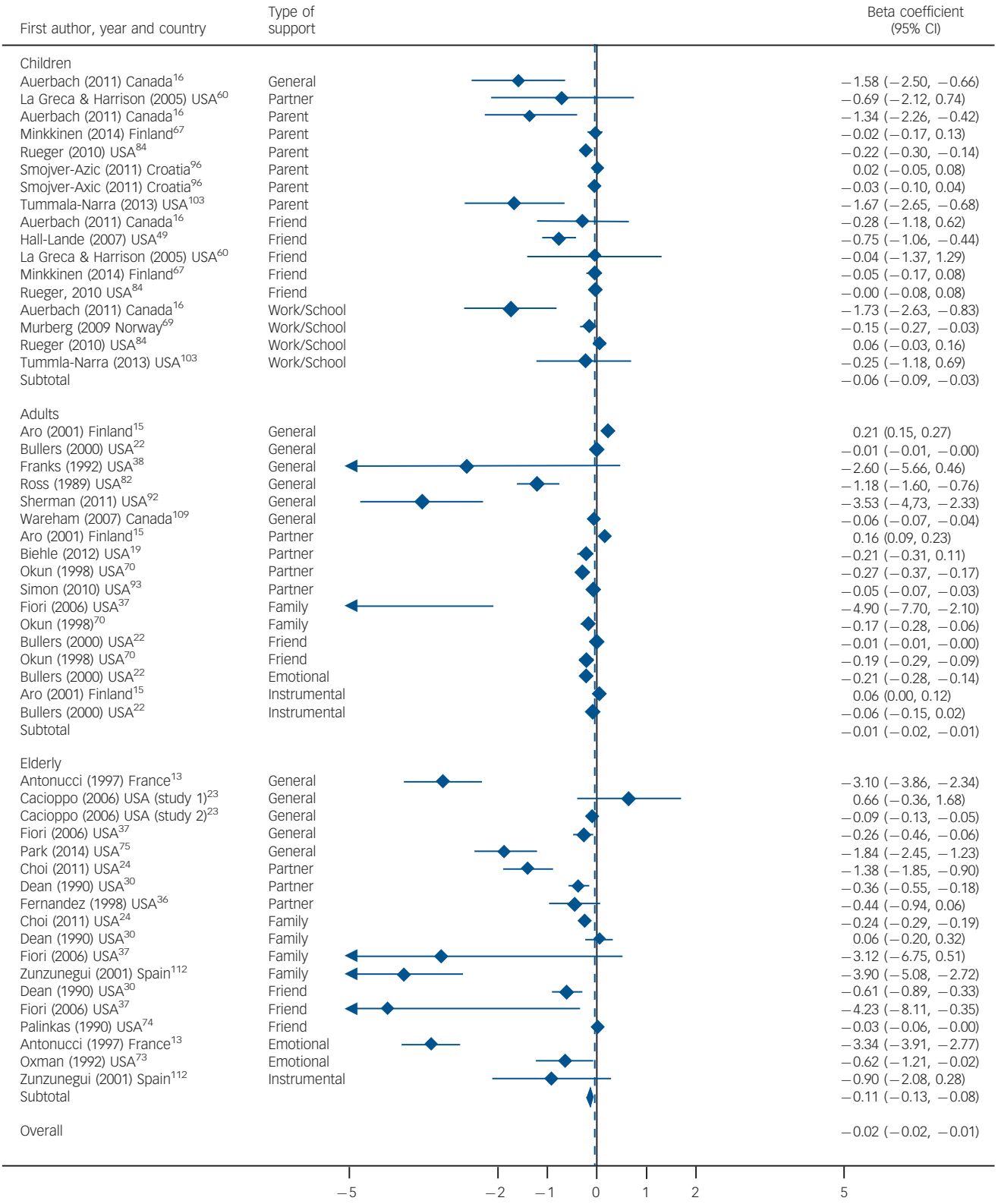

Fig. 3 Forest plot of studies using a continuous depression outcome, categorised by life period.

found a significant association) but less so in women (5 of 7 studies). Cross-sectional studies found significant results more often than cohort studies (Table 1). Study quality did not affect consistency of significant results and removing low-quality studies did not affect pooled estimates. As in the adult studies, spouses were the source of social support most consistently associated with protection from depression (all studies), followed by support from friends (83% of studies) (Table 1). Evidence for support from children and family was less consistent (50% and 36% of studies respectively reported a significant association). Evidence for emotional support and instrumental support relating to protection from depression was supported in half the studies. Each study

used a unique social support measurement tool, of which only about a third were validated (online supplement DS1).

Discussion

This study provides the most comprehensive systematic literature review to date on the association between social support and protection from depression. Further, it is the first to contrast evidence for this association across life periods and provide meta-analytic estimates of association within each of these periods. We identified 100 studies that reported on aspects of social support and protection from depression across all ages. Evidence is overall highly consistent and supports the notion that social support is an important protective factor against depression. However, the sources of social support that were most protective of depression varied across the life periods. Parental support was most consistently associated with protection from depression in children and adolescents, whereas spousal support was most salient for adults and older adults. Furthermore, the review identified large variations in the operationalisation and measurement of social support. Over ten different aspects of social support were investigated in the literature, measured with close to a hundred different measurement tools. Finally, an important limitation of this body of evidence is that most studies were cross-sectional, thus precluding inference of the direction of association between social support and protection from depression. This caveat is particularly salient for studies of children and adolescents, in which the cross-sectional estimates were larger and more significant than those of the cohort studies, suggesting that reverse causality (i.e. a perception of greater support among the least depressed) might be inflating estimates in the former set of studies.

Children and adolescents

Support from parents and family is most consistently related to a youth's protection from depression, more than any other source. Children and adolescents rely on their parents to meet their basic needs, such as emotional assistance and material resources. Parental support has been shown to affect a child's mental health development,[113,114] which in turn may contribute to protection from depression. In this review, parental support was particularly important for girls. This effect may be attributable to gender-specific parent–child dyads.[115] Among the three studies that investigated maternal and paternal support independently from each other, all studies reported maternal support to be a significant protective factor from depression in girls, but only one study reported this for boys, and only in the context of single-mother households.[76] These findings are supported by others that suggest maternal support is a particularly important component of development and mental well-being in girls.[116] Conversely, paternal support was associated with protection from depression in two-thirds of studies, equally for girls and boys. Others have demonstrated the importance of paternal involvement on child behaviours and outcomes.[116] Interestingly – and perhaps contrary to popular belief that views peer support as a substitute for parental support (particularly in adolescence) – social support from friends was not consistently associated with protection from depression in samples of children and adolescents. Peer support has been shown to be important in the psychological development of children. However, friendships during adolescence are more transitory and may be less reliable sources of support than parents and family.[117] Furthermore, cross-sectional studies do not permit assessment of the possibility that depression might also adversely affect the capacity to develop friendships in these crucial formative years.[118]

Adults

In samples of adults evidence is strongest for spousal support as a protective factor against depression. Evidence also suggests that both social support (e.g. empathy) and social strain (e.g. criticism) from a spouse are significantly related to depressive symptoms in adults, although in opposite directions,[70,93,119] and both giving and receiving support from a spouse is associated with lower levels of depressive symptoms.[19] Evidence was also highly consistent for family support as a protective factor against depression in adults, but was mixed for friend support. Adulthood is a time when family responsibilities are greatest and a main source of stress. In this context, spousal and family support to assist with parental obligations may be particularly important to mental health.[120] In addition, as the composition of networks tends to shift across adulthood to include more family members than friends, family may therefore represent a more available source of support.[121]

Emotional support is a highly consistent protective factor against depression in adults compared with instrumental support. Emotional support, such as having someone to confide in, attempts to directly reduce the negative emotions associated with a distressing situation,[122] whereas instrumental support such as having someone to help with chores or in case of a crisis may benefit mental health more indirectly, by providing respite from chronic and acute stress. Alternatively, given the dearth of longitudinal studies, these results could be indicative of reverse causality, whereby emotional support is mostly activated in situations of greater need, and thus could be spuriously found to be associated with greater distress and depression.[123] Emotional support could also be more easily provided, particularly when the provider and recipient are geographically distant, as instrumental support often requires a physical presence.

Older adults

In elderly samples spousal support is a consistent protective factor against depression, particularly in men. Results from two longitudinal studies suggest that having a poor relationship with a spouse,[54] or having no partner in the household,[97] were associated with depression in older men. This evidence supports established evidence that spousal support may be particularly important for the health of men.[124] Cross-sectional evidence, however, shows spousal support to be significant for both genders.[24] Unlike earlier life periods, evidence for a protective effect of family support was weak among older adults. Only a third of studies that examined family support reported a significant association. The role of family and relatives may change with older age, as relatives are also ageing (or may die) and may become less able to offer support. The type of social support that older individuals need from their family for mental health could also be different from that for younger adults. For example, Minicuci *et al* found that poor financial support from family members was associated with depression in older men, but poor emotional support was not.[66] Further research on the type of social support that is relevant to prevent depression in older age is needed.

Across the different life periods support from friends was most consistently associated with protection from depression in older adults. Support from friends could be an adjunct to support from spouse and family. It is possible that friendship and companionship become more important with older age as spouses and family become less available due to illness and death.[125] This pattern of evidence is supported by studies that

stratified their sample by age group. Fiori *et al* found that positive support from friends was significantly associated with less depressive symptoms in older adults (age 60+ years), but not in younger adults (35–59 years old).[37] Similarly, Okun & Keith found that support from friends and/or relatives (other than spouse or children) was significantly and strongly related to less depressive symptoms in older adults (60–92 years old) but not in younger adults (28–59 years old).[70]

Children could be an additional source of support against depression in older adults, yet evidence for this is weak and mixed. Only half of the studies investigating support from children found a significant association. However, support from children was measured in a variety of ways, such as getting help from children, receiving expressive or emotional support, or number of children seen weekly. The exact role of social support from children for their older parents is therefore not clear. Children may provide important instrumental support or companionship to their parents, but evidence for these types of support is absent. In addition, reverse causality may apply here as well, as children may come to be involved in providing support with increasing loss of autonomy, which is typically associated with increased risk of depression.[126]

Limitations of the studies

Social support measurement

An important finding of this review is the large number of instruments researchers used to measure and operationalise social support, which limits the replication of findings. General perceived social support (e.g. 'Do you have someone you can really count on to help you out in a crisis situation?') was the most common measure of social support. Yet this measure does not fully capture the range of social support available to individuals, which may vary between individuals and over the life course. Additionally, perceived general social support may not be a reliable measure in children, who may not have the life experience or self-reflection to make a general assessment of their personal level of social support. Less than half of studies in the literature used a validated social support instrument. Scales that have not been validated may not accurately measure social support or might capture elements of life beyond social support, such as physical health, personality traits (e.g. extroversion) and living arrangement (e.g. living alone).[127,128] The concept of time in social support measurement has also been largely ignored up to now. Except for one study,[30] none of the scales used a time frame when assessing social support. Consequently, perception of social support may refer to various time periods depending on the individual, and may include future expectation of support. Social support may further change over time in response to life events, yet the majority of longitudinal studies examined social support at a single point in time. There may be a reciprocal relationship between depressive symptoms and social support, as social withdrawal may drive away social ties. There is also a dearth of evidence on the protective effects of social support against depression across the life course. In the only life course study to date, authors found that parental support during childhood decreased depressive symptoms in adulthood.[90] Further high-quality longitudinal studies are needed to confirm these results.

Depression measurement

Depressive symptoms were generally measured from self-report screening depression scales. Although the majority of scales are validated instruments, they are screening tools and not clinical interviews, and may therefore overestimate the presence of mood problems. The time frame of reference for depressive symptoms ranged from current symptoms to lifetime depression. The strength of associations tended to be greater in studies that measured current or past-week depressive symptoms than in studies that used longer time frames. Current depressive symptoms might be more strongly associated with perceived social support because being depressed may affect the perception of social support. A shorter time frame might also rely less on recall and provide a more reliable assessment of depressive problems.

Limitations of our review

As with any review, publication bias is possible. Publishers and authors tend to favour the publication of significant findings over non-significant ones. We were only able to review papers in English, French and Finnish, potentially missing some studies. Nevertheless, we only found English studies to fit our criteria. We included only studies from Western countries; results may therefore have limited generalisability to other geographical areas, particularly low-income countries and/or other cultural contexts. Future research focusing on other cultures and countries is recommended. We restricted our search to samples from the general population. The association between social support and protection from depression may differ in vulnerable subgroups.

Strengths of the review

We used a rigorous methodology to search and assess the published research on the inverse association between social support and depression. Two reviewers independently examined the evidence. We favoured an in-depth analysis of the literature to explain current findings and trends, complemented by a meta-analysis to summarise findings. We carefully sought to assess the association between social support and protection from depression overall and across life periods, a topic that has not been specifically reviewed in the literature.

Future research

Our review provides consistent evidence of an association between social support and protection from depression in samples of the general population across all ages. Sources of support tended to vary in importance across life periods, with parental support being most consistently associated with protection from depression in children and adolescents, and spousal support in adults and older adults. Significant heterogeneity in social support measurement is a key finding of this review. Future studies using validated social support scales are recommended. As the contrast in magnitude and significance of effects between cohort and cross-sectional studies suggests the presence of reverse causation in these associations, research on the temporal dynamics of social support and protection from depression, particularly over the life course, is also strongly encouraged.

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Online Supplement DS1. Example of Pubmed database search strategy

("Social Support"[Mesh] OR "Social Isolation"[Mesh] OR family support[Title/Abstract] OR familial support[Title/Abstract] OR family structure[Title/Abstract] OR living alone[Title/Abstract] OR social environment[Title/Abstract] OR social context[Title/Abstract] OR social relationship[Title/Abstract] OR social relationships[Title/Abstract] OR social ties[Title/Abstract] OR social network[Title/Abstract] OR social networks[Title/Abstract] OR social engagement[Title/Abstract] OR social isolation[Title/Abstract] OR perceived isolation[Title/Abstract] OR social contacts[Title/Abstract] OR social contact[Title/Abstract] OR social integration[Title/Abstract] OR social resource[Title/Abstract] OR social resources[Title/Abstract] OR emotional support[Title/Abstract] OR tangible support[Title/Abstract] OR informational support[Title/Abstract] OR instrumental support[Title/Abstract] OR companionship support[Title/Abstract] OR perceived support[Title/Abstract] OR received support[Title/Abstract] OR friendship[Title/Abstract] OR friendships[Title/Abstract])
AND (depressive[Title/Abstract] OR depression[Title/Abstract] OR affective disorder[Title/Abstract] OR affective disorders[Title/Abstract])

Online Supplement DS2. Items of the quality assessment scale

We relied on a modified version of the Newcastle-Ottawa scale (1). We evaluated components of the checklist (criteria met; criteria not met; not reported) and appraised the overall quality of evidence of the study (poor; moderate; high). High-quality studies had satisfactory ratings on items related to measurement and confounder control and up to one unsatisfactory rating for other items. Medium quality studies had one unsatisfactory rating on items related to either measurement or confounder control and up to one unsatisfactory rating for other items, or up to two unsatisfactory items. Low quality studies had unsatisfactory rating on items related to measurement and confounder control, or up to three unsatisfactory items.

SELECTION

1. Were study participants representative of the study base?
2. Were people with different levels of social support drawn from the same population?
3. Was the overall participation rate > 60%?
4. Was lost to follow-up unlikely to introduce bias? (Cohort study)

MEASUREMENT

5. Was social support assessed from validated tool?
6. Were depressive symptoms assessed using validated scale or structured interview?
7. Were social support and depression assessed in the same way for entire study population?
8. Were adequate measures taken to determine that the cohort did not have depression at baseline? (Cohort study)

CONFOUNDING

9. Did the study control for at least 3 important confounders? (e.g., age, gender, marital status, income, education)

Online Table DS1. Overview of social support and depression measures in the literature

	Children and adolescents % (n/total n)	Adults and general population % (n/total n)	Older adults % (n/total n)	All % (n/total n)
Social support measure				
Most used instruments	No instrument used more than once	ISEL: 12% (3/36)	No instrument used more than once	ISEL: 4% (4/100)
Number of studies using validated measure social support	45% (14/31)	33% (12/36)	21% (7/33)	33% (33/100)
Depression measure				
Most used instruments or modified version of the instrument	CDI : 25% (8/31) BDI : 23% (7/31) CES-D: 16% (5/31)	CES-D: 36% (13/36) CIDI: 19% (7/36) BDI: 11% (4/36)	CES-D: 52% (17/33) GMS: 9% (3/33)	CES-D: 35% (35/100)
Number of studies using validated measure of depression	81% (25/31)	89% (32/36)	100% (33/33)	90% (90/100)
Number of studies measuring dichotomous depression outcome	26% (8/31)	36% (13/36)	39% (13/33)	34% (34/100)

CES-D: Center for Epidemiologic Studies; CIDI-SF MD: Composite Diagnostic Interview Schedule Short Form for major depression; DSM-IV: Diagnostic and Statistical Manual
BDI: Beck's Depression Inventory; CDI: Children's Depression Inventory; CES-D: Center for Epidemiology Studies Depression scale; CIDI: Composite International Diagnostic Instrument; GMS: Geriatric Mental State; ISEL: Interpersonal Support Evaluation List

Online Table DS2. Data extraction of selected studies in children

First author, year, country	Study design	Sample description	Depression measurement	Social support measurement	Method of analysis	Covariates included in analysis	Association
Feldman, 1988, USA (2)	Cross-sectional	N=103 6th graders	Children's Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score ranging from 0-54.	Friendship Support Scale: 21 items adapted from pre-existing scales; 9 positive, 12 negative items; Score range 21-105. Family Adaptability and Cohesion Evaluation Scale (FACES III): 2 subscales for family cohesion and family adaptability; 10 items/subscale. Parent-Adolescent Communication Scale: 2 subscales for family openness in communication and extent of problems in communication; 10 items/subscale.	Linear regression	Sex, family structure, cohesion, adaptability, mother communication	Girls Cohesion: β -0.52, p<.001 Mother communication: β -0.05, NS Friendship support: β -0.40, p<.001 Boys Cohesion: β -0.52, p<.001 Mother communication: β -0.18, NS Friendship support: β -0.40, p<.001
Slavin, 1990, USA (3)	Cohort 8 months	N=333 Age range 14-18 Students from a predominantly white middle class high school	Children's Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score ranging from 0-54.	Perceived Emotional/ Personal Support Scale (PEPSS): 3 subscales on family, nonfamily, friends support; 4 items/subscale; Score range 1-4/subscale.	Linear regression	Baseline depressive symptoms; Stratified by sex	Girls Family: β -0.06, p>0.05 Adult : β 0.15, p<0.01 Friend : β -0.11, p<0.05 Boys Family: β 0.03, p>0.05 Adult : β -0.1, p>0.05 Friend: β 0.1, p>0.05
Rubin, 1992, USA (4)	Cross-sectional	N=300 Age range 13-19 Students	Beck Depression Inventory (BDI): Symptoms past 2 weeks; 21 items; Continuous score ranging from 0-63	Adolescent Friendship Inventory (AFI): 6 dimensions of adolescent peer relationships: social comfort, amount of time with friends, emotional support and intimacy, family support for peer relationship, loyalty-trust, and ambivalence-conflict;	Linear regression	Total stress, school performance, acting out, family cohesion and positive friendship	Boys Family cohesion: β -0.123, p>0.05 Positive friendship: β -0.169, p<0.05 Girls Family cohesion: β -0.296, p<0.001

				16 items; Continuous score. FACES II – Family Cohesion subscale: 16 items on perception of positive emotional involvement of family, time together, consultative decision making, common interests/ activities; Continuous score.			Positive friendship: β -0.296, p<0.001
Oldenburg, 1997, USA (5)	Cross-sectional	N=322 From 5th and 8th grades	Children's Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score ranging from 0-54 Depression Self-Rating Scale for Children (DSRS): Symptoms in past week; 18 items; Continuous score ranging from 18-54 Two scales summed to create index of depressive symptoms	Friendship Quality Questionnaire (FQQ): Quality of friendship with best friend; 5 subscales on validation and caring, conflict resolution, intimate exchange, companionship, conflict and betrayal; Total summed score.	Linear regression	Grade, gender, popularity	Friend quality: β -0.38, p<0.001
Patten, 1997, USA (6)	Cross-sectional	N=5,531 Age range 12-17 California Youth Tobacco Survey	Kandel and Davies scale; Symptoms in past 12 months; 6 items; Continuous score ranging from 0-18; Depression using cut-off score >13	Perceived Parental Support: Adolescent naming parents as someone they could talk to about problems; Categorized in 4 categories: both parents supportive; mother only supportive; father only supportive; neither parent supportive.	Logistic regression	Family structure, age, race; Stratified by sex	Reference group: both parents supportive in two-parent household Boys Two-parent household Father not supportive: OR 1.96 (1.00-3.87) Mother not supportive: OR 1.81 (0.62-5.26) Neither supportive: OR 2.72 (1.65-4.50)

							Single-mother household Mother supportive: OR 1.77 (1.76-4.16) Mother not supportive: OR 2.63 (1.23-5.61) Single-father household Father supportive: OR 1.77 (0.71-4.39) Father not supportive: OR 3.11 (1.06-9.12) Neither parent in household OR 1.29 (0.54-3.09) Girls Two-parent household Father not supportive: OR 2.32 (1.53-3.53) Mother not supportive: OR 3.58 (0.53-24.05) Neither supportive: OR 2.84 (1.86-4.33) Single-mother household Mother supportive: OR 1.62 (1.05-2.50) Mother not supportive: OR 3.55 (2.00-6.33) Single-father household Father supportive: OR 0.62 (0.27-1.44) Father not supportive: OR 5.55 (1.95-15.76) Neither parent in household OR 1.96 (0.96-4.03)
Sheeber, 1997, USA (7)	Cohort 1 year	N=420 (adolescent and mother pairs) Age range 14-20 Oregon Adolescent Depression Project	Adolescent depression construct using confirmatory analysis which combines BDI score, CES-D score, suicidal ideation score Continuous score	Family support construct using confirmatory analysis from the following scales: <u>Family Environment Scale (Cohesion subscale)</u>: 5 items, administered to both adolescent and mother Parent Attitude Research Instrument (PARI) & Conflict Behavior Questionnaire (CBQ) derived 6-item scale on maternal support completed by adolescent.	Structural equation modeling	Depression score at baseline	Familial support: β -0.145, $p<0.05$

				Family conflict construct: 5-item maternal conflict scale derived from CBQ and PARI + mother and adolescent reports of areas of disagreement.			
Donnelly, 1999, Ireland (8)	Cross-sectional	N=887 Age range 11-15 Students	Children's Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score ranging from 0-54	Family Relationships Index (FRI): 2 subscales on family cohesion and family conflict; 9 items/subscale; Continuous score.	Linear regression	Family cohesiveness, unknown control for success, negative impact, family conflict, internality for failure (cognitive domain), powerful others for failure, internality for success, unknown control for failure	Family cohesiveness: β -1.67, p<0.05 Family conflict: β 0.71, p<0.05
Hussong, 2000, USA (9)	Cross-sectional	N=456 Age range 16-19 Students attending 2 schools from white farming or working class families	Beck Depression Inventory (BDI): Symptoms in past 6 months; 20 items; Continuous score ranging from 0-60	Number of close friends Positive friendship quality: using 12-item subscale of Network of Relationships Inventory (measures self-disclosure/ intimacy, companionship, loyalty/reliable alliance, affection) Negative friendship quality: using mean of 12-item Conflict scale (measures frequency, duration, intensity and diversity of conflict topics) and 17-item Peer Control scale (measures overt behavioral/verbal control, covert behavioral/verbal control)	Linear regression	Social desirability, gender	Number of close friends: β -0.05, p>0.05 Positive friendship: β -0.01, p>0.05 Negative friendship: β 0.06, p>0.05
Kaltiala-Heino, 2001, Finland (10)	Cross-sectional	N=16,464 Age range 14-16 Students	Beck Depression Inventory – Short Form (BDI-SF): Symptoms in past 2 weeks; 13 items; Continuous score ranging from 0-39; Depression using cut-off score >8	Perceived support from parents: 1 item per parent; Dichotomized as no support vs. some support	Logistic regression	Age, sex, grade at school, region, degree of urbanisation of living area, education of parents, years since moving to current residential area, unemployment of parent(s) and family structure	Girls Lack of support from parents: OR 3.7 (3.1–4.4) From teachers: OR 2.1 (1.7–2.5) From peers: OR 3.1 (2.4–3.9) Boys Lack of support from parents: OR 2.6 (2.1–3.3) From teachers: OR 2.5 (2.0–3.1) From peers:

							OR 1.9 (1.5–2.4)
Marcotte, 2002, Canada (11)	Cross-sectional	N=550 Mean age 15 Students from 2 public schools in communities with high unemployment	Beck Depression Inventory (BDI) – French version: Symptoms in past 2 weeks; 21 items; Continuous score ranging from 0-63	Perceived Social Support – Family: Level of satisfaction regarding support, information and feedback needs that are met by the family; 20 items; Continuous score ranging from 20-120.	Linear regression	Gender, age, dysfunctional attitudes related to success, dependency and self-control	Family support: β -0.32, p<0.001
Colarossi, 2003, USA (12)	Cohort 1 year	N=217 Age range 15-18 Students from suburban Midwestern communities	Symptoms Checklist-Revised: Symptoms in past-month; 9 items; Continuous score ranging from 1-7	Derived from Iowa Youth and Family Inventory: Perceived frequency of functional social support from mother, father, friend 6 items Score range 6-30 Perceived teacher support 6 items Score range 0-42	Structural equation modeling	Depression and self-esteem score at baseline; Stratified by sex	All Mother support: β -0.14, p<0.05 Father support: β 0.11, NS Teacher support: β -0.13, p<0.05 Peer support: β -0.13, p<0.05 Girls Mother support: β -0.17, p<0.05 Father support: β 0.06, NS Teacher support: β -0.18, p<0.05 Peer support: β -0.14, NS Boys Mother support: β -0.08, NS Father support: β 0.18, NS Teacher support: β -0.03, p<0.05 Peer support: β -0.13, NS
Cornwell, 2003, USA (13)	Cohort 1-2 years	N=11,835 Mean age 16 National Longitudinal Study of Adolescent Health	Index of questions from CES-D: Symptoms in past week; 19 items; Sum score divided by number of items (logged)	Parent support: 8 items selected from the in-home interview that capture "closeness with parents" Score range 1-5 Logged score Friend support:	Linear regression	Baseline depression score, parental support change, sex, age, race/ethnicity; Used study weights to account for complex study design	Parent support (logged score): β -0.116, p<0.001 Friend support (logged score): β -0.072, p<0.001

				1 item asking "How much do you think your friends care about you?" Score range 1-5 Logged score			
Galambos, 2004, Canada (14)	Cohort 4 years	N=1,322 Age range 12-19 National Population Health Survey (NPHS)	Composite International Diagnostic Interview (CIDI): Symptoms in past year; 9 items; Major depressive episode (yes/no) determined from DSM-IV criteria	Perceived social support: 4 items asking if person has someone to confide in, to count on for help, to count on for advice, who makes them feel loved Score range 0-4	Logistic regression	Sex, BMI, physical activity level, smoking	Perceived social support: OR 0.90, NS
Stice, 2004, USA (15)	Cohort 2 years	N=492 Age range 11-15 Female students	Affective Disorders and Schizophrenia for School-Age Children: Current disorders; Semi-structured interview; Cases defined as having sub-threshold or threshold diagnostic criteria for major depression	Network of Relationships Inventory: Measures companionship, intimacy, affection, admiration and reliable alliance from parents and peers 12 items	Latent growth curve and logistic regression	Depression symptoms at baseline	Results from LGC Parental support : β -0.03 (-0.053, -0.07) Peer support: β -0.009 (-0.033, 0.015) Results from logistic regression among non-depressed girls at baseline Parental support: OR 0.46, p=0.001 Peer support: OR 0.65, p=0.11
La Greca, 2005, USA (16)	Cross-sectional	N=421 Age range 14-19 Students	Beck Depression Inventory (BDI) – Revised: Symptoms in past 2 weeks; 21 items; Continuous score ranging from 0-63	Network of Relationship Inventory – Revised: Measures 9 positive qualities in relationships (companionship, affection, disclosure, nurturance, instrumental aid, approval, support, reliable alliance, and satisfaction) and 5 negative qualities (conflict, criticism, exclusion, dominance, pressure) Each quality is measured with 3 items Total 42 items Summed score for positive and negative qualities	Linear regression	Sex, general peer relations, school social status (average, popular/jock, burnout/alternative) relational victimization, overt victimization, dating	Best friend Positive quality score: β -0.04, p>0.05 Negative quality score: β 2.14, p<0.05 Romantic relationship Positive quality score: β -0.69, p>0.05 Negative quality score: β 3.52, p<0.05
Bosacki, 2007,	Cross-	N=7,290	Center for	Inventory of Parent and Peer	Linear	Gender, direct and	Friendship support:

Canada (17)	sectional	Age range 13-18 Students	Epidemiologic Studies Depression Scale (CES-D): Symptoms in past week; 20 items; Continuous score Range 0-60	Attachment: Assesses trust, communication and alienation in friendships 18 items Summed score	regression	indirect victimization, social isolation, friendship trust, friendship alienation, friendship conflict	β 0.00, p>0.05
Hall-Lande, 2007, USA (18)	Cross-sectional	N=4,746 Age range 11-18 Students from 31 schools in a large metropolitan area Eating Among Teens (EAT) Project	Depression scale: Symptoms in past year; 6 items; Continuous score ranging from 6-18	Single survey item, "Do you have one or more close friends you can talk to about your problems?" A “no” response categorized as socially isolated	Linear regression	Social isolation, race, school level, socioeconomic status, BMI, family connectedness, GPA, school connectedness	No close friends (vs one or more close friends): Boys β 0.81, p<0.001 Girls β 0.66, p=0.01
Klima, 2008, USA (19)	Cohort 2 years	N=247 From 4th grade followed until 6th grade UCLA Family Development Study	Children’s Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score ranging from 0-54	Social Support Scale for Children – Close Friend Support subscale: Assesses whether children perceive that they have a caring, understanding friend to whom they can disclose problems and feelings; 6 items; Averaged score on each item; Range 1-4	Linear regression	Baseline depression score	Close friend support: β -0.03, p>0.05
Ellonen, 2008, Finland (20)	Cross-sectional	N=95,103 Age range 14-16	Beck Depression Inventory (BDI) – Finnish version: Symptoms in past 2 weeks; 13 items; No or mild depression, (scores 0-7) vs. moderate or severe depression (scores 8-36)	Perceived classmate support: 2 items Perceived teacher support: 5 items Derived from factor analysis of 7 statements (e.g., ”Teachers encourage me to express my own opinion in class”) Scores recoded as never, sometimes, often/always	Multilevel logistic regression	Sex, age, family structure, parental education, parental unemployment	Perceived teacher social support (ref: often/always) Sometimes: OR 2.5 (2.1–2.9) Never: OR 8.1 (7.7–8.5) Perceived classmate support (ref: often/always) Sometimes: OR 1.7 (1.4–2.0) Never: OR 3.4 (3.0–3.8)
Ge, 2009, USA (21)	Cohort 3 years	N=756 (378 pairs of siblings) Age range 9-18 Nonshared Environment in Adolescent	Children’s Depression Inventory (CDI): Symptoms in past 2 weeks; 27 items; Continuous score	Parent-Child Relationship Scale: For each child, mothers and fathers independently 4 items include “how close are you to your child?”, “how loving are you to your child?”, “how much does your child understand	Multilevel linear regression	Sex, age, depressive symptoms at baseline, family events	Closeness to mother: β -0.32, p<0.001 Closeness to father: β -0.24, p<0.001

		Development (NEAD) Project	ranging from 0-54	you?", and "how much do your child enjoy spending time alone with you?" Continuous score Score range 4-20 per parent			
Murberg, 2009, Norway (22)	Cohort 1 year	N=198 Age range 16-18 Students from one high school	7 depression-related items selected from the 25-item version of the Hopkins Symptoms Checklist; Past week symptoms; Continuous score ranging from 7-28	Teacher support: 8 items Continuous score Classmate support: 4 items Continuous score	Linear regression	Depressive score at baseline, stressful life events, classmate and teacher support	Teacher support: Standardized β -0.147, p=0.017 Classmate support: Standardized β -0.031, p>0.05
Piko, 2009, Hungary (23)	Cross-sectional	N=881 Age range 14-20	Children's Depression Inventory (CDI) – Short version: Symptoms in past 2 weeks; 8 items; Continuous score; Weighted by a factor of 3.375 for comparison with original CDI score ranging from 0-54	Perceived Social Support Scale: Subscale for mother and father 6 items/subscale Continuous score Range from 6-24 per subscale Single item measuring how often adolescent talked to parent about personal problems, score 1 (never) to 5 (always) Single item measuring how often adolescent talked to teacher about personal problems, score 1 (never) to 5 (always)	Linear regression	Social support from father, social support from mother, dinner with family, talking about problems with parents, high academic achievement, talking about problems with teacher, happy with school; Stratified by sex	Boys: Social support from father: β -0.23, p<0.001 Social support from mother: β -0.04, p>0.05 Talking about problems with parents: β -0.01, p>0.05 Talking about problems with teachers: β -0.08, p>0.05 Girls: Social support from father: β -0.15, p<0.001 Social support from mother: β -0.26, p<0.01 Talking about problems with parents: β -0.22, p<0.001 Talking about problems with teachers: β 0.13, p<0.05 (Standardized coefficient)
Rueger, 2010, USA (24)	Cohort About 8 months	N=636 Students from 7th and 8th grades in a large suburban school	Behavioral Assessment System for Children, Version 2, Adolescent Version:	Child and Adolescent Social Support Scale (CASSS): Rates frequency with which students perceive supportive behaviors from parents, teachers, classmates, close	Linear regression	All 5 forms of social support were entered simultaneously in model; Stratified by gender	Girls Parent support: β -0.22, p<0.01 Teacher support: β -0.04, NS Classmate support:

			Depression subscale; Depressive symptoms in the past several months; Measures depressed feelings, negative affect, sadness and loneliness	friends and the school; 60 items; Score range 12-72			β -0.10, NS Friend support: β -0.03, NS School support: β 0.04, NS Boys Parent support: β -0.16, p<0.01 Teacher support: β 0.12, p<0.05 Classmate support: β -0.14, p<0.05 Friend support: β 0.01, NS School support: β 0.02, NS
Samm, 2010, Estonia (25)	Cross-sectional	N=4,389 Ages 11, 13 and 15 Health Behavior in School-Aged Children (HBSC) study	Single item (yes/no): "Over the past 12 months, have you sometimes, daily for 2 weeks or more at a time, felt so sad that you have given up your usual activities?"; Past year measure	Single item (easy/difficult): "How easy is it for you to talk about your worries to the following people" List of people included mother and father	Logistic regression	Gender, family economic deprivation, family communication and family structure; Stratified by age	Reference: difficult communication with parent Age 11 years Mother communication: Easy: OR 0.5 (0.29-0.89) No mother: OR 0.3 (0.08-1.16) Father communication: Easy: OR 0.6 (0.41-0.87) No father: OR 0.7 (0.40-1.37) Age 13 years Mother communication: Easy: OR 0.6 (0.38-0.84) No mother: OR 0.4 (0.10-1.37) Father communication: Easy: OR 0.6 (0.46-0.85) No father: OR 0.7 (0.41-1.09) Age 15 years Mother communication: Easy: OR 0.8 (0.56-1.11) No mother: OR 0.6 (0.23-1.54) Father communication: Easy: OR 0.6 (0.43-0.73) No father: OR 0.7 (0.48-1.10)
Auerbach, 2011, Canada (26)	Cohort 6 months	N=258 Age range 12-18 Students from one high school	Center for Epidemiologic Studies Depression Scale	Social Support Scale for Children and Adolescents (SSSCA): Assesses support in the domains of peer, parent, and classmate	Multilevel linear regression	Age, gender, initial depressive symptoms; total, peer, classmate, and parent social	Total social support : β -1.58, p<0.01 Peer social support :

			(CES-D): Symptoms in past week; 20 items; Continuous score ranging from 0-60	relationships 6 items/subscale Range score from 0-18/ subscale Range score 0-54 for total social support		support	β -0.28, p>0.05 Classmate social support β -1.73, p<0.001 Parent social support β -1.34, p<0.01
Smojver-Azic, 2011, Croatia (27)	Cross-sectional	N=1,191 Age range 14-19 Students who live with both parents	Depressive Symptoms Scale (DSS): Developed by authors; Current symptoms; 11 items; Continuous score ranging from 0-44	Parental Acceptance-Rejection Scale (PARS): Parental warmth and affection; 6 items; Score range 0-18 Parental aggression and hostility; 5 items; Score range 0-15	Linear regression	Family activities, parental conflict strategies, warmth/affection – mother/father, aggression/hostility – mother/father; stratified by sex	Boys Warmth/affection – mother: β -0.04, p=0.402 Warmth/affection – father: β 0.08, p=0.103 Aggression/hostility – mother: β 0.22, p<0.001 Aggression/hostility – father: β 0.03, p=0.535 Girls Warmth/affection – mother: β 0.08, p=0.112 Warmth/affection – father: β -0.16, p=0.002 Aggression/hostility – mother: β 0.20, p<0.001 Aggression/hostility – father: β 0.05, p=0.313
Khatib, 2013, UK (28)	Cohort 2 years	N=821 Age range 11-14 Research with East London Adolescents Community Health Survey (RELACHS)	Short Moods and Feelings Questionnaire: Symptoms in past 2 weeks; 13 items; Score range 0-36; Depression using cut-off score >8	Multidimensional Scale of Perceived Social Support: Assessed support from family, friends and special person 12 items Score range 0-84 Split into tertiles	Logistic regression	Age, gender, interaction between age and gender, eligibility for free school meals, parental employment status, parental ownership of vehicle, Strengths and Difficulties Questionnaire score at baseline, country of birth, length of time in the UK, ethnicity	Reference: high support Low family social support: OR 2.25 (1.43, 3.54) Low levels of support from friends: OR 1.22 (0.80, 1.85) Low levels of support from special person: OR 1.32 (0.85, 2.03) Low levels of total support: OR 1.51 (0.97, 2.33)
Tummala-Narra, 2013, USA (29)	Cross-sectional	N=707 Age range 12-18 Students from an urban area	Center for Epidemiologic Studies Depression Scale (CES-D): Symptoms in past week;	2 item from the Polling Justice Survey: Perceived support from adults at home: 1 item; response on 4 point Likert-type scale	Linear regression	Stratified by sex and SES	Stratified by sex Perceived support from adults at home Boys: β -0.75, p>0.05 Girls:

			20 items; Continuous score ranging from 0-60	Perceived support from adults at school: 1 item; response on 4 point Likert-type scale			β -3.02, p<0.01 Perceived support from adults at school Boys: β -0.53, p>0.05 Girls: β -0.06, p>0.05 Stratified by SES Perceived support from adults at home Higher SES: β -2.01, p<0.05 Low SES: β -2.08, p<0.01 Perceived support from adults at school Higher SES: β -1,50, p>0.05 Low SES: β 0.49, p>0.05
Galand, 2013, Belgium (30)	Cross-sectional	N=400 Age range 11-16	Depressive symptoms: 10 items; Current; 5-point Likert scale (0 = never to 4 = very often); Score 0-20	Teacher support: 8 items; 5-point Likert scale (0 = totally false to 4 = totally true) Peer support: 8 items; Assess peer acceptance/ support; 5-point Likert scale (as above) Parental support: 8 items; Parental availability/family climate; 5-point Likert scale (as above)	Linear regression	Gender, grade retention, peer victimization, parental support, teacher support, peer support	Parental support β -0.19, p<0.001 Teacher support β -0.25, p<.0001 Peer support β -0.01, p>0.05
Colman, 2014, Canada (31)	Cohort, 14 years, 6 waves	N = 1,137 Age range 16-17	Composite International Diagnostic Interview – Short Form (CIDI-SF): 9 items; Past-year; Major depressive	<u>Social support</u>: 4 items; Scale 0-4, dichotomized into high (4) and low (0-3);	Logistic regression	Gender, severity of depressive symptoms at baseline, childhood traumatic events, SES (high/middle vs. low family income)	Social support on depression: OR 0.76 (0.43-1.34)

			episode using DSM-IV criteria				
Minkkinen, 2014, Finland (32)	Cross-sectional	N = 502 Age range 9-13	Children's Depression Inventory – Short Form (CDI-SF): 10 items; symptoms past two weeks; 3-point Likert scale (0-2); Score 0-20	Teacher social support: 3 items; 3-point scale; Peer social support: 1 item, "If you are happy or sad with whom are you able to talk?"; no friends = poor support Family protective factors: Having parents to talk to (1 item), parental presence (1 item), parent-child activities (1 item)	Linear regression	Gender, class size, immigrant family, money at home, country, family protective factors	<u>Finland</u> Family protective factors: Parents to talk to β -0.00, ns Parental presence β -0.06, ns Parent-child activities β -0.07, ns School variables: Teacher social support (sq. root) β **-0.12**, p<.05 Peer social support β -0.01, ns <u>Norway</u> Family protective factors: Parents to talk to β -0.04, ns Parental presence β -0.05, ns Parent-child activities β -0.09, ns School variables: Teacher social support (sq. root) β **-0.17**, p<.01 Peer social support β -0.11, ns

Online Table DS3. Quality assessment of selected studies in children

First author, year, country	Study participants represent study base	People with different social support drawn from the same population	Overall participation rate > 60%	Social support assessed from validated tool	Depressive symptoms assessed from validated tool	Social support and depressive symptoms assessed in same way for entire sample	Adjustment for baseline depression / depressive score*	Bias due to lost to follow-up*	Controlled for at least three important confounders	Most important design flaw(s)	Overall quality
Feldman, 1988, USA (2)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Slavin, 1990, USA (3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Possible. 50% attrition.	No	Confounder control, potential selection bias, short follow-up period (8 months)	Low
Rubin, 1992, USA (4)	Yes	Yes	No	Yes	Yes	Yes	N/A	N/A	Yes	Low participation rate (27%)	High
Oldenburg, 1997, USA (5)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Patten, 1997, USA (6)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Sheeber, 1997, USA (7)	Yes	Yes	Yes	No	No	Yes	Yes	Unlikely	No	Validity of social support and depression scales, confounder control	Low
Donnelly, 1999, Ireland (8)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	No	Confounder control	Moderate
Hussong, 2000, USA (9)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	No	Confounder control	Moderate
Kaltiala-Heino, 2001, Finland (10)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Marcotte, 2002, Canada (11)	Somewhat	Yes	Unable to tell	Yes	Yes	Yes	N/A	N/A	Yes	Generalizability (sample from high unemployment rate area)	Moderate

Colarossi, 2003, USA (12)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	No	Confounder control	Moderate
Cornwell, 2003, USA (13)	Yes	Yes	Unable to tell	No	Yes	Yes	Yes	Unable to tell	Yes	Validity of social support scale, missing information on cohort selection and follow-up rate	Moderate
Galambos, 2004, Canada (14)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
Stice, 2004, USA (15)	Somewhat	Yes	No	Yes	Yes	Yes	Yes	Unlikely	No	Confounder control, low participation rate (56%)	Moderate
La Greca, 2005, USA (16)	Yes	Yes	No	Yes	Yes	Yes	N/A	N/A	Yes	Low participation rate (50%)	High
Bosacki, 2007, Canada (17)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Hall-Lande, 2007, USA (18)	Yes	Yes	Yes	No	No	Yes	N/A	N/A	Yes	Validity of social support and depression scale	Moderate
Klima, 2008, USA (19)	Yes	Yes	No	Yes	Yes	Yes	Yes	Unlikely	No	Confounder control, low participation rate	Moderate
Ellonen, 2008, Finland (20)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Ge, 2009, USA (21)	Somewhat	Yes	Yes	Yes	Yes	Yes	Yes	Likely	Yes	Potential for selection bias, generalizability	Moderate
Murberg, 2009, Norway (22)	Somewhat	Yes	Yes	No	No	Yes	Yes	Unlikely	Yes	Validity of social support and depression scales	Moderate
Piko, 2009, Hungary (23)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	High
Rueger, 2010, USA (24)	Yes	Yes	Yes	Yes	Unable to tell	Yes	No	Unable to tell	No	Confounder control, missing information	Low

										follow-up rates, no control for baseline depression	
Samm, 2010, Estonia (25)	Yes	Yes	Yes	No	No	Yes	N/A	N/A	Yes	Validity of social support and depression scales	Moderate
Auerbach, 2011, Canada (26)	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Likely	Yes	Potential selection bias	High
Smojver-Azic, 2011, Croatia (27)	Yes	Yes	Unable to tell	No	No	Yes	N/A	N/A	No	Validity of social support and depression scales, confounder control	Low
Khatib, 2013, UK (28)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Likely	Yes	Potential selection bias	High
Tummala-Narra, 2013, USA (29)	Yes	Yes	Yes	Yes	No	Yes	N/A	N/A	No	Validity of social support scale, confounder control	Low
Galand, 2013, Belgium (30)	Yes	Yes	Yes	N/A	No	Yes	No	Yes	Yes	Validity of depression and social support scales	Moderate
Colman, 2014, Canada (31)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		High
Minkkinen, 2014, Finland (32)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Validity of social support scale	Moderate

* Assessed in cohort studies only
N/A: Not applicable

Online Table DS4. Data extraction of selected studies in adults

First author, year, country	Study design	Sample description	Depression measurement	Social support measurement	Method of analysis	Covariates included in analysis	Association
Golding, 1989, USA (33)	Cross-sectional	N=1,294 Non-Hispanic white participants Age range 18 + Los Angeles Epidemiologic Catchment Area (LA-ECA) project	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	Social Support Scale (Schafer, 1981): Support from spouse, work supervisor and co-workers; Asks whether person is reliable, shows caring, can be confided in; Score 0-4/item; Score range 0-12/type of support	Stepwise linear regression	Marital events, employment events, employment strain, marital support, supervisor support, coworker support, gender, age, job status, missing data variable; Stratified by employment status and marital status	Marital support (x 10^3): Married employed: β -0.22, p<0.01 Married unemployed: β -0.22, p<0.001 Work supervisor support: Married employed: β -0.02, p<0.01 Unmarried employed: β -0.02, NS Coworker support: Married employed: β -0.01, NS Unmarried employed: β -0.01, NS
Ross, 1989, USA (34)	Cross-sectional	N=809 Age range 18-85	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past week symptoms; Continuous score ranging from 0-42	Perceived support: Sense of having a supportive person to talk and turn to in times of trouble; 2 items; Score range 2-10	Linear regression	Age, education, family income, married, white, religion, perceived control, problem solving, talking to others	Perceived support: β -1.184, p<0.001
Franks, 1992, USA (35)	Cross-sectional	N=83 Age range 40+ Family practice patients	SCL-90 – Depression Subscale: Past week symptoms; 13 items; Continuous score ranging from 0-52	Interpersonal Support Evaluation List (ISEL): 3 social support functions: belonging, appraisal, tangible support (self-esteem excluded); 10 items/scale; Range 10-30/scale with higher score representing lower support	Linear regression	Life events, emotional involvement, perceived criticism	Appraisal social support: β 2.60, NS Other types of support: NS
Okun, 1998, USA (36)	Cross-sectional	N=1,301 Young adults Age range 28-59 N=452 Older adults	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past week	Positive social exchanges: 2 items; Indicate how much each of 3 sources: 1) make them feel loved; 2) is willing to listen to talk about problems; Range 2-10	Linear regression	Age, gender, black, education, number of contacts with friends or family members, number of contacts with child, functional health status; positive	Older adults: *Positive social exchange with*: Spouse: β -0.17, p<0.01 Children: β -0.25, p<0.001 Friend/relative:

		Age range 60-92 N=849 Have spouse, at least one child 17+ years old living outside home Americans Changing Lives (ACL) Survey	symptoms; 11 items; Continuous score ranging from 11-33	<u>Negative social exchanges</u>: 2 items; Indicate how much each of 3 sources: 1) makes too many demands; 2) is critical of them or what they do; Sources were spouse, children, relative/friend; Range 2-10		social exchange with spouse, children and other friend/relative; negative social exchange with spouse, children other friend/relative; Stratified by age group	β -0.21, p<0.001 *Negative social exchange with*: Spouse: β 0.23, p<0.001 Children: β 0.02, NS Friend/relative: β 0.21, p<0.05 <u>Younger adults</u>: *Positive social exchange with*: Spouse: β -0.54, p<0.001 Children: β -0.01, NS Friend/relative: β -0.12, NS *Negative social exchange with*: Spouse: β 0.26, p<0.05 Children: β 0.04, NS Friend/relative: β 0.23, NS
Lin, 1999, USA (37)	Cross-sectional	N=1,261 Mean age 47 Adults from Albany Survey	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Perceived/actual instrumental and expressive support</u>: Derived from factor analysis and 4 scales measuring: Perceived crisis support, 10 items; Actual crisis support, 10 items; Perceived routine support, 10 items; Actual routine support, 10 items	Linear regression	Gender, age, income, undesirable life events, participation in community organizations, number of weekly contacts, intimate relationships	Perceived instrumental support: β 0.03, NS Actual instrumental support: β -0.35, NS Perceived expressive support: β -0.63, p<0.01 Actual expressive support: β -0.10, NS
Bullers, 2000, USA (38)	Cross-sectional	N=488 Age range 19-89 Randomly selected residents of North Carolina	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past month symptoms; 7 items; Mean Continuous score ranging from 1-4	<u>Measure of 4 social ties</u>: Emotional support (2 items), instrumental support (2 items), number of close ties (max. 35), and demanding social ties (2 items)	Linear regression	Age, education, sex	<u>All</u> Emotional support: β -0.207, p<0.01 Instrumental support: β -0.058, NS Demanding social ties: β 0.355, p<0.01 Number of close ties: β -0.090, p<0.05 <u>Women</u> Emotional SS:

							β -.221, p<.01 Instrumental SS: β -.025, NS Demanding ST: β .404, p<.01 Number of close ties: β -.073, NS <u>Men</u> Emotional SS: β -.210, p<.01 Instrumental SS: B -.135, p<.05 Demanding ST: β .245, p<.01 Number of close ties: β -.114, NS
Peirce, 2000, USA (39)	Cohort 7 years	N=1,192 Age range 18+ (baseline)	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past month symptoms; 20 items; Continuous score ranging from 20-80	<u>Interpersonal Support Evaluation List (ISEL)</u>: 20 items from the original 40; 4 social support functions: belonging, appraisal, tangible, and self-esteem support; Range 1-4 per item	Structural equation modeling	Age, race, sex, education, family income	Social support at time 1 on depression at time 2: Standardized β -0.13, p<0.001 Social support at time 2 on depression at time 3: Standardized β -0.09, p<0.01
Wade, 2000, USA (40)	Cohort About 5 years	N=1,033 (Wave 1) N=854 (Wave 2) Age range 17-54 Caucasian female twin pairs without chronic depression at baseline	Structural Clinical Interview (SCID): Current; Diagnosis of MD was made by computer algorithm using questions from the Structured Clinical Interview for DSM-III-R	<u>Institute for Social Research Social Interaction Scale</u>: 24 items; 8 dimensions including spouse problems, spousal support, relative problems, relative support, friend problems, friend support, confidants, and social integration; Spouse items on 5-poin-scale"; All other items on 4-point scale.	Generalized Estimating Equation (GEE) Modeling and Structural equation modeling (SEM)	None	<u>GEE estimates for depression at times 1 and 2</u> Spousal support: OR 0.71, p<0.001 Lack of spouse problems: OR 0.66, p<0.001 Relative support: OR 0.81, p<0.001 Lack of relative problems: OR 0.65, p<0.001 Friend support: OR 0.96, NS Lack of friend problems: OR 0.80, p<0.001 Confidants: OR 0.98, NS Social integration: OR 1.07, NS

							<u>SEM estimates for social support at time 1 and depression at time 2</u> Lack of spouse problems: Standardized β -0.10, p<0.05 Social integration: Standardized β -0.04, p<0.05 All other subscales: NS
Wade, 2000, Canada (41)	Cross-sectional	N=16,291 Age range 18+ National Population Health Survey (NPHS)	Composite International Diagnostic Interview (CIDI) – Short Form for Depression: Past year; 9 items; Depression identified if answered "yes" to 4+ symptoms in addition to primary stem items	<u>Four dimensions of perceived social support</u>: Respondents were prompted to answer yes or no to 4 questions asking whether they had someone: who they could confide in, count on, who could give them advice, and who makes them feel loved	Logistic regression	Age, sex, marital status, income adequacy, education, province, immigrant status, work status, work classification, social stressors, health status, self-esteem, mastery	Social support: β -0.109, NS
Aro, 2001, Finland (42)	Cross-sectional	N=1,851 Age range 48-50 Women	Beck Depression Inventory (BDI): Symptoms past 2 weeks; 21 items; Continuous score ranging from 0-63	<u>Social support</u>: 6 items; Number of friends, frequency of meeting friends, satisfaction with received support, and quality with intimate relationships, frequency of support given, and having someone close to discuss problems with	Linear regression	Marital status, number of household members, education, urbanization, socioeconomic status, income, work status, self-rated health, number of doctors' appointments, number of sick days, diagnosed disease during past 12 months; Sample restricted sex (female only) and age (48-50 years old)	Number of friends: β -0.03, NS Frequency of meeting friends: β 0.06, p<0.05 Satisfaction with received support: β 0.21, p<0.001 Quality with intimate relationships: β 0.16, p<0.001 Frequency of support given: β -0.05, p<0.01 Having someone close to discuss problems: β 0.06, p<0.05
Elliot, 2001, USA (43)	Cross-sectional	N=395 Age range 45-74 Urban adults	Center for Epidemiologic Studies Depression Scale (CES-D) – Short Form:	<u>Subjective social support</u>: Measured by asking respondents if they agree that "you have someone you can turn to for support and understanding when things get rough," and "you have	Linear regression	Female, socioeconomic status, age, married, employed, kids in home, financial strain, marital conflict, neighborhood	Subjective social support: β 2.047, NS Social integration: β 2.059, NS

			Past month symptoms; 10 items; Continuous score	someone you really like to talk to" (yes/no) <u>Social integration</u>: Measured by frequency of talking on the phone, going out with or visiting friends in each other's homes, and attendance at religious or non-religious meetings		dangerous, life events, fatalism, mastery	
Patten, 2001, Canada (44)	Cross-sectional	N=2,542 Age range 18+ Calgary household residents	Composite International Diagnostic Interview for Depression – Short Form (CIDI-SF): Past year; 9 items; Depression identified if answered "yes" to 4+ symptoms in addition to primary stem items	4 items; Anyone to confide in, to count on in a crisis situation, to count on for advice in making important decisions, to make them feel loved and cared for; 4-point scale	Logistic regression	None	No one to confide in about private feelings or concerns: PR 2.22 (1.68, 2.93) No one to count on in a crisis situation: PR 2.57 (1.93, 3.43) No one to count on for advice in making important decisions: PR 2.48 (1.95, 3.16) No one in their life to make them feel loved and cared for: PR 2.96 (2.26, 3.86)
Segrin, 2003, USA (45)	Cross-sectional	N=325 Age range 19-85	Beck Depression Inventory – Short Form (BDI-SF): Symptoms past 2 weeks; 13 items; Continuous score	<u>Social Support-Friend Scale (PSS-FR)</u> and the <u>Perceived Social Support-Family Scale (PSS-FA)</u> (Procidano & Heller, 1983): 20 items per index, included family and spouse Spousal support measured using <u>House and Kahn's (1985) Positive Support Index</u>: 2 items Contact with family and friends: Asks how much time they spend with friends or relatives; 5-point Likert scale	Linear regression	Age	Social support from family: β -0.30, p<0.01 Social support from friends: β -0.33, p<0.001 Social support from spouse: β -0.40, p<0.001 Contact with family member: β -0.15, p<0.01 Contact with friends: β -0.32, p<0.001
Shaw, 2004, USA (46)	Cross-sectional	N=2,783 Age range 25-74 National Survey of Midlife	Depressive symptoms; Past 30 days; 6 items; 5-point Likert	<u>Early parental support</u>: 2 subscales: 1) availability of support from mother and 2) from father; 6 items/subscale;	Linear regression	Gender, education, race, age, childhood physical health, childhood mental health	Early parental support: β -0.207, p<0.001 Family emotional support: β -0.042, p<.05

		Development in the United States	scale; Continuous score ranging from 5-30	Sum score Range 6-24 <u>Current emotional support</u>: Regarding family and friends (4 items each); Scored on 4-point Likert scale; Separate scores for family and friend support <u>Negative interaction</u>: Regarding family and friends (4 items each); Scored on 5-point Likert scale (1 – never to 4 – often); Separate scores for family and friends			Friend emotional support : β 0.031, NS Family negative interaction: β 0.075, p<.001 Friend negative interaction : β 0.026, NS
Kendler, 2005, USA (47)	Cohort 1 year	N=1,057 pairs Age range 21-58 (time 2) Opposite-sex dizygotic twins Virginia Adult Twin Study of Psychiatric and Substance Use Disorders	Depression diagnosis: 14 items representing 14 depressive symptoms not caused by physical illness; Past year; Diagnosis of depression from computer algorithm	<u>Social support</u>: 24-item scale; Measures frequency of attending social gatherings, frequency of contact with co-twin, friends and other relatives, quality of social support received (emotional and instrumental support), presence and number of confidantes; Used factor analysis to estimate global support	Conditional logistic regression	Modelling controls for shared genetic and shared environmental factors; Stratified by sex	<u>Women</u> *Global support*: OR 0.60 (0.51-0.74), p<0.0001 *Co-twin*: OR 0.77, p<0.01 *Other relatives*: OR 0.68, p<0.0001 *Friends*: OR 0.84, p<0.05 *Parents*: OR 0.65, p<0.0001 *Spouse*: OR 0.79, p<0.01 *Children*: OR 0.85, NS *Social integration*: OR 0.80, p<0.05 <u>Men</u> *Global support*: OR 0.95 (0.78-1.14), NS *Co-twin*: OR 1.14, NS *Other relatives*: OR 0.96, NS *Friends*: OR 0.98, NS *Parents*: OR 0.88, NS *Spouse*: OR 1.17, NS

							Children: OR 1.08, NS *Social integration*: OR 0.93, NS <u>Women and men combined</u> OR 0.74, p<0.01
Dalgard, 2006, Multinational (Finland, England, Ireland, Spain, Norway) (48)	Cross-sectional	N=8,787 Age range 18-64 ODIN (Outcome of Depression in Europe Network) Project	Beck Depression Inventory (BDI): Symptoms past 2 weeks; 21 items; Range 0-63; Depression cut-off score >12	<u>Oslo Support Scale</u>: Questions about number of close confidantes, sense of concern or interest from other people, and relationship to neighbours; Categorized as 'Lots of help', 'Some help' and 'No help'	Logistic regression	Age and country; Stratified by sex	Compared to "Lots of help" <u>Women</u>: Some help: OR 2.7 (2.1, 3.5) No help: OR 4.8 (3.4, 6.8) <u>Men</u>: Some help: OR 2.2 (1.6, 3.1) No help: OR 2.4 (1.6, 3.5)
Fiori, 2006, USA (49)	Cross-sectional	N=719 428 middle-aged (age 35-59) and 291 older adults (age 60+) Social Relations and Mental Health over the Life Course Study	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Social networks</u>: Number of people in network; Network mapping procedure Respondents were asked a series of questions concerning the quality of their relationships with spouse, (closest) child, and same-sex best friend; Composite measures of positive and negative quality of family relations were constructed by averaging the positive and negative items	Linear regression	Age, sex, race, education, health, and family composition; Stratified by age	<u>Middle-aged adults</u> Positive family: β -4.90, p<0.01 Negative family: β 1.46, p<0.001 Total network, positive friend and negative friend: NS <u>Older adults</u> Total network: β -0.26, p<0.01 Positive family: β -3.12, NS Negative family: β 1.42, p<0.01 Positive friend: β -4.23, p<0.05 Negative friend: NS
Heponiemi, 2006, Finland (50)	Cohort 5 years	N=1,413 Age range 20-35 553 male and 860 female Cardiovascular Risk in Young Finns study	Beck Depression Inventory (BDI) – Modified: Symptoms past 2 weeks; 21 items; Mean score; Range 1-5	<u>Perceived Social Support Scale – Revised</u>: 12 items; Measures perceived support from friends, family and significant others; Mean score range 1-5 per type of support	Linear regression	Baseline depressive score, age, gender	Social support: β -0.08, p=0.002

Ruiz, 2007, USA (51)	Cross-sectional	N=925 Age range 18-23 National Survey of Families and Households (NSFH)	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Quality of child-parent relationship</u>: Reports about quality of relationships to mothers and/or fathers; Scale ranging from 0 to 10 <u>Social cohesion with grandparents</u>: 3 subscales: strength of emotional closeness, frequency of contact, and source of social support	Linear regression	Gender, ethnicity, age, education, family of origin poverty ratio, family structure	Quality of relationship with parents: β -0.357, p<0.001 Cohesion with grand-parents: β -0.81, p<0.01
Wareham, 2007, Canada (52)	Cross-sectional	N=6,316 Age range 20-64 Canadian Community Health Survey	Composite International Diagnostic Interview Short Form for Major Depression (CIDI-SFMD): Past year; 9 items; Continuous score ranging from 1-8	<u>Medical Outcomes Study (MOS) Social Support Survey</u>: 19 items; Measures 4 domains of support : tangible (score 0-16), affective (score 0-12), positive social interaction (score 0-16), and emotional/informational (score 0-32)	Stepwise regression	Gender	<u>All</u> Positive social interaction: β -0.058, p<0.001 Emotional/informational: β 0.009, p<0.05 Other types of support: NS <u>Women</u> Positive social interaction: β -0.050, p<0.001 Tangible: β 0.020, p<0.01 Affection: β -0.031, p<0.05 Emotional/informational: NS <u>Men</u> Positive social interaction: β -0.069, p<0.001 Emotional/informational: β 0.024, p<0.001 Tangible: NS Affection: NS
Stojanovic-Spehar, 2009, Croatia (53)	Cross-sectional	N = 17,290 Age range 21+	Diagnosis of Depressive episode from medical file (ICD 10)	Respondents were asked if they have a close confidence and if they would receive any help in case of illness	Logistic regression	Age, gender, marital status, economic status, education, physical independence, life satisfaction, appearance, difficult patient, suicide attempt	Having close confident OR 1.40 CI 0.54, 3.66 Help in case of illness OR 0.95 CI 0.28, 3.27
Hefner, 2009, USA (54)	Cross-sectional	N=1,378 Undergraduate college students	Patient Health Questionnaire (PHQ):	<u>Multidimensional Scale of Perceived Social Support (MPSS)</u>: Perception of social support	Logistic regression	Gender, age, race, nationality, sexual orientation, graduate	<u>Social support scale</u>: OR 0.65, p<0.001

		Healthy Minds Study	9 items; Past 2 weeks Depressive disorder determined using standard algorithms	quality; 12 items; 3 subscales, 4 items/subscale		status, financial situation, living situation	
Moak, 2010, USA (55)	Cross-sectional	N=34,653 Age range 21-99 Participants in 2nd wave of the National Institutes of Alcohol Abuse and Alcoholism for the National Epidemiological Survey on Alcohol and Related Conditions (NESARC)	Alcohol Use Disorders and Associated Disabilities Interview (AUDADIS): Lifetime; Major depressive disorder based on DSM-IV criteria	Perceived interpersonal social support: 12 items from the ISEL; Continuous score Response 1-4; Range 12-48; Split in quartiles for analysis	Logistic regression	Gender, age, ethnicity and living below the poverty line, other physical and mental conditions	Ref: Highest support Intermediate high SS: OR 1.19 (1.09, 1.39), p<.001 Intermediate low SS: OR 1.30 (1.19, 1.42), p<.001 Low SS: OR 1.55 (1.41, 1.71), p<.001
Patten, 2010, Canada (56)	Cohort 8 years	N=12,351 Age range 12+ No major depression at baseline National Population Health Survey (NPHS)	Composite International Diagnostic Interview Short Form for Major Depression (CIDI-SFMD): Past year; 9 items; Depression identified if answered "yes" to 4+ symptoms in addition to primary stem items	Medical Outcomes Study Social Support Scale (MOSSS): 19 items; Measures functional support; 4 subscales: informational/emotional support, tangible support, positive social interaction and affection support; Divided in quartiles	Proportional hazard model	Age, sex, marital status, education, employment	Lower quartile subscale scores vs. higher quartile scores Informational/emotional support: HR 1.7 (1.5, 2.0) Tangible support: HR 1.5 (1.3, 1.8) Positive social interaction: HR 1.7 (1.4, 2.0) Affection support: HR 1.6 (1.4, 1.9)
Simon, 2010, USA (57)	Cross-sectional	N=789 Age range 18-23 Partnered, never married adults	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past month; 20 items; 4-point response scale;	Partner support: 6 items capturing respondents' perceptions of supportive interactions with their partner; Score range 1-5 Partner strain: 5 items regarding respondents' perceptions of negative interactions with partner;	Linear regression	Gender, race, age, family socioeconomic status, education, working status, parent, partner strain	Partner support: β -0.05, p<0.001 Partner strain: β 0.14, p<0.001

			Score range 20-73; Log of continuous score	Score range 1-3			
Almeida, 2011, USA (58)	Cohort 5 years	N=2,673 Age range 18-25 Primary care givers of children, 94% women Project on Human Development in Chicago Neighbourhoods (PHDCN)	Composite International Diagnostic Interview Short Form for Major Depression (CIDI-SFMD): Past year; 9 items; Depression identified if answered "yes" to 4+ symptoms in addition to primary stem items	<u>Adapted Version Provision of Social Relation Scale (PSR)</u>: Assesses support from family and friends separately; 15 items out of original 18; Revised 3-point scale	Logistic regression	Ethnicity, gender, age, marital status, income, education, employment	Family support: OR 0.50 (0.37, 0.69) Friend support: OR 0.76 (0.57, 1.01)
Grumer, 2011, Germany (59)	Cross-sectional	N=2,522 Age range 16-42 Not in school Jena Study on Social Change and Human Development	Brief Symptom Inventory (BSI): Short form of SCL-90; Past week; 6 items; 7-point Likert scale	<u>Berlin Social Support Scale</u>: 8 items; 7 Likert-point scale	Structural equation modeling	Gender, age, education, region, employment status	Social support: Standardized β -0.24, p<0.01
Sherman, 2011, USA (60)	Cross-sectional	N=249 Age range 41-89 Women Robeson County Outreach Screening and Education (ROSE) project	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-56	<u>Multidimensional Scale of Perceived Social Support (MSPSS)</u>: 12 items; Assess perceived social support provided to respondent from three different sources: friends, family, and partner	Linear regression	Age, marital status, medical conditions, education, ethnicity, strain	Social support: β -3.53, p<0.01
Stafford, 2011, UK (61)	Cohort 2 years	N=7,985 Age range 50+ English Longitudinal Study of Ageing	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past week symptoms; 8 items;	<u>Self-Completion Questionnaire</u>: Asked if had husband/wife/ partner, children, other immediate family, friends; Each relationship assessed for positive (3 items; empathy, dependability, confiding) and negative (3 items; criticism, being let down, and annoyance)	Logistic regression	Age, gender, household wealth, long-term limiting illness, prior depressive symptoms	<u>Positive exchange</u> From all types combined: OR 0.78 (0.71, 0.86) From partner: OR 0.79 (0.73, 0.85) From children: OR 0.83 (0.77, 0.89) From other family: OR 0.92 (0.86, 0.99)

			Y/N response re. symptoms experience; Depression with 4+ symptoms	exchanges; Each item assessed for 4 types of relationships; Score range 0 (not at all) to 3 (a lot); 0-9 per category			From friends: OR 0.98 (0.91, 1.05) <u>Negative exchange</u> From all types combined: OR 1.31 (1.20, 1.43) From partner: OR 1.29 (1.19, 1.40) From children: OR 1.22 (1.14, 1.31) From other family: OR 1.18 (1.10, 1.27) From friends: OR 1.07 (1.00, 1.15)
Biehle, 2012, USA (62)	Cross-sectional	N=100 Age range 19-46 Married for less than 7 years; Recruited from university (staff, faculty, students)	Profile of Mood States (POMS): 25 items; Depression factor; Mean score 1-5	<u>Provision of support</u>: 6 items; How much support they showed their spouse; Scale 1-5; Mean score <u>Receipt of emotional support</u>: 6 items; How much support their spouse shows them; Mean score <u>Unacknowledged support provision</u>: Difference score between an individual's report of how much support they provided minus how much support their spouse reported receiving from them <u>Invisible support receipt</u>: Opposite of above – how much support not reported by received	Linear regression	Stratified by sex	<u>Provision of support:</u> Husband, reported: β -0.14, p<0.01 Husband, unacknowledged: β 0.10, p>0.05 Wife, reported: β -0.29, p<0.001 Wife, unacknowledged: β 0.17, p<0.05 <u>Receipt of support:</u> Husband, reported: β -0.24, p<0.01 Husband, invisible: β -0.08, p>0.05 Wife, reported: β -0.17, p<0.05 Wife, invisible: β -0.11, p>0.05
Grav, 2012, Norway (63)	Cross-sectional	N=40,659 Age range 20-89 Nord-Trondelag Health Study (HUNT)	Hospital Anxiety and Depression Scale (HADS): Current symptoms; 14 items; 4 point scale; cut-off score of 8	<u>Tangible and emotional support</u>: 1 item each; Tangible support: 'Do you have friends that can help you when you need them?'; Emotional support: 'Do you have friends that you can speak to confidentially?'; Yes/no;	Logistic regression	Age, gender	Friend emotional support: OR 2.80 (2.53, 3.10) Friend tangible support: OR 2.46 (2.18, 2.77)

				Compound index of low (no to both Qs), medium (one no), and high (both yes)			
Teo, 2013, USA (64)	Cohort 10 years	N=3,154 Age range 25-75 No depression at baseline Midlife in the United States (MIDUS) survey	Composite International Diagnostic Interview Short Form (CIDI-SF): Past year; 9 items; Depression based on DSM-III-R criteria	Positive/supportive, and negative/straining social aspects; Partner, family and friends; 4 items; Scale 1-4; Mean composite score of positive and negative social support	Logistic regression	Age, ethnicity, sex, household income, education, generalized anxiety disorder, alcohol misuse, overall physical and mental health	Overall poor quality of support: OR 2.54 (1.71, 3.76) Social strain: OR 2.33 (1.64, 3.29) Lack of social support: OR 1.57 (1.14, 2.16)
McKenzie, 2013, US (65)	Cross-sectional	N = 5,681 Age range 40+	Patient Health Questionnaire (PHQ): Depressive symptoms in last 2 weeks; 4-point Likert scale (0 = not at all to 3 = nearly every day); Cut-off score 10+ for depression	Social Support Questionnaire (SSQ): number of close friends [none; 1-4; 5-9; 10+])	Logistic regression	Age, race, family income, education, smoking and drinking, total # of people in household, history of major medical illness	Men Number of friends: No friends OR 4.01 (1.89-8.50,) 1-4 friends OR 2.10 (1.18-3.74) 5-9 friends OR 1.32 (0.76-2.29) 10+ friends (Reference) Women Number of friends: No friends OR 1.86 (0.92-3.79) 1-4 friends OR 1.54 (0.99-2.40) 5-9 friends OR 1.10 (0.69-1.76) 10+ friends (Reference)
Barger, USA, 2014 (66)	Cross-sectional	N = 12,286 Age range 18+	Composite International Diagnostic Interview – Short Form (CIDI-SF): Major depressive episode in past 12 months using DSM-III-R criteria Depression Screening Questionnaire (DSQ): Depressive symptoms in past 2 weeks; Score range 0-20	Has Confidant – yes/no; Unmet support needs - yes/no; Tangible support – yes/no; Social contacts – 5 items; frequency of meeting/phoning friends/relatives and participating in group activities; ordinal responses coded as 0-4, summed/ recoded into five categories for analysis (0-9, 10-12, 13-14, 15-16, 17-21)	Negative binomial regression	Age, gender, education, regional language, nationality	Major depression Confidant RR 0.59 (0.38-0.92) Unmet support RR 2.11 (1.63-2.73) Tangible support RR 0.58 (0.40-0.84) Social contact: 0-9 (Reference) 10-12: RR 0.78 (0.54-1.13) 13-14: RR 0.66 (0.44-0.97) 15-16: RR 0.50 (0.31-0.80) 17-21: RR 0.65 (0.39-1.08) Depressive symptoms Confidant RR 0.86 (0.79-0.94) Unmet support RR 1.47 (1.39-1.54) Tangible support RR 0.78 (0.72-0.84) Social contact: 0-9 (Reference) 10-12: RR 0.90 (0.83-0.98) 13-14: RR 0.87 (0.80-0.95)

							15-16: RR 0.81 (0.74-0.89) 17-21: RR 0.78 (0.71-0.86)
Barth, 2014, Switzerland (67)	Cross-sectional	N = 5,236 men Age range 18-25	Patient Health Questionnaire (PHQ-9): 9 depressive symptoms in past 2 weeks; Three diagnostic groups: Depression 5+ symptoms, including depressed mood or anhedonia; Subthreshold depression: 2-4 symptoms, including depressed mood or anhedonia	Number of friends: <3, 3-4, >4 close friends Perceived amount of support: Average score on emotional support, 4-point Likert scale (1 = not sufficient at all to 4 = much) and perceived amount of material support, 4-point Likert scale (same as above)	Logistic regression	Education, parent's education, household equivalent income, low satisfaction with social relations, low self-efficacy, satisfaction with job/training/school	Number of friends <3 : OR 1.88 (1.16-3.06) 3-4: OR 1.27 (0.86-1.88) >4 : Reference Low perceived amount of support : OR 1.28, 0.94-1.76, ns
Lewis, 2014, UK (68)	Cross-sectional	N = 555 187 males, mean age = 43.07 368 females, mean age = 40.78	Inventory of Depressive Symptomatology (IDS): 30 items	Social Support Questionnaire – Short Version (SSQ-6): 6 items; level of satisfaction for support in 6 scenarios (1 = very unsatisfied to 6 = very satisfied); Summed score	Structural equation modeling	5 personality traits (agreeableness, extraversion, neuroticism, openness, conscientiousness)	Social support on depression symptoms: β -0.06, p<.05
Wilson, 2014, USA (69)	Cross-sectional	N = 240 female Mean age 21.4 (SD 5.0)	Center for Epidemiologic Studies – Depression Scale (CES-D): 20-item version; Past week symptoms; Cut-off score of 16	Self-reported strong social support group (1 item, Y/N)	Logistic regression	Class year, race/ethnicity, nation of birth (US/other), residence (on-/off-campus), nightly hours of sleep, sleep quality, family member with previous mental health diagnosis, relationship status, exercise, previous mental health clinical diagnoses or treatment	Association with depression: Absence of strong social support group OR = 4.3, 95% CI 1.4-13.7

Online Table DS5. Quality assessment of selected studies in adults

First author, year, country	Study participants represent study base	People with different social support drawn from the same population	Overall participation rate > 60%	Social support assessed from validated tool	Depressive symptoms assessed from validated tool	Social support and depressive symptoms assessed in same way for entire sample	Adjustment for baseline depression / depressive score*	Bias due to lost to follow-up*	Controlled for at least three important confounders	Most important design flaw(s)	Overall quality
Golding, 1989, USA (33)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Generalizability	High
Ross, 1989, USA (34)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Franks, 1992, USA (35)	No	Yes	No	Yes	Yes	Yes	N/A	N/A	Yes	Generalizability (small sample size), low participation rate (55%)	Moderate
Okun, 1998, USA (36)	Somewhat	Yes	Yes	No	No	Yes	N/A	N/A	Yes	Generalizability, validity of social support and depression scales	Moderate
Lin, 1999, USA (37)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Bullers, 2000, USA (38)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Peirce, 2000, USA (39)	Yes	Yes	Yes	No	Yes	Yes	Yes	Likely	Yes	Validity of social support scale, potential for selection bias	Moderate
Wade, 2000, USA (40)	No	Yes	Yes	No	Yes	Yes	Excluded those with chronic depression	Possible	No	Validity of social support scale, confounder control, control for baseline depression (only excluded those with chronic depression),	Low
Wade, 2000, Canada (41)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Aro, 2001, Finland (42)	Yes	Yes	No	No	Yes	Yes	N/A	N/A	Yes	Low participation rate (57%),	Moderate

										validity of social support scale	
Elliot, 2001, USA (43)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Patten, 2001, Canada (44)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	No	Validity of social support scale, confounder control	Low
Segrin, 2003, USA (45)	Yes	Yes	Unable to tell	Yes	Yes	Yes	N/A	N/A	No	Confounder control	Moderate
Shaw, 2004, USA (46)	Yes	Yes	Yes	No	No	Yes	N/A	N/A	Yes	Validity of social support and depression scales	Moderate
Kendler, 2005, USA (47)	No	Yes	Yes	No	Yes	Yes	No	Likely.	Yes	Validity of social support scale, control for baseline depression, generalizability	Low
Dalgard, 2006, Multinational (Finland, England, Ireland, Spain, Norway) (48)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Fiori, 2006, USA (49)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Heponiemi, 2006, Finland (50)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
Ruiz, 2007, USA (51)	No	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Wareham, 2007, Canada (52)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	No	Confounder control	Moderate
Stojanovic-Spehar, 2009, Croatia (53)	Yes	Yes	Yes	Yes	No	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Hefner, 2009, USA (54)	No	Yes	No	Yes	Yes	Yes	N/A	N/A	Yes	Generalizability, low participation rate (57%)	Moderate
Moak, 2010, USA (55)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Patten, 2010,	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Likely	Yes	Potential for	High

Canada (56)										selection bias.	
Simon, 2010, USA (57)	Somewhat, partnered never married	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Validity of social support scale, generalizability	Moderate
Almeida, 2011, USA (58)	No	Yes	Unable to tell	No	Yes	Yes	No	Unable to tell	Yes	Generalizability, validity of social support scale, control for baseline depression, missing information on participation rates and lost to follow-up	Low
Grumer, 2011, Germany (59)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Sherman, 2011, USA (60)	No	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Stafford, 2011, UK (61)	Yes	Yes	Yes	No	Yes	Yes	Yes	Likely	Yes	Validity of social support scale, selection bias	Moderate
Biehle, 2012, USA (62)	No	Yes	No	No	Yes	Yes	N/A	N/A	No	Generalizability (young couple volunteers in first marriage), validity of social support scale, confounder control	Low
Grav, 2012, Norway (63)	Yes	Yes	No	No	Yes	Yes	N/A	N/A	No	Low participation rate (>60%), validity of social support scale, confounder control	Low
Teo, 2013, USA (64)	Yes	Yes	Unable to tell	No	Yes	Yes	Yes	Likely	Yes	Validity of social support scale, potential selection bias	Moderate
McKenzie, 2013, US (65)	Yes	Yes	Unable to tell	Yes	Yes	Yes	N/A	N/A	Yes		High
Barger, USA, 2014 (66)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Barth, 2014,	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social	Moderate

Switzerland (67)										support scale	
Lewis, 2014, UK (68)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	No	Validity of social support scale, confounder control	Low
Wilson, 2014, USA (69)	No	Yes	No	No	Yes	Yes	N/A	N/A	Yes	Generalizability, low participation rate, validity of social support scale	Low

* Assessed in cohort studies only
N/A: Not applicable

Online Table DS6. Data extraction of selected studies in older adults

First author, year, country	Study design	Sample description	Depression measurement	Social support measurement	Method of analysis	Covariates included in analysis	Association
Grant, 1988, USA (70)	Cohort 2 years	N=118 Age range 65-92 Living independently in the community	Brief Symptom Inventory (BSI): Past week; 53 items; 7-point Likert scale; Continuous score	Social Support Questionnaire (SSQ): 6 questions; 4 types of support: thing giving, help giving, emotional support, advice giving; 5-point Likert scale; Composite category called "high-quality supports" for high consistency over interview and high emotional support satisfaction score (4+ score)	Linear regression	None	Number of high quality support relatives significantly associated with current depressive symptoms, but no change of symptoms over time
Krause, 1989, USA (71)	Cohort About 19 months	N=265 Age range 65+	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60; 3-factor construct using factor analysis	Social Support Index: 3 subscales: informational support, tangible help, and emotional assistance from significant others; Binary variable to measure satisfaction within each subscale	Structural equation modeling	Age, sex, marital status, education, depressive symptoms at time 1	Satisfaction with support at T1 predicting depressive score at T2: Standardized β 0.201, $p<0.05$
Dean, 1990, USA (72)	Cross-sectional	N=997 Age range 50+ Married and widowed adults	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	Expressive support: 5 items; Past 6 months; Support from each of four sources: spouse, children, other relatives, and friend; 3-point scale; Categorized as unavailable, low, medium and high	Linear regression	Sex, disability, undesirable life events, financial strain	Reference: no support Spousal support: Low: β 0.563, $p<0.01$ Medium: β 0.030, $p>0.05$ High: β -0.363, $p<0.001$ Children support: Low: β 0.347 , $p>0.05$ Medium: β 0.285, $p>0.05$ High:

							β 0.162, p>0.05 <u>Relative support:</u> Low: β 0.165 , p>0.05 Medium: β -0.122, p>0.05 High: β 0.117, p>0.05 <u>Friend support:</u> Low: β -0.204 , p>0.05 Medium: β -0.442, p<0.01 High: β -0.618, p<0.001
Palinkas, 1990, USA (73)	Cross-sectional	N=1,615 Age range 65+	Beck Depression Inventory – Modified: Symptoms past 2 weeks; 18 items; Continuous score ranging from 0-63	<u>Social Activity Score</u>: Number of social clubs and voluntary associations to which subject belonged <u>Social Network Index</u> <u>Frequency of face-to-face contacts</u>: Close family and friends (1 or more/week vs. <1/week) <u>Social distance of a special person</u>: Subject's primary source of support (spouse, child, relative, friend, other, none) <u>Number of friends and family</u>: Mean number	Stepwise linear regression	Age, sex, number of chronic conditions	Social activity score: β -0.474, p<0.01 Social distance from special someone: β 0.249, p<0.01 Social network index: NS Frequency of contact: NS Number of friends: β 0.034, p<0.05 Number of family: NS Church participation: β -0.583, p<0.01
Russell, 1991, USA (74)	Cohort 1 year	N=301 Age range 65+	Zung Depression Scale: Symptoms in past several days; 20 items; Range 20-80	<u>Social Provisions Scale (SPS)</u>: 24 items; Yes/no scale (instead of 4-point scale); Divided into 6 subscales: nurturance, guidance, reliable alliance, attachment, reassurance of worth, social integration; Summary score	Structural equation modeling	Initial depression	Social support <u>Direct effects</u>: Standardized β -0.161, p<0.05 <u>Indirect effects</u>: Standardized β -0.049, p<0.05
Oxman, 1992,	Cohort	N=1,861	Center for	<u>Social network:</u>	Linear	Education, marital	No. of children seen weekly:

USA (75)	3 years	Age range 65+ New Haven Establishment of Populations for Epidemiologic Study of the Elderly	Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	Included number according to kinship (children, close relatives, friends) and number making each of two types of contact (face-to-face visits and phoning/writing) <u>Perceived tangible support</u>: 2 items <u>Perceived emotional support</u>: 2 items	regression	status, baseline depression score, baseline disability index; Stratification variable (Age, sex, race/ ethnicity, income not entered because not significant)	β -0.347, p=0.015 No. of relatives phoning/writing yearly: β -0.123, p=0.055 No. of friends phoning/writing yearly: β -0.041, p=0.359 Adequacy of tangible support: β -0.855, p=0.005 Adequacy of emotional support: β -0.617, p=0.042
Kivela, 1996, Finland (76)	Cohort 5 years	N=679	Clinical interview: Depression determined using the DSM-III criteria	<u>Social network and activities</u>: Assessed children living in same city, siblings living in same city, being alone often, relationship with spouse, social participation, visitors, relationship with neighbors	Contrast between those with and without depression at follow-up	Stratified by sex	<u>Men</u> Relationship with spouse (moderate-poor): RR 3.4 (1.2, 9.3) Relationship with neighbors (moderate-poor): RR 1.4 (0.6, 3.2) <u>Women</u> Relationship with spouse (moderate-poor): RR 1.5 (0.7, 3.3) Relationship with neighbors (good vs moderate-poor) : RR 1.4 (0.7-2.6)
Antonucci, 1997, France (77)	Cross-sectional	N=3,777 Age range 65+ PAQUID Research Program	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Social Networks in Adult Life Questionnaire</u>: How many people in their network do not understand them (4 = no one, 3 = a few people, 2 = most people, 1 = everyone); If they are satisfied with the quality of their relationships with their network (yes/no)	Linear regression	Age, gender, impairment, social network size and composition	Satisfaction with social support: β -3.10, p<0.001 Understanding: β -3.34, p<0.001
Prince, 1997, UK (78)	Cross-sectional	N=654 Age range 65+	Short-Comprehensive Assessment and Referral Evaluation (CARE): 6 indicator scales;	<u>Social support deficits (SSDs)</u>: (1) living alone; (2) seeing a relative less often than once a week; (3) having no supportive neighbours; (4) having one or less supportive friends; (5) experiencing upset/bother in a	Logistic regression	Change of residence, gender, age, life events	<u>Number of social support deficits</u> Ref: None 1: OR 1.4 (0.6, 3.1) 2: OR 1.7 (0.7, 3.8) 3: OR 1.9 (0.8, 4.5) 4: OR 3.9 (1.4, 10.9) 5 or 6: OR 17.5 (4.1, 74.3)

			Past month; Pervasive depression	relationship with a child; (6) experiencing dissatisfaction with support received from friends; Calculated number of social support deficits			
Fernandez, 1998, USA (79)	Cohort 2 years	N=728 Age range 58-64 (baseline) Working full-time	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Degree of satisfaction with dating or marital relationships</u>: 1 item; How satisfied they were with their relationships; 4-point scale <u>Frequency of visits</u>: Visits from 3 close friends/ family and who do not live with respondent; Response scale 0-6 (no visit to >1 visit a week); Score range 0-18	Linear regression	Sex, race, education, income T1, medical conditions T1, retired T2, depressive symptoms T1, self-esteem T1, has partner T1	Satisfaction with partner/spouse at T1: β -0.439, p>0.05 Satisfaction with partner/spouse at T2: β -0.584, p<0.05 Frequency of interactions with friends and relatives at T2: β 0.164, p>0.05
Bisconti, 1999, USA (80)	Cross-sectional	N=268 Age 65-95 81% female	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Modified Interview Schedule for Social Interaction</u> (ISSI; Henderson, 1990): 8 items; Each item has 2 parts; 1) quantity of social support from family and from friends (5-point Likert scale – nobody to 11+ sources of support); 2) perceived satisfaction with support (binary)	Linear regression	Age, gender	Friend support: β -0.35, p<0.001 Family support: β -0.27, p<0.001 Perceived support: β -0.25, p<0.001
Schoevers, 2000, Netherlands (81)	Cohort 3 years	N=1,940 Non-depressed community-living elderly	Geriatric Mental State (GMS-AGECAT): Semi-structured questionnaire; Current cases of depression	1 item: 'Do you get help from children or neighbours?'	Logistic regression	Socioeconomic variables, social support, stressors	OR not significant in multivariate stepwise regression OR 1.16 (0.89, 1.51) in univariate model
Antonucci, 2001, USA (82)	Cross-sectional	N=128 Age range 60-91 Married, with best friend of same gender Social Relations Study	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Positive and negative aspects of social relationships</u>: Support from spouse and same-sex friend; 2 items: "I share my private feelings and concerns with my friend/ spouse", "My friend/spouse gets on my nerves"; 5-point response scale;	Linear regression	Sex, age, current health	Confide in spouse: β -0.16, p>0.05 Spouse gets on nerves β 0.29, p<0.01 Confide in same-sex friend: β -0.05, p>0.05 Same-sex friend gets on nerve gets

				Score range 1-5			on nerves: β 0.13, p>0.05
Wallace, 2001, USA (83)	Cross-sectional	N=443 Age range 60-95	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	Modified Interview Schedule for Social Interaction (ISSI; Henderson, 1990): 8 items; Each item has 2 parts: 1) quantity of social support from family and from friends (5-point Likert scale – nobody to 11+ sources of support); 2) perceived satisfaction with support (binary)	Linear regression	Age, gender, hardiness	Family support: β -0.21, p<0.001 Friend support: β -0.33, p<0.001
Zunzunegui, 2001, Spain (84)	Cross-sectional	N=1,028 Age range 65+ Parents with living children	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	Emotional support from children: 6 items; 4-point response scale; How frequently do you feel loved by your children? How frequently do you feel you are listened to by your children? How frequently do you feel you can have confidence in your children? How frequently do you feel you help your children? How frequently do you feel useful to your children? How often do you feel you have an important role for your children?; Categorized as lowest quartile vs. not Instrumental support: Received instrumental help from children for any of seven basic and ten instrumental activities of daily living	Linear regression	Age, gender, education, functional status	Lack of emotional support from children – lowest quartile (vs. other): β 3.9, p<0.001 Lack of instrumental support (vs no lack): β 0.9, p>0.05
Minicuci, 2002, Italy (85)	Cross-sectional	N=2,398 Age range 65 Non-institutionalized	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60; Cut-off 16 for case	Frequency of contacts with family members, other relatives, and friends: Response: never, every 6 months, every 2 to 3 months, every month, more often Support expected: 1 item; "In case of need, do you expect your family (or relatives, or friends) would help you?"	Logistic regression	SES variables, health and functioning, life habits, social relations	Men Strong association with negative expectations of support from family members in case of financial need (OR 2.43, CI 1.51, 3.92) Other measure of social support: NS Women All measure of social support: NS (Results not reported)

			of depression				
Osborn, 2003, UK (86)	Cross-sectional	N=14,217 Age range 75+ 53 practices in UK; Excluded those in LT nursing care or with terminal disease MRC Trial of the Assessment and Management of Older People in the Community	Geriatric Depression Scale (GDS15): Past week; 15 items; Cut-off ≥6 for case of depression Mini-Mental State Examination (MMSE): Those with score below 17/did not complete language component deemed cognitively impaired, excluded	<u>Confiding relationships</u>: 1 item; 'When you need to talk about private matters or when you are worried or stressed who can you really count on, or feel at ease with?'; Number of people	Logistic regression	Sex, age, home ownership, Marital status, life events, living alone, current smoker, alcohol use, serious illnesses	Confiding in no one (vs. >1 person): OR 3.45 (2.44, 4.87) Confiding in one person (vs. >1 person): OR 1.14 (0.95, 1.37)
Vanderhorst, 2005, Australia (87)	Cross-sectional	N=110 Age range 75+ 79% female; People registered with local city council's home care program	Zung Depression Scale: Symptoms in past several days; 20 items; Range 20-80	<u>Social Support Subscale of the Coping Resources Inventory</u> (Hammer, 1988): Measures extent to which participant is involved in social networks that are able to provide support during times of stress; 13 items; 4-point Likert scale	Linear regression	Gender, age, education, marital status, sense of belonging	Social support during times of stress: β -0.68, p<0.001
Cacioppo, 2006, USA – Study 1 (88)	Cross-sectional	N=1,945 Age range 54+ Health and Retirement Study	Center for Epidemiologic Studies Depression Scale – Short Form (CES-D-SF): 7 items; Excluded item on loneliness; Past week; Score range 0-7	<u>Loneliness scale</u>: 3 items; Such as: How often do you feel that you lack companionship; Standardized score <u>Social support</u>: 2 items; How often felt could talk to friends about worries and how often could rely on friends for help if had problems; 3-point scale: hardly ever/ never/some of the time/often	Negative binomial regression	Perceived stress, sex, race, age, education, income, marital status, loneliness	Loneliness: β 0.20, p<0.01 Social support: β -0.09, p<0.05
Cacioppo, 2006, USA – Study 2 (88)	Cohort 3 years	N=212 Age range 50-67	Center for Epidemiologic Studies	<u>R-UCLA Loneliness scale</u>: 20 items; Measures general feelings of	Regression analyses (baseline data	Perceived stress, sex, race, age, education, income, marital status,	*Cross-sectional analysis*: Loneliness:

	Cross-sectional data included in this review	Chicago Health, Aging, and Social Relations Study	Depression Scale (CES-D): Past week symptoms; 19 items; Excluded item on loneliness; Continuous score ranging from 0-57	social isolation, loneliness, and dissatisfaction with one's social interactions; Standardized score <u>Interpersonal Support Evaluation List (ISEL)</u>: Assesses 3 forms of social support: tangible, appraisal, and belonging; 12 items; 4-point Likert scale; Overall score ranging 4-16	only)	hostility	β 2.62, p<0.001 Social support: β 0.66, p>0.05
Harris, 2006, UK (89)	Cohort 2 years	N=945 Age range 65+ Without depression at baseline; Registered with two South London practices	Geriatric Depression Scale (GDS15): Past week; 15 items; Cut-off >5 for case of depression	Availability of support and frequency of contact; Existence of a confidante; Satisfaction with support; Experience of conflict or upset in close relationships; Adapted from General Household Survey, Health Insurance Study, Gospel Oak Project	Forward stepwise logistic regression	Age, sex, practice, baseline GDS-15 score	Not satisfied with support (vs. satisfied) at time 1: OR 2.3 (1.3, 4.2)
St John, 2006, Canada (90)	Cross-sectional	N=1,382 Age range 65+ Manitoba Study of Health and Aging	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Continuous score ranging from 0-60	<u>Number of companions</u>: How many people in total would you say visit you or provide companionship?'; Response range 0-65	Logistic regression	Geographic residence, gender, age, education, living arrangement, adequacy of income, self-rated health, functional impairment	Number of companions: OR 0.93 (0.89, 0.98)
Golden, 2009, Ireland (91)	Cross-sectional	N=1,299 Age range 65+	Geriatric Mental State Exam (GMS): Past month symptoms; Case of depressed mood determined from interview	<u>Practitioner Assessment of Network Type Schedule</u>: Developed by Wenger (Wenger, 1991; Wenger and Tucker, 2002); Locally integrated social network (optimal in older age) vs. four other types of network (restricted = family-dependent; transitional)	Logistic regression	Age, widowhood, physical disability	Non-integrated social network: OR 1.8, p=0.009
Golden, 2009, Ireland (92)	Cross-sectional	N=1,334 Age range 65-98	Geriatric Mental State (GMS): Past month symptoms; Case of	<u>Social network</u>: 8 items; Availability of close local family (3 items); Level of involvement of family,	Logistic regression	Age, gender	Family domain: OR 0.99 (0.79, 1.2) Social engagement domain: OR 0.48 (0.38, 0.60)

			depression defined as significant depressed mood or significant loss of interest in the previous month	friends and neighbours (3 items); Level of interaction with community and voluntary groups (2 items); 2 clusters from latent cluster analysis: family and social engagement domain			
Mechakra-Tahiri, 2010, Canada (93)	Cross-sectional	N=2,670 Age range 65+ ESA (Etude de Sante des Aines)	ESA-Q: Depressive disorder based on the DSM-IV criteria	3 questions about: (1) availability of a confidante to talk to about various problems; (2) presence of someone who could provide instrumental help; (3) presence of someone who could provide emotional support; Good predictive and construct validity; Sum score 0-3	Logistic regression	Age, income, type of region, number of chronic health problems, perceived physical health	<u>Women</u> No presence of confidante: OR 1.56 (1.08, 2.26) No instrumental support: OR 1.32 (0.74, 2.32) No emotional support: OR 1.55 (0.89, 2.69) <u>Men</u> No presence of a confidante: OR 1.88 (1.11, 3.21) No instrumental support: OR 2.33 (0.99, 5.46) No emotional support: OR 1.23 (0.51, 2.98)
Choi, 2011, USA (94)	Cross-sectional	N=2,759 Age range 57-85 National Social Life, Health, and Aging Project (NSHAP)	Center for Epidemiologic Studies Depression Scale (CES-D) – Modified: Past week symptoms; 11 items; Continuous score ranging from 0-33	<u>Spousal support</u>: 4 items; Can you open up to partner if need to talk about your worries, can you rely on him/her for help if problem, do they make too many demands, criticize you; Response scale 1-4; Sum scores 4-12; No support (no partner), low (score 4–8), medium (score 9–10), high (score 11–12) <u>Family and friend support</u>: 4 items; Same as spousal support; 3-point response scale (1-3); Continuous score 4-12	Linear regression	Age, race, education, household income, chronic medical conditions, activity of daily living impairment, frequency of physical activity, religious service attending	<u>Women</u> Family/friend support: β -0.26, p<0.001 *Spouse/partner support* (ref: no support): Low support: β 2.15, p<0.001 Medium support: β -0.30, p>0.05 High support: β -0.89, p<0.05 <u>Men</u> Family/friend support: β -0.26, p<0.001 *Spouse/partner support* (ref: no support): Low support: β 0.21, p>0.05 Medium support: β -0.21, p>0.05 High support: β -2.15, p<0.001
Coleman, 2011, Bulgaria and	Cross-sectional	N=160 in Romania, 160 in Bulgaria	Hospital Anxiety and Depression	<u>MOS Social Support Survey</u>: 19-item;	Linear regression	Country, age, gender, living alone, physical	Social support: β -0.07, p<.001

Romania (95)		Age range 60+ Predominantly rural areas	Scale – Depression Subscale (HAD-D): Focus on anhedonia; 7 items	5-point scale; Self-report questionnaire; Measure functional support; 4 subscales (informational/ emotional, tangible, positive social interaction, affection); Continuous score Score range 19-95		limitations, strength of belief	
Glaesmer, 2011, Germany (96)	Cross-sectional	N=1,659 Age range 60-85	Patient Health Questionnaire (PHQ-9): Past 2 weeks; 9 items; Score 0-27	<u>Oslo Social Support Scale</u>: 3 items; Perception of social support from family, friends, neighbors.	Linear regression	Gender, age, education, household income, living with partner, number of medical conditions, social support	<u>All</u> Social support: β -0.195, p<0.001 <u>Men</u> Social support: β -0.239, p<0.001 <u>Women</u> Social support: β -0.157, p<0.001
Sonnenberg, 2013, Netherlands (97)	Cohort 13 years	N=1,928 Age range 55-85 Without depression at baseline Longitudinal Aging Study Amsterdam (LASA)	Center for Epidemiologic Studies Depression Scale (CES-D): Past week symptoms; 20 items; Score range 0-60; Depression if score >16	<u>Presence of partner</u>: 1 item; Yes/no <u>Personal network size</u>: Range from 0-75; Small network if <11 <u>Emotional support</u>: Measures how often in previous year participant talked to these 9 closest network members about personal experiences and feelings; Score 0 (never) to 3 (often); Low support if mean score <2	Cox proportional hazard regression	Age, gender, level of education, cognitive impairment, functional limitations	<u>All</u> No partner in household: HR 1.17 (0.95, 1.45) Small network (<11): HR 1.29 (1.07, 1.55) Low emotional support: HR 0.85 (0.70, 1.03) <u>Men</u> No partner in household: HR 1.70 (1.19, 2.43) Small network (<11): HR 1.71 (1.25, 2.34) Low emotional support: HR 0.87 (0.62, 1.21) <u>Women</u> No partner in household: HR 1.06 (0.82, 1.35) Small network (<11): HR 1.10 (0.87, 1.40) Low emotional support: HR 0.86 (0.68, 1.09)
Sjoberg, 2013, Sweden (98)	Cohort 5 years, 2 waves	<u>1901/02 Cohort</u> N=245 <u>1930 Cohort</u> N=310	DSM-IV-TR: 9 items; Past-month symptoms; Diagnosis of	Subjective contacts (too little contact/good enough) with children, neighbors or others	Logistic regression	Sex, marital status	<u>Cohort 1901/02</u> Perceived contacts: Too little contact with All: OR 1.12 (0.21-5.87) Children: N/A

		Baseline age 70 years	major depression, requiring presence of at least 5 out of 9 symptoms				Neighbors: OR 2.21 (0.24-20.83) Others: OR 2.53 (0.48-13.32) <u>Cohort 1930</u> Perceived contacts: Too little contact with All: OR 2.43 (0.21-28.14) Children: N/A Neighbors: N/A Others: OR 5.62 (0.47-67.26)
Uebelacker, 2013, USA (99)	Cross-sectional	N=91,912 women Age range 50-79 years	Center for Epidemiological Studies – Depression Scale (CES-D): 6 items; Past week symptoms; Score range 0-18; High depressive symptoms using cut-off 5+	<u>Medical Outcomes Study – Social Support Questionnaire</u>: 9 items; 4 types of social support (emotional/ informational, affection, tangible, positive social interaction); Score 9-45	Logistic regression	Age, race/ethnicity, marital status	Social support: Women: OR 0.50 (0.49-0.51)
Djundeva, 2014, Holland/UK (100)	Cross-sectional	N=6,268 Aged 65+ years Have at least one adult, non-resident child	EURO-D scale: 12 items; Past month; Dichotomized using score 4+ as depression	Reported frequency of instrumental support from adult child (sporadically, weekly, daily)	Logistic regression	Age, family members respondent lives with, education, employment, subjective appraisal of economic situation, occurrence of stressful events in last 2 years (death of spouse, divorce), # children, volunteering activity, previous history of depressive mood, proximity of grown child, support given by parent, support from sources other than child, gender, activity of daily living limitations, living situation, contact with child, country regime	Instrumental support from child (ref: no support) Sporadic: OR 1.32 (1.07-1.64) Every week: OR 1.15 (0.93-1.43) Daily: OR 1.49 (1.14-1.95)
Park, 2014, USA (101)	Cross-sectional	N=1,432 Aged 65+ years	Center for Epidemiological Studies –	Social support: 1 item, "In times of trouble, can you count on at least some of	Linear regression	SES, gender, age, education, marital status, annual	Social support as a predictor of depressive symptoms: β -1.86, p<.001

			Depression Scale (CES-D): 10 items; Past week symptoms; 4-point Likert scale (0 = rarely to 3 = most of the time); Score 0-30	your family or friends?” 3-point Likert scale (1 = hardly ever to 3 = most of the time)		household income, health risk groups, religious attendance	

Online Table DS7. Quality assessment of selected studies in older adults

First author, year, country	Study participants represent study base	People with different social support drawn from the same population	Overall participation rate > 60%	Social support assessed from validated tool	Depressive symptoms assessed from validated tool	Social support and depressive symptoms assessed in same way for entire sample	Adjustment for baseline depression/ depressive score*	Bias due to lost to follow-up*	Controlled for at least three important confounders	Most important design flaw(s)	Overall quality
Grant, 1988, USA (70)	No	Yes	N/A	No	Yes	Yes	In some analysis	Unlikely	No	Validity of social support scale, generalizability, confounder control	Low
Krause, 1989, USA (71)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
Dean, 1990, USA (72)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Palinkas, 1990, USA (73)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Russell, 1991, USA (74)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unlikely	No	Confounder control	Moderate
Oxman, 1992, USA (75)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
Kivela, 1996, Finland (76)	Yes	Yes	Yes	Unable to tell	Yes	Yes	Yes	Likely	No	Confounder control, potential selection bias	Moderate
Antonucci, 1997, France (77)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Prince, 1997, UK (78)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Fernandez, 1998, USA (79)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
Bisconti, 1999, USA (80)	Unable to tell	Yes	Yes	Yes	Yes	Yes	N/A	N/A	No	Confounder control	Moderate
Schoevers, 2000, Netherlands (81)	Yes	Yes	Yes	No	Yes	Yes	Yes	Likely	Yes	Validity of social support scale, potential selection bias	Moderate
Antonucci, 2001, USA (82)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Wallace, 2001, USA (83)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate

Zunzunegui, 2001, Spain (84)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Minicuci, 2002, Italy (85)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Osborn, 2003, UK (86)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Vanderhorst, 2005, Australia (87)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Cacioppo, 2006, USA – Study 1 (88)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Cacioppo, 2006, USA – Study 2 (88)	Yes	Yes	No	Yes	Yes	Yes	N/A	N/A	Yes	Low participation rate (45%)	High
Harris, 2006, UK (89)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unlikely	Yes	Validity of social support scale	Moderate
St John, 2006, Canada (90)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Golden, 2009, Ireland (91)	Yes	Yes	Unable to tell	Yes	Yes	Yes	N/A	N/A	Yes	Potential for selection bias	High
Golden, 2009, Ireland (92)	Yes	Yes	Unable to tell	No	Yes	Yes	N/A	N/A	No	Validity of social support scale, confounder control	Low
Mechakra-Tahiri, 2010, Canada (93)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Choi, 2011, USA (94)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Coleman, 2011, Bulgaria and Romania (95)	Unable to tell	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Generalizability (mainly rural, recruitment unreported)	High
Glaesmer, 2011, Germany (96)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes		High
Sonnenberg, 2013, Netherlands (97)	Yes	Yes	Unable to tell	No	Yes	Yes	Yes	Likely	Yes	Validity of social support scale, selection bias	Moderate
Sjoberg, 2013, Sweden (98)	Yes	Yes	Yes	No	Yes	Yes	Yes	Unable to tell	No	Validity of social support scale, confounder control	Moderate
Uebelacker,	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social	Moderate

2013, USA (99)										support scale	
Djundeva, 2014, Holland/UK (100)	Yes	Yes	No	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate
Park, 2014, USA (101)	Yes	Yes	Yes	No	Yes	Yes	N/A	N/A	Yes	Validity of social support scale	Moderate

* Assessed in cohort studies only
N/A: Not applicable

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Social support and protection from depression: systematic review of current findings in Western countries

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