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Review

The association between social relationships and depression: A systematic review

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ABSTRACT

Background: Depression is one of the most prevalent mental disorders globally and has implications for various aspects of everyday-life. To date, studies assessing the association between social relationships and depression have provided conflicting results. The aim of this paper was to review the evidence on associations between social relationships and depression in the general population.
Methods: Studies investigating the association of social support, social networks, or social connectedness with depression were retrieved and summarized (searches using Pubmed, ScienceDirect, PsycNet were conducted in May 2014).
Results: Fifty-one studies were included in this review. The strongest and most consistent findings were significant protective effects of perceived emotional support, perceived instrumental support, and large, diverse social networks. Little evidence was found on whether social connectedness is related to depression, as was also the case for negative interactions.
Limitations: Due to the strict inclusion criteria relating to study quality and the availability of papers in the domain of interest, the review did not capture 'gray literature' and qualitative studies.
Conclusion: Future research is warranted to account for potential bias introduced by the use of subjective measures as compared to objective measures of received support and actual networks. Due to the heterogeneity between available studies on the measure of social relationships, the inclusion of comparable measures across studies would allow for more valid comparisons. In addition, well-designed prospective studies will provide more insight into causality. Future research should address how social support and networks interact and together affect risks for depression. Social connectedness and negative interactions appear to be underutilized as measures in population-based studies.
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1. Introduction

Depression is arguably one of the most prevalent and prominent mental disorders of our time, touching the lives of people across nations, ages, and social and cultural groups. The Global Burden of Disease Study 2010 has identified depressive disorders as the second leading cause of years lived with disability, designating it a as a major public-health priority (Ferrari et al., 2013). Besides depression being a serious and debilitating disorder in and of itself, it has various negative consequences for physical health (Prince et al., 2007). At worst, depression can lead to suicide (Ferrari et al., 2013), and 15% of those who are clinically depressed die by suicide (Verster et al., 2008). Further, the economic consequences of depression are substantial. The costs of mood disorders in Europe for the year 2010 has been estimated to be € PPP 113.4 billion (Gustavsson et al., 2011). Almost half of these costs is the result of productivity loss, implying the vast negative impact of depression on populations' economy and sustainability. Depression has been found to be associated with a wide range of factors such as female gender, somatic illness, and cognitive and functional impairments. Additionally, loss of close social contacts has been found to be an important predictor of depression, along with various other variables relating to social relationships (Djernes, 2006).

Social relationships have important implications for both physical and mental health. The state of one's social relationships can affect that person's overall health. Specifically, according to evidence from a recent review, good social relationships can prolong survival by 50% (Holt-Lundstad et al., 2010). A seven-decade follow-up study discovered that social relationships are better predictors of health than a range of biological and economic factors (Vaillant, 2008). Similarly, Holt-Lundstad et al. (2010) reported that having poor social relationships is potentially more harmful than excessive drinking and smoking, obesity, and lack of exercise.

Studies investigating social relationships generally pertain to three major domains: social support, social networks, and social connectedness (Ashida and Heaney, 2008; Barratt et al., 2006; Noone and Stephens, 2014; Ottmann et al., 2006; Stone, 2003). Social support has long been known to exert considerable influence on mental health and wellbeing (Thoits, 2011). The literature distinguishes between perceived and received (or enacted) social support. Perceived support is the subjective feeling of being supported by one's relationships, while received support refers to the actual support provided. The literature on social support further distinguishes between emotional support (e.g. someone being available to listen or offer sympathy during times of crisis or hardship, or someone available to give advice) and instrumental support (e.g. someone available to offer help with issues that require physical effort or financial aid). All these different forms of social support appear to have different implications for mental health (Nurullah, 2012). Support may also be provided to or received from different sources, such as spouse, children, relatives, friends, and co-workers. It has been demonstrated that the role and effect of social support on health and psychological well-being varies depending on the source of support (Li et al., 2014; Walen and Lachman, 2000). Finally, as an opposite measure of supportive behaviors, some studies also include negative interactions (strain), such as tension, criticism, or placing too strong demands on others (Schuster et al. 1990).

Social relationships can be more clearly distinguished in terms of their network structure (i.e. social networks) and network function (i.e. social support) (House, 1987). Thus, while the term social support relates to the functional content in social relationships, social networks is a concept that relates to the formal structure of social relationships, such as size, composition, contact frequency, boundedness, etc. (Prince et al., 1997). Studies on social networks have been characterized by investigating the web of social connections that surrounds an individual and this has been shown to have important associations with both physical and mental health (Smith and Christakis, 2008). Two distinct approaches exist for assessing social networks: egocentric and sociocentric approaches. Egocentric models include data from individuals about members in their network, whereas sociocentric models utilize not only the network information from each individual, but also information from the network members themselves. As a consequence, sociometric models often yield more novel insights, but also make much greater demands of data (Smith and Christakis, 2008). Another insightful way to examine social networks is to categorize them into network types, such as network composition (e.g. the level of diversity of family members, friends, and coworkers in a network) and other measures, such as social engagement. Network types thus tend to encompass a more comprehensive assessment of network properties and can be particularly informative (e.g. Litwin and Landau, 2000).

Finally, social connectedness refers to the degree to which a person experiences belongingness, attachment, relatedness, togetherness, or entrenchment in one's social relationships. Thus, it refers more to subjective feelings and attitudes towards oneself in relation to the social context, rather than specific social relationships (Townsend and McWhirter, 2005; Williams and Galliher, 2006). The literature also makes use of the term 'social disconnectedness' to refer to conditions of social isolation, such as living alone, physical separation from others, widowhood, etc. (Cornwell and Waite, 2009a, 2009b; Zavaleta et al., 2014).

A number of recent reviews have been published that address the influence of social relationships on populations' health status (Holt-Lundstad et al., 2010; Smith and Christakis, 2008; Tajvar et al., 2013; Uchino, 2006). However, the evidence in the literature concerning the influence of social relationships on mental illness, particularly for depression, is often conflicting or sparse (Nurullah, 2012). Moreover, many studies on social relationships employ non-probability or convenience sampling, which considerably

limits the degree to which one can extrapolate findings and draw conclusions about the influence of global network and support properties in the general population (Smith and Christakis, 2008). Thus, this work focuses on population-based studies that investigate the association between social relationships (social support, social networks, and social connectedness) and depression.

2. Methods

2.1. Search strategy

The electronic databases of PsycInfo/PsycNet, PubMed/MedLine, and ScienceDirect were searched for studies measuring the association between social networks, social support, or social connectedness, and depression. Search words were customized for each database, and each search involved combining key word searches for a list of social relationships variables ('social support', 'peer support', 'emotional support', 'social networks', 'social relationship', 'social connectedness', 'belongingness') and specific terms relating to outcomes of depression ('depression', 'depressive symptoms'). Medical Subject Headings (MeSH) (i.e. "social support", "depression", "adult") were used whenever possible. MeSH is the National Library of Medicine's controlled vocabulary for the purpose of indexing journal articles in a hierarchical structure, which makes it possible to conduct a more comprehensive search. This terminology is commonly used in review articles to identify relevant studies. Databases were searched for studies published in English, Spanish, French, Scandinavian (Danish, Swedish, Norwegian), or Ex-Yugoslavian (Croatian, Bosnian, Serbian) languages. These languages were selected based on the availability of people who understand these languages in the research group.

The search was limited to studies published between 2004 and 2014 in order to obtain the most recent scientific articles. Studies were included if: (a) they published empirical quantitative research examining the association between social support, social networks, and/or social connectedness, and depression or depressive symptoms; (b) social support, social networks, and/or social connectedness were the predictor/independent variable or one of the main predictors/independent variables of the study; and (c) depression or depressive symptoms was the outcome/dependent variable of the study. Due to the bias introduced when designating particular target groups as participants, only studies involving community samples were included (Tsuang et al., 2011). Thus, studies not employing random sampling were excluded, and included studies had to have been carried out according to conventional standards relating to appropriate sampling procedures to reflect the general population (Bonita et al., 2006). Due to the focus on adults, published studies exclusively on infants, children, and adolescents were also excluded.

Two authors independently reviewed potential articles to be included based on the inclusion criteria. The level of agreement was assessed with kappa statistics (kappa 0.82; SE 0.05), and disagreements were resolved subsequently by consensus. The initial search yielded 1737 articles with duplicates removed. Inspection of abstracts and titles found that 1675 articles did not fulfill the inclusion criteria. Sixty-two articles were identified as potentially relevant, but 11 of those were later excluded as closer examination revealed that they did not match the inclusion criteria. An overview of the search process is illustrated in Tables 1 and 2 and Fig. 1.

2.2. Data extraction

The search strategy resulted in a total of 51 papers being included in the review. All the information from each article that was relevant to the research question and in line with the inclusion criteria was extracted and tabulated. Extracted data comprised publication data, country, language, setting and aims

Table 1
List of sources searched and search terms used for systematic review.

Electronic databases
Pubmed/Medline
PsycNet/PsycInfo
ScienceDirect
Search terms
Social support [MeSH] OR peer support [keyword] OR emotional support [keyword] OR social networks [keyword] OR social relationship [keyword] OR social connectedness [keyword] OR belongingness [keyword]
AND
Depression [MeSH] OR depressive symptoms [keyword]
AND
Adult [MeSH]
AND
Year: 2004 TO 2014

Table 2
Overview of the search terms used in each search database.

Pubmed		**ScienceDirect**		**PsycNet**	
Search terms	**Boolean operators**	**Search terms**	**Boolean operators**	**Search terms**	**Boolean operators**
Social support [MeSH]	OR	Social support [keyword]	OR	Social support [keyword]	OR
Peer support [keyword]	OR	Peer support [keyword]	OR	Peer support [keyword]	OR
Emotional support [keyword]	OR	Emotional support [keyword]	OR	Emotional support [keyword]	OR
Social networks [keyword]	OR	Social networks [keyword]	OR	Social networks [keyword]	OR
Social relationship [keyword]	OR	Social relationship [keyword]	OR	Social relationship [keyword]	OR
Social connectedness [keyword]	OR	Social connectedness [keyword]	OR	Social connectedness [keyword]	OR
Belongingness [keyword]	AND	Belongingness [keyword]	AND	Belongingness [keyword]	AND
Depression [MeSH]	OR	Depression [keyword]	OR	Depression [keyword]	OR
Depressive symptoms [keyword]	AND	Depressive symptoms [keyword]		Depressive symptoms [keyword]	AND
Adult [MeSH]				Adulthood (18yrs & older)	AND
				Year: 2004 TO 2014	
Hits:	**1550**	**Hits:**	**167**	**Hits:**	**58**

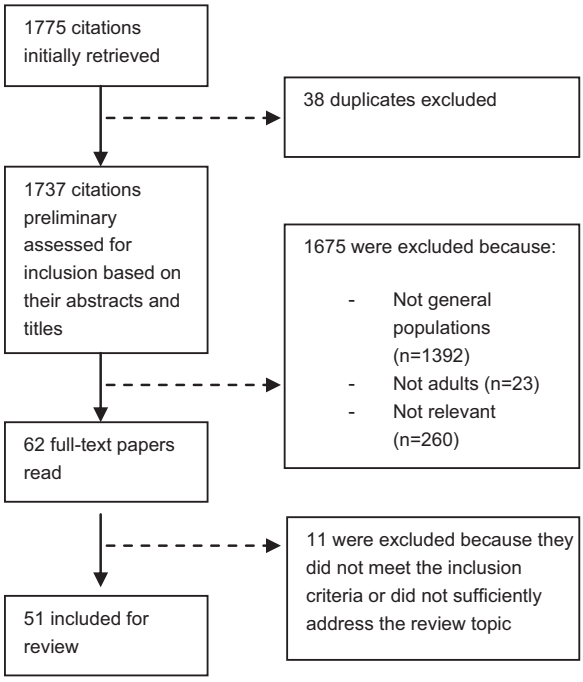

Fig. 1. Selection of studies for systematic review.

of the study, study design, sample characteristics, data collection methods, key measures, theoretical framework, and main findings. Extracted data also comprised quality assessment of each study following the guidelines of the Effective Public Health Practice Project (Armijo-Olivo et al., 2012; Thomas et al., 2004). An overview and description of included studies including quality assessment can be found in Tables 3 and 4. The quality assessment comprised of six components: (1) selection bias; (2) study design; (3) confounders; (4) blinding; (5) data-collection method; and (6) withdrawals and drop-outs. Each component was rated as weak, moderate, or strong, and a final rating was made of each study. A study was rated as 'low quality' if it had received two or more weak ratings; 'moderate quality' if it had received one weak rating; and 'high quality' if it had not received any weak ratings. Any discrepancies in terms of rating were resolved between the two reviewers. The complete details of the quality assessment procedure can be found on the Effective Public Health Practice Project website: http://www.ephpp.ca/tools.html.

2.3. Synthesis

Due to the broad nature of the search and the different studies included in the review, a narrative synthesis was conducted to synthesize the information (see Table 1 and Fig. 1). The synthesis was guided by the methods described by Popay et al. (2006). This guide provides some basic steps to the process of conducting a narrative synthesis which is more systematic and transparent, and also minimizes bias in both the assessment of studies and decision made by reviewers. The guide includes topics on developing a theoretical model and a preliminary synthesis for a narrative review, exploring the relationships in the data, and assessing the robustness of the synthesis product. As a component to this approach, different studies in this review were grouped into overarching conceptually or thematically related categories.

3. Results

The review included 28 cross-sectional and 23 prospective studies. According to quality criteria set forth by the Effective Public Health Practice Project (Armijo-Olivo et al., 2012; Thomas et al., 2004), nine studies were rated as 'low quality' (9/51=17.6%), 30 studies were rated as 'moderate quality' (30/51=58.8%), and 12 studies were rated as 'high quality' (12/51=23.6%). Of those rated as 'low', seven were cross-sectional, and two were prospective studies. Of those rated as 'moderate', 21 were cross-sectional, and nine were prospective studies. Finally, the 12 studies rated as 'high' were all prospective studies.

3.1. Social support

Perceived emotional support was the most frequently utilized social support variable, being used in 35 of the studies. This variable was significantly associated with depressive symptoms in 32 of the 35 five studies (32/35=91.4%). In all these studies, higher levels of perceived emotional support were protective against depression, and lower levels were associated with the presence, onset or development of depression [15.6% (5/32) of the studies were cross-sectional with low quality (Chen et al., 2005; Harvey et al., 2010; Ostberg and Lennartsson, 2007; Virtanen et al., 2008; Zhang and Li, 2011); 40.6% (12/32) were cross-sectional with moderate quality (Alexandrino-Silva et al., 2011; Chazelle et al., 2011; Choi and Ha, 2011; Fiori et al., 2006; Fiori and Denckla, 2012; Glaesmer et al., 2011; Grav et al., 2012; Leung et al., 2007; Li and Liang, 2007; Mair et al., 2010; Millan-Calenti et al., 2013; Sicotte et al., 2008); 6.3% (2/32) were prospective with low quality (Heponiemi et al., 2006; Tiikkainen and Heikkinen, 2005); 21.9% (7/32) were prospective with moderate quality (Bierman and Statland, 2010; Jokela et al., 2007; Koizumi et al., 2005; Pettit et al., 2011; Plaisier et al., 2007; Rugulies et al., 2006; Stoetzer et al., 2009); and finally 15.6% (5/32) were prospective with high quality (Fauth et al., 2012; Huang et al., 2011; Taylor and Lynch, 2004; Teo et al., 2013; Yang, 2006)]. The remaining three studies (3/35=8.6%) did not find perceived emotional support to be a significant correlate of depression [33.3% (1/3) cross-sectional moderate (Litwin, 2011); 66.7% (2/3) prospective moderate (Smith and Bielecky, 2012; Tsai et al., 2005)].

The findings from the five studies which measured both perceived emotional support and perceived negative interactions were mixed. One study found that neither were significantly associated with depression [20% (1/5) cross-sectional moderate (Litwin, 2011)]. Two studies found that emotional support was negatively associated with depression, and that negative interactions were positively associated with depression with similar magnitudes in opposite directions [20% (1/5) cross-sectional moderate (Li and Liang, 2007); 20% (1/5) cross-sectional moderate (Fiori et al., 2006)]. One study found that only negative interactions were significantly and positively associated with depression [20% (1/5) cross-sectional low (Ford et al., 2011)], while another study found that both emotional support and negative interactions were associated with depression in opposite directions (i.e. emotional support being protective, and negative interactions being a risk factor), but with the effect of negative interactions being modestly stronger [20% (1/5) prospective high (Teo et al., 2013)].

Findings for received emotional support were similar to findings regarding perceived emotional support. Low levels of received emotional support were significantly associated with depression in eight out of 12 studies (8/12=66.7%) [37.5% (3/8) cross-sectional moderate (Fiori and Denckla, 2012; Leggett et al., 2012; Mair et al., 2010); 25% (2/8) prospective moderate (Rugulies et al., 2006; Stoetzer et al., 2009), and 37.5% (3/8) prospective high (Chao, 2011; Garcia-Pena et al., 2013; Sonnenberg et al., 2013)]. One study out of the twelve (1/12=8.3%) reported that receiving emotional

Table 3
Overview of the 28 cross-sectional studies included in the review.

Reference	Location of study	Number of participants and age group	Design and study length	Social relationships measure	Depression outcome measure	Methodological quality
Fiori and Denckla (2012)	USA	*N*=6767 All adults (18+years)	Cross-sectional	Support (perceived; received; provided; instrumental, emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D) short form	Moderate
Glaesmer et al. (2011)	Germany	*N*=5033 60–85 years old	Cross-sectional	Support (perceived emotional)	The Depression Module of the Patient Health Questionnaire (PHQ-9)	Moderate
Grav et al. (2012)	Norway	*N*=40659 20–89 years old	Cross-sectional	Support (perceived emotional)	The Hospital Anxiety and Depression scale for depression (HADS-D)	Moderate
Harvey et al. (2010)	Norway	*N*=40401 20–89 years old	Cross-sectional	Support (perceived emotional)	The Hospital Anxiety and Depression scale for depression (HADS-D)	Low
Leggett et al. (2012)	Vietnam	*N*=600 55 years old and above	Cross-sectional	Support (received emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Li and Liang (2007)	China	*N*=2943 60–94 years old	Cross-sectional	Support (perceived instrumental and emotional) and negative interactions	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Ostberg and Lennartsson (2007)	Sweden	*N*=5053 18–75 years old	Cross-sectional	Support (perceived instrumental and emotional)	Self-reporting of the occurrence of depression	Low
Zhang and Li (2011)	China	*N*=1428 55 years old and above	Cross-sectional	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Low
Choi and Ha (2011)	USA	*N*=2924 57–85 years old	Cross-sectional	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Litwin (2010)	Europe	*N*=9054 60 years old and above	Cross-sectional	Network (contact frequency, size, structure) and social engagement	The EURO-D depression Scale	Moderate
Litwin (2012)	USA	*N*=1349 65 years old and above	Cross-sectional	Network (contact frequency; size) and network type	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Mair et al. (2010)	USA	*N*=3105 All adults (18+years)	Cross-sectional	Combined network (ties) and support (perceived emotional and reciprocal emotional and instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Millan-Calenti et al. (2013)	Spain	*N*=579 65 years old and above	Cross-sectional	Combined network (contact frequency) and support (perceived emotional and instrumental)	The Geriatric Depression Scale (GDS) short form	Moderate
Tsai et al. (2005)	Taiwan	*N*=1200 65 years old and above	Cross-sectional	Combined network (size) and support (perceived emotional)	The Geriatric Depression Scale (GDS) short form	Moderate
Fiori et al. (2006)	USA	*N*=1669 60 years old and above	Cross-sectional	Support (perceived emotional) and negative interactions. Network types	The Center for Epidemiologic Studies-Depression scale (CES-D) short form	Moderate
Litwin (2011)	USA	*N*=1350 65–85 years old	Cross-sectional	Combined network (social ties) and support (perceived emotional). Negative interactions and network types	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Sicotte et al. (2008)	Cuba	*N*=1905 60 years old and above	Cross-sectional	Combined network (social ties) and support (perceived and received; network type emotional and instrumental)	The Geriatric Depression Scale (GDS)	Moderate
Wilby (2011)	USA	*N*=91 65 years old and above	Cross-sectional	Combined network (social ties; contact frequency) and support (received emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Low
Tiedt (2010)	Japan	*N*=3807 65 years old and above	Cross-sectional	Combined network (size; contact frequency) and support (perceived and received emotional and instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Chan et al. (2011)	Singapore	*N*=4489 60 years old and above	Cross-sectional	Combined network (size; contact frequency) and support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Chen et al. (2005)	China	*N*=1600 60 years old and above	Cross-sectional	Combined network (contact frequency) and support (perceived emotional)	The Geriatric Mental State (GMS) and the Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT)	Low
Alexandrino-Silva et al. (2011)	Brazil	*N*=367 60 years old and above	Cross-sectional	Support (perceived emotional)	The Composite International Diagnostic Interview version 1.1 (CIDI 1.1)	Moderate
Ford et al. (2011)	UK	*N*=9377 45 years old	Cross-sectional	Combined network (size; social ties; contact frequency) and support (perceived and received emotional and instrumental). Negative interactions	The abbreviated revised Clinical Interview Schedule (CIS-R)	Low
Leung et al. (2007)	China	*N*=507 65 years old and above	Cross-sectional	Support (perceived instrumental and emotional)	The Symptom Checklist-90 revised (SCL-90-R)	Moderate

Table 3 (*continued*)

Reference	Location of study	Number of participants and age group	Design and study length	Social relationships measure	Depression outcome measure	Methodological quality
Chazelle et al. (2011)	Ireland	*N*=9978 All adults (18+years)	Cross-sectional	Combined network (composition) and support (perceived emotional)	The short form of the Composite International Diagnostic Interview (CIDI-SF)	Moderate
Virtanen et al. (2008)	Finland	*N*=3374 30–64 years old	Cross-sectional	Support (perceived emotional)	The WHO Composite International Diagnostic Interview (M-CIDI) for depressive disorder	Low
Waldenstrom et al. (2008)	Sweden	*N*=672 20–64 years old	Cross-sectional	Support (perceived instrumental)	DSM-IV depressive syndromes assessed via SCAN interviews	Moderate
Russell and Taylor (2009)	USA	*N*=947 All adults (18+years)	Cross-sectional	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate

Methodological quality was rated in terms of six components: (1) selection bias; (2) study design; (3) confounders; (4) blinding; (5) data-collection method; (6) withdrawals and drop-outs. Each component was rated as weak, moderate or strong, and a final rating was made of each study. A study was rated as 'low quality' if it had received two or more weak ratings; 'moderate quality' if it had received one weak rating, and 'high quality' if it had not received any weak ratings. Any discrepancies in terms of rating were resolved between the two reviewers.

support was a predictor of depression [prospective high (Bisschop et al., 2004)], while the remaining studies (3/12=25%) did not reach statistical significance [33.3% (1/3) cross-sectional low (Ford et al., 2011); 33.3% (1/3) prospective moderate (Smith and Bielecky, 2012), 33.3% (1/3) prospective high (Taylor and Lynch, 2004)].

Low levels of perceived instrumental support also emerged as an important predictor of depression in eleven out of twelve studies (11/12=91.6%) [27.3% (3/11) cross-sectional low (Harvey et al., 2010; Ostberg and Lennartsson, 2007; Virtanen et al., 2008); 45.4% (5/11) cross-sectional moderate (Fiori and Denckla, 2012; Grav et al., 2012; Leung et al., 2007; Li and Liang, 2007; Sicotte et al., 2008); 9.1% (1/11) prospective low (Tiikkainen and Heikkinen, 2005); 9.1% (1/11) prospective moderate (Koizumi et al., 2005); 9.1% (1/11) prospective high (Huang et al., 2011)], while only one study (1/12=8.4%) examining perceived instrumental support did not find it to be a significant correlate [cross-sectional moderate (Millan-Calenti et al., 2013)]. Three studies included both perceived and received support, and all of these found that perceived support was a more important predictor of depression than received support, which was found to have either a less strong or non-significant association [33.3% (1/3) cross-sectional moderate (Fiori and Denckla, 2012), 66.7% (2/3) prospective high (Taylor and Lynch, 2004; Yang, 2006)].

Findings were more mixed for received instrumental support. Only two out of ten studies (2/10=20%) reported protective effects of instrumental support receipt [50% (1/2) cross-sectional moderate (Waldenstrom et al., 2008); 50% (1/2) prospective high (Muramatsu et al., 2010)]. Three studies (3/10=30%) found receipt of instrumental support to be a significant risk factor for depression [33.3% (1/3) cross-sectional low (Ford et al., 2011); 33.3% (1/3) cross-sectional moderate (Tiedt, 2010); 33.3% (1/3) prospective high (Bisschop et al., 2004)], while four studies (4/10=40%) did not reach significance [50% (2/4) cross-sectional moderate (Fiori and Denckla, 2012; Tsai et al., 2005); 50% (2/4) prospective high (Taylor and Lynch, 2004; Yang, 2006)]. The remaining study [prospective high (Garcia-Pena et al., 2013)] reported that low levels of both received emotional and instrumental support predicted deterioration of depressive symptoms for people with depression at baseline, but neither was a significant predictor of depressive symptoms for people without depression at baseline.

Eight studies utilized variables on both emotional and instrumental support. Five of those (5/8=62.5%) found emotional support to be more strongly related to depression than instrumental support [60% (3/5) cross-sectional moderate (Fiori et al., 2006; Leung et al., 2007; Millan-Calenti et al., 2013), 40% (2/5) prospective high (Chao, 2011; Yang, 2006)], while the remaining three studies (3/8=37.5%) concluded the opposite [66.6% (2/3) cross-sectional low (Ford et al., 2011, Ostberg and Lennartsson, 2007); 33.3% (1/3) prospective moderate (Koizumi et al., 2005)].

In terms of the source of social support, five studies out of seven studies (5/7=71.4%) concluded that social support from friends was equally important in terms of predicting depression as family support [20% (1/5) cross-sectional low (Zhang and Li, 2011); 60% (3/5) cross-sectional moderate (Choi and Ha, 2011; Leggett et al., 2012; Russell and Taylor, 2009), 20% (1/5) prospective high (Muramatsu et al., 2010)], while two studies (2/7=28.6%) reported that only family support exerted a significant influence on depression [50% (1/2) prospective moderate (Pettit et al., 2011), 50% (1/2) prospective high (Teo et al., 2013)].

In terms of studies focusing on the role of support in work-settings, four studies provided evidence that emotional and instrumental support in the workplace was protective against depression [25% (1/4) cross-sectional moderate (Waldenstrom et al., 2008); 75% (3/4) prospective moderate (Plaisier et al., 2007; Rugulies et al., 2006; Stoetzer et al., 2009)]. Stoetzer et al. (2009) [prospective moderate] found that work-related social support had a protective effect, however, when stratified by gender, this relationship was only found to be protective for men. Rugulies et al. (2006) [prospective moderate] reported that low levels of support from workplace supervisors significantly predicted depression, but only for women. Low coworker support was not found to be significant for either gender. One study did not find evidence that work-related social support predicted depression (Smith and Bielecky, 2012) [prospective moderate]. Two of the studies reported that negative working conditions were strong predictors of depression, and that social support was not effective enough to buffer against the effect of this association [100% (2/2) prospective moderate (Plaisier et al., 2007; Smith and Bielecky, 2012)].

3.2. Social networks

Nine studies (9/13=69.2%) reported that a larger social network was an important protective factor against depression [11.1% (1/9) cross-sectional low (Ford et al., 2011); 33.3% (3/9) cross-sectional moderate (Chan et al., 2011; Sicotte et al., 2008; Tsai et al., 2005); 55.5% (5/9) prospective high (Chao, 2011; Garcia-Pena et al., 2013; Kuchibhatla et al., 2012; Rosenquist et al., 2011; Sonnenberg et al., 2013)] while the remaining four studies (4/13=30.8%) did not find a significant association between social network size and depression [25% (1/4) cross-sectional low (Wilby, 2011); 25% (1/4) cross-sectional

Table 4
Overview of the 23 prospective studies included in the review.

Reference	Location of study	Number of participants and age group	Design and study length	Social relationships measure	Depression outcome measure	Methodological quality
Garcia-Pena et al. (2013)	Mexico	*N*=7449 60 years old and above	Prospective; 3 time points over 3 years	Combined network (size) and support (received emotional and instrumental)	The Geriatric Depression Scale (GDS)	High
Huang et al. (2011)	Taiwan	*N*=1017 65 years old and above	Prospective; 4 time points over 10 years	Support (perceived instrumental and emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Koizumi et al. (2005)	Japan	*N*=1178 70 years old and above	Prospective; 2 time points over 1 year	Support (perceived instrumental and emotional)	The Geriatric Depression Scale (GDS)	Moderate
Pettit et al. (2011)	USA	*N*=816 21–30 years old	Prospective; 4 time points over 14 years	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate
Teo et al. (2013)	USA	*N*=4642 25–75 years old	Prospective; 2 time points over 10 years	Support (perceived emotional) and negative interactions	The short form of the Composite International Diagnostic Interview (CIDI-SF)	High
Kuchibhatla et al. (2012)	USA	*N*=4162 65 years old and above	Prospective; 4 time points over 10 years	Network (contact frequency; size)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Rosenquist et al. (2011)	USA	*N*=12067 30 years old and above	Prospective; 3 time points over 18 years	Network (social ties)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Tiikkainen and Heikkinen (2005)	Finland	*N*=133 80 years old	Prospective; 2 time points over 5 years	Social connectedness (perceived togetherness)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Low
Chaoet al. (2011)	Taiwan	*N*=4049 60 years and above	Prospective; 5 time points over 14 years	Combined network (social ties; composition; contact frequency) and support (received emotional and instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Sonnenberg et al. (2013)	The Netherlands	*N*=2823 55–85 years and above	Prospective; 5 time points over 14 years	Combined network (size) and support (received emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Heponiemi et al. (2006)	Finland	*N*=3596 15–30 years old	Prospective; 2 time points over 5 years	Support (perceived emotional)	Beck's Depression Inventory (BDI-modified)	Low
Jokela et al. (2007)	Finland	*N*=341 All adults (18+years)	Prospective; 2 time points over 4 years	Support (perceived emotional)	Beck's Depression Inventory (BDI-modified)	Moderate
Bierman and Statland (2010)	USA	*N*=1167 65 years and older	Prospective, 2 time points over 2 years	Support (perceived emotional)	Four items from the Hopkins Symptoms Checklist	Moderate
Bisschop et al. (2004)	The Netherlands	*N*=2288 55–85 years old	Prospective; 3 time points over 6 years	Combined network (size; contact frequency) and support (received instrumental and emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Fauth et al. (2012)	Sweden	*N*=779 70 years old and above	Prospective; 3 time points over 12 years	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Taylor and Lynch (2004)	USA	*N*=3876 65 years and older	Prospective; 4 time points over 12 years	Support (perceived emotional; received emotional and instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Yang (2006)	USA	*N*=1149 65 years old and above	Prospective; 2 time points over 6 years	Combined network (size; contact frequency) and support (perceived emotional; received instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D)	High
Muramatsu et al. (2010)	USA	*N*=6535 70 years old and above	Prospective; 5 time points over 10 years	Support (perceived and received instrumental)	The Center for Epidemiologic Studies-Depression scale (CES-D) short form	High
Plaisier et al. (2007)	The Netherlands	*N*=7076 18–64 years old	Prospective; 3 time points over 4 years	Support (perceived emotional)	The CIDI interview	Moderate
Rugulies et al. (2006)	Denmark	*N*=4470 All adults (18+years)	Prospective; 2 time points over 5 years	Support (perceived emotional and instrumental)	The five-item Mental Health Inventory (MHI-5) of the Short-Form Health Survey	Moderate
Smith and Bielecky (2012)	Canada	*N*=3753 15–74 years old	Prospective; 3 time points over 5 years	Support (perceived emotional and instrumental)	The short form of the Composite International Diagnostic Interview (CIDI-SF)	Moderate
Stoetzer et al. (2009)	Sweden	*N*=4040 20–64 years old	Prospective; 2 times points over 3 years	Support (perceived emotional)	The Major Depression Inventory (MDI)	Moderate
Cacioppo et al. (2010)	USA	*N*=229 50–68 years old	Prospective; 5 time points over 5 years	Support (perceived emotional)	The Center for Epidemiologic Studies-Depression scale (CES-D)	Moderate

Methodological quality was rated in terms of six components: (1) selection bias; (2) study design; (3) confounders; (4) blinding; (5) data-collection method; (6) withdrawals and drop-outs. Each component was rated as weak, moderate or strong, and a final rating was made of each study. A study was rated as 'low quality' if it had received two or more weak ratings; 'moderate quality' if it had received one weak rating, and 'high quality' if it had not received any weak ratings. Any discrepancies in terms of rating were resolved between the two reviewers.

moderate (Millan-Calenti et al., 2013); 50% (2/4) prospective high (Bisschop et al., 2004; Yang, 2006)]. The findings on the role of frequency of social contact on depression were less consistent. Two studies out of four (2/4=50%) reported that lower frequency of social contact predicted depression [50% (1/2) cross-sectional moderate (Chan et al., 2011); 50% (1/2) prospective high (Chao, 2011)], while two other studies (2/4=50%) did not find any significant associations between frequency of contact and depression [50% (1/2) cross-sectional moderate (Millan-Calenti et al., 2013), 50% (1/2) prospective high (Teo et al., 2013)].

In terms of studies utilizing more comprehensive measures of network properties, four studies analyzed the effect of the type of social network on depression, and these studies consistently found that diverse social networks were protective against depression as opposed to more restricted network types, i.e., networks including family, relatives, and several networks of friends had favorable effects on depression outcomes [100% (4/4) cross-sectional moderate (Fiori et al., 2006; Litwin, 2011, 2012; Sicotte et al., 2008)]. Chao (2011) [prospective high] concluded that a network consisting of 25–50% family and 50–75% friends was the most beneficial in terms of protecting against depression. Rosenquist et al. (2011) [prospective high] analyzed the distribution of depression across social ties over time and discovered that depression levels in one person were positively correlated with depression levels in friends and neighbors, and that these correlations remained significant up to three degrees of separation. In the events of financial strain, Sicotte et al. (2008) [cross-sectional moderate] reported that social networks served as a buffer against depression. Living with others and having a great diversity of social ties were important deterrents of depression under conditions of insufficient income.

In terms of living arrangements, two studies reported that multigenerational co-residence was a protective factor against depression, i.e. people who live with their relatives or children benefit from the social networks of their living arrangements [50% (1/2) cross-sectional moderate (Sicotte et al., 2008); 50% (1/2) prospective high (Chao, 2011)]. While maintaining relationships to one's family and relatives is important, Fiori et al. (2006) [cross-sectional moderate] concluded that having only a family network with few or no friends was more detrimental and posed a greater risk of depression than having a network with friends but no family.

3.3. Social connectedness

In relation to social connectedness, Tiikkainen and Heikkinen (2005) [prospective low] assessed the impact of perceived togetherness on the association between loneliness and depression over time and concluded that people who feel mutual proximity and security in their social environment suffer significantly less often from depression.

In terms of social isolation, three studies out of twelve (3/12=25%) did not find significant associations between living alone or without a partner and depression [33.3% (1/3) cross-sectional low (Wilby, 2011); 66.6% (2/3) prospective high (Garcia-Pena et al., 2013; Teo et al., 2013)]. However, nine studies (9/12=75%) reported that living alone or without a partner were significant predictors of depression [11.1% (1/9) cross-sectional low (Chen et al., 2005); 44.4% (4/9) cross-sectional moderate (Chan et al., 2011; Fiori et al., 2006; Russell and Taylor, 2009; Sicotte et al., 2008); 11.1% (1/9) prospective low (Tiikkainen and Heikkinen, 2005); 11.1% (1/9) prospective moderate (Cacioppo et al., 2010); 22.2% (2/9) prospective high (Bisschop et al., 2004; Sonnenberg et al., 2013)]. Four studies were consistent in reporting that living alone or without a partner was a greater risk factor of depression for men [75% (3/4) cross-sectional moderate (Chan et al., 2011; Fiori et al., 2006; Sicotte et al., 2008); 25% (1/4) prospective high (Sonnenberg et al., 2013)], while three studies suggested that women were more at risk from the loss of close friends [100% (3/3) cross-sectional moderate (Alexandrino-Silva et al., 2011; Choi and Ha, 2011; Fiori et al., 2006)]. Zhang and Li (2011) [cross-sectional moderate] reported that widows either had or perceived themselves as having less emotional support from the family than the married elderly, and this lower level of support predicted higher levels of depression. Russell and Taylor (2009) [cross-sectional moderate] similarly concluded that people who live alone seem to benefit less from social support than people who live with a partner.

3.4. Other salient findings

As a result of sorting all included papers into overarching thematically or conceptually related categories, several distinct topics emerged on how various factors play a role in the association between social relationships and depression. These factors were gender (13 studies), intrapersonal characteristics (5 studies), and chronic physical illness and disability (8 studies).

3.5. Gender

In terms of associations by sex, eight studies out of 13 (8/13=61.5%) reported that lack of social support was a significant predictor of depression for women, while this was not the case for men [12.5% (1/8) cross-sectional low (Virtanen et al., 2008); 50% (4/8) cross-sectional moderate (Fiori and Denckla, 2012; Mair et al., 2010; Sicotte et al., 2008; Tiedt, 2010); 25% (2/8) prospective moderate (Koizumi et al., 2005; Rugulies et al., 2006); 12.5% (1/8) prospective high (Huang et al., 2011)]. Four studies (4/13=30.8%) discovered that this same pattern was significant for men, but not for women [50% (2/4) cross-sectional moderate (Alexandrino-Silva et al., 2011; Choi and Ha, 2011); 50% (2/4) prospective moderate (Plaisier et al., 2007; Stoetzer et al., 2009)]. One study (1/13=7.7%) reported that lack of emotional support was a significant predictor only in women, while lack of instrumental support was a significant predictor only in men [cross-sectional moderate (Grav et al., 2012)].

Only two studies included measures on support provision. Fiori and Denckla (2012) [cross-sectional moderate] reported that provision of emotional support was protective against depression for both men and women, while women especially seemed to benefit from having a network in need of emotional support. Sicotte et al. (2008) [cross-sectional moderate] concluded that women seem to benefit from reciprocity of social support, i.e. balanced exchanges of social support play a protective role against depression only for women.

3.6. Intrapersonal characteristics

Yang (2006) [prospective high] reported that a favorable effect of perceived support in the association between disabilities and depression could be explained by psychological mechanisms, in the sense that perceived emotional support bolstered an individual's sense of control. Two studies showed results that implied the opposite effect, but with instrumental support. In these studies, receipt of instrumental support exacerbated symptoms of depression, suggesting that such support may undermine feelings of control [50% (1/2) cross-sectional moderate (Tiedt, 2010); 50% (1/2) prospective high (Bisschop et al., 2004)]. Heponiemi et al. (2006) [prospective low] investigated the influence of perceived emotional support on progression to depression, while taking into account childhood anger and later hostility. They reported an overall protective effect of support - an effect that was associated with decreases in depressive symptoms over time. Although hostility itself was a risk factor for depression, its presence often caused interpersonal conflicts, and this in turn, effectively reduced an individual's opportunities for receiving support. Sonnenberg et al. (2013) [prospective high] investigated the influence

of individuals' need for social affiliation – the need to actively seek out support from social connections – in the relation between received emotional support and late-life depression. Across both genders, a high need for social affiliation seemed to worsen outcomes under low levels of emotional support.

Finally, Jokela et al. (2007) [prospective moderate] assessed the influence of a particular genetic factor on the association between perceived social support and depression. Over a four year period, low social support predicted an increase in depressive symptoms only in individuals carrying both dominant alleles of the Tryptophan hydroxylase 1 gene, implying a greater risk for individuals with this particular genetic feature under conditions of low social support.

3.7. Chronic physical illness and disability

Eight studies reported that perceived social support played a significant protective role in the association between disability or chronic illness and depression [12.5% (1/8) cross-sectional moderate (Leung et al., 2007), 12.5% (1/8) prospective moderate (Bierman and Statland, 2010), 75% (6/8) prospective high (Chao, 2011; Fauth et al., 2012; Huang et al., 2011; Muramatsu et al., 2010; Taylor and Lynch, 2004; Yang, 2006)]. In a similar fashion, Huang et al. (2011) [prospective high], Yang (2006) [prospective high] and Bierman and Statland (2010) [prospective moderate] found that adults with high levels of perceived social support experienced less distress from disability and limitations in activities of daily living. Leung et al. (2007) [cross-sectional moderate] also reported a similar protective effect of perceived emotional support in the association between chronic illnesses and depression. Fauth et al. (2012) [prospective high] found that greater levels of perceived social support predicted fewer depressive symptoms at disability onset, and a more pronounced decline in depressive symptoms at later time points, thus implying a protective effect. Both Taylor and Lynch (2004) [prospective high] and Muramatsu et al. (2010) [prospective high] reported that changes in trajectories of perceived emotional support over time mediated the relationships between worsening disability and depressive symptoms, and can act as a buffer against the detrimental effects of disability on depression. Finally, Chao (2011) [prospective high] concluded that provision of instrumental support was protective when it was received on a short-term basis, which can be indicative of a less severe illness, while the opposite was the case when it was received on a long-term (permanent) basis, as can be expected with more severe illnesses.

4. Discussion

4.1. Social support

There was a general consensus that perceived support is more important than received support, and there was also overwhelming evidence that the perceived emotional variant consistently played a protective role against depression across general populations. A considerable amount of good quality studies demonstrated a causal direction from perceived social support to depression through prospective analyses. Also, there was some indication that negative interactions are important risk factors for depression. However, only few studies utilized measures relating to negative interactions.

The evidence was mixed for receipt of instrumental support, and it was difficult to pinpoint exactly how this influences depression. The evidence was conflicting across studies that were different in terms of both quality and design. Other reviews note that the effect of received social support on mental health is generally inconclusive (Haber et al., 2007), which seems to also be the case for received instrumental support in this review. A number of the included studies suggested that receipt of instrumental support has negative implications for depression. Previous research has also noted associations between receipt of instrumental support and adverse mental health outcomes (Deelstra et al., 2003; Kawachi and Berkman, 2001; Nurullah, 2012).

Across included studies, there was some evidence that work-related social support was an important determinant of depression, but the evidence was limited and sometimes conflicting. Similarly, several studies found more important determinants relating to negative working conditions. Previous research reports that the effect of work-related social support seems to be sensitive to other factors, and that several psychosocial work characteristics must be taken into account to predict physical health (Hoogendoorn et al. 2000; Michie and Williams, 2003).

4.2. Social networks

The protective effect of larger social networks against depression has been confirmed in the literature (Smith and Christakis, 2008). In this review, over half of the studies arriving at this same conclusion were of the highest quality and had a prospective design. Notably, the diverse types of social networks were consistently found to be associated with favorable depression outcomes. It seems that having close family relationships combined with a number of different peer networks from different contexts is particularly beneficial. Finally, depression can spread through social networks. The contagious properties of depression have been corroborated by other independent studies and meta-analyses (Haeffel and Hames, 2014; Joiner and Katz, 1999). Although this may seem disconcerting, Smith and Christakis (2008) note that positive and beneficial emotional states, such as happiness and optimism, also seem to spread through social networks.

4.3. Social connectedness

Summarizing the limited evidence for social connectedness, it seems that people in a social environment with relationships in which they feel mutual proximity and belongingness are less likely to be at risk of depression. Ashida and Heaney (2008) found that social connectedness may be more important for the health status of older adults, possibly because higher levels of feeling socially connected offer more proximity to social networks, and greater likelihood of feeling comfortable while relying on networks for support. Thus, social connectedness may play a protective role against depression by mediating the positive effects of social relationships on mental health (Williams and Galliher, 2006). Previous reviews and independent studies have confirmed the protective effect of social connectedness against various mental health outcomes (Townsend and McWhirter, 2005; Lee et al., 2001; Lee and Robbins, 1998; Resnick et al., 1997). However, this review highlights the current situation of social connectedness being underutilized in studies assessing social determinants of depression.

There was good evidence in terms of both prospective designs and quality to support that social isolation is particularly detrimental in terms of predicting depression. Multi-generational living arrangements was a general protective factor against depression. This finding may be considered in the light of research demonstrating that transitions to institutional settings predict depressive symptoms (Pot et al., 2005). There may be several reasons for this, but it could be attributed to feelings of proximity and social inclusion. Living alone or without a partner were generally found to be strong predictors of depression, and bereavement in particular played an important role. The importance of psychological factors of social isolation and bereavement in the association with depression in community-dwelling elderly has been emphasized in previous reviews (Cole and Dendukuri, 2003; Kawachi and Berkman, 2001).

Reviews have confirmed that bereavement can be more damaging to the physical and mental health of men, while women are strongly affected by the loss of close friends (Smith and Christakis, 2008; Kawachi and Berkman, 2001). This may be explained by the consistent finding that men tend to rely on spouses for support, while women seem to rely more on friends as confidants (Glynn et al., 1999; Reevy, 2007; Schultz and Schwarzer, 2004; van Daalen et al., 2005).

4.4. Gender

The literature supports significant associations between social support and depression particularly and sometimes exclusively for women (Kawachi and Berkman, 2001), and also that reciprocity of support seems to be an important protective factor for women (Belle, 1987).

4.5. Intrapersonal characteristics

A variety of psychological characteristics play important roles in the relationship between social support and depression. In terms of feelings of control, previous research confirms that different types of social support may either promote self-efficacy or have detrimental effects on self-esteem by reinforcing dependence (Kawachi and Berkman, 2001). Only three studies in this review included measures of feelings of control. More research is warranted to explore sense of control and self-efficacy as a possible mechanism in the link between social relationships and outcomes on mental disorders. A high need for social affiliation also seems to be important, especially under conditions of low levels of social support. Similar conclusions have been drawn in studies utilizing the variables of social neediness in relation to depression (Rude and Burham, 1995). Another intrapersonal characteristic, hostility, was a risk factor for depression, which often resulted in interpersonal conflicts and reduced opportunities for receiving support. Thus, psychological factors and levels of social support seem to have a reciprocal effect on each other in these instances, which ultimately have important consequences for depression outcomes. A moderating role of psychological characteristics on physical health outcomes has been noted in a previous review and may be equally relevant for mental health (Uchino, 2006). Uchino further provides evidence for the influence of social support on the relationship between various biological characteristics and disease. In this review, we identified one particular genetic composition which seems to have a role to play in the support-depression relationship.

4.6. Chronic physical illness and disability

Perceived social support seems to offer a sense of security and reliance on social networks for people that are physically disadvantaged or people that are experiencing disease. This was a robust finding across a range of different included studies, with three quarters being prospective high quality studies. Previous research has found similar favorable associations between perceived social support and outcomes relating to depression, levels of functional impairment, and ability to cope with physical disabilities (Evers et al., 1998; Greenglas et al., 2006; Holahan et al., 1997, 1995, 1996).

The included studies were less informative in terms of the influence of received support, particularly instrumental support. The reason for this may be that long-term received instrumental support is often referred to under the term 'informal care', which was beyond the scope of this review. However, it should be noted that an abundance of studies demonstrate that long-term instrumental support for various reasons is associated with adverse mental health outcomes (Blazer, 2003; Kwak et al., 2014; Martire et al., 2002; Newsom and Schultz, 1998; Roe et al., 2001; Beach et al., 2005; Christie et al., 2009; Jang et al., 2002; Krause and Rook, 2003; Wallsten et al., 1999; Wolff and Agree, 2004).

4.7. Limitations

A number of limitations should be born in mind when interpreting the results. First, reporting bias may exist for perceived social support. For example, lack of perceived support may appear to be a risk factor for depression, but this may be due to the tendency of individuals with depression to form rather cynical and pessimistic perceptions of the reality of their social surroundings, and this may not necessarily mean that support is actually lacking. This could explain the discrepancies observed for the associations between perceived or received support and depression. In addition, reverse causality may exist between depression and social relationships, where people with depression may be less likely to engage in social activities or seek social support. This is a limitation of particular importance for cross-sectional studies, as prospective studies are less likely to be affected by this type of bias. Further, due to the large number of studies available in the domain of interest, only studies from peer-reviewed journals were included. Publication bias and the fact that 'gray literature' (i.e. papers published in databases that are not controlled by academic publishers) were not included in our review may have limited our findings. One should also note that our emphasis on studies assessing the influence of social relationships in populations-based samples did not allow for the inclusion of qualitative studies. Although qualitative studies are less able to address how one variable influences another, they can be useful in terms of offering explanations of psychosocial phenomena that are often not accessible through quantitative research. Finally, given that this review included studies from a wide range of cultural and national contexts, cultural differences may exist and have implications for how findings should be interpreted. A growing body of literature has examined how social relationships vary across culture, such as social support seeking in individualistic as opposed to collectivistic cultures (Kim et al., 2008). However, the articles included in this review generally focused on the population in question, and we did not come across any studies drawing particularly insightful conclusions regarding culture differences. This is an area that should be further explored.

5. Conclusion

This review provides some confirmation that perceived social support and larger, diverse social networks, in particular, play important protective roles against depression in the general population, including those with chronic somatic illness or disability. However, some challenges persist and must be addressed. First, studies are needed to address how people's *perceptions* of social support and networks, as compared to objective measures, affect the association between social relationships and depression. Second, it was difficult to compare studies due to the utilization of different support and network variables that are distinct and not necessarily comparable even when pertaining to social support or social networks. Thus, the best comparisons were derived from studies that utilized several social support variables (e.g. perceived *and* received support) or social network variables (e.g. size *and* contact frequency). Studies on social support and social networks could benefit from more coherence in terms of incorporating several relevant measures, and research should aim to include a broad range of social relationships variables, rather than just one or two single measures. This would pave the way for a more robust research base for social support and social networks, and ultimately strengthen the comparability across studies. Third, measures on negative interactions (as opposed to emotional support) were largely underutilized, which made it difficult to make conc-

lusions about how supportive relationships and negative interactions may interact and impact on health. Thus, studies on social support are more informative when also including measures on negative interactions in social relationships. Forth, although the included studies on social support and social networks were vast and comprehensive, many of the studies did not include variables on both social networks and social support, and often when they did, they still did not include all the necessary and relevant variables. On the contrary, most studies focused either on social support or social networks, and were not able to evaluate how these two constructs relate to each other. The most informative studies were those that did not focus exclusively on social support or social networks, but those that considered these two in their analyses as being two distinct aspects of basically the same construct. As emphasized previously, social networks and social support have sometimes been referred to as 'network structure' and 'network function', respectively. This may be a particularly useful way to engage in research with these variables, as this approach seems to take both elements into account. There is a strong call for future research to determine how social networks and social support interact and ultimately affect risks for depression. Finally, social connectedness is underutilized as a social relationships measure in studies assessing depression outcomes in the general population. Future research has yet to assess the degree to which this variable constitutes a vital social determinant of depression in population-based samples.

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Conflict of interest

None of the authors have any interests to declare in relation to this submission.

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