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SOCIAL ISOLATION IN MENTAL HEALTH:

A CONCEPTUAL AND METHODOLOGICAL REVIEW

SCOPING REVIEW 14



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This report presents an independent review commissioned by the Department of Health's NIHR School for Social Care Research. The views expressed in this publication are those of the authors and not necessarily those of the NIHR School for Social Care Research or the Department of Health, NIHR or NHS.

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Contents

Abstract	1
Introduction	2
Method	4
Overall approach	4
Literature search	4
Data extraction and synthesis	5
Results	6
Definitions and brief explanation of relevant conceptual terms	7
A conceptual model of social isolation and related terms	10
Measures	13
Discussion	17
Comparison with other conceptual reviews	17
Strengths and limitations	18
A gap in the literature: online social relationships	19
Implications	19
Appendix 1: Conceptualisations of social isolation and related concepts in existing literature, and their fit with our proposed domains	20
Appendix 2: Multi-domain measures relating to social isolation and related concepts	28
References	30

Abstract

Social isolation and related terms such as loneliness have been increasingly discussed in the field of mental health. However, there is a lack of conceptual clarity and consistency of measurement of these terms and understanding of overlaps.

This scoping review aims to provide a clear conceptual framework for social isolation and related terms, and to propose well established measures in the field of mental health for each conceptual domain.

The review used an iterative strategy of expert consultation and literature searching, following an established process for conceptual reviews. A multidisciplinary group of senior academics was consulted both before and after literature searching to identify relevant terms, conceptual papers or recommended measures. We searched the Web of Science database using terms suggested by experts and then identified further relevant studies through review articles and through reading full text or reference lists of included studies. A narrative synthesis was conducted.

This report provides definitions and brief explanations of relevant conceptual terms from the literature, and proposed a conceptual model with five domains to include all elements of current conceptualisations. These five domains are:

- social network: quantity
- social network: structure
- social network: quality
- appraisal of relationships: emotional
- appraisal of relationships: resources

It also identified some well-developed measures suitable for assessing each of the five conceptual domains or covering multi-domains. We discuss the strengths and limitations of our approach.

The review proposes a conceptual model to distinguish and fit all concepts relating to social isolation. The developed model can help researchers and intervention developers to identify expected outcomes of interventions precisely and choose the most appropriate measures for use in mental health settings.

Keywords

to follow

Acknowledgements

The authors are grateful for the help of Professor Stefan Priebe and the London Social Psychiatry Group for consultation and guidance with this review, and to the international experts who provided helpful feedback on early iterations of their conceptual model of social isolation.

Introduction

There has been a realisation among policymakers and social care and health practitioners that social relations play an influential role in mental health and psychological wellbeing (Andersson 1998). People with mental illness living in the community often say they feel socially isolated and lonely (DeNiro 1995, Davidson *et al.* 2004, Herman *et al.* 2005, Perese and Wolf 2005, Chernomas *et al.* 2008).

Feelings of loneliness are worse and social network size is smaller among mental health service users than in the general population (Clinton *et al.* 1998, Borge *et al.* 1999, Lauder *et al.* 2004, Palumbo *et al.* 2015). Previous studies report loneliness to be related to personality disorders and psychoses (Richman and Sokolove 1992, Neeleman and Power 1994, DeNiro 1995), suicide (Goldsmith *et al.* 2002), and more severe depressive symptoms (Segrin 1999, Heikkinen and Kauppinen 2004, Wei *et al.* 2005, Cacioppo *et al.* 2006, Luanaigh and Lawlor 2008). Similarly, Schwarzbach and colleagues (2014) have identified in a systematic review that poor social support and quality of relations, and lack of confidants were significantly associated with depression. In the context of severe mental illness, social isolation has been linked to higher levels of delusions (Garety *et al.* 2001), lack of insight (White *et al.* 2000) and high hospital usage (Mgutshini 2010). Conversely, people who received more social support from friends and family were more likely to recover from psychotic symptoms (Calsyn and Winter 2002).

However, there is a lack of clarity about definitions of social isolation, loneliness and related concepts, and how they should be measured (Windle *et al.* 2011, Courtin and Knapp 2015). Definitions of social isolation encompass, and sometimes merge, the objective degree of social contact an individual has with others and the subjective experience of the adequacy of that contact. Nicholson (2009) for example, defines social isolation as 'a state in which the individual lacks a sense of belonging socially, lacks engagement with others, has a minimal number of social contacts and they are deficient in fulfilling quality relationships'. While social isolation has been linked to loneliness, it is not synonymous (Wenger *et al.* 1996, Andersson 1998). Social isolation can be objectively measured in terms of social network size and/or frequency of contact with others (Wenger *et al.* 1996) while emotional loneliness can only be described – subjectively – by a person him/herself (Andersson 1998). A consensus on the definition of loneliness has not been reached (Bekhet *et al.* 2008) and several measures of loneliness and social isolation have been developed (Cramer and Barry 1999). These, and related terms, e.g. social networks, confiding relationships, social support, are all contested concepts, with multiple meanings. Researchers sometimes use these terms loosely and interchangeably because it is unclear how different these concepts differ or overlap (Valtorta *et al.* 2016). For example, in research studying the course of psychiatric illness, loneliness and social isolation were measured by only one item and analysed and reported simultaneously as a phrase 'loneliness/social isolation' (Hansson *et al.* 1994).

This review focused entirely on social relations as they are experienced/can be measured at the level of individuals, but of course there is a higher order sociological approach to looking at how people relate to each other within a society, and individual relationships will always be within this context. For example, social isolation and related concepts, which focus on individuals' connectedness, companionship and contact with others, may be distinguished from concepts such as ecological social capital (which relate to the quality of social relationships within a community in general) and from concepts such as social inclusion (which relates to individuals' access to resources and participation in economic, political and social activity, rather than the number or quality of their interpersonal relationships). Previous reviews have provided an overview of the current conceptual and methodological literature on social exclusion (Morgan *et al.* 2007, Wright and Stickley 2013) and social capital (Harpham *et al.* 2002, Bhandari and Yasunobu 2009). While there are conceptual reviews of specific concepts relevant to social isolation and loneliness (Wenger *et al.* 1996, de Jong Gierveld *et al.* 2006, Zavaleta *et al.* 2014), to our knowledge, no review has explored the full range of concepts relating to social isolation and related terms and how they are used in the field of mental health. In this field, where numerous conceptual terms

with contested definitions are used, our review can therefore help address the lack of conceptual clarity and consistency of measurement which hampers attempts to synthesise findings about the effectiveness of interventions to reduce social isolation, or its impact on other outcomes (Windle *et al.* 2011, Courtin and Knapp 2015).

The aim of this review is to provide a clear conceptual framework for social isolation and related terms, and examples of different measurement approaches for each concept and most well established measures in the field of mental health (focusing on mental illness and populations of mental health service users, rather than the fields of wellbeing or mental health promotion). It will be of value in helping future researchers decide exactly what they want to measure and how to go about it.

Method

Overall approach

Conceptual and methodological reviews differ from systematic reviews of effects. Systematic reviews predefine precise criteria to capture a discrete body of evidence, while the exact scope and nature of conceptual reviews is established through the process of conducting the review and thus clarifying relevant concepts. Practical challenges for conceptual reviews include: difficulties in maintaining pre-planned search strategies; implicit weighting of studies' merits or relevance; iteration of the process; and problems of forming straightforward conclusions and recommendations (Lilford *et al.* 2001). Lilford and colleagues (2001) offer recommendations for conduct of methodological research to minimise bias and facilitate efficient management of research. We followed these recommendations and used an iterative and consultative process to achieve a clear, conceptual understanding of social isolation and related terms. This process included searching widely using disparate databases and sources, making sure that the review is informed by expert advice (including in this case social science, psychological and medical perspectives) and allowing some overlap in the various stages of the review process so that the final nature and scope of the review can be clarified in response to interim findings and feedback.

Literature search

The iterative search strategy involved:

Expert consultation: First, we consulted a multidisciplinary group of senior academics familiar with this field (a London social psychiatry group) to identify relevant terms (e.g. social networks, loneliness, confiding relationships, social support). Following initial literature searching, we extracted data which informed our development of a draft conceptual map with several domains to fit in all identified relevant terms. Then we consulted this same group and contacted 15 international experts identified through initial literature searching, to present our draft conceptual map and seek feedback and suggestions for any additional relevant terms, conceptual papers or recommended measures. These international experts specialise in the concepts identified by our first consultation and have conducted numerous relevant studies outside the mental health field, including social neuroscience, sociology, social psychology, social and behavioural research, social policy, and public health sciences.

Literature search: Using terms suggested by experts, we searched the Web of Science database on 23 April 2015 for papers which proposed definitions of social isolation and related terms, or the methods of measurement of these concepts. Search terms for social isolation and related terms (social isolation OR loneliness OR social network* OR social support OR confiding OR confide OR social contact* OR social relation* OR social capital) were combined with terms for mental disorders (mental OR psychiatr* OR schizo* OR psychosis OR psychotic OR depress*, mania* OR manic OR bipolar near/5 (disorder or disease or illness) OR anxiety). Time limits for the initial search were restricted to 1 January 2013 to 23 April 2015 as a high volume of articles was retrieved initially. Web of Science was selected as an inter-disciplinary database covering a wide range of subject areas, including Science Citation Index Expanded and Social Sciences Citation Index. Reference lists of studies identified through the electronic search for inclusion in the review and of review articles were then hand-searched for other relevant studies, without time limit. Wherever a paper retrieved for full-text screening referred to another potentially relevant study, this too was retrieved and screened: in this way we retrieved older literature in addition to the recent papers included in our time-limited search.

Studies were included from the initial electronic database search which met two criteria: they proposed a definition or measure of a concept relating to social isolation; and the concept or

measure had been applied in the field of mental health, relating to adults with mental illness. Studies of children under 16 years old, or populations with learning disabilities and organic disorders were excluded. Studies with no explicit definition of social isolation and related terms or studies not using well-developed measures of these terms, e.g. studies using single-item measures, were excluded. Where relevant concepts or measures used in a mental health context had originally been developed in other fields, the original source was additionally retrieved and reviewed.

Data extraction and synthesis

We extracted information on definitions of social isolation and related terms, and on approaches to its measurement, using an electronic data extraction form developed for this review. From papers reporting relevant measures, we recorded: name of the measure, reference, concept measured, description (items or subscales), psychometric properties established, and studies using this measure. Wherever additional papers referred to relevant conceptual definitions or measures already identified through our search, these additional papers were noted in our data extraction form. Initial screening was conducted by single review authors (JW, BLE, RF, CN, FM), with regular meetings between review authors to address uncertainties about inclusion where necessary and check that a consistent approach to screening was applied.

A narrative approach was adopted to synthesise the findings, comprising three stages.

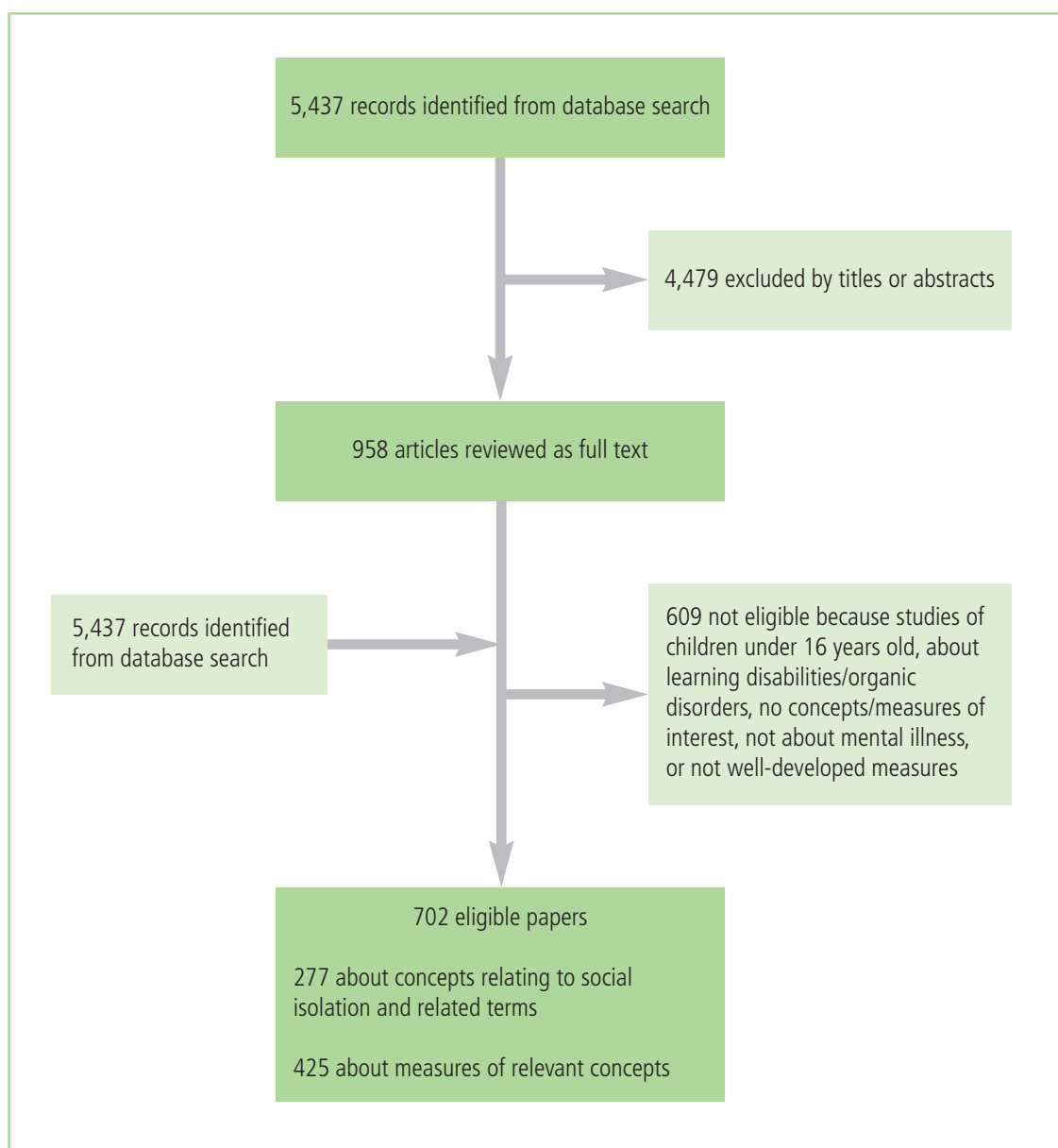
1. With reference to the retrieved definitions of relevant terms, the review authors developed a set of conceptual domains which covered all the elements within conceptualisations of social isolation and related terms from the included papers.
2. The validity of the conceptual framework provided by this set of domains was then assessed with reference to existing literature. All included conceptual papers from the literature search were cross-referenced with the domains we developed, to check whether our conceptual map was sufficiently comprehensive to include all relevant concepts and was not adding additional domains not covered in the literature. (A record of the retrieved concepts we reviewed and how we mapped them to the domains of our conceptual framework is provided in Appendix 1).
3. Measures of social isolation and related terms identified from our literature search were reviewed by the authors and best examples of suitable measures for each of our proposed conceptual domains were identified. For each domain, measures, regardless of their length, with established good psychometric properties and demonstrated applicability and wide use in mental health settings were prioritised and thus identified as most suitable measures. Initial selection of appropriate measures was undertaken by single review authors (JW, BLE, RF, CN, FM); review authors met to agree the final selection of measures included in this review based on the two criteria above.

Further consultation with experts was conducted to improve and validate the conceptual model and to identify any further relevant literature or concepts not included. We persisted in this process until no new concepts or measurement methods were emerging.

Results

In our electronic database search, 5,437 papers were identified (Figure 1). This number was reduced to 958 potentially eligible papers by reading titles and abstracts. After full text screening, we excluded 609 papers because they were studies of children under 16 years old, about learning disabilities/organic disorders, had no concepts/measures of interest, were not about mental illness, or lacked well-developed measures. A further 353 studies were identified from reference lists of papers included and review articles. Therefore, 702 papers were finally included in our review. Of these, 277 papers discussed concepts relating to social isolation and related terms with 162 papers identified from reference lists. These 277 included multiple papers describing the same, or conceptually similar definitions of terms. We also retrieved 425 papers presenting measures of relevant concepts with 191 original papers which developed or adapted these measures. Of these, we have reported 16 in our review, those which have been most widely used in the field of mental health and/or have the best established psychometric properties.

Figure 1. Search strategy



Definitions and brief explanation of relevant conceptual terms

The conceptual map of social isolation and related terms was informed by definitions of concepts identified in our search of the literature. In this section we summarise how social isolation and related terms have previously been conceptualised. These concepts have been widely cited in mental health research although not all of them originated in the field of mental health. We traced the original definitions of these concepts through the reference lists of included studies.

Social isolation

Nicholson (2009) undertook an evolutionary concept analysis to identify the definition and attributes of social isolation as experienced by older adults. Five aspects of social isolation were proposed – ‘number of contacts, feeling of belonging, fulfilling relationships, engagement with others, and quality of network members’ (ibid.).

Zavaleta and colleagues (2014), in a review of social isolation not specific to a mental health context, defined social isolation as ‘the inadequate quality and quantity of social relations with other people at the different levels where human interaction takes place (individual, group, community and the larger social environment)’. They distinguished two domains of social isolation: external and internal characteristics. External characteristics, also known as objective social isolation, refer to observable social contacts – having few or no meaningful relationships with others (de Jong Gierveld *et al.* 2006, Zavaleta *et al.* 2014). Conversely, internal characteristics, also labelled as subjective social isolation, refer to personal attitudes not quantifiable by observation, such as trust, satisfaction with relationships and loneliness (Zavaleta *et al.* 2014). The Nicholson and Zavaleta models of social isolation both include objective social contact and subjective perceived adequacy of contact within one overarching construct of social isolation.

Warren (1993) proposed four criteria relating to the quality of someone’s social environment and relationships as essential ingredients of social isolation: stigmatised environment (an individual being negatively appraised as different from other people because of appearance, behaviour or tribe), societal indifference, personal-societal disconnection, and personal powerlessness (Warren 1993).

Loneliness

Loneliness can be construed as a painful emotional state that occurs when there is ‘a discrepancy between...the desired and achieved patterns of social interaction’ (Peplau and Perlman 1982, Goosby *et al.* 2013, Zavaleta *et al.* 2014). Bekhet and colleagues (2008) summarised three common assumptions from various definitions of loneliness: perceived deficiencies in one’s social relationships; a subjective state, different from the objective state of social isolation; and an unpleasant and distressing experience. Loneliness can be regarded as multifaceted.

Another often cited definition of loneliness is a state of negative affectivity accompanying the perception that one’s social needs are not being met by the quantity or especially the quality of one’s social relationships (Peplau and Perlman 1982, Wheeler *et al.* 1983, Pinquart and Sorensen 2001, Hawkey *et al.* 2008).

Weiss (1974) also proposed a multidimensional concept of loneliness, categorising loneliness into social or emotional dimensions. Social loneliness derived from inadequate engaging social networks, while emotional loneliness stemmed from the absence of intimate attachment relationships. Based on this categorisation, Weiss (Weiss 1974) conceived a model of loneliness with six components – attachment, social integration, reassurance of worth, reliable alliance, guidance, and opportunity for nurturance. These components were claimed to be necessary in order to avoid loneliness (Weiss 1974).

Social support

Two main conceptualisations of social support have been distinguished: functional and structural (Sanchez Moreno 2004). The structural perspective emphasises the existence, quantity, and properties of an individual's social relations (*ibid.*). The functional viewpoint attempts to determine which functions are fulfilled by the person's social relations (*ibid.*). The functions most often cited are: emotional support (which involves caring, love and empathy), instrumental support (referred to by many as tangible support), informational support (which consists of information, guidance or feedback that can provide a solution to a problem), appraisal support (which involves information relevant to self-evaluation) and social companionship (which involves spending time with others in leisure and recreational activities) (House 1981; Cohen and Hoberman 1983; Wills 1985). Many measures of social support assess three components, spanning both structural and functional domains: social network and social integration variables (diversity/number of relationships), received support (how often supportive behaviours are received) and perceived support (support the person believes to be available if he or she should need it) (Hupcey 1998; Dour *et al.* 2014). Cobb (1979) proposes the mutuality of obligation in relations with others, as well as the functional support received by an individual from others, as a component of social support.

Social network

Social network refers to 'a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behaviour of the persons involved' (Mitchell 1969). Social network analysis can measure 'morphological' and 'interactional' characteristics of networks (Cohen and Sokolovsky 1978). Morphological characteristics refer to quantitative properties of a network. They include size (number of contacts), degree (average number of links each person in network has with others in the network), and density (actual links between network members as a proportion of all possible links) (Cohen and Sokolovsky 1978). Interactional characteristics refer to the nature of relationships. They include intensity: whether relationships are 'uniplex' (one function only) or 'multiplex' (more than one function) and directionality: who is helping whom in a dyadic relationship (Cohen and Sokolovsky 1978).

Social capital

Social capital is generally understood as 'a series of resources that individuals earn as a result of their membership in social networks, and the features of those networks that facilitate individual or collective actions' (Portes 1998, Putnam 2000, McKenzie *et al.* 2002). The widely used definition of social capital in health sciences originates with Putnam (Putnam 2000, De Silva *et al.* 2005). By analogy with concepts of physical capital and human capital (tools and training that improve individual productivity), social capital refers to 'features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit' (Putnam 2000). The concept of social capital emphasises multiple dimensions. It can be divided into a behavioural/activity component (structural social capital) and a cognitive/perceptual component (cognitive social capital) (Bain and Hicks 1998, De Silva *et al.* 2005). Five dimensions of social capital have been proposed: social norms, trust, partnership with the community, information sharing, and political participation (Kim and Harris 2013).

In addition, social capital has both an individual and a collective aspect – a private and a public face (Putnam 1999). It can be considered a property of communities (an ecological construct) or of individuals. Individual social capital is most commonly measured by asking individuals about their participation in social relationships (for example, membership of groups) and their perceptions of the quality of those relationships. Two components of social capital have also been proposed (Siegler 2015): 'Bonding' social capital describes closer connections between people with a family connection or shared group identity, and is typically the source of most of an individual's emotional and instrumental social support. 'Bridging' social capital describes more distant connections between people not directly linked to friends or family, with distinctions or distance between them

– for example people from different classes or ethnic communities. This distinction mirrors that made by Granovetter (1973) between ‘strong ties’ and ‘weak ties’ with others in a person’s social network.

Confiding relationship

Measures of confiding relationship rate the degree of closeness and intimacy someone has with other people (Brown and Harris 1978 Murphy 1982). For example, intimate relationships with a spouse, or with a friend who was seen on a regular basis and could be relied on to give advice, were considered ‘good confidant’, while ‘poor or no confidant’ refers to conflicted relationships with a spouse, an unsteady relationship or no one to confide in at all (Emmerson *et al.* 1989). Since their seminal 1978 paper on the social origins of depression, which established the lack of a confiding relationship as a risk factor for depression, Brown and Harris have emphasised the desirability of separating out the degree of confiding in a relationship (which may be influenced by both parties’ attachment style and perception of the other) and the active emotional support given by a confidant (Brown *et al.* 1986). This mirrors the distinction between perceived and received support in the social support literature.

Alienation

Bronfenbrenner (1979) defined alienation as ‘the feeling of disconnectedness from social settings such that the individual views his/her relationships from social contexts as no longer tenable’. Five basic ways where the concept of alienation has been used have been discussed by Marxist and existentialist scholars (Seeman 1959, Maddi 1967, Moszaros 1970, Seeman 1975): powerlessness, meaninglessness, normlessness, isolation and self-estrangement. Powerlessness originated in the Marxian view that the worker in a capitalist society ‘is alienated to the extent that the prerogative and means of decision are expropriated by the ruling entrepreneurs’ (Seeman 1959). In Seeman’s paper, powerlessness can be conceived beyond the industrial sphere as ‘the expectancy or probability held by the individual that his own behavior cannot determine the occurrence of the outcomes, or reinforcements, he seeks’. Meaninglessness refers to lack of understanding of the events in which an individual is involved, especially ‘when the individual’s minimal standards for clarity in decision-making are not met’ (*ibid.*). Normlessness is derived from Durkheim’s concept of anomie (Durkheim 1997 [1897]). Seeman (1959) defined an anomic situation as one where there is a ‘high expectancy that socially unapproved behaviors are required to achieve given goals’. Isolation is related to reward values in terms of alienation. Isolated people ‘assign low reward value to goals or beliefs that are typically highly valued in the given society’ (*ibid.*). Self-estrangement refers to the inability of an individual to obtain self-rewarding or self-consummatory activities (*ibid.*).

Dean (1961), however, considered alienation as having three main components: powerlessness, normlessness and social isolation. The last component was conceived as part of Durkheim’s concept of anomie – ‘a feeling of separation from the group or of isolation from group standards’ (*ibid.*). Dean also constructed a 24-item scale to measure these three components (*ibid.*).

In the study by Ifeagwazi and colleagues (2015), emphasis was placed on interpersonal, political and socioeconomic domains of perceived alienation. Interpersonal alienation has been associated with social isolation, loneliness and feelings of distrust (Ernst and Cacioppo 1999). The indicators of interpersonal alienation have been reported to include feelings that one’s thoughts do not count, feelings of being left out, of being taken advantage of, and receiving no help if something happened (Lopez-Calva *et al.* 2012). Political alienation and socioeconomic alienation refer to perceived estrangement from the salient objects in the political domain and from socioeconomic activities respectively (Ifeagwazi *et al.* 2015). Among the above domains, interpersonal alienation is of most relevance to our review, with conceptual overlap with definitions of social isolation and social support.

A conceptual model of social isolation and related terms

The above review of conceptual definitions identified through literature searching and analysis enabled us to generate a draft conceptual model of social isolation and related terms. After repeatedly consulting experts and checking the match of the concepts identified with our model, five conceptual domains were proposed which are sufficiently comprehensive to include all elements of current conceptualisations. These five domains are:

- social network: quantity
- social network: structure
- social network: quality
- appraisal of relationships: emotional
- appraisal of relationships: resources

Table 1 summarises how these five domains map on to existing conceptual terms.

Table 1. Social isolation and related concepts: conceptual framework

Established concepts relating to social isolation or loneliness	Domains included in existing concepts relating to social isolation or loneliness					
	Network:			Appraisal of relationships:		Other domains (not directly related to social isolation or loneliness)
	quantity	structure	quality	emotional	resources	
Social isolation	×		×	×	×	
Loneliness				×		
Social support	×	×		×	×	
Social network	×	×	×			
Social capital (individual)				×	×	Ecological social capital Negative social capital
Confiding relationships and related concepts			×			Negative aspects of relationships
Alienation				×		Powerlessness, normlessness

Appendix 1 provides further information about existing conceptual definitions of social isolation and related terms, and how the components of these definitions map on to our proposed five domains. Definitions of our five conceptual domains of social isolation and related terms are as follows:

Network: quantity refers to quantitative social contact; e.g. the number of people in someone's social network, or the number or frequency of someone's social contacts over a period of time.

Network: structure refers to characteristics of people's social contacts, which do not involve any appraisal of the quality of the relationship: e.g. network density (how many of the people in someone's social network also know each other), and the characteristics of someone's social contacts (e.g. how many are kin, friends, colleagues, (mental) health and social care staff, mental health service users, drug users, etc.)

Network: quality refers to the perceived quality of someone's relationships. This domain includes measures of the quality of specific important relationships (e.g. with a partner, or parents). It also includes measures of qualitative information about all someone's individual social contacts (e.g. rating how many of someone's social contacts are friends, could be confided in, or could be missed).

Appraisal of relationships: emotional refers to people's overall appraisal of the perceived adequacy or impact of their relationships: e.g. loneliness or emotional social support. This domain does not directly relate to, and is not measured by, the number of or quality of specific individual relationships.

Appraisal of relationships: resources refers to someone's appraisal of their overall access to resources or perceived connectedness due to their relationships: e.g. individual social capital or tangible social support.

Our five domains enable three important distinctions to be made:

1. Objective versus perceived qualities of someone's social relationships. Network: size and network: structure domains provide quantitative (theoretically externally observable or verifiable) information about the number or structure of someone's social contacts. Network: quality and the two appraisal of relationship domains by contrast relate to an individual's qualitative appraisal of their relationships or social connectedness.
2. Individual relationships versus overall social/inter-personal connectedness. The three 'network' domains in our conceptual map relate to the quantity or quality of individual relationships. The information about these individual relationships may be summed to provide information about someone's relationships or social connectedness overall. The two 'appraisal of relationships' domains relate to people's subjective evaluation of their relationships overall, without direct reference to specific individuals.
3. Tangible (practical) and intangible (emotional) support from relationships. Appraisal of relationship: emotional refers to the perceived companionship, love and emotional support derived from someone's social/inter-personal relationships. Appraisal of relationships: resources refers to the perceived informational or instrumental support someone can obtain from their social/interpersonal relationships.

There are elements of existing conceptual terms which are not covered by our proposed five conceptual domains. These were excluded as not directly relating to social isolation or related terms and fall into three categories:

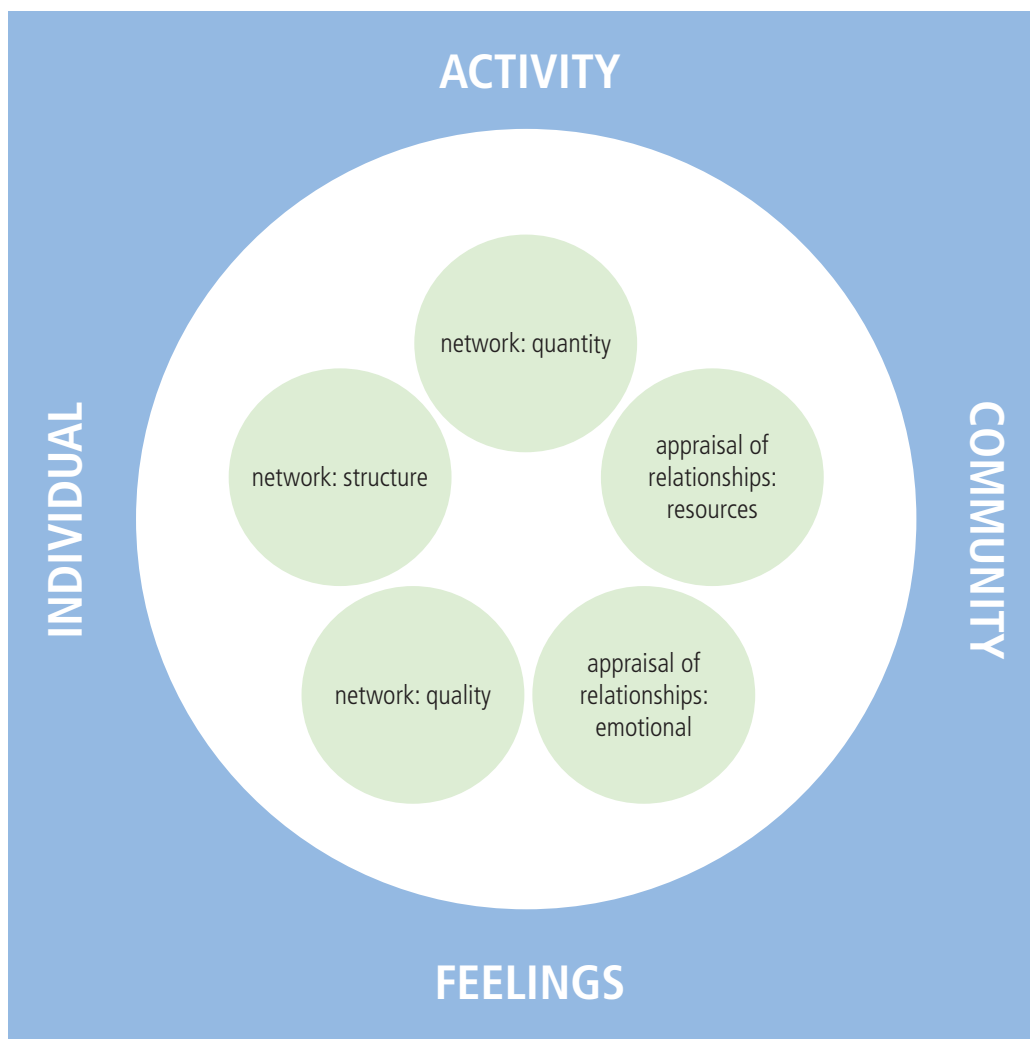
1. Negative aspects of relationships. Social isolation, loneliness and related concepts are defined by the presence or absence of contact or desired support from relationships, rather than

negative aspects of social relationships. However, concepts of relationship quality, including expressed emotion, and some conceptualisations of social capital also consider the actively negative aspects of interpersonal relationships (such as criticism, or over-involvement), which require the presence of social contact and may occur independently of loneliness (see Appendix 1, Tables A1-5 and A1-6).

2. Participation in social, economic or political activity. This is relevant to social inclusion and included in some conceptualisations of social capital (see Appendix 1, Table A1-5).
3. Degree of trust, perceived shared norms or beliefs with someone's society or institutions of power. Conceptualisations of social capital and alienation both include consideration at societal level of politico-legal and moral norms and requirements and how these are perceived and experienced by individuals (see Appendix 1, Tables A1-5 and A1-7).

Our resulting conceptual map of social isolation and related terms used in mental health research is presented in Figure 2.

Figure 2. Social isolation and related concepts: conceptual map



Measures

First, measures which are suitable for assessing each of our five proposed conceptual domains of social isolation and related terms (Table 2) are described. Second, we report multi-domain measures of social isolation or related terms which are primarily used to provide a total score covering more than one of our conceptual domains. In both cases, we followed specified criteria in selecting measures, prioritising ones which have been generally used, have adequate psychometric properties, and have been used in an adult mental health context.

Table 2. Suitable measures of conceptual domains of social isolation and related concepts

Domain	Measure	Description
Network: quantity	Social Network Schedule (Dunn et al. 1990)	Network size: the number of people with whom the respondent has had social contact in the last month
		Frequency of contact: the number of people whom the respondent has had social contact daily; weekly; or monthly over the past month
Network: structure	Social Network Schedule (Dunn et al. 1990)	Network density: the proportion of all possible ties between network members which are present (i.e. how many of a respondent's network know each other)
		Proportion of kin/non-kin in social network: how many of the total number of people within a respondent's social network are relatives?
Network: quality	Social Network Schedule (Dunn et al. 1990)	Confiding relationships: number of social contact people whom the respondent reports they can talk to about worries or feelings
		Would be missed: number of social contact people whom the respondent would miss if never seen again
Appraisal of relationships: emotional	UCLS-8 (Hays and DiMatteo 1987)	8-item, uni-dimensional scale of experienced loneliness
	De Jong-Gierveld Loneliness Scale (De Jong-Gierveld et al. 1985)	11-item scale of experienced loneliness, comprising social and emotional loneliness sub-scales
Appraisal of relationships: resources	Resource Generator-UK (Webber and Huxley 2007)	27-item scale assessing a respondent's access to resources within their social network, comprising four sub-scales: domestic resources, expert advice, personal skills, problem-solving resources

1. Social network domains

The Social Network Schedule (SNS) The SNS (Dunn *et al.* 1990) was designed for assessing the social networks of mental health service users, as part of the TAPS Study (a study evaluating outcomes for patients leaving long-stay psychiatric hospitals during a programme of deinstitutionalisation in the UK in the 1980s). The SNS schedule involves using a time budget and structured interview with a respondent to generate an inventory of all the people with whom they have had social contact within the last month. The frequency of interaction with each identified contact person (daily, weekly or monthly) and their role in relation to the respondent (e.g. relative, mental health staff member, provider of services, fellow service user) are recorded. For each contact person, the respondent is then asked whether they would miss the person if they never saw them again; whether they would visit the person if they moved away; whether they just say hello to the person, just do things for each other, or also have conversations (passive, intermediate or active contact); whether they consider the person a friend; and whether they consider the person a confidant (someone they can talk to about personal worries or feelings). The schedule can thus generate quantitative data for the number of people in someone's social network; the number of people seen daily, weekly or monthly; the proportion of people in different roles within the network; and the number of people who meet various qualitative criteria, e.g. friends, confidants, people who would be missed.

While the Social Network Schedule was originally developed for use in a study with residents of mental health inpatient services (Dunn *et al.* 1990), it has subsequently been used widely and internationally in inpatient and community mental health settings (Anderson *et al.* 1993, Becker *et al.* 1998b, Horan *et al.* 2006, Albert *et al.* 2011, Priebe *et al.* 2013, Lloyd-Evans *et al.* 2015), demonstrating its feasibility and providing reference data across a range of settings. The SNS is a self-report measure, so cannot be appropriately tested for inter-rater reliability between different informants. In testing where more than one interviewer records network data from the same respondent interview, the SNS has however demonstrated very good inter-rater reliability, with levels of agreement of over 97% (Dunn *et al.* 1990). Log linear modelling and latent class analysis of SNS data from a large sample in the TAPS study also support the validity of the designations of contacts in the schedule (Leff *et al.* 1990). Identifying whether or not a social contact is a confidant was found to be most salient, interacting significantly with all other SNS variables. Reports of whether a contact would be missed also related closely to other SNS variables relating to relationship quality (Leff *et al.* 1990). The SNS has demonstrated a degree of criterion validity, with network size and number of confiding relationships associated with quality of life (Becker *et al.* 1998a), and associated with and predictive of better social functioning (Howard *et al.* 2000).

A recent review of the social networks of people with psychosis (Palumbo *et al.* 2015) identified the SNS as one of the two most commonly used measures of social networks, along with the Network Analysis Profile (NAP) (Sokolovsky and Cohen 1981). Similar to the SNS, the NAP uses an inventory of social contacts elicited from a structured interview to identify the attributes of social contacts (member attributes), the nature of interactions between the respondent and each contact (linkage attributes), and characteristics of the respondent's network as a whole (network attributes). The validity of the assessed attributes and inter-rater reliability of the NAP appear to be less well established than for the SNS. Additionally, the NAP takes about two hours to administer, which may be too long for most studies or routine assessment (Siette *et al.* 2015).

In the light of the well-demonstrated feasibility across a range of settings and established good psychometric properties of the SNS, we recommend its suitability for assessing all three conceptual domains relating to network properties. While the SNS can be used to measure three of our proposed domains, scores for each measured variable can only be reported separately; no summary total score can be generated. In this way, the SNS is distinct from multi-domain measures described later.

Network quantity: The SNS can generate two useful variables relating to network quantity: network size (overall number of contacts seen at least monthly within someone's social network); and frequency of contacts (number of people seen daily, or weekly or monthly).

Network structure: Two variables relating to network structure which can be derived from the SNS are network density (how many of the contacts within someone's social network are also in contact with each other) and the proportion of kin and non-kin contacts within someone's network. People with psychosis have been found to have a higher proportion of kin than the general population within their social network (Palumbo *et al.* 2015). Both network density and non-kin relationships are of interest as possible indicators of access to 'weak ties' (Granovetter 1973), which may promote access to information and resources and recognition of social norms.

Network quality: The number of confidants and the number of social contacts who would be missed have both been identified in the SNS as good markers for relationship quality (Leff *et al.* 1990). These two variables may be preferable to measuring the number of friends in someone's social network, because of the challenges identified in previous literature of achieving a consistently understood definition of 'a friend' (Harley *et al.* 2012, Palumbo *et al.* 2015). The importance of confiding relationships as a protective factor against depression is well established (Brown and Harris 1978), increasing the interest in a mental health context of assessing the number of confiding relationships someone has.

While the SNS assesses characteristics of all the social contacts in someone's network, an alternative approach which has been used with the general population (Stansfeld and Marmot 1992) and adolescents (Furman and Buhrmester 2009) is to ask respondents to specify and rate the quality of a specified number of their closest relationships. Where such measures can be used to assess any type of relationship (so are not only applicable for instance to people having a partner, or living with parents), they are potentially useful to provide an aggregate score relating to network quality. Our review did not find measures using this approach which have been validated in mental health settings, but potentially appropriate, well-established relationship quality measures are described in Appendix 2.

2. Appraisal of relationship domains

Emotional appraisal: Loneliness measures have been well established and used in mental health settings to assess the overall perceived adequacy of a person's relationships to provide emotional support.

The University of California at Los Angeles (UCLA) Loneliness Scale was originally developed as a 20-item scale by Russell and colleagues in 1978 (1978) followed by a revised version in 1980 (Russell *et al.* 1980). They then developed version 3 of the scale with the response format and wording of the items simplified (Russell 1996). This version has been widely used in both the general population and clinical studies (Russell 1996, VanderWeele *et al.* 2011, Townley and Kloos 2014). This unidimensional scale is used to assess both the frequency and intensity of lonely experience during significant aspects and events in respondents' lives (Cramer and Barry 1999). Russell reported not only high reliability of the scale including both internal consistency and test-retest reliability after 12 months, but also good construct validity comprising convergent and discriminant validity and the validity of a unidimensional factor structure supported by confirmatory factor analysis (Russell 1996). To minimise respondent burden, Hays and DiMatteo (1987) derived an 8-item short-form measure from the 20-item UCLA Loneliness Scale, and demonstrated that it is reliable, valid and a good substitute for the 20-item version. Although the UCLA Loneliness Scale has been widely used as a global index of loneliness, some researchers suggested carefully explaining results derived from the instrument because it principally emphasised social loneliness, with additional reference to emotional loneliness and negative affect, but little assessment of family loneliness (feelings of isolation from immediate family members) (Ditommaso and Spinner 1993, Cramer and Barry 1999).

The de Jong-Gierveld Loneliness Scale is another commonly used loneliness measure. It was originally developed as a 34-item multidimensional scale, but it was found mainly to measure severe feelings of loneliness (de Jong-Gierveld and Kamphuis 1985). Therefore an 11-item scale was developed with five positive and six negative items, which was reported to be easier to administer and suitable for lonely and non-lonely respondents (de Jong-Gierveld and Kamphuis 1985). Researchers can choose to use either the total 11-item scale or the separate social and emotional subscales (De Jong Gierveld and Van Tilburg 2006): the authors concluded that the data conform adequately to a unidimensional structure (Hays and DiMatteo 1987). De Jong-Gierveld and colleagues confirmed that both the reliability and construct validity were adequate (de Jong-Gierveld and Kamphuis 1985, Cramer and Barry 1999, de Jong Gierveld and van Tilburg 1999). A shorter six-item version was also developed for use in large surveys, with three items for emotional loneliness and the other three items for social loneliness (De Jong Gierveld and Van Tilburg 2006, 2010). This six-item version of the scale also yields a total score and two subscale scores, with factor analysis providing some confirmation for the two subscales of social and emotional loneliness (De Jong Gierveld and Van Tilburg 2006).

Resource appraisal: Instruments which exclusively measure the perceived ability of social contacts to help with access to resources are few, with the domain often included in broader measures of social support or social capital.

The Resource-Generator UK (RG-UK) (Webber and Huxley 2007) asks respondents whether they could access 27 types of informational or practical support from someone they know, to generate a total measure of access to resources within their social network. The scale comprises four subscales: domestic resources, expert advice, personal skills, and problem-solving resources. The measure has good content validity, having been developed through a rigorous focus group and expert panel process. It has also demonstrated moderately good inter-rater reliability (ibid.) It has subsequently been shown to be feasible for use in mental health settings and to have a degree of criterion validity in this context, being negatively associated with experienced stigma (Webber *et al.* 2014). A limitation of the RG-UK acknowledged by its developers (Webber and Huxley 2007) is that it is context and culturally-specific to the UK: it may require updating or adaptation to ensure validity in other countries.

3. Multi-domain measures

Our review also identified numerous measures covering more than one of our proposed conceptual domains. In particular, our review supports the observation reported by Huxley and colleagues (2012) that 'measures of social support are as varied as the number of investigators'. These measures, while they often comprised more tightly focused sub-scales, generate and typically report most prominently a total score. While such instruments can provide data broadly relating to social isolation or related terms within a single measure, interpreting scores or the meaning of changes in scores is made difficult because they reflect more than one distinct concept. We have described a number of these multi-domain measures in Appendix 2, prioritising measures which have been widely used, demonstrated good psychometric properties and been shown to be feasible in mental health settings.

Discussion

This review provides an overview of existing definitions of social isolation and related terms especially in relation to mental health, and proposes a conceptual model with five domains to include all elements of current conceptualisations. These five domains are:

- social network: quantity
- social network: structure
- social network: quality
- appraisal of relationships: emotional
- appraisal of relationships: resources

We also identified some well-developed measures suitable for assessing each of the five conceptual domains or covering multi-domains.

Comparison with other conceptual reviews

Shortly after the initial submission of this review, another conceptual review of loneliness and social isolation was published (Valtorta *et al.* 2016). To our knowledge, that review and ours are the only two conceptual reviews of the full range of concepts in relation to social isolation and related terms. Valtorta and colleagues reviewed measures of loneliness, social isolation and social relationships used in studies of older adults, and of cardiovascular disease. Fifty-four measures were included in the review, including measures of social support, social isolation, social network and loneliness. From this review, Valtorta and colleagues developed a framework for classifying and comparing measures, which proposed two dimensions: (i) whether measures covered structural or functional aspects of social relationships; and (ii) the degree of subjectivity asked of respondents.

Although Valtorta and colleagues reviewed literature from two other subject areas rather than mental health literature, the findings from their review were highly compatible with ours. The four concepts measured by instruments included in their review (social support, social isolation, social network and loneliness) were included in our review, which also considered measures of social capital, confiding relationships, and alienation. The two dimensions proposed by Valtorta and colleagues can also be distinguished in our conceptual model. The domains in our model of 'network quantity' and 'network structure' describe objective and structural characteristics of social relationships; while 'network quality', and the two 'appraisal of relationships' domains in our model describe functional and subjective characteristics. Our model is in addition able to distinguish characteristics of a person's individual social relationships versus their relationships and inter-personal connectedness overall; and emotional and practical elements of the functional characteristics of social relationships.

The compatibility of conceptualisations between these two reviews, despite the different literatures surveyed, provides a degree of validation for both, and suggests our conceptual model may be of general use when considering concepts relating social isolation, not just in studies of mental health. There was an absence, in the review by Valtorta and colleagues compared to ours, of additional existing concepts retrieved from literature searching, and of additional new conceptual domains developed through a synthesis of relevant studies. This suggests that, despite the limitations in the scope and methods of our review discussed below, our review was sufficiently thorough and in depth to develop a robust conceptual model.

Strengths and limitations

Given the nature of this conceptual review, we conducted an iterative approach. This involved some overlap in the tasks of literature searching, and data extraction and data synthesis, to ensure that all relevant concepts could be included and so that a useful conceptual model could be generated. We sought to ensure the validity of our conceptualisation of social isolation and related terms by following an established process for conducting conceptual reviews (Lilford *et al.* 2001) and consulting with external experts during the process. Our review provided a comprehensive model with five conceptual domains into which all relevant conceptual terms fit well.

Three limitations relate to the scope of the review. First, it was not our intention to describe conceptualisations of how people relate to each other within a society or their relation to the larger social order. Our review attempts to synthesise existing conceptualisations and measures of social isolation and related terms at an individual level rather than looking at their societal context, which will vary greatly.

Second, the review focused on how social isolation and related terms have been conceptualised and measured in the field of mental health. Where papers retrieved in our search used definitions or measures of social isolation or loneliness, we sought to identify the original source of these, even if outside the mental health field. Through this process, our review includes concepts and measures from other fields of study which have been used in mental health contexts. But conceptualisations or measures which have not yet been used in mental health settings were outside the scope of our review, so some potentially useful concepts and measures may therefore have been overlooked. We have only reported measures which have been used and validated with mental health populations; their suitability for other population groups is not covered by our review.

Third, our review focused on social isolation and related terms, which have been mainly conceptualised as relating to a lack of relationships or positive aspects of existing relationships. As such, our review did not fully explore how negative aspects of relationships have been defined or measured, and scales measuring negative characteristics of social contact or relationships were rare among those identified by our review. When people report 'low' social support using a score, it may reflect either the absence of support from others or the presence of a negative, conflictive relationship (Coyne and Bolger 1990), but most social support scales are not able to distinguish these potential meanings of low support (Coyne and Downey 1991). An exception is 'the Close Persons Questionnaire' (Stansfeld and Marmot 1992) which includes items on three types of support – confiding/emotional support, practical support and negative aspects of support. Portes (1998) also proposes the concept of 'negative social capital' deriving from peer pressures for exclusive in-group bonding, or high demands from others. Negative aspects of relationships, such as high expressed emotion or interpersonal friction, have been shown to be associated with poor outcomes in schizophrenia and affective disorders (Vaughn and Leff 1976, Coyne and Downey 1991, Stansfeld and Marmot 1992, Zoellner *et al.* 1999, Crevier *et al.* 2014). The conceptualisation and measurement of negative aspects of relationships is a fruitful area for a future review.

Because our conceptual review used an iterative search strategy rather than searching for predefined terms, our review cannot be replicated exactly and we cannot be certain that all relevant papers were included.

Two further potential limitations of the review relate to the search strategy and procedures. First, the initial electronic search was only conducted in Web of Science with time limits 2013–2015, due to the wide range of searching concepts and the large amount of articles retrieved. As a result, important studies may have been missed, although further relevant studies were identified through review articles and through reading full text or reference lists of included studies. Before this process was concluded, we reached a point where new conceptual definitions of terms or new measures were rarely being identified, indicating that saturation of novel information had been reached. Second, screening of potentially relevant studies was conducted by a team of researchers,

with no formal checks of reliability in researchers' selection of relevant studies. To mitigate this potential problem, study authors (JW, BLE) provided training for all the researchers involved in literature searching and were consulted in the event of uncertainty about studies' relevance.

A gap in the literature: online social relationships

The concepts and measures of social relationships retrieved for our review rarely included consideration of online social contact. However, online relationships may play a significant role in social life of people with mental illness (Highton-Williamson *et al.* 2015). People with mental disorders may have greater social isolation and loneliness comparative to the general population due to their symptoms (Clinton *et al.* 1998, Borge *et al.* 1999, Garety *et al.* 2001, Lauder *et al.* 2004). However, they appear to use social media and online networking similarly to the general population (Ennis *et al.* 2012, Firth *et al.* 2015). It may therefore be important to assess online social contact in considering social isolation and related terms in mental health. However, the literature in this field is small and needs to be more systematically explored.

Highton-Williamson and colleagues (2015) carried out a systematic review of online social networking in patients with psychosis. Among the 11 articles included in their review, most were qualitative research, case reports and analyses of postings (Highton-Williamson *et al.* 2015). Among those which used measures to assess online social networking, the researchers either designed questionnaires themselves or adapted measures from previous studies (Mittal *et al.* 2007, Spinzny *et al.* 2012, Martini *et al.* 2013), regarding the amount of time spent in various social activities on the internet, frequency of internet use for different needs, number of online contacts, or knowledge of social networking sites. There appears therefore to be a lack of a reliable and validated measure of online social relationships and this has hampered comparisons of results across studies (Highton-Williamson *et al.* 2015). Development of such a measure would be a useful focus for future research.

Implications

This review has demonstrated that social isolation and related terms are not simple concepts and the boundaries between them are often blurred, although they can be conceptually categorised within a relatively small number of domains. This is not of academic interest only: concept clarity can support intervention development and evaluation. Loneliness and social isolation, for instance are not always highly correlated: a Finnish study of older adults, for example, found no relationship between reported loneliness and frequency of contact with family (Routasalo *et al.* 2006). The authors argue that interventions only aiming to increase the number of social contacts may not reduce loneliness; attention to the received emotional support from relationships, and to subjects' own inner expectations may also be required (Routasalo *et al.* 2006). A range of interventions may therefore be required to address different problems relating to people's social relationships. Further research is also needed to understand which aspects of people's social relations are most important in sustaining good mental health or recovering from mental illness. In both cases, precision about what exactly is being studied and how best to measure it is essential.

The need for better evidence regarding the effectiveness of social interventions is widely accepted (Oakley 1998, NICE 2014). Our review can contribute to this in the area of social isolation and related terms by helping researchers and intervention developers to specify expected outcomes of interventions and mechanisms of effect more precisely, and measure them appropriately. Conceptual clarity can also help researchers explore relationships between social isolation and other outcomes, and directions of effect, more precisely. Our review offers an overview of concepts relating to social isolation and proposes a conceptual model which fits all of them. It can help researchers and practitioners to understand more profoundly the meaning of and difference between these closely related concepts, and how they can be measured in the field of mental health.

Appendix 1: Conceptualisations of social isolation and related concepts in existing literature, and their fit with our proposed domains

Table A1-1. Conceptualisations of social isolation

Reference	Attributes	Fit with proposed domains*
Zavaleta et al. (2014)	Internal social isolation (satisfaction with social relations, need for relatedness, loneliness, feeling of belonging to community, trust)	4, 5
	External social isolation (frequency of social contact, social network support, presence of a discussion partner, reciprocity and volunteering)	1, 3
Nicholson (2009)	Number of contacts	1
	Feeling of belonging	4
	Fulfilling relationships	4
	Engagement with others	5
	Quality of network members	3

Table A1-2. Conceptualisations of loneliness

Reference	Attributes	Fit with proposed domains*
Hawkey et al. (2008)	Perceived deficiencies in quantity of one's social relationships	4
Peplau and Perlman (1982)	Perceived deficiencies in quality of one's social relationships	4
Paloutzian and Ellison (1982)		
Weiss (1974)	Social-isolation loneliness (absence of an engaging social network)	4
	Emotional-isolation loneliness (absence or loss of close attachment relationships)	4
Kearns et al. (2015)	Feelings (feeling of being on one's own associated with not having sufficient intimate and/or other contacts, or contacts of the right type)	4
	Circumstances (an individual's social contacts and social support, both in an everyday sense (who one sees, talks to, etc.) and as a latent resource (knowing who can be relied upon for help or support))	5
	Responses (a consequence of how people cope with, and respond to, their social situation)	6

*Notes:

1 Network: quantity

2 Network: structure

5 Appraisal of relationships: resources

4 Appraisal of relationships: emotional

3 Network: quality

6 Other domains (not directly related to social isolation or loneliness)

Table A1-3. Conceptualisations of social support

Reference	Attributes	Fit with proposed domains*
Cohen and Wills (1985)	Structural social support (existence and form of the social network)	1, 2
	Functional social support (how the network serves to provide different kinds of support)	4, 5
Barrera et al. (1981)	Tangible forms of assistance (provision of goods and services)	5
	Intangible forms of assistance (guidance and expressions of esteem)	4
Barrera (1986)	Social embeddedness (connections to significant others: measured quantitatively – either by presence or absence of indicators, e.g. married, participating in community groups etc., or through social network analysis)	1, 2
	Perceived social support (self-reported perceived availability and adequacy of supportive ties)	4
	Enacted support (reported receipt of helping activity from others)	5
House (1981)	Emotional support (empathy, love, trust and caring)	4
	Instrumental support (tangible aid and services)	5
	Informational support (advice, suggestions and information)	4
	Appraisal support (information useful for self-evaluation)	4
Dour et al. (2014)	Emotional (a resource who listens and validates)	4
	Instrumental (practical support)	5
	Informational (advice)	4
	Companionate (people with whom to socialise)	4
	Feedback (feedback on community's behavioural expectations)	4
Dour et al. (2014)	Perceived support	5
	Received support (how often supportive behaviours are received)	1, 2
	Social integration (diversity/ number of relationships)	4

*Notes:

1 Network: quantity

2 Network: structure

5 Appraisal of relationships: resources

4 Appraisal of relationships: emotional

3 Network: quality

6 Other domains (not directly related to social isolation or loneliness)

(continued).

Table A1-3. Conceptualisations of social support (continued)

Reference	Attributes	Fit with proposed domains*
Cobb (1976)	Informational	4
	Tangible	5
	Esteem	4
	Emotional	4
	Social network	4
House (1981)	Emotional support (caring, love and empathy)	4
	Instrumental support (tangible support)	5
Cohen and Hoberman (1983)	Information, guidance or feedback that can provide a solution to a problem	4
Wills (1985)	Appraisal support (information relevant to self-evaluation)	4
	Social companionship (spending time with others in leisure and recreational activities)	4
Hand et al. (2014)	Tangible support	5
	Affectionate support	4
	Emotional support	4
	Informational support	4
	Positive social interaction support	4
Ben-Zur et al. (2014)	Emotional assistance (e.g. sympathy, care)	4
	Informative assistance (e.g. advice)	4
	Instrumental assistance (e.g. financial aid or loans, help with responsibilities)	5
Melrose et al. (2015)	Received support (quantity of supportive behaviors received by an individual)	5
Haber et al. (2007)	Perceived support (both the availability of support and satisfaction with it)	4
Sarason et al. (1990)		

*Notes:

1 Network: quantity

2 Network: structure

5 Appraisal of relationships: resources

4 Appraisal of relationships: emotional

3 Network: quality

6 Other domains (not directly related to social isolation or loneliness)

(continued).

Table A1-3. Conceptualisations of social support (continued)

Reference	Attributes	Fit with proposed domains*
Lin et al. (2015)	Action-facilitating support (informational support and tangible aid)	5
Cutrona and Suhr (1994)	Nurturant support (emotional support and network support)	4
Yan and Tan (2014)	Informational support	4
Berkman et al. (2000)	Emotional support	4
	Companionship	4
Wortman and Conway (1985)	Instrumental assistance	5
*Notes:		
1 Network: quantity	4 Appraisal of relationships: emotional	
2 Network: structure	3 Network: quality	
5 Appraisal of relationships: resources	6 Other domains (not directly related to social isolation or loneliness)	

Table A1-4. Conceptualisations of social networks

Reference	Attributes	Fit with proposed domains*
Cohen and Sokolowski (1978)	Morphological characteristics of networks (quantitative properties of a network: size = number of contacts; degree = average number of links each person in network has with others in the network; density = actual links between network members as a proportion of all possible links)	1, 2
	Interactional characteristics of networks (the nature of relationships: intensity = whether relationships are 'uniplex' (one function only) or 'multiplex' (more than one function); directionality = who is helping whom in a dyadic relationship)	3
Burt (1982)	Size	1
	Density	2
	Boundedness (the degree to which the networks are defined by traditional structures such as kin, neighbours, work)	2
	Homogeneity (how similar members are to each other)	2
*Notes:		
1 Network: quantity	4 Appraisal of relationships: emotional	
2 Network: structure	3 Network: quality	
5 Appraisal of relationships: resources	6 Other domains (not directly related to social isolation or loneliness)	

Table A1-5. Conceptualisations of individual social capital (as a characteristic of a community or an individual)

Reference	Attributes	Fit with proposed domains*
Granovetter (1992) Putnam (1995)	Structural (quantity and morphology of social contacts and social participation)	1, 2, 6
	Relational (perceived support, trust and sense of belonging derived from relationships)	4, 5, 6
Grootaert and Van Bastelaer (2002)	Structural (established roles, social networks and other structures which can facilitate information sharing and participation)	1, 2, 6
	Cognitive (shared norms, values, trust, attitudes and beliefs)	4, 5, 6
Nahapiet and Ghoshal (1998)	Structural (quantity and morphology of social networks)	1, 2
	Relational (perceived support)	4, 5
	Cognitive (shared interpretations or systems of meaning with others (norms))	5, 6
Putnam (1996)	Bonding ('strong ties' with proximal social network, characterised by loyalty, homogeneity and exclusivity)	4, 5
Szreter and Woolcock (2004)	Bridging ('weak ties' with more distal social network, likely to foster social inclusion and participation)	5, 6
Bird et al. (2010)	Bonding	
	Bridging	
	Linking (relationships/ties to people in formal institutions of power)	5, 6
Chen et al. (2009)	The extent to which relationships are characterised by: Durability Trustworthiness Resource-richness Reciprocity	4, 5
Portes (1998)	Instrumental social capital (relating specifically to the ability of someone's relationships and social connections to help them access resources: a sub-component of relational social capital)	5
Portes (1998)	Negative social capital (e.g. exclusive in-group bonds such as gang membership may inhibit social contact with others; excessive demands from others in someone's social network)	6

*Notes:

1 Network: quantity

2 Network: structure

5 Appraisal of relationships: resources

4 Appraisal of relationships: emotional

3 Network: quality

6 Other domains (not directly related to social isolation or loneliness)

(continued).

Table A1-5. Conceptualisations of individual social capital (as a characteristic of a community or an individual) (continued)

Reference	Attributes	Fit with proposed domains*
Kim and Harris (2013)	Five dimensions of social capital: Social norms Trust Partnership with community Information sharing Participation in society	4, 5, 6,
Frank et al. (2014)	Five dimensions of social capital: Trust Safety Cohesion Engagement Reciprocity	4, 5, 6,

Table A1-6. Conceptualisations of confiding relationships and related concepts

Reference	Attributes	Fit with proposed domains*
Brown and Harris (1978)	Confiding relationship (having an intimate partner or other in whom one can confide – i.e. discuss problems and feel listened to)	3
Langston (1994)	Capitalisation support (the extent to which a partner or other confidant provides a perceived supportive reaction to a personally meaningful event)	3
Rook (1987)	Companionship (presence of companionate relationships within someone's social network which allow participation in activities, recreational or other, for the purpose of enjoyment (i.e. not instrumental resources))	3
Rusbult et al. (1994)	Relationship quality (the 'investment model' includes four aspects of intimate relationships affecting their quality: overall commitment, satisfaction, quality of alternatives, investment)	3

*Notes:

1 Network: quantity

2 Network: structure

5 Appraisal of relationships: resources

4 Appraisal of relationships: emotional

3 Network: quality

6 Other domains (not directly related to social isolation or loneliness)

Table A1-7. Conceptualisations of alienation

Reference	Attributes	Fit with proposed domains*
Durkheim (1897)	Characteristic of an individual	4, 5
	Characteristic of a society	6
Dean (1961)	Powerlessness: "separation" from effective control over his economic destiny; of his helplessness; of his being used for purposes other than his own	6
	Normlessness: (purposelessness and conflict of norms)	6
	Social isolation: 'feeling of separation from the group or of isolation from group standards' (referring to Durkheim's concept of 'anomie')	6
Ifeagwazi et al. (2015) Seeman (1959, 1975) Meszaros (1970) Maddi (1967)	Powerlessness: 'Expectancy or the probability held by the individual that his own behavior cannot determine the occurrence of the outcome or reinforcements he seeks' (Seeman 1959)	6
	Meaninglessness; 'the individual is unclear as to what he ought to believe – when the individual's minimal standards for clarity in decision-making are not met' (Seeman 1959)	6
	Self-estrangement: 'the inability of an individual to find self-rewarding – or ... self-consummatory – activities that engage him' (Seeman 1959)	6
	Normlessness: 'high expectancy held by the individual that socially unapproved behaviours are required to achieve given goals' (Seeman 1959)	6
	Isolation: Individuals 'assign low reward value to goals or beliefs that are typically highly valued in the given society' (Seeman 1959)	6
	Interpersonal alienation: Feelings of being taken advantage of, being left out of things going on around, people around me would not do much if something happened to me, and feelings that one's personal thoughts do not matter (Lopez-Calva et al. 2012)	4, 5
Ernst and Cacioppo (1999)	Political alienation: 'the extent of one's attachment to the ongoing political order or estrangement from society's central institutional system of government' (Ifeagwazi et al. 2015)	6
Lopez-Calva et al. (2012)	Socioeconomic alienation: 'may be marked by poverty, limited prospects of [sustainable] employment, and lack of business opportunities and skills relevant to the market needs' (Ifeagwazi et al. 2015)	6
Citrin (1977)		6
*Notes:		
1 Network: quantity	4 Appraisal of relationships: emotional	
2 Network: structure	3 Network: quality	
5 Appraisal of relationships: resources	6 Other domains (not directly related to social isolation or loneliness)	

Appendix 2: Multi-domain measures relating to social isolation and related concepts

Measure	Focus	Description	Psychometric properties and use
Close Persons' Questionnaire (Stansfeld and Marmot 1992)	Social support from close relationships	14-item measure. Three subscales: emotional and practical support and negative aspects of relationship.	Moderately good test-retest reliability and some criterion validity (moderate relationship with received social support) established Participants select and rate their most important close relationships, creating a composite score Used with general population; not validated for a mental health population
Interview Measure of Social Relationships (IMSR) (Brugha et al. 1987)	Personal social resources	Multidimensional: size and density of the primary social network, contacts with acquaintances, adequacy of interaction and supportiveness of relationships, and crisis support.	Good inter-rater reliability, a high degree of temporal stability of close relationships, and good acceptability for use in large-scale surveys of individuals with differing social and educational backgrounds
Adapted Social Capital Assessment (SASCAT) (Harpham et al. 2002)	Social capital	18-item. Two dimensions: Structural component: assesses group membership, support (emotional, economic and/or assistance) received and involvement in citizenship activities over the previous year. Cognitive component: evaluates trust in community, interpersonal relationships among community members, sense of belonging to community, and perception that other community members may try to take advantage if given the chance.	'Psychometric techniques show SASCAT to be a valid tool reflecting known constructs and displaying postulated links with other variables'; good face and content validity
Dean Alienation Scale (Dean 1961)	Alienation	24-item scale. Three subscales: powerlessness, normlessness and social isolation.	Strong face validity, construct validity, and acceptable levels of internal consistency reliability established

(continued).

Measure	Focus	Description	Psychometric properties and use
Medical Outcomes Study (MOS) Social Support Scale (Sherbourne and Stewart 1991)	Social support	20-item. Four dimensions: emotional/informational, tangible, affectionate, and positive social interaction.	Reliable (all Alphas >0.91) and fairly stable over time, construct validity hypotheses supported
Social Provisions Scale (SPS) (Cutrona et al. 1987)	Social support	24-item. Six dimensions: guidance, reassurance of worth, social integration, attachment, nurturance, reliable alliance.	A reliable and valid measure with adequate reliabilities and construct validity
Interview Schedule for Social Interaction (ISSI) (Henderson et al. 1980)	Social relationships	52-item. Two dimensions: availability and adequacy.	Sufficiently valid and reliable, and also sensitive to predictable variations between socio-demographic groups, to justify its use in clinical and epidemiological studies, both in psychiatry and general medicine
Abbreviated Duke Social Support Index (DSSI) (Koenig, Westlund et al. 1993)	Social support	23-item. Three subscales: social interaction, subjective support, instrumental support. 11-item. Two subscales: social interaction and subjective support.	High reliability and validity, e.g. high internal consistency and correlated with hopelessness and anxiety
Interpersonal Support Evaluation List (ISEL) (Cohen and Hoberman 1983; Cohen et al., 1985)	Social support	48-item. Four domains: tangible, appraisal, self-esteem and belonging subscales. 12-item. Three subscales: appraisal, belonging, and tangible social support. 6-item. Two dimensions: emotional and tangible.	Internal consistency and test retest reliability ranging from .70-.80, with moderate intercorrelation
Social Supporting Rating Scale (SSRS) (Cao et al. 2011)	Social support	10-item. Three dimensions: objective social support, subjective social support, utilisation of support.	Good reliability and validity
Multi-dimensional Scale of Perceived Social Support (MSPSS) (Zimet et al. 1988)	Social support	12-item. Two dimensions: perception of total social support, and perceived support from significant other/friends/family.	Internal consistency for the subscales was very high

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