PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Loneliness, social isolation and social relationships: what are we measuring? A novel framework for classifying and comparing tools
AUTHORS	Valtorta, Nicole Kirsty; Kanaan, Mona; Gilbody, Simon; Hanratty, Barbara

VERSION 1 - REVIEW

REVIEWER	Linda Waite Department of Sociology University of Chicago Chicago, Illinois 60035
REVIEW RETURNED	25-Jan-2016

GENERAL COMMENTS	This paper seeks to evaluate the various measures used in previous research to assess loneliness, social isolation and social relationships. The paper is an effort to classify the measures used on several dimensions, to help researchers seeking validated measures of these concepts to chose the best one for their purpose. Although this is a worthy goal, the paper falls short in a number of ways. First, the list of publications in which the measures chosen have appeared is quite dated. There have been numerous more recent publications that should be included. Second, the paper says very little about how the measures were chosen, by what criteria they were evaluated, and, importantly, how they were placed on the graph included with the paper. It is also not clear what the graph means, as there was no interpretation of it. The paper produced no guidelines for scholars with which to select a measure. Thus, as a reader of the paper and a potential user of these measures, I had no idea how to proceed to evaluate them. Much more needs to be said about what was done, the insights the exercise produced, what the evaluation concluded and how it did so, and how a research could use it. The description of the methods needs to be complete enough that others could duplicate the results.

REVIEWER	Aparna Shankar Population Health Research Institute, St. George's, University of London UK
REVIEW RETURNED	28-Jan-2016

GENERAL COMMENTS	This is an interesting review examining measures of social relationships. My comments on the manuscript are given below: - I think the introduction could be made much more detailed, leading up to the main issues examined by this review. It would be useful if

	details regarding the various dimensions examined by the review (i.e. structure vs function, objective vs subjective) are explained clearly at the outset. - Isolation, loneliness and social support are distinct concepts and there is considerable evidence indicating this. I agree with the authors that there has been considerable confusion and overlap in the way these terms are used in many studies. However, rather than examining the 2 dimensions across these different concepts, I would suggest that the authors classify scales within related concepts (e.g. group together all the isolation/integration/social network scales). The scales should then ideally have a similar structure, and should be related to how the concept is defined. For example, I would expect most isolation or network measures to be structural, and low in subjectivity; while loneliness scales would be functional and higher in subjectivity. If the scale does not conform to this or includes additional items then this indicates to researchers that they may consider using different scales/ examining subscales within the main scale, etc. - I also think it would be worth also explaining how each of the scales is meant to be used. For instance, if a scale includes both structural and functional dimensions, do the developers recommend that the total scale score is used (i.e., combine structural and functional scores?) - Related to the above, Table 1 could be organised separately for each main construct. - The subjectivity dimension should be considered a bit further – as of now it appears that 2 scales cannot be classified on this dimension. - Beyond a brief statement in the introduction, the authors do not really consider issues regarding validity and reliability. This could be developed further.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Linda Waite
Institution and Country: Department of Sociology, University of Chicago, Chicago, Illinois 60035, USA
Please state any competing interests or state 'None declared': None

Please leave your comments for the authors below

1. This paper seeks to evaluate the various measures used in previous research to assess loneliness, social isolation and social relationships. The paper is an effort to classify the measures used on several dimensions, to help researchers seeking validated measures of these concepts to chose the best one for their purpose. Although this is a worthy goal, the paper falls short in a number of ways.

Response: Thank you for this summary. The primary aim of our study was to help readers navigate the growing literature on loneliness and social isolation, rather than to provide a list of validated tools from which researchers could choose depending on their purpose. To avoid ambiguity, we have removed the term 'selecting' from our study title. We have clarified our objective in the abstract, and

provided a more detailed discussion of a) how the classification can inform researchers' choice of tools for future studies, and b) be used for other purposes, such as defining criteria for systematic reviews.
P.2: 'Objectives: We present a novel way of classifying and comparing measures of social relationships, to help readers interpret the growing literature on loneliness and social isolation, and to provide researchers with a starting point to guide their choice of measuring tool.'
PP.16-7: 'The classification described in this paper was designed to help readers interpret the existing literature on loneliness and isolation, and to help inform future epidemiological studies on social relationships. One of the ways in which it can be employed is by researchers who intend to review the literature, and who need to define which dimensions of social relationships they are interested in. Rather than rely on inconsistent conceptual terminology, they can use the classification to define the remit of their review (e.g. focus on functional or structural dimensions) and identify which measurement tools do and do not fit within their criteria.

Another important way in which the classification can contribute to future research is by helping to guide researchers' choice of measurement tool, since it provides an overview of some of the tools previously used in epidemiological studies, and allows investigators to compare instruments developed from different disciplines and theoretical perspectives. Once researchers have compared tools using our framework, they will be in a position to consider other factors of relevance, most importantly: psychometrics (has the tool been validated and shown to be reliable? What of its responsiveness and interpretability?); study population (is the tool adequate for the age group or the cultural context?); and whether the tool captures the most relevant dimensions of social relationships given the investigators' hypotheses about how relationships influence health. Careful choice of measures is essential if we are to further our understanding of how social relationships affect health, and to identify people in need of help. Only by being clear about what is measured and why can we design appropriate prevention and intervention strategies that target the areas of relationships most problematic for health and wellbeing.'

2. First, the list of publications in which the measures chosen have appeared is quite dated. There have been numerous more recent publications that should be included.

Response: The two systematic search strategies we used to identify the papers for our study were updated in May and October 2015 (i.e. 4 months ago). We focused our searches on the service use and cardiovascular disease literatures. By taking this approach, we have captured tools that were used across clinical and health services research, in a broad range of studies (67,000 papers screened). We recognize that papers relating to outcomes other than service use or incident cardiovascular disease may have been published since - but a) it would not be appropriate for us to take them into account here given that we did not search for them systematically, and ad-hoc insertion of papers would risk introducing bias, and b) our intention was to examine tools in general use.
PP.6-7: 'We developed a classification in two stages. First, we systematically searched for studies on the association between social relationships and health and social care service use among adults aged 65 and over. Searches were tailored to eight electronic databases (MEDLINE, EMBASE, Scopus, Web of Science, CINAHL Plus, the Cochrane Library, the Centre for Reviews and Disseminations database and PsycINFO) using a combination of index headings (e.g. 'Loneliness', 'Social isolation', 'Social support') and free text terms (see Appendix 1 for the search strategy used in MEDLINE), and were last updated in October 2015. The reference lists of relevant studies were screened for further eligible records. […]

In a second phase, we tested whether a framework based on these two dimensions could be used to classify the measures used in studies on social relationships and cardiovascular disease. To identify these studies, we searched sixteen electronic databases (MEDLINE, EMBASE, CINAHL Plus,

PsycINFO, ASSIA, Web of Science, Cochrane Library, Social Policy and Practice, National Database of Ageing Research, Open Grey, HMIC, ETHOS, NDLTD, NHS Evidence, SCIE, and NICE), using a combination of thesaurus and free text terms including loneliness, social isolation, social relationships, social support, social network (search last updated in May 2015; for an example of the full electronic strategy used to search MEDLINE, see Appendix 2). The titles and abstracts of the 35, 925 records identified were independently screened by two researchers, who selected eligible studies based on whether they included a measure of the quality and/or quantity of individuals' social relationships.'

3. Second, the paper says very little about how the measures were chosen, by what criteria they were evaluated, and, importantly, how they were placed on the graph included with the paper. It is also not clear what the graph means, as there was no interpretation of it.

Response: Thank you. We have provided a more in depth description of how we identified the tools, and how we placed them on the graph included in the paper.
PP.6-7: 'The 32,205 records identified [from our first search] were screened by two researchers who selected studies which included a measure of the quantity and/or quality of individuals' social relationships. We applied no study design, language, publication type or date restrictions. For each study, we retrieved the questions used to assess social relationships and grouped them according to how they were formulated. Through this process we identified two ways in which questions differed: 1) whether they were asking about the structure or the function of social relationships, and 2) whether respondents were being asked to report on: past and present contact with others; availability of relationships as they perceive it; adequacy of their relationships; feelings relating to social relationships.

In a second phase, we tested whether a framework based on these two dimensions could be used to classify the measures used in studies on social relationships and cardiovascular disease. […] The titles and abstracts of the 35, 925 records identified [from our second search] were independently screened by two researchers, who selected eligible studies based on whether they included a measure of the quality and/or quantity of individuals' social relationships.'
P.15: 'Clarifying the remit of each instrument allows us to situate tools in relation to other available measures. In Figure 1, we have mapped the multi-item questionnaires developed as stand-alone tools onto a two-dimensional diagram. Questionnaires were placed on the diagram according to whether they contained questions focusing on the structural, functional or both aspects of relationships (vertical axis); and according to the degree of subjectivity asked of respondents (horizontal axis). Where questionnaires contained more than one type of question - e.g. the Duke Social Support Indices, where participants are asked about their involvement in relationships, as well as to report on the perceived availability and adequacy of relationships -, they were mapped accordingly i.e. spanning across these three types of questions. Similarly, where questionnaires included questions about structural as well as functional aspects, they were placed so as to straddle both areas of the diagram (e.g. the Lubben social Network Scales, the ENRICH Social Support Inventory, or the Duke-UNC Functional Social Support Questionnaire). For the purpose of clarity, we did not include single-item tools and tools that were developed for specific studies or datasets in our diagram.'

4. The paper produced no guidelines for scholars with which to select a measure. Thus, as a reader of the paper and a potential user of these measures, I had no idea how to proceed to evaluate them.

Response: As mentioned in response to comment 1, we wish to emphasise that our study was not intended as a guide for how to select a tool, but rather as a way of clarifying the literature that can inform this choice – since in order to choose a tool, researchers need to be able to compare it with others, something which was not possible prior to our study. In our discussion, we acknowledge other aspects, such as tool validity and/or reliability, which researchers need to take into account when

selecting a tool.
PP.16-7: ‘Another important way in which the classification can contribute to future research is by helping to guide researchers’ choice of measurement tool, since it provides an overview of some of the tools previously used in epidemiological studies, and allows investigators to compare instruments developed from different disciplines and theoretical perspectives. Once researchers have compared tools using our framework, they will be in a position to consider other factors of relevance, most importantly: psychometrics (has the tool been validated and shown to be reliable? What of its responsiveness and interpretability?); study population (is the tool adequate for the age group or the cultural context?); and whether the tool captures the most relevant dimensions of social relationships given the investigators’ hypotheses about how relationships influence health. Careful choice of measures is essential if we are to further our understanding of how social relationships affect health, and to identify people in need of help. Only by being clear about what is measured and why can we design appropriate prevention and intervention strategies that target the areas of relationships most problematic for health and wellbeing.’

5. Much more needs to be said about what was done, the insights the exercise produced, what the evaluation concluded and how it did so, and how a research could use it. The description of the methods needs to be complete enough that others could duplicate the results.

Response: We have provided a more detailed description of our methods and expanded on how our classification can inform other researchers’ work. Most importantly, we have made it clear that we did not set out to evaluate the individual measures.
P.4: ‘In this study, we propose a new way of classifying measures of social relationships. Our aim is to provide a transparent and accessible way of reviewing tools, to help readers understand and interpret the existing evidence.’

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Reviewer: 2
Reviewer Name: Aparna Shankar
Institution and Country: Population Health Research Institute, St. George's, University of London, UK
Please state any competing interests or state ‘None declared’: None declared

Please leave your comments for the authors below

This is an interesting review examining measures of social relationships. My comments on the manuscript are given below:

6. I think the introduction could be made much more detailed, leading up to the main issues examined by this review. It would be useful if details regarding the various dimensions examined by the review (i.e. structure vs function, objective vs subjective) are explained clearly at the outset.

Response: Thank you. We have provided a more detailed introduction, including definitions of the dimensions which make up our classification .
PP.3-6: ‘Social relationships ‘exist between two people when each person influences the other’s thoughts, feelings, and or behaviour, [i.e.] when people are at least minimally interdependent’.[1] Their influence on health is attracting growing interest from policy makers and practitioners, amidst concern about the wellbeing of certain groups, in particular older adults, in increasingly fragmented industrialised societies.[2-4] We know from reviews of the research evidence that people with weaker social relationships are at greater risk of premature mortality.[5] What we do not know is whether some aspects of relationships (e.g. their quality or quantity; subjectively v. objectively assessed

availability) are more problematic than others, and for whom.

One of the main reasons why we know little about the comparative effects of different social relationship dimensions is the inconsistent use of terminology. In the absence of a comprehensive framework, investigators from a range of disciplines, including sociology, psychology, demography, and epidemiology, have suggested definitions of concepts that cannot always easy be reconciled. For example, House and Khan proposed to distinguish between two dimensions of social relationships: social network and social support [6]. They defined social network as the structural dimension of social relationships, encompassing aspects such as the density, duration, dispersion, reciprocity and homogeneity of relationships. Social support was defined as the functional aspect of relationships (i.e. covering aspects such as the provision or receipt of information, instrumental help, emotional support or advice). In contrast, O'Reilly suggested instead that social network be used as the main concept, with social support as a subsidiary concept covering the qualitative and behavioural aspects of the social network [7].

Approaches to operationalising tools have been similarly heterogeneous, so that it is often unclear how different measurement tools differ or overlap, making comparison difficult. This raises a number of questions: how do researchers choose their measure? Are these measures relevant to the population under study? Do questionnaires capture what they purport to measure? In this study, we propose a new way of classifying measures of social relationships. Our aim is to provide a transparent and accessible way of reviewing tools, to help readers understand and interpret the existing evidence.

Rationale for developing a classification of measurement tools

There are many instruments available for assessing different aspects of social relationships: the Berkman-Syme Social Network Index,[8] the Lubben Social Network Scale,[9] the de Jong Gierveld Loneliness Scale,[10] the UCLA Loneliness Scale,[11] the Interview Schedule for Social Interaction,[12] for example. Exactly what these tools are designed to measure is often unclear. Researchers have tended to use terms including social integration, social ties or social isolation loosely and interchangeably, so that labels such as 'measure of social support' or 'social interaction scale' are not reliable indicators. For example, in an article reporting results from the Prospective Epidemiological Study of Myocardial Infarction, we read that 'social support' was measured using the Berkman-Syme Social Network Index.[13] In a systematic review of observational studies on psychosocial factors and coronary heart disease, 'social support' was understood to encompass a range of situations and measurement tools, including 'high love and support from wife', 'social network index' and 'social isolation'.[14]

An important reason for clarifying the literature is that different domains of social relationships might have different implications for health. Unfortunately, most epidemiological studies focus on only one measure of social relationships, precluding direct comparisons. Evidence from the few studies that do include measures of objective as well as subjective aspects of social relationships suggests that the two dimensions are weakly correlated, and that they have independent effects on health-related outcomes.[15-17] A single approach to measuring social relationships is therefore unlikely to be appropriate for all purposes, and investigators need to choose measurement tools carefully, basing their choice on clear hypotheses of how and why social relationships might influence particular health outcomes.[18]

To overcome the lack of conceptual clarity in the literature and to help researchers choose measurement tools tailored to their needs and objectives, we propose a way of classifying instruments that allows comparison across disciplinary boundaries. Our classification builds upon a distinction frequently referred to in the literature, the difference between functional (qualitative) and the structural (quantitative) aspects of social relationships,[19] and takes into account a second,

important, dimension: the way in which questionnaire items are phrased, which informs us about the degree of subjectivity asked of respondents.'

7. Isolation, loneliness and social support are distinct concepts and there is considerable evidence indicating this. I agree with the authors that there has been considerable confusion and overlap in the way these terms are used in many studies. However, rather than examining the 2 dimensions across these different concepts, I would suggest that the authors classify scales within related concepts (e.g. group together all the isolation/integration/social network scales). The scales should then ideally have a similar structure, and should be related to how the concept is defined. For example, I would expect most isolation or network measures to be structural, and low in subjectivity; while loneliness scales would be functional and higher in subjectivity. If the scale does not conform to this or includes additional items then this indicates to researchers that they may consider using different scales/ examining subscales within the main scale, etc.

Response: Thank you. Whilst we acknowledge that concepts such as social network or social support are often defined in opposition, we can cite numerous examples of studies in which they are used interchangeably, which is why we chose not to use labels such as social network or social isolation for our classification. As for equating social isolation or networks with the structural dimension, and loneliness with more functional questions, this depends on the definitions used. For example, a definition of loneliness commonly used by researchers is that it is a subjective negative feeling associated with the quality and the quantity of their social relationships – which suggests that questions in a loneliness scale could cover both structural and functional aspects. Likewise, when social isolation is defined as a relative absence of social relationships, and where relationships are defined as having a qualitative dimension (.e.g. interdependence, mutual influence of thoughts, feelings or behavior), we might expect tools to cover functional as well as structural aspects. This is why we opted to examine the two dimensions (structural and functional) across concepts.
PP.3-4: 'In the absence of a comprehensive framework, investigators from a range of disciplines, including sociology, psychology, demography, and epidemiology, have suggested definitions of concepts that cannot always easy be reconciled. For example, House and Khan proposed to distinguish between two dimensions of social relationships: social network and social support [6]. They defined social network as the structural dimension of social relationships, encompassing aspects such as the density, duration, dispersion, reciprocity and homogeneity of relationships. Social support was defined as the functional aspect of relationships (i.e. covering aspects such as the provision or receipt of information, instrumental help, emotional support or advice). In contrast, O'Reilly suggested instead that social network be used as the main concept, with social support as a subsidiary concept covering the qualitative and behavioural aspects of the social network [7].'

8. I also think it would be worth also explaining how each of the scales is meant to be used. For instance, if a scale includes both structural and functional dimensions, do the developers recommend that the total scale score is used (i.e., combine structural and functional scores?)

Response: Thank you. We have updated Table 1 so that tools for which subscales are available are identified with an asterisk. In appendix 3, we provide references to the original source in which each of the 54 tools was first mentioned and/or described, so that readers can pursue their interest in specific measurement tools further.

9. Related to the above, Table 1 could be organised separately for each main construct.

Response: As mentioned in response to comment 7, we do not think it informative to structure our table according to labels/concepts, since in the literature and amongst researchers there is no shared understanding of what each concept refers to.

PP.3-4: ‘In the absence of a comprehensive framework, investigators from a range of disciplines, including sociology, psychology, demography, and epidemiology, have suggested definitions of concepts that cannot always easy be reconciled. For example, House and Khan proposed to distinguish between two dimensions of social relationships: social network and social support [6]. They defined social network as the structural dimension of social relationships, encompassing aspects such as the density, duration, dispersion, reciprocity and homogeneity of relationships. Social support was defined as the functional aspect of relationships (i.e. covering aspects such as the provision or receipt of information, instrumental help, emotional support or advice). In contrast, O’Reilly suggested instead that social network be used as the main concept, with social support as a subsidiary concept covering the qualitative and behavioural aspects of the social network [7].’

10. The subjectivity dimension should be considered a bit further – as of now it appears that 2 scales cannot be classified on this dimension.

Response: Thank you. We have rectified the two omissions in table 1, and provided a clearer introduction to the section in which we describe the subjectivity dimension.
PP.8-10: ‘Second dimension: the degree of subjectivity asked of respondents

All answers to self-report questionnaires involve a degree of subjectivity, nevertheless, when comparing questions on social relationships, we found that the degree of subjectivity expected of respondents varied, based on the way in which items were formulated. In the following section, we describe each of the four different formulations we identified, starting with the more objective questions, and progressively moving towards greater subjectivity.

1) Items assessing respondents’ involvement in social relationships

A first type of question aims to capture people’s access to social relationships using a relatively objective approach. These questions often, but not always, ask individuals to quantify their social relationships and require a numerical answer. For example: ‘How many relatives do you see or hear from at least once a month?’ (possible answers: 0, 1, 2, 3 or 4, 5 to 8, or 9+, Lubben Social Network Scale)[9]. Such questions attempt to gauge the size and range of social relationships in which a person is involved, although we note that answers could be telling us more about individuals’ needs rather than access - i.e. people might not have engaged in certain social relationships because they did not feel the need to, rather than because they could not.

2) Items assessing the availability of social relationships as perceived by respondents

A second way of assessing access to social relationships is to ask people whether such relationships are available to them. For example, in a 4-item measure of social isolation used in the Japan Public Health Center-based Prospective Study II,
participants were asked: ‘Do you have someone who is supportive of your opinions and actions?’.[23] Questions are often phrased hypothetically, for example: ‘Is there someone who would give you any help at all if you were sick or disabled, for example, your husband/wife, a member of your family, or a friend?’ (OARS Social Resource Scale)[24] Such questions do not tell us about whether social relationships are actually available to individuals, but are a measure of availability as perceived by respondents.

3) Items assessing the adequacy of social relationships from respondents’ perspective

A third type of question asks respondents to report on whether they are satisfied with the quality and/or quantity of their interaction with others. Examples of such items include: How satisfied are you

with the kinds of relationships you have with your family and friends? (possible answers: Very dissatisfied, Somewhat dissatisfied, Satisfied, 11-item Duke Social Support Index);[25] 'I find my circle of friends and acquaintances too limited.' (possible answers: "yes!" "yes," "more or less," "no," and "no!" or "yes," "more or less," and "no", de Jong Gierveld Loneliness Scale).[10] Answering such questions requires participants to appraise their social relationships against their expectations.

4) Items where respondents are asked about their feelings relating to social relationships

A last type of question focuses on feelings associated with social relationships. For example, in the UCLA Loneliness Scale, respondents are asked whether they 'feel isolated from others', 'feel left out', or 'feel completely alone'.[11] Questions can cover both positive and negative feelings, and ask how people feel about the quality as well as the quantity of their relationships.'

11. Beyond a brief statement in the introduction, the authors do not really consider issues regarding validity and reliability. This could be developed further.

Response: The primary aim of our study was to provide a conceptual framework that can guide readers through the growing literature on loneliness and social isolation, rather than to evaluate studies based on their validity or reliability. We feel that an in depth discussion of issues relating to validity and reliability is beyond the remit of our paper, although we acknowledge that taking psychometric properties of the measures into consideration is important, and state this in our conclusion.
PP.16-7: 'Once researchers have compared tools using our framework, they will be in a position to consider other factors of relevance, most importantly: psychometrics (has the tool been validated and shown to be reliable? What of its responsiveness and interpretability?); study population (is the tool adequate for the age group or the cultural context?); and whether the tool captures the most relevant dimensions of social relationships given the investigators' hypotheses about how relationships influence health. Careful choice of measures is essential if we are to further our understanding of how social relationships affect health, and to identify people in need of help.'