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## A systematic review of loneliness and social isolation scales used in epidemics and pandemics

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### ABSTRACT

The COVID-19 pandemic has heightened social isolation and loneliness. There is a lack of consensus on rating scales to measure these constructs. Our objectives were to identify commonly used loneliness and social isolation scales over the last two decades and test their user characteristics. 7928 articles were searched in PubMed/MEDLINE, CINAHL, Web of Science, and APA PsychINFO databases. 41 articles were included based on study criteria. Among fourteen scales reported, UCLA 3-item loneliness scale was found to be most commonly used. The scale is specifically developed for telephone use and is the fastest taking less than a minute for self-administration.

### 1. Introduction

In the last few years, there has been an increase in animal-to-person spread and transmission of infective agents (Parrish et al., 2008). The increased frequency of infectious disease outbreaks, epidemics like Ebola, Zika, (Bloom and Cadarette 2019), and the ongoing pandemic have highlighted an urgent need to study the psychological effects of these crises. Preventive and control measures, like social distancing, quarantine, and closure of workplaces have been widely implemented (Cetron and Simone 2004; Wilder-Smith and Freedman 2020). While these public health safety measures are important to slow the spread of COVID-19, they have led to adverse psychological effects in the form of increased loneliness, anxiety, and despair (Tull et al., 2020).

The COVID-19 pandemic has increased the feelings of loneliness and social isolation (Killgore et al., 2020; Trad et al., 2020). Loneliness is described as subjective distress (Malcolm et al., 2019) resulting from a discrepancy between an individual's preferred and actual social relations (Holt-Lunstad et al., 2015). On the other hand, social isolation is an objective measure based on social network size and frequency of social interactions (Malcolm et al., 2019). Although loneliness and social

isolation are often used interchangeably, they are conceptually different constructs and need to be differentiated for research purposes (Malcolm et al., 2019).

Loneliness is pervasive and has far-reaching health consequences; nearly 50% of Americans report loneliness (Polack 2018). Loneliness and social isolation are associated with a higher incidence of cardiovascular diseases (CVD), higher healthcare utilization, and worse outcomes even after controlling for conventional risk factors of CVD (Sharma et al., 2021). One study found that loneliness was associated with a 29% increase in the risk of coronary heart disease, a 32% rise in the risk of stroke, and 43% mortality (HRSA, 2019).

Although there has been an accumulating body of literature on the effects of loneliness on health, heterogeneity of study settings, age of participants studied, and a myriad of loneliness scales used make it difficult to generalize the results. Pandemics add another layer of complexity by necessitating the remote use of these scales. A standardized assessment instrument should meet the following quality criteria: be objective and reliable, well-validated, have established norms, and be practical to use (Moller 2009).

The primary objective of the study is to review the literature from the

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last 20 years to find well-validated and commonly used loneliness and social isolation scales that can be practically used in the context of epidemics and pandemics. The secondary objectives of the study are to analyze the trend of use of such scales in the last decade and to test user characteristics of the three most used scales.

## 2. Materials and methods

**Search strategy and selection criteria:** Peer reviewed studies were searched from the last 20 years at PubMed/MEDLINE, PsycINFO, CINAHL, and Web of science using keywords “loneliness” AND “epidemic”, “social isolation” AND “epidemic”, “loneliness” AND “pandemic”, “social isolation” AND “pandemic”, “loneliness” AND “COVID-19”, “Social isolation” AND “COVID-19”. Articles were included if they met the following criteria: 1) published between January 2000–July 2020, 2) study population was  $\geq 18$  years of age, 3) written in English, and 4) loneliness/social isolation assessed with a specific measure in the context of a pandemic/epidemic. No ethical approval was needed as this review did not involve direct or indirect participation of human subjects.

After the initial search, articles relevant to the study were selected and duplicate papers were removed. An expert panel adjudication (AD, KPP, PRP) (Appendix 1) resolved any ambiguity of inclusion and exclusion criteria. After a final set of articles were determined, all scales measuring social isolation and loneliness were tabulated. Characteristics of each of the scales were compared. The three most used rating scales were studied for trend of their use within the last decade. The characteristics of the top three scales were examined in more detail (Table 1).

## 3. Results

After reviewing 7928 articles, removing duplicates, and using inclusion and exclusion criteria, 41 peer reviewed articles were included. A total of fourteen different scales of loneliness and social isolation were used in the 41 papers (Appendix 2). Among the fourteen scales, the three most used scales were: 1) University of California Los Angeles (UCLA) 3-

**Table 1**  
User characteristics of the top three scales.

	UCLA 3-item*	UCLA version 3**	ULS-8***
No of items	3 items	20 items	8 items
Developed for telephone use	+	+	-
Face to face interviews	+	+	+
Self-administration	+	+	+
Time needed (when self-administered)****	< 1 min	2–3 min	1–2 min
Time (when administered over the phone)****	1–1.5 min	4–5 min	Not developed for phone use
Cronbach's alpha	0.72	Ranges from 0.89 to 0.94	0.84
Validity	Optimal convergent and discriminant validity	Good convergent, construct and discriminant validity	Good discriminant and convergent validity (like R-UCLA 20)

\* University of California Los Angeles (UCLA) 3-item questionnaire (Hughes et al., 2004),.

\*\*UCLA loneliness scale version-3 (Russell 1996),.

\*\*\*8-item UCLA loneliness scale (ULS-8) (Hays and DiMatteo 1987).

\*\*\*\*The time of administration was calculated it by different team self-administering the scales and by administering it over the phone to different people. This was done 10 times for each method and then the average time was calculated.

item questionnaire (Hughes et al., 2004), 2) UCLA loneliness scale version-3 (Russell 1996), and 3) 8-item UCLA loneliness scale (ULS-8) (Hays and DiMatteo 1987). These three scales collectively were used in 56% of the articles, and the UCLA 3 item questionnaire was used most (24%). Based on the trends of use of the top three scales over the last decade, the UCLA 3-item questionnaire is the most used loneliness scale in the context of the COVID-19 pandemic.

Table 1 shows the characteristics of the top three isolation scales pertinent to the current COVID-19 pandemic. Among these three scales, the UCLA 3-item is developed and validated for telephone use, whereas the UCLA version 3 can be used for telephone use. ULS-8 was not developed for telephone use. The average time needed for self-administration (average of 10 trials) showed that all scales could be administered within three minutes, with the UCLA 3-item scale being the fastest requiring less than a minute for self-administration. All three had acceptable validity and reliability. Salient features of the other loneliness and social isolation scales are listed in Appendix 3.

## 4. Discussion

Our study reveals that the UCLA 3-item scale (Hughes et al., 2004) has been the most frequently used in the setting of an epidemic or pandemic. First developed by Russell et al. in 1978 (Russell et al., 1978), this scale is an offshoot of the original 20-item UCLA loneliness scale.

The popular use of the UCLA 3-item questionnaire in the setting of the current COVID-19 pandemic can be explained due to various factors. It is telephone validated, easy to use, and can be self-administered. Although there are other shorter scales available (Gierveld and Tilburg, 2006; Hawthorne, 2006; Hays and DiMatteo 1987; Neto 2014), the UCLA-3 item scale is the only instrument developed for telephone surveys (Hughes et al., 2004). Due to the fear of contracting an infection in the setting of a pandemic, research participants are reluctant to visit the health care setting in-person and are known to prefer telephone visits (Lum et al., 2020). Although participating in research online has become an increasingly common way of conducting research during an epidemic/pandemic, its use may be limited due to access. Hence, using a telephone remains an effective mode during pandemics.

Although UCLA scales have been well validated and reliable, the research study is unique as it throws light on why one scale has gained popularity in the pandemic compared to others. The scales, though useful, also have some challenges with interpretation and practical application. Being based on the Likert scale, no validated cut-off for “feeling lonely” or a way to categorize loneliness as mild, moderate, severe exists. Though there has been no consensus for cutoff scores of loneliness using UCLA scales, various strategies have been employed by research teams. For example, the UCLA 3-item scale scores have been used both as continuous and categorical variables. In order to dichotomize loneliness a score of greater than 3 (those who answer ‘some of the time’ or ‘often’ to any item) is used for the presence of loneliness (Perissinotto et al., 2012). Others have classified participants as “moderately lonely” if they responded “some of the time” to any component, and “severely lonely” if they responded “often” to any component. Others used scores in top quintile (6–9) to define loneliness (Steptoe et al., 2013).

Our study has various strengths. To the best of our knowledge, a review of loneliness and social isolation scales has not been done in the context of a pandemic, making this paper unique. It incorporates an extensive literature search spanning over the past 20 years and summarizes various loneliness and social isolation scales used in epidemic and pandemic research. The salient features of various scales have been discussed. Findings from this study may be used to further test the missing psychometric properties of the various scales.

However, there are some limitations as well. A review of the literature revealed that previous epidemic loneliness and social isolation studies were mostly done in the context of HIV/AIDS. No loneliness and social isolation studies were done in the context of other epidemics like

swine flu, Ebola epidemic, etc. This also sheds light on the fact that the recent pandemic has been much more impactful emotionally and continues to have far-reaching consequences when compared to the others. Despite the limitations discussed, the UCLA 3-item scale is the most used scale during pandemics due to its favorable user characteristics.

## 5. Conclusions

For a scale to be useful in the setting of epidemics and pandemics, it should be reliable, well-validated, quick and easy to use, require minimal training, and developed for use by telephone, online, or mail surveys. Having many of these qualities, the UCLA 3-item scale becomes a preferred and most widely used scale.

## CRedit author statement

**Author contributions:** All authors have contributed significantly to the paper and approved the final version. Detailed author contributions are as follows: Aparna Das: conceptualization, methodology, conducting the study, literature review, formal data analysis and manuscript preparation, Kalpana P. Padala: conceptualization, interpreting data analysis and critical review and editing of the manuscript; Christina G. Crawford: literature review, data analysis and critical review of the manuscript, Alan Teo: critical review of the manuscript, Diana M. Mendez: critical review of the manuscript, Olive A. Phillips: critical review of the manuscript, Benjamin C. Wright: critical review of the manuscript, Samuel House: critical review of the manuscript, Prasad R. Padala: conceptualization, methodology, interpreting data analysis and manuscript preparation and critical review of the manuscript, project administration and supervision.

## Conflict of interest

None

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2021.114217](https://doi.org/10.1016/j.psychres.2021.114217).

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