



King's Research Portal

DOI:
[10.3390/socsci11090425](https://doi.org/10.3390/socsci11090425)

Document Version
Publisher's PDF, also known as Version of record

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):
Tzouvara, V., & Kupdere, P. (2022). Examining Differences, Relationships, and Predictors for Loneliness in an Adult Population: The Roles of Personal Characteristics, Place of Residence, Leisure Activities, Mental Health, and Social Outcomes. *Social Sciences*, 11(9), Article 425. <https://doi.org/10.3390/socsci11090425>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Article

Examining Differences, Relationships, and Predictors for Loneliness in an Adult Population: The Roles of Personal Characteristics, Place of Residence, Leisure Activities, Mental Health, and Social Outcomes

Vasiliki Tzouvara ^{1,*} and Pinar Kupdere ²

¹ Care for Long-Term Conditions Research Division, Faculty of Nursing, Midwifery and Palliative Care, King's College London, London WC2R 2LS, UK

² Department of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London WC2R 2LS, UK

* Correspondence: vasiliki.tzouvara@kcl.ac.uk

Abstract: Loneliness is associated with poor mental and social outcomes globally. The literature suggests an association between loneliness and personal characteristics, place of residence, and leisure activities. However, the current literature has produced inconsistent findings and has focused largely on older adults. This study is one of the first to examine the differences, relationships, and predictors of loneliness in an adult population, and the roles of personal characteristics, place of residence, leisure activities, mental health, and social outcomes. A cross-sectional online survey was undertaken. A sample of 155 adults responded, with a mean age of 34.5 years (SD = 13.2), and with 54.1% identifying as female. An analysis revealed experiences of loneliness across the sample. In addition, age was moderately associated with loneliness, while psychological distress, depressive symptoms, and social networks were significantly associated with loneliness. Depressive symptoms were a positive predictor for loneliness, and social networks were a negative predictor for loneliness. This study has confirmed findings from previous research and provided new information on loneliness, which can guide future research and interventions to prevent or support people who suffer from loneliness.

Keywords: loneliness; mental health outcomes; social outcomes; personal characteristics; predictors



Citation: Tzouvara, Vasiliki, and Pinar Kupdere. 2022. Examining Differences, Relationships, and Predictors for Loneliness in an Adult Population: The Roles of Personal Characteristics, Place of Residence, Leisure Activities, Mental Health, and Social Outcomes. *Social Sciences* 11: 425. <https://doi.org/10.3390/socsci11090425>

Academic Editor: Kara Fletcher

Received: 15 July 2022

Accepted: 11 September 2022

Published: 19 September 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Loneliness is a distressing emotional response to perceived deficiencies in interpersonal relationships (Peplau and Perlman 1982). The prevalence of loneliness is estimated to be between 7 and 45% across European populations, depending on the country and the measures used to assess loneliness (Franssen et al. 2020). Research from the United States (US) also suggests that over one-third of all adults aged 45 years or over may experience loneliness (Mullen et al. 2019). Given this prevalence, developed countries have been forced to recognise the “epidemic of loneliness” that now affects major cities (Franke et al. 2021). Furthermore, the evidence demonstrates strong associations between loneliness, depression (Matthews et al. 2016), and poor mental health and social outcomes (Ge et al. 2017; Wang et al. 2019; Hu et al. 2020). Previously, demographic characteristics such as age and gender have been found to be associated with loneliness (Maes et al. 2019), but there have been inconsistent findings concerning the associations between loneliness, place of residence, and participation in leisure activities (MacDonald et al. 2020), and there has been a strong research focus on older adult populations.

This study, therefore, aimed to examine the differences, relationships, and predictors for loneliness in relation to personal characteristics (age and gender), place of residence (urban vs. rural), participation in leisure activities (specific and general), and mental

health and social outcomes in an adult sample. This study was designed and conducted during the second wave of the COVID-19 pandemic, and its findings are timely considering the tremendous impact of the pandemic and lockdown measures on social isolation and loneliness (Groarke et al. 2020; Jia et al. 2020; Al Dhaheri et al. 2021; Müller et al. 2021).

1.1. Conceptualisation of Loneliness

There are several concepts that are similar but inherently different regarding loneliness, and yet they are often used interchangeably. One such concept is that of solitude, which describes being alone, often by choice, to find relaxation or self-fulfilment. Thus, unlike loneliness, solitude relates to a positive emotional evaluation of a state, which can be a revitalising experience (Ishmuhametov 2006). Social isolation is another concept that is often confused with the term loneliness. Whilst social isolation is an objective state that reflects a person's limited social relationships and contacts, loneliness is a person's subjective evaluation of the gap between the desired social contact and actual social contact. Thus, loneliness can be viewed as the unwanted state of being alone. The key difference between social isolation and loneliness is the choice that people make in the situation. That is, people might feel lonely but not be socially isolated, and vice versa (for a detailed overview, see Tzouvara et al. 2015).

There are at least three major types of loneliness that have been widely identified in the literature: existential, pathological, and psychosocial (Bekhet et al. 2008). Existential loneliness, also referred to as primary loneliness, is perceived as a natural characteristic of being human and is therefore not a product of losses or a lack of relationships (Francis 1976; Bekhet et al. 2008). Pathological loneliness is considered to be the result of cognitive dysfunctions and affective disorders. This type of loneliness is usually experienced by people with severe mental illnesses, such as schizophrenia (Bekhet et al. 2008). Psychosocial loneliness is situational and related to factors such as place of residence, temporary separation from others, or lack of social relationships (Carr and Schellenbach 1993). Therefore, any experience that could affect an individual's personal and social circumstances could trigger experiences of psychosocial loneliness. The study described in this paper focuses on psychosocial loneliness as it is associated with well-being and distress, which can be affected by factors that include social networks and personal characteristics.

1.2. Personal Characteristics, Social Networks, Mental Health Outcomes, and Loneliness

Internal factors, including gender, age, mental health, and social networks, are key to our understanding of loneliness. However, the current evidence presents inconsistent findings about the role of personal characteristics, such as gender (Nicolaisen and Thorsen 2014). One three-level meta-analysis study that included 399,798 people revealed small gender effects for loneliness, suggesting nonsignificant differences between the female and male participants (Maes et al. 2019). However, another study examining 46,054 adult participants from 237 countries, islands, and territories revealed that the levels of loneliness were greater in males than females, while gender was a significant predictor for feelings of loneliness in the sample (Barreto et al. 2021). The lack of a consistent and clear a priori theoretical hypothesis for gender differences in loneliness may partially explain the mixed findings in the literature (Maes et al. 2019).

There are a substantial number of studies examining the relationships and effects of loneliness in various age populations, including in younger people (Matthews et al. 2016), older people (Ong et al. 2016), and the general population (Maes et al. 2019; Mann et al. 2021). However, a study using national cross-sectional representative data from the General Social Survey that included 2477 US respondents showed a nonlinear relationship between loneliness and age (Hawkley et al. 2020). Furthermore, by focusing on specific age groups, there has been less attention paid to how loneliness develops across the lifespan. This limits our understanding of the relationship between age and loneliness within various phases of life (Franssen et al. 2020), preventing the formation of reliable conclusions in this area of research (Shovestul et al. 2020).

The network size, structure, and frequency of social interactions are also important dimensions of loneliness. People with less social contacts report an increased risk of loneliness compared with people with larger social networks (Moorer and Suurmeijer 2001). People with limited support networks, and those that have networks that are mainly family-based, are more likely to experience loneliness (Kemperman et al. 2019). Whilst it has been suggested that experiencing loneliness serves to increase people's motivation for social interactions and connections (Hu et al. 2020), it can also cause people to actively avoid social interactions due to the fear of social disapproval and negative emotional outcomes (DeWall et al. 2009).

Loneliness is likely to have a significant impact on mental health (Wang et al. 2019). However, the role of loneliness in mental health outcomes has only been recently systematically researched (Wang et al. 2020). Studies have found associations between loneliness and various mental illnesses, including personality disorders and depressive disorders (Nenov-Matt et al. 2020), depression (Meltzer et al. 2013), psychosis (Lim et al. 2018), suicide and self-harm (Shaw et al. 2021), and dementia and Alzheimer's disease (Sundström et al. 2020). A recent systematic review (Mann et al. 2021) investigated the longitudinal associations between loneliness and the onset of mental health problems in the general population. It found that baseline loneliness was associated with the onset of depression, and it reported an odds ratio of 2.33 (95% CI: 1.62–3.34) for the onset of depression in adults who were often lonely compared with those who were not. However, the findings of this review should be viewed cautiously due to heterogeneity issues, the focus on the elderly in the majority of the identified studies, and the absence of a peer review for the article (Mann et al. 2021). The research examining mental health outcomes as potential predictors or risk factors for loneliness is still in its infancy, and more longitudinal studies are needed to unpack the causality. Understanding the relationship between loneliness and mental health outcomes will enable effective intervention, which is particularly important at the moment given the effects of the COVID-19 pandemic on mental health outcomes and loneliness (Groarke et al. 2020; Jia et al. 2020; Al Dhaheri et al. 2021; Müller et al. 2021).

1.3. Place of Residence, Participation in Leisure Activities, and Loneliness

There is a paucity of research on the relationship between loneliness and place of residence, and particularly research looking at either urban or rural geographical regions (Menec et al. 2019). The limited infrastructure, long distances, and sparse populations in rural areas may increase the risk of loneliness due to limited social participation and integration (Marr 2015). Urban areas may be better able to provide the sort of social opportunities that may reduce the likelihood of loneliness (MacDonald et al. 2020). Yet, people in rural areas report strong community connections that could protect against developing loneliness (Menec et al. 2019). Indeed, contemporary urban life can impact on an individual's sense of community, which can limit opportunities for social connection and trigger loneliness. The current evidence on the urban and rural differences in loneliness has produced mixed findings (MacDonald et al. 2020). Whilst some studies report higher loneliness rates in urban areas compared with rural regions in older adults (Paul et al. 2003; Menec et al. 2015), other studies show higher levels of loneliness in more rural regions (Savikko et al. 2005; Finlay and Kobayashi 2018), or no significant differences between regions when controlling for other factors (Jang et al. 2016). The impact of place of residence may also differ by age group. For example, a UK-based survey found that children in urban areas were four times more likely to be lonely than children in rural areas (Krishnan 2019). Whilst research investigating urbanisation and loneliness has attracted considerable interest, with statistics agencies reporting on the rates of people living alone, very few studies use loneliness-specific measures or focus on understanding loneliness across a broader adult population (MacDonald et al. 2020).

Active leisure activities are positive predictors for developing social relationships, while activities related to career development were found to positively impact personal growth and happiness (Toepoel 2013; Kim et al. 2015). However, evidence suggests that

single activities (Queen et al. 2014), desk-bound tasks (Vancampfort et al. 2019), or tasks perceived as pointless (Tam and Chan 2019) can increase levels of loneliness. The multilevel modelling results from the study by Tam and Chan (2019) demonstrated that situational meaningfulness negatively predicts loneliness after controlling for other factors, including age, gender, personality, meaningful life engagement, trait loneliness, the day of the week, aloneness, and boredom. The authors argue that the findings of this study reveal an association between the meaninglessness of an activity and loneliness. However, as this was a cross-sectional study, the results should be interpreted cautiously, as there is no way of establishing causality between the different variables.

Several interventions targeting loneliness stem from engagement and participation in leisure activities. A literature review of 38 studies on interventions to reduce social isolation and loneliness in older people revealed that leisure and skill-development interventions are two key strategies (Gardiner et al. 2018). Recent systematic reviews have also reported that participation and engagement in groups and activities was an important protective factor against loneliness during the COVID-19 pandemic (Williams et al. 2021). Social leisure activities, such as meeting friends and having hobbies, in particular, appear to prevent loneliness and enhance well-being. Other longitudinal studies have suggested that simple activities, such as playing cards or mahjong, watching TV, or listening to the radio, can also reduce the risk of persistent loneliness in older people when assessed up to five years later (Teh and Tey 2019). However, most studies that have focused on the associations between leisure activities and loneliness have focused mainly on the differences between leisure activities and urbanisation (MacDonald et al. 2020).

2. Rationale for the Study

The current studies on loneliness have failed to examine the role of internal factors, such as personal characteristics, external factors (such as participation in leisure activities), and place of residence, or have failed to consider peoples' mental and social outcomes, in one study. This failure is worrying considering the fact that mental health and social outcomes significantly correlate with loneliness across the lifespan, which has led to worldwide initiatives for reducing its effects (Wang et al. 2020). In addition, the main focus of loneliness literature has been on older people, while differences in loneliness across the lifespan have attracted less attention. Finally, the current studies fail to capture the differences in loneliness concerning leisure activities and place of residence (e.g., urban vs. rural). This study aimed to bridge this knowledge gap, and to begin to clarify the inconsistencies in the current literature. To the best of the authors' knowledge, this is one of the few studies that have examined personal characteristics and mental health and social outcomes in a single study to assess the differences, relationships, and predictability of loneliness in an adult population.

The research questions were:

- (a) Are there significant differences in the levels of loneliness by personal characteristics (age and gender), place of residence (urban vs. rural), participation in leisure activities, and mental health?
- (b) Is there a significant relationship between personal characteristics, mental health, social outcomes, and loneliness?
- (c) Are personal characteristics (age and gender), place of residence (urban vs. rural), leisure activities, mental health, and social outcomes significant predictors for loneliness?

3. Methods

3.1. Participants

Data were collected through a cross-sectional online survey completed by eligible participants (see Table 1). Online surveys were widely used during the COVID-19 pandemic, and they provided important behavioural data across different populations and settings. Conroy (2018) argues that a 95% confidence interval with a margin of error of ± 10 is

acceptable for an exploratory study ($n = 100$). In this study, a margin of error of $\pm 10\%$ —and not less than 5% —was applied, and an online sampling method was implemented.

Table 1. Eligibility Criteria.

Inclusion Criteria	Exclusion Criteria	Reasons for Exclusion
Adults ≥ 18 years old	People ≤ 18 years old	Guardian consent would have been required. An age restriction was applied when designing the online survey.
People able to read English well enough to answer the survey questions.	People who could not read English well enough to answer to the survey questions.	Survey only existed in English-language version.
People who had access to and/or were able to use electronic devices, such as laptops, computers, and smart phones/mobile phones.	People who did not have access to and/or were unable to procure these electronic devices.	Adults without access to electronic devices were unable to complete an online survey.

One hundred and fifty-five respondents completed the online survey. The mean age of the sample was 34.5 years (SD: 13.2, age range: 18–83). Eighty-seven respondents were female (56.1%), sixty-three were male (40.1%), and five (3.1%) identified themselves as nonbinary (3.1%). The majority of the respondents were White (87.1%), single (54.2%), atheist/agnostic (41.3%), had a postgraduate degree (43.9%), and were living with close family (45.2%). One hundred and nineteen of them resided in urban areas (76.8%), while thirty-six lived in rural areas (23.3%). Table 2 provides a full description of the participant characteristics.

Table 2. Personal characteristics of participants.

Sociodemographic Variables (n = 155)		N	%
Gender	Male	63	40.6
	Female	87	56.1
	Nonbinary	5	3.1
Ethnicity	White (British)	59	38.1
	Asian (British)	3	1.9
	Black	2	1.3
	Asian	8	5.2
	Multiethnic	7	4.5
	White (other)	76	49
Marital status	Single	84	54.2
	Married	39	25.2
	Cohabiting	22	14.2
	Divorced/separated	6	3.9
Religiosity	Other	4	2.6
	Extremely religious	6	3.9
	Quite religious	31	20
	Not very religious	50	32.3
	Atheist/agnostic	64	41.3
Living arrangements	Other	4	2.6
	Alone	30	19.4
	Intimate family	70	45.2
	Children	8	5.2
	Extended family	2	1.3
	Partner	33	21.3
Educational level	Roommates	12	7.7
	Secondary school	24	15.5
	College	21	13.5
Place of residency	Undergraduate	35	22.6
	Postgraduate	68	43.9
	Other	7	4.5
Age: mean (SD, range)	Urban	36	23.2
	Rural	119	76.8
		34.5 (13.2, 18–83)	

3.2. Measurements

Personal Characteristics: Sociodemographic variables, including gender, age, ethnicity, country of residence, education, marital status, living arrangements, and religion, were collected.

Place of residence: One single binary question was used to collect the data on place of residence. Participants were asked to describe their place of residence as either “urban” or “rural”.

Leisure Activities: Four general leisure (GL) activities and five specific leisure (SL) activities were assessed. The GL activities were rated from 1 to 6 (from “hardly ever” to “several times a week”). The four GL activities were: (a) attending movies, the theatre, a play, museum, or concert; (b) spending time in nature; (c) going sightseeing or going to an amusement park or zoo; (d) eating out or going dancing; (e) taking part in neighbourhood programs, hobbies, or social clubs. The SL activities were rated from 1 to 4 (from “hardly ever” to “more than ten hours a week”). The five activities were: (a) physical sports; (b) reading or mind sports; (c) listening to music; (d) taking part in computer activities (games, Internet, etc.); (e) watching TV. The GL and SL questions were adapted from the study by [MacDonald et al. \(2020\)](#), and the participants were asked to respond to the questions on leisure activities retrospectively by rating their activity levels due to social distancing measures.

UCLA Loneliness Scale (UCLA-3): This self-report tool, which measures loneliness, consists of three questions, rated on a scale from 1 to 3 (from “hardly ever lonely” to “often lonely”). The questions refer to a lack of companionship, feeling left out, and feeling isolated from others. A total score is calculated by summing the three items, with higher scores indicating greater loneliness. The scale has high internal consistency (0.82) and reliability ([Hughes et al. 2004](#)), and it has been widely used in assessing loneliness ([Arimoto and Tadaka 2019](#)).

Lubben Social Network Scale-6 (LSNS-6): The LSNS-6 self-report tool was used to assess the size of the participants’ active and close networks of family and friends. Participants are asked to rate the size of their social networks on a 5-point Likert scale (0 = none; 1 = 1 person; 2 = 2 persons; 3 = 3 or 4 persons; 4 = from 5 to 8 persons; 5 = 9 or more persons). The items related to friends and relatives include 3 questions: (1) “How many friends do you see or hear from at least once a month?”; (2) “How many friends do you feel close to to such an extent that you could call on them for help?”; (3) “How many friends do you feel at ease with that you can talk to about private matters?”. These three items are used to assess relative relationships by altering the word friends with the word relatives. A total score is calculated by summing all the items (from minimum = 0 to maximum = 30). A score of 12 and lower indicates a risk of social isolation, while higher scores indicate stronger networks ([Lubben et al. 2006](#)). The scale has shown high internal consistency (0.83) and adequate reliability ([Lubben et al. 2006](#)).

Mental Health: [The Catalogue of Mental Health Measures \(2020\)](#) was used to identify the scales for assessing mental health. Two different questionnaires were used: (a) the Kessler Psychological Distress Scale (K10), and (b) the General Health Questionnaire (GHQ-12) scale. The K10 is a 10-item self-report tool that measures levels of psychological distress. The responses are rated on a scale from 1 to 5 (from “none of the time” to “all the time”). Answers are summed for a total score (minimum score = 10; maximum score = 50), with higher scores indicating high levels of distress. Cut-off points may also be applied: likely to be well (10–19), mild disorder (20–24), moderate disorder (25–29), and severe (30–50). The K10 has high levels of internal consistency and concurrent validity ([Hides et al. 2007](#)). The test reliability scores have ranged from 0.42 to 0.74, indicating good reliability ([Kessler 2021](#)).

The GHQ-12 is also a 12-item self-report tool for identifying common mental health problems. Responses are rated on a 4-point Likert scale ranging from 0 to 3 (from “not at all” to “more than usual”), with the reversal of scoring for some items ([Liang et al. 2016](#)). A total score is obtained by summing all the scores (minimum score = 0; maximum score = 36),

with higher scores indicating a more severe condition (Gao et al. 2004). A cut-off point of 12 or higher is thought to indicate depressive symptoms (Liang et al. 2016). The GHQ-12 has high validity (Hankins 2008), internal consistency, and reliability (0.84) (Liang et al. 2016).

3.3. Data Analysis

The Statistical Package for Social Science (SPSS) (Version 27) was used. Data were tested for normality and distribution; tests for skewness reported similar values to previous studies (0.195) (von Känel et al. 2021), and parametric statistics were used. No missing values were recorded. Descriptive statistics provided summaries for all variables. The reliability of the UCL-3, LSNS6, GHQ-12, and K10 scales were examined by using Cronbach's alpha coefficients. Place of residence had two categories (rural vs. urban), while gender was categorised into three groups: male, female, and nonbinary. Grouping data aims at increasing the accuracy and efficiency of estimation (Veerendra 2020). The SL and GL items were treated as continuous variables (MacDonald et al. 2020). Similarly, the UCL-3, LSNS6, PHQ, and K10 scales were treated as continuous variables (von Känel et al. 2021; Mezuk et al. 2016; Krause et al. 2009; Röhr et al. 2020).

An independent t-test for the testing differences with two groups (e.g., rural/urban), and a one-way ANOVA for testing differences with three or more groups (e.g., gender), and loneliness were performed. Cohen's d test was used to test the effect size. Point biserial correlation (χ^2) for dichotomous variables and Pearson's correlation for continuous variables were used to examine the relationships between the independent and dependent variables. Multiple linear regression was used to test the predictors for loneliness, with the following independent variables included in the regression model: age, gender, leisure activities, place of residence, social networks, and mental health outcomes. Independent variables with two or more groups were dummy coded before being entered into the model (e.g., gender) (UCLA: Statistical Consulting Group 2016; Coolican 2018).

4. Procedures

The lead author led the recruitment phase of the study. The JISC Online Surveys tool, which is an online tool designed for use by academic, research, and educational organisations, was used to collect the data (JISC 2021). Data were collected from April to July 2021. Recruitment occurred in three concurrent phases (see Figure 1): (a) through social media platforms, such as Reddit, Twitter, Facebook, and Instagram; (b) by email and messenger accounts, such as Yahoo, Messenger, Instagram Message, WhatsApp; (c) through the webpages and newsletter of one Mental Health and Loneliness research group. The UKRI Network brings together researchers, health practitioners, charities, people with lived experiences of mental ill health, and other organisations to address important mental health questions. For the first two methods, the lead author's accounts were used to disseminate the study. For the third, the lead author asked permission from the coordinator of the UKRI Loneliness and Social Isolation in Mental Health Network to disseminate the link through their webpages and newsletter. The lead author is a member of the UKRI Network. An introduction paragraph with the study's aim, ethics approval details, research teams' contact details, and weblink to the survey were distributed.

The first section of the online survey welcomed participants to the study and introduced them to the participant information sheet and consent form. One screening question on the participant age was added at the end of the first page to ensure that people below the age of 18 years old did not take part. Respondents were then informed that they could consent to participate in the study only after reading the information sheet by clicking the "yes" button at the end of the first page. The survey consisted of forty-nine questions, and it took 10–15 min to complete. The second section involved questions about personal characteristics that aimed to ease the respondents into the survey and to increase the item response rates for the demographic items (Teclaw et al. 2012). The survey then went on to ask questions about the respondents' leisure activities, social networks, loneliness, and mental health.

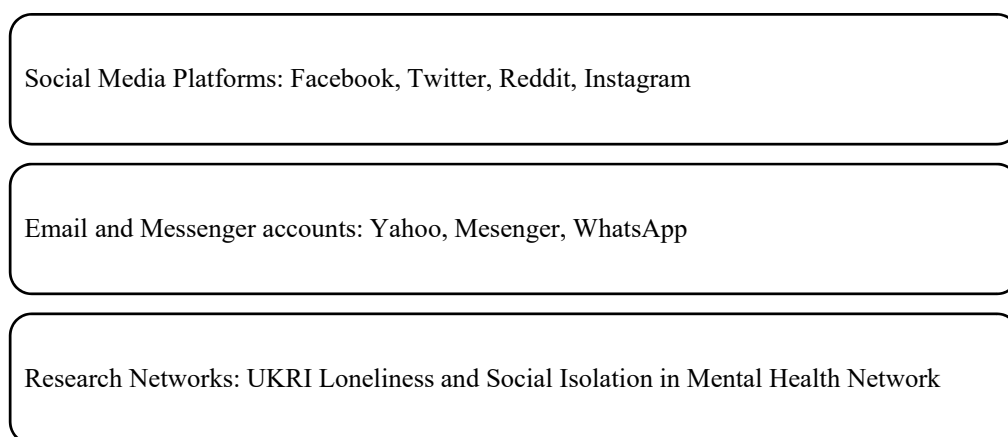


Figure 1. Study's recruitment plan.

5. Ethics

Ethical approval was granted by the University of Leicester Ethics Committee. Survey participation was voluntary and anonymous. The research team's contact details were provided to the participants for enquiries and clarifications. The JISC Online Surveys tool features an electronic password to securely facilitate data collection. Upon analysis, the data were saved onto the lead author's password-protected computer. All data were collected, maintained, and stored in compliance with General Data Protection Regulation (GDPR) legislation.

Information on specific mental health disorders was not collected, and diagnostic clinical tools were not used; however, some of the questions may have triggered traumatic memories or distress. In order to further minimise any potential risk or harm, at the end of the online survey, a debrief section was included. The section invited participants to provide feedback on the survey, and to provide their email addresses if they wished to be contacted with the results of the survey. The section also provided the contact details of the ethics committee, and of relevant supporting organisations, such as the Samaritans, Rethink, and Mind.

6. Results

The participants reported high levels of psychological distress ($M = 36.3$, score range = 10–50), depressive symptoms ($M = 17.9$, score range = 10–50), loneliness ($M = 5.4$, score range = 3–9), and contact with social networks ($M = 16.9$, range = 0–30). Moderate levels of participation in general and specific leisure activities were reported ($M = 13.6$, score range = 5–19; $M = 12.9$, score range = 4–24, respectively). The scales were examined for reliability using the Cronbach's alpha test, and they presented acceptable scores [Taber 2018](#) (Table 3).

Table 3. Mental health and social outcome, leisure activity, and reliability scores.

Research Instruments	Mean (Range)	Cronbach's Alpha
Psychological distress (K10)	36.3 (10–50)	0.93
Depressive symptoms (GHQ)	17.9 (3–33)	0.82
Social networks (LSNS-6)	16.9 (0–30)	0.83
Loneliness (UCLA-3)	5.4 (3–9)	0.75
Specific leisure activities (SL)	12.9 (5–19)	-
General leisure activities (GL)	13.6 (4–24)	-

6.1. Differences and Relationships in Loneliness

The results indicated no significant differences in the reported loneliness levels between subjects living in rural ($M = 5.4$, $SD = 1.99$) and urban ($M = 5.5$, $SD = 1.75$) areas

($t(153) = -0.254, p = 0.800$). The levels of loneliness were not significantly different for males ($M = 5.7, SD = 1.6$), females ($M = 5.2, SD = 1.9$), and nonbinary participants ($M = 6.7, SD = 1.5$). There was no statistically significant difference between the levels of loneliness and gender ($F(2, 151) = 2.803, p = 0.064$).

The correlation analysis indicated that loneliness was moderately positively correlated with age ($r(153) = 0.172$), with greater loneliness correlating with increased age. Loneliness was found to be strongly correlated with psychological distress ($r(153) = 0.457, p \leq 0.001$), depressive symptoms ($r(153) = 0.527, p \leq 0.001$), and social networks ($r(153) = -0.341, p \leq 0.001$) (Table 4). No significant relationships existed between loneliness, general leisure activities, specific leisure activities, and place of residence (Table 5).

Table 4. Differences and relationships between personal characteristics, mental health, and social outcomes.

Person Characteristics, Mental Health, and Social Variables (n = 155)	UCLA-3				
	Mean (SD)	t-Test	F Ratio	R (Correlations)	p Value
Gender					
Male	5.7 (1.6)	-	2.803 *	-	0.064
Female	5.2 (1.9)	-			
Nonbinary	6.7 (1.5)	-			
Place of Residence					
Urban	5.4 (1.9)	-0.254 **	-	0.021	0.800
Rural	5.5 (1.7)				
Age (years)	34.5 (13.2)	-	-		
K10	36.3 (8.8)	-	-	-0.457 **	<0.001
GHQ	17.9 (5.8)	-	-	0.527 **	<0.001
SNS6	16.9 (5.3)	-	-	-0.341 **	<0.001

K10: psychological distress; GHQ: depressive symptoms; SNS6: social networks. * $p < 0.005$, ** $p < 0.001$.

Table 5. Descriptive and correlation statistics of general leisure (GL) and specific leisure (SL) activities with loneliness.

Activity	Mean (SD)	Most Common Response (%)	Pearson Correlation	p Value
Specific leisure activities				
Taking part in physical sports	1.9 (0.8)	2–5 h a week (43.2)	0.050	0.537
Taking part in listening to music	2.98 (0.9)	More than 10 h a week (39.4)	0.135	0.094
Taking part in watching TV	2.6 (1.9)	More than 10 h a week (27.7)	-0.013	0.875
Taking part in computer activities (games, Internet, etc.)	3.2 (1.09)	More than 10 h a week (58.1)	0.140	0.082
Taking part in reading or mind sports	2.1 (1.09)	2–5 h a week (35.5)	0.038	0.641
General leisure activities				
Attending movies, the theatre, or a play, museum, or concert	3.13 (1.2)	Rarely (43.2)	-0.014	0.867
Going to a café, restaurant, or going out dancing	4.02 (1.2)	A few times a week (28.4)	-0.091	0.258
Partaking in activities such as neighbourhood programs, hobby or social clubs, or professional organizations	2.95 (1.6)	Hardly ever (25.8)	0.031	0.703
Spending time in nature, going sightseeing, or going to an amusement park or zoo	3.57 (1.4)	Rarely (28.4)	-0.062	0.444

6.2. Predictors for Loneliness

A multiple regression analysis was used to test whether age, gender, place of residence, leisure activities, poor mental health outcomes, and social networks were significant predictors for loneliness in an adult sample. A significant regression equation was found ($F(8, 146) = 10.674, p < 0.001$), with an R^2 of 0.370, and an adjusted R^2 of 0.331, indicating that the predictors explained 37% of the variance in the model. In addition, the regression analysis indicated that depressive symptoms were a significant positive predictor for loneliness ($\beta = 0.122, p \leq 0.001$), with higher levels of depressive symptoms predicting greater loneliness. The extent of social networks was also a significant negative predictor for loneliness ($\beta = -0.094, p \leq 0.001$), with stronger social networks predicting less loneliness in the sample. Age, gender, place of residence, and leisure activities were not significant predictors for loneliness (Table 6).

Table 6. Multiple regression analysis for testing predictors for loneliness.

Model Summary					
Multiple R	0.608				
R^2	0.370				
Adjusted R^2	0.331				
Std error	1.478				
Analysis of variance					
	Sum of Square	df	Mean ²	F	<i>p</i> Value
Regression	185.957	9	20.662	9.458	<0.01
Residual	316.753	145	2.185		
Total	502.710	154			
Coefficients: variables included in the equation					
	Unstandardised Coefficients		Standardised Coefficients		
	B	Std error	B	t	<i>p</i>
K10 (psychological distress)	−0.019	0.020	−0.093	−0.946	0.346
GHQ (depressive symptoms)	0.122	0.029	0.395	4.1	<0.01
LSNS6 (social network)	−0.094	0.027	−0.277	−3.5	<0.01
Specific leisure activities	0.027	0.049	0.038	0.554	0.580
General leisure activities	0.053	0.033	0.122	1.6	0.112
Age	−0.005	0.010	−0.034	−0.451	0.653
Place of residence *	0.124	0.289	0.029	0.428	0.670
Gender (male) **	0.468	0.275	0.128	1.7	0.090
Gender (other) **	0.234	0.708	0.023	0.330	0.742

* Place of residence: dummy coded (1 = urban, 0 = rural); ** gender (male): dummy coded (1 = male, 0 = other, and 1 = other (female/nonbinary), 0 = male).

7. Discussion

The findings revealed increased levels of psychological distress and depression in this sampled adult population. The participants reported maintaining social relationships with family and friends, and yet they were experiencing loneliness. The analysis revealed an association between loneliness and age, psychological distress, depressive symptoms, and social networks. A multiple regression analysis showed that only depressive symptoms and social networks were significant predictors for loneliness in the sample.

Age was found to have a moderate positive relationship, with greater loneliness associated with increased age. These findings are in line with previous evidence (Ong et al. 2016; Hawkey et al. 2020). However, age was not a significant predictor for loneliness in this sample. The wider literature suggests that older people are more susceptible to experiences of loneliness due to physical and mental health problems, alterations to living circumstances, transitions into care, and limited social contacts and bereavements (National Institute on Aging 2019; Hybholt et al. 2020; Berg-Weger and Morley 2020). However, evidence also suggests that younger and older people share the same probability

of experiencing loneliness during their lifetimes (Victor and Yang 2012; Age UK 2018). One study found that young people experienced more loneliness compared with middle-aged participants, while middle-aged people experienced more loneliness than older adults (Barreto et al. 2021). Due to the cross-sectional nature of the data, the small effects of the relationships, and the lack of rigorous sampling, inferences cannot be drawn from this study. Yet, evidence suggests that resilience negatively correlates with loneliness (Jakobsen et al. 2020), and if older people become more resilient through life experiences, then they may be better able to cope with loneliness. No gender differences were reported in this study, which aligns with some previous research (Maes et al. 2019). However, gender-research inconsistencies limit our understanding of the relationship between gender and loneliness.

Previous research has suggested that place of residence and participation in leisure activities are significant predictors for loneliness. For example, MacDonald et al. (2020) found that living in heavily urbanised areas and engaging in fewer social activities significantly correlated with loneliness. Even though the same type and number of general and specific leisure activities were assessed as in MacDonald et al.'s study (2020), this study identified no significant relationship between place of residence, social activities, and loneliness. It is significant that, in the current study, the data were collected at the end of the second wave of the COVID-19 pandemic, when governments worldwide began easing lockdown restrictions. People were able to return to some of the activities that they used to attend before restrictions were put in place, which may have positively impacted experiences of loneliness.

Research has generally shown a significant relationship between loneliness and poor mental health outcomes (Tutzer et al. 2021). This study also found psychological distress to be significantly associated with loneliness. It may be that loneliness and psychopathology are linked to interpersonal challenges that result in limited rewarding social interactions. Another explanation is that loneliness is a complex construct in which relationship loss can cause generalised distress and negative emotional outcomes (Jackson and Cochran 1991). Certainly, current research studies have established a significant relationship between psychological distress and loneliness due to the COVID-19 pandemic (Tutzer et al. 2021). However, psychological distress was not found to be a significant predictor for loneliness in this sample. It is therefore important to examine the relationship between loneliness and psychological distress longitudinally to understand the relationship causality between these two constructs.

A multiple regression analysis showed that higher levels of depressive symptoms predicted greater loneliness in the sample. The findings of this study align with previously published evidence. For example, in a population-based study of 1919 adults, Ge et al. (2017) demonstrated the association of loneliness with depressive symptoms, even after controlling for other variables, such as gender, age, employment status, and other variable covariates. The authors also found that the relationship between depressive symptoms and loneliness was stronger and independent of any other association between loneliness and social indicators (e.g., social connectedness). Lee et al. (2021) reported a cohort study of people over 50 years old that found that higher loneliness scores at baseline were associated with higher depression-symptom severity during a 12-year follow-up, irrespective of other social experiences. The authors argued that between 11 and 18% of cases of depression could be potentially preventable if the occurrence of loneliness could be reduced. However, an earlier five-year longitudinal study found that loneliness was a significant predictor for depressive symptoms at yearly intervals, but that depressive symptoms were not found to predict loneliness at the same time (Cacioppo et al. 2010). A recent study (Sipowicz et al. 2021) that examined the perceived levels of loneliness and depression in rural- and city-dwelling older adults found that sociodemographic variables and somatic morbidities accounted for around 90% of the variance in the depressiveness and loneliness scores, while living alone was found to be the strongest relative predictor of both loneliness and depressiveness in the sample. This highlights the role of age and psy-

chological distress in loneliness, and the role of depressive symptoms and social networks in predicting loneliness.

The inconsistencies in the literature highlight the need for further research to inform our understanding of the associations between depression and loneliness. Insecure attachment styles, for example, could explain the association between depressive symptoms and loneliness. People with insecure attachment styles may be more vulnerable to experiencing depression, have low self-esteem, and have greater difficulty developing and maintaining relationships with others (Mushtaq et al. 2014), thereby increasing the risk of loneliness. Personality type may explain the pathology and aetiology for depression (Janowsky 2001). Introverted personalities, which are characterised by a desire to maintain personal and emotional privacy, tend to interact with small groups and may appear shy and withdrawn (Guy-Evans 2020). This may make it more challenging for them to connect with people and maintain social relationships, which may lead to experiences of loneliness. A negative self-evaluation and lack of confidence in individuals, which are common in people with depression, could also lead to experiences of loneliness (Wang et al. 2020). Equally, people suffering from depression have an increased risk of experiencing loneliness due to actively avoiding others (Xue 2017). There is, however, a coexistence between loneliness and depression (Wang et al. 2020). Lonely people often hold negative perceptions, are more prone to negative emotions, and may often be hostile, which relates to a depressive symptomatology (Gasse et al. 2020). Despite this evidence, there is still a need for further longitudinal studies to examine and demonstrate the causal association between depression and loneliness.

Social relationships and connections are significant protective factors for loneliness, and they positively impact happiness and overall well-being. Evidence reveals that the type of social network (e.g., family, friends, etc.) plays a significant role and reduces the risk of experiencing loneliness across the lifespan. One study of 14,725 adults (Nicolaisen and Thorsen 2017) revealed that a lack of satisfaction regarding the amount of contact with friends is associated with loneliness across all age groups. In addition, studies examining loneliness in older adults demonstrate that the quality of existing relationships is more important than the number of social relationships (Chatters et al. 2018). A UK longitudinal study (Wallinheimo and Evans 2022) found a clear relationship between the frequency of Internet use and subjective loneliness, with those who used the Internet more than once a day reporting being less lonely than those using it once a week or less. Those participants who used the Internet for email communication also reported feeling less lonely. This is a promising finding because it suggests that Internet use may increase opportunities for socialization, and it may be a protective factor for loneliness in older adults who may be less mobile and able to travel. However, it is also important to note that older adults can face difficulties using digital technologies due to a lack of technical knowledge due to a lack of computer literacy skills and lack of access to the Internet (Martínez-Alcalá et al. 2021).

The psychological and sociological literature shows that people with larger and stronger social networks and active social relationships are more likely to be satisfied with their lives (Amati et al. 2018). Social relationships and contacts are key players in promoting a sense of self and a feeling of belonging (Deci and M 2002; seen in Amati et al. 2018). The literature also suggests that higher subjective well-being depends on the number of people one trusts and confides in (Amati et al. 2018). Such social networks and relationships can provide company, emotional support, and instrumental support (Amati et al. 2018). The benefits related to these resources help to meet people's expectations in relation to wanting close social relationships, and therefore, can reduce experiences of loneliness. The findings from this study are in line with the psychosocial typology of loneliness, of which life or social circumstances, personal characteristics, and/or mental health can trigger and explain experiences of loneliness (Carr and Schellenbach 1993).

The study reported in this paper examined mental health and social outcomes, along with geographical and personal-characteristic variables and their interactions, with loneliness in a single study. The focus of this study therefore aligns with *The Five Year Forward View For Mental Health* (2016), which recognises loneliness as one important determinant

of mental health that affects people of any age. Clinicians should be aware of the negative effects of loneliness, while assessing loneliness should be an essential part of clinical practise because social connectedness has numerous positive implications for health. It is further argued that the prevention of and reduction in the deficits in social relationships should be a key focus of clinical practise. This is important because problems in relationships may cause clinically significant distress, worsen symptoms, and affect the treatment of mental health and general physical conditions (Heinrich and Gullone 2006). Future studies should examine the pathways of these interactions and relationships through large-scale and longitudinal studies. The coproduction of evidence-based interventions with key stakeholders for preventing and reducing loneliness should be a top priority in the scientific arena. Finally, research that tests the effectiveness and sustainability of future loneliness-specific interventions should be implemented.

The study has several strengths and limitations. Using an online cross-sectional design meant that a cause-and-effect relationship could not be established between the variables. However, strong indications about the relationships and predictability of loneliness were identified and could inform future research directions. There were also limitations in terms of the sampling. Whilst a larger sample might have been beneficial, acceptable confidence intervals and margins of error were adapted in accordance with the recommendations for cross-sectional surveys (Conroy 2018). Online survey designs provide access to large samples; however, they are prone to recruitment bias because only people with access to the Internet and technological equipment can participate. Therefore, older people and other populations with no access to the Internet were not able to participate in this study. This is important because these populations might be the most vulnerable to experiences of loneliness. The study also aimed to examine the relationships between gender and loneliness. However, any results in terms of gender found in this study should be viewed with caution due to the fact that most of the participants were female, and there was an extremely low representation of the nonbinary population in this sample (3.1%). This study did not collect information on the respondents' sexual orientations, and thus it was not possible to explore relationships between loneliness and sexual orientation. However, although a meta-analysis found only four studies to date that have examined this issue, the results found higher levels of loneliness amongst sexual minorities compared with the heterosexual population (Gorczynski and Fasoli 2021). Thus, future studies should aim to ensure that they include sexually diverse populations, and especially as demographic information pertaining to sexuality is often not routinely collected (Gorczynski and Fasoli 2021).

In addition, the timing of this study was potentially important, as it was conducted during the COVID-19 pandemic, when some countries were under lockdown, and others had social distancing measures in place. The responses, therefore, might reflect loneliness experiences and mental and social outcomes in relation to the pandemic and its related restrictions. The Loneliness Scale (UCLA-3) that was used in this study to measure loneliness had validity and reliability with this population. However, it does not examine the different types of loneliness, such as intimate and social loneliness. Future studies could examine whether there are different associations and predictors for these different types of loneliness. Finally, whilst this study provided some useful insights into the role of social networks and their relationship with loneliness, other aspects of social relationships, such as social isolation and the frequency of social contact, were not examined. Future research should determine the role of social isolation, the network structure, and the frequency of contact, and whether these relate to or predict loneliness.

8. Conclusions

The findings of this study support previous research evidence in relation to personal characteristics, mental health, and social outcomes. A multiple regression analysis revealed that depression was a positive predictor for loneliness, while social networks were a negative predictor. More research in this area is needed, and particularly to examine the causal directionality of these relationships. It is important for researchers and clinicians

to understand the predictors and pathways for loneliness in order to develop tailored evidence-based interventions that can improve mental health and social outcomes.

Author Contributions: Conceptualization, V.T.; methodology, V.T.; analysis, V.T.; writing—original draft preparation, V.T.; writing—review and editing, P.K.; supervision, V.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of University of Leicester (29237-vt83-ls:psychology).

Informed Consent Statement: All subjects gave their informed consent for inclusion before they participated in the study.

Data Availability Statement: The data supporting the reported results can be accessed by emailing the corresponding author.

Acknowledgments: The authors would like to thank Samantha Coster, King's College London, for the valuable comments and thoughts, and for editing the final manuscript. The authors would also like to thank the participants of this study.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Age UK. 2018. All the Lonely People: Loneliness in Later Life. Available online: https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/loneliness/loneliness-report_final_2409.pdf (accessed on 25 March 2021).
- Al Dhaheri, Ayesha S., Mo'ath F. Bataineh, Maysm N. Mohamad, Abir Ajab, Amina Al Marzouqi, Amjad H. Jarrar, Carla Habib-Mourad, Dima O. Abu Jamous, Habiba I. Ali, Haleama Al Sabbah, and et al. 2021. Impact of COVID-19 on mental health and quality of life: Is there any effect? A cross-sectional study of the MENA region. *PLoS ONE* 16: e0249107. [CrossRef]
- Amati, Viviana, Silvia Meggiolaro, Giulia Rivellini, and Susanna Zaccarin. 2018. Social relations and life satisfaction: The role of friends. *Genus* 74: 7. [CrossRef] [PubMed]
- Arimoto, Azusa, and Etsuko Tadaka. 2019. Reliability and validity of Japanese versions of the UCLA loneliness scale version 3 for use among mothers with infants and toddlers: A cross-sectional study. *BMC Women's Health* 19: 105. [CrossRef] [PubMed]
- Barreto, Manuela, Christina Victor, Claudia Hammond, Alice Eccles, Matt T. Richins, and Pamela Qualter. 2021. Loneliness around the world: Age, gender, and cultural differences in loneliness. *Personality and Individual Differences* 169: 110066. [CrossRef] [PubMed]
- Bekhet, Abir K., Jaclene A. Zauszniewski, and Wagdy E. Nakhla. 2008. Loneliness: A Concept Analysis. *Nursing Forum* 43: 207–13. [CrossRef]
- Berg-Weger, M., and John E. Morley. 2020. Loneliness in Old Age: An Unaddressed Health Problem. *Journal of Nutrition & Health Aging* 24: 243–45.
- Cacioppo, John T., Louise C. Hawkley, and Ronald A. Thisted. 2010. Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. *Psychology & Aging* 2: 453–63.
- Carr, Martha, and Cynthia Schellenbach. 1993. Reflective monitoring in lonely adolescents. *Adolescence* 28: 737–47.
- Chatters, Linda M., Harry Owen Taylor, Emily J. Nicklett, and Robert Joseph Taylor. 2018. Correlates of objective social isolation from family and friends among older adults. *Healthcare* 6: 6010024. [CrossRef]
- Conroy, Ronán M. 2018. The RCSI Sample Size Handbook. Available online: <https://www.researchgate.net/publication/324571619> (accessed on 25 March 2021).
- Coolican, Hugh. 2018. *Research Methods and Statistics in Psychology*, 7th ed. Oxfordshire: Taylor & Francis Group.
- Deci, Edward L., and Ryan Richard M. 2002. *Handbook of Self-Determination Research*. Rochester: University of Rochester Press.
- DeWall, C. Nathan, Jon K. Maner, and D. Aaron Rouby. 2009. Social exclusion and early-stage interpersonal perception: Selective attention to signs of acceptance. *Journal of Personality and Social Psychology* 96: 729–41. [CrossRef]
- Finlay, Jessica M., and Lindsay C. Kobayashi. 2018. Social isolation and loneliness in later life: A parallel convergent mixed-methods case study of older adults and their residential contexts in the Minneapolis metropolitan area, USA. *Social Science & Medicine* 208: 25–33.
- Francis, Gloria M. 1976. Loneliness: Measuring the abstract. *International Journal of Nursing Studies* 13: 153–60. [CrossRef]
- Franke, Thea, Joanie Sims-Gould, Lindsay Nettlefold, Callista Ottoni, and Heather A. McKay. 2021. "It makes me feel not so alone": Features of the Choose to Move physical activity intervention that reduce loneliness in older adults. *BMC Public Health* 21: 297–12. [CrossRef]

- Franssen, Thanée, Mandy Stijnen, Femke Hamers, and Francine Schneider. 2020. Age differences in demographic, social and health-related factors associated with loneliness across the adult life span (19–65 years): A cross-sectional study in the Netherlands. *BMC Public Health* 20: 1118. [CrossRef] [PubMed]
- Gao, Fei, Nan Luo, Julian Thumboo, Calvin Fones, Shu-Chuen Li, and Yin-Bun Cheung. 2004. Does the 12-item General Health Questionnaire contain multiple factors and do we need them? *Health & Quality of Life Outcomes* 2: 63–70.
- Gardiner, Clare, Gideon Geldenhuys, and Merryn Gott. 2018. Interventions to reduce social isolation and loneliness among older people: An integrative review. *Health and Social Care in the Community* 26: 147–57. [CrossRef] [PubMed]
- Gasse, A., W. S. Kim, and J. Gagnon. 2020. Association between depression and hostile attribution bias in hostile and non-hostile individuals: An ERP study. *Journal of Affective Disorders* 276: 1077–83. [CrossRef]
- Ge, Lixia, Chun Wei Yap, Reuben Ong, and Bee Hoon Heng. 2017. Social isolation, loneliness and their relationships with depressive symptoms: A population-based study. *PLoS ONE* 12: e0182145. [CrossRef]
- Gorczynski, Paul, and Fabio Fasoli. 2021. Loneliness in sexual minority and heterosexual individuals: A comparative meta-analysis. *Journal of Gay & Lesbian Mental Health* 26: 112–29.
- Groarke, Jenny M., Emma Berry, Lisa Graham-Wisener, Phoebe E. McKenna-Plumley, Emily McGlinchey, and Cherie Armour. 2020. Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 Psychological Wellbeing Study. *PLoS ONE* 15: e0239698. [CrossRef]
- Guy-Evans, Olivia. 2020. Introvert and Extrovert Personality Traits. Available online: <https://www.simplypsychology.org/introvert-extrovert.html> (accessed on 6 July 2021).
- Hankins, Matthew. 2008. The reliability of the twelve-item general health questionnaire (GHQ-12) under realistic assumptions. *BMC Public Health* 8: 355. [CrossRef] [PubMed]
- Hawkley, Louise C., Susanne Buecker, Till Kaiser, and Maike Luhmann. 2020. Loneliness from young adulthood to old age: Explaining age differences in loneliness. *International Journal of Behavioral Development* 46: 39–49. [CrossRef] [PubMed]
- Heinrich, Liesl M., and Eleonora Gullone. 2006. The clinical significance of loneliness: A literature review. *Clinical Psychology Review* 26: 695–718. [CrossRef]
- Hides, Leanne, Dan I. Lubman, Harriet Devlin, Sue Cotton, Campbell Aitken, Tania Gibbie, and Margaret Hellard. 2007. Reliability and validity of the Kessler 10 and Patient Health Questionnaire among injecting drug users. *Australian & New Zealand Journal of Psychiatry* 41: 166–68.
- Hu, Tingyun, Xi Zheng, and Miner Huang. 2020. Absence and Presence of Human Interactin: The relationship between loneliness and empathy. *Frontiers in Psychology* 11: 768. [CrossRef]
- Hughes, Mary Elizabeth, Linda J. Waite, Louise C. Hawkley, and John T. Cacioppo. 2004. A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging* 26: 655–72. [CrossRef]
- Hybholt, Lisbeth, Lene Lauge Berring, Annette Erlangsen, Elene Fleischer, Jørn Toftegaard, Elin Kristensen, Vibeke Toftegaard, Jenny Havn, and Niels Buus. 2020. Older Adults' Conduct of Everyday Life After Bereavement by Suicide: A Qualitative Study. *Frontiers in Psychology* 11: 1131. [CrossRef]
- Ishmuhametov, Ishgaley. 2006. Multifactor dynamic loneliness model. *Computer Modelling and New Technologies* 10: 82–8.
- Jackson, Judy, and Susan D. Cochran. 1991. Loneliness and Psychological Distress. *The Journal of Psychology* 125: 257–62. [CrossRef]
- Jakobsen, Ida Skytte, Lykke Mie Riis Madsen, Martin Mau, Odin Hjemdal, and Oddgeir Friberg. 2020. The relationship between resilience and loneliness elucidated by a Danish version of the resilience scale for adults. *BMC Psychology* 8: 131. [CrossRef]
- Jang, Yuri, Nan Sook Park, David A. Chiriboga, Hyunwoo Yoon, Jisook Ko, Juyoung Lee, and Miyong T. Kim. 2016. Risk Factors for Social Isolation in Older Korean Americans. *Journal of Aging and Health* 28: 3–18. [CrossRef] [PubMed]
- Janowsky, David S. 2001. Introversion and extroversion: Implications for depression and suicidality. *Current Psychiatry Reports* 3: 444–50. [CrossRef] [PubMed]
- Jia, Ru, Kieran Ayling, Trudie Chalder, Adam Massey, Elizabeth Broadbent, Carol Coupland, and Kavita Vedhara. 2020. Mental health in the UK during the COVID-19 pandemic: Cross-sectional analyses from a community cohort study. *BMJ Open* 10: e040620. [CrossRef] [PubMed]
- JISC. 2021. Online Surveys. Available online: <https://www.onlinesurveys.ac.uk/> (accessed on 6 July 2021).
- Kemperman, Astrid, Pauline van den Berg, Minou Weijs-Perrée, and Kevin Uijtdewilgen. 2019. Loneliness of Older Adults: Social Network and the Living Environment. *International Journal of Environmental Research and Public Health* 16: 406. [CrossRef]
- Kessler, Ronald C. 2021. Kessler Psychological Distress Scale (K10). Available online: <https://www.statisticssolutions.com/kessler-psychological-distress-scale-k10/#:~:text=The%20Kessler%20Psychological%20Distress%20Scale,a%20five%2Dlevel%20response%20scale> (accessed on 15 August 2021).
- Kim, Junhyoung, Jinmoo Heo, In Heok Lee, and Jun Kim. 2015. Predicting Personal Growth and Happiness by Using Serious Leisure Model. *Social Indicators Research* 122: 147–57. [CrossRef]
- Krause, James S., Lee L. Saunders, Karla S. Reed, Jennifer Coker, Yusheng Zhai, and Emily Johnson. 2009. Comparison of the Patient Health Questionnaire and the Older Adult Health and Mood Questionnaire for self-reported depressive symptoms after spinal cord injury. *Rehabilitation Psychology* 54: 440–48. [CrossRef]
- Krishnan, J. 2019. Urban Loneliness: Little-Understood, Life-Threatening Public Health Challenge. Available online: <https://www.ha-asia.com/urban-loneliness-little-understood-life-threatening-public-health-challenge/> (accessed on 10 August 2021).

- Liang, Ying, Lei Wang, and Xican Yin. 2016. The factor structure of the 12-item general health questionnaire (GHQ-12) in young Chinese civil servants. *Health and Quality of Life Outcomes* 14: 136. [CrossRef]
- Lim, Michelle H., John F. M. Gleeson, Mario Alvarez-Jimenez, and David L. Penn. 2018. Loneliness in psychosis: A systematic review. *Social Psychiatry & Psychiatry Epidemiology* 53: 221–38.
- Lubben, James, Eva Blozik, Gerhard Gillmann, Steve Iliffe, Wolfgang von Renteln Kruse, John C. Beck, and Andreas E. Stuck. 2006. Performance of an Abbreviated Version of the Lubben Social Network Scale Among Three European Community-Dwelling Older Adult Populations. *Gerontologist* 46: 503–13. [CrossRef]
- MacDonald, Kristi J., Gonneke Willemsen, Dorret I. Boomsma, and Julie Aitken Schermer. 2020. Predicting loneliness from where and what people do. *Social Sciences* 9: 51. [CrossRef]
- Maes, Marlies, Pamela Qualter, Janne Vanhalst, Wim Van den Noortgate, and Luc Goossens. 2019. Gender differences in loneliness across the lifespan: A meta-analysis. *European Journal of Personality* 33: 642–54. [CrossRef]
- Mann, Farhana, Jingyi Wang, Ellie Pearce, Ruimin Ma, Merle Schleif, Brynmor Lloyd-Evans, and Sonia Johnson. 2021. Loneliness and the onset of new mental health problems in the general population: A systematic review. *medRxiv*. [CrossRef]
- Marr, Eric J. 2015. Assessing transportation disadvantage in rural Ontario, Canada: A case study of Huron County. *Journal of Rural Community Development* 10: 100–20.
- Martínez-Alcalá, Claudia I., Alejandra Rosales-Lagarde, Yonal M. Pérez-Pérez, Jose S. Lopez-Noguerola, María L. Bautista-Díaz, and Raul A. Agis-Juarez. 2021. The Effects of COVID-19 on the Digital Literacy of the Elderly: Norms for Digital Inclusion. *Frontiers in Education* 6: 1–19.
- Matthews, Timothy, Andrea Danese, Jasmin Wertz, Candice L. Odgers, Antony Ambler, Terrie E. Moffitt, and Louise Arseneault. 2016. Social isolation, loneliness and depression in young adulthood: A behavioural genetic analysis. *Social Psychiatry and Psychiatry Epidemiology* 51: 339–48. [CrossRef]
- Meltzer, Howard, Paul Bebbington, Michael S. Dennis, Rachel Jenkins, Sally McManus, and Traolach S. Brugha. 2013. Feelings of loneliness among adults with mental disorder. *Social Psychiatry and Psychiatry Epidemiology* 48: 5–13. [CrossRef]
- Menec, Verena H., Nancy E. Newall, Corey S. Mackenzie, Shahin Shooshtari, and Scott Nowicki. 2019. Examining individual and geographic factors associated with social isolation and loneliness using Canadian Longitudinal Study on Aging (CLSA) data. *PLoS ONE* 14: e0211143. [CrossRef]
- Menec, Verena H., Sheri Bell, Sheila Novek, Gulnara A. Minnigaleeva, Ernesto Morales, Titus Ouma, Jose F. Parodi, and Rachel Winterton. 2015. Making rural and remote communities more age-friendly: Experts' perspectives on issues, challenges, and priorities. *Journal of Aging & Social Policy* 27: 173–91.
- Mezuk, Briana, Moon Choi, Amy S. DeSantis, Stephen R. Rapp, Ana V. Diez Roux, and Teresa Seeman. 2016. Loneliness, Depression, and Inflammation: Evidence from the Multi-Ethnic Study of Atherosclerosis. *PLoS ONE* 11: e0158056. [CrossRef]
- Moorer, Peter, and Theo PBM Suurmeijer. 2001. The effects of neighbourhoods on size of social network of the elderly and loneliness: A multilevel approach. *Urban Studies* 28: 105–18. [CrossRef]
- Mullen, Rebecca A., Sebastian Tong, Roy T. Sabo, Winston R. Liaw, John Marshall, Donald E. Nease, Alex H. Krist, and John J. Frey. 2019. Loneliness in Primary Care Patients: A Prevalence Study. *Annals of Family Medicine* 17: 108–15. [CrossRef] [PubMed]
- Müller, Felix, Susanne Röhr, Ulrich Reininghaus, and Steffi G. Riedel-Heller. 2021. Social Isolation and Loneliness during COVID-19 Lockdown: Associations with Depressive Symptoms in the German Old-Age Population. *International Journal of Environmental Research and Public Health* 18: 3615. [CrossRef] [PubMed]
- Mushtaq, Raheel, Sheikh Shoib, Tabindah Shah, and Sahil Mushtaq. 2014. Relationship between loneliness, psychiatric disorders and physical health? A review on the psychological aspects of loneliness. *Journal of Clinical and Diagnostic Research: JCDR* 8: 1–4. [CrossRef] [PubMed]
- National Institute on Aging. 2019. Social Isolation, Loneliness in Older People Pose Health Risks. Available online: <https://www.nia.nih.gov/news/social-isolation-loneliness-older-people-pose-health-risks> (accessed on 10 August 2021).
- Nenov-Matt, Tabea, Barbara B. Barton, Julia Dewald-Kaufmann, Stephan Goerigk, Stephanie Rek, Katharina Zentz, Richard Musil, Andrea Jobst, Frank Padberg, and Matthias A. Reinhard. 2020. Loneliness, Social Isolation and Their Difference: A Cross-Diagnostic Study in Persistent Depressive Disorder and Borderline Personality Disorder. *Frontiers in Psychiatry* 11: 1467. [CrossRef]
- Nicolaisen, Magnhild, and Kirsten Thorsen. 2014. Who are lonely? Loneliness in different age groups (18–81 years old), using two measures of loneliness. *The International Journal of Aging and Human Development* 78: 229–57. [CrossRef]
- Nicolaisen, Magnhild, and Kirsten Thorsen. 2017. What Are Friends for? Friendships and Loneliness Over the Lifespan—From 18 to 79 Years. *The International Journal of Aging and Human Development* 84: 126–58. [CrossRef]
- Ong, Anthony D., Bert N. Uchino, and Elaine Wethington. 2016. Loneliness and Health in Older Adults: A Mini-Review and Synthesis. *Gerontology* 62: 443–49. [CrossRef]
- Paul, Constança, António M. Fonseca, Ignácio Martín, and João Amado. 2003. Psychosocial profile of rural and urban elders in Portugal. *European Psychologist* 8: 160–67. [CrossRef]
- Peplau, Letitia Anne, and Daniel Perlman, eds. 1982. Perspectives on loneliness. In *Loneliness*. New York: Wiley, pp. 1–18.

- Queen, Tara L., Robert S. Stawski, Lindsay H. Ryan, and Jacqui Smith. 2014. Ryan, and Jacqui Smith. 2014. Loneliness in a day: Activity engagement, time alone, and experienced emotions. *Psychology and Aging* 29: 297–305. [CrossRef]
- Röhr, Susanne, Margrit Löbner, Uta Gühne, Kathrin Hesel, Luca Kleineidam, Michael Pentzek, Angela Fuchs, Marion Eisele, Hanna Kaduszkiewicz, Hans-Helmut König, and et al. 2020. Changes in Social Network Size Are Associated with Cognitive Changes in the Oldest-Old. *Frontiers in Psychiatry* 11: 330. [CrossRef]
- Savikko, Niina, Pirkko Routasalo, Reijo S. Tilvis, Timo E. Strandberg, and Kaisu H. Pitkälä. 2005. Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics* 41: 223–33. [CrossRef] [PubMed]
- Shaw, Richard J., Breda Cullen, Nicholas Graham, Donald M. Lyall, Daniel Mackay, Chukwudi Okolie, Robert Pearsall, Joey Ward, Ann John, and Daniel J. Smith. 2021. Living alone, loneliness and lack of emotional support as predictors of suicide and self-harm: A nine-year follow up of the UK Biobank cohort. *Journal of Affective Disorders* 279: 316–23. [CrossRef] [PubMed]
- Shovestul, Bridget, Jiayin Han, Laura Germine, and David Dodell-Feder. 2020. Risk factors for loneliness: The high relative importance of age versus other factors. *PLoS ONE* 15: e0229087. [CrossRef]
- Sipowicz, Kasper, Marlena Podlecka, Łukasz Mokros, and Tadeusz Pietras. 2021. Lonely in the City-Sociodemographic Status and Somatic Morbidities as Predictors of Loneliness and Depression among Seniors-Preliminary Results. *International Journal of Environmental Reserch & Public Health* 18: 7213.
- Sundström, Anna, Annelie Nordin Adolfsson, Maria Nordin, and Rolf Adolfsson. 2020. Loneliness Increases the Risk of All-Cause Dementia and Alzheimer's Disease. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* 75: 919–26. [CrossRef] [PubMed]
- Taber, Keith S. 2018. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education* 48: 1273–96. [CrossRef]
- Tam, Katy Y. Y., and Christian S. Chan. 2019. The effects of lack of meaning on trait and state loneliness: Correlational and experience-sampling evidence. *Personality and Individual Differences* 141: 76–80. [CrossRef]
- Teclaw, Robert, Mark C. Price, and Katerine Osatuke. 2012. Demographic Question Placement: Effect on Item Response Rates and Means of a Veterans Health Administration Survey. *Journal of Business and Psychology* 27: 281–90. [CrossRef]
- Teh, Jane K. L., and Nai Peng Tey. 2019. Effects of selected leisure activities on preventing loneliness among older Chinese. *SSM—Population Health* 9: 100479. [CrossRef] [PubMed]
- The Catalogue of Mental Health Measures. 2020. Common Measures of Mental Health. Available online: <https://www.cataloguementalhealth.ac.uk/?content=7> (accessed on 15 August 2021).
- The Five Year Forward View For Mental Health. 2016. A Report from the Independent Mental Health Taskforce to the NHS in England. Available online: <https://www.england.nhs.uk/wp-content/uploads/2016/02/Mental-Health-Taskforce-FYFV-final.pdf> (accessed on 15 August 2021).
- Toepoel, Vera. 2013. Ageing, leisure, and social connectedness: How could leisure help reduce social isolation of older people? *Social Indicators Research* 113: 355–72. [CrossRef]
- Tutzer, Franziska, Beatrice Frajo-Apor, Silvia Pardeller, Barbara Plattner, Anna Chernova, Christian Haring, Bernhard Holzner, Georg Kemmler, Josef Marksteiner, Carl Miller, and et al. 2021. Psychological Distress, Loneliness, and Boredom Among the General Population of Tyrol, Austria During the COVID-19 Pandemic. *Frontiers in Psychiatry* 12: 921. [CrossRef]
- Tzouvara, Vasiliki, Chris Papadopoulos, and Gurch Randhawa. 2015. A narrative review of the theoretical foundations of loneliness. *British Journal of Community Nursing* 20: 329–34. [CrossRef] [PubMed]
- UCLA: Statistical Consulting Group. 2016. Introduction to SAS. Available online: <https://stats.idre.ucla.edu/sas/modules/sas-learning-moduleintroduction-to-the-features-of-sas/> (accessed on 15 August 2021).
- Vancampfort, Davy, Garcia Ashdown-Franks, Lee Smith, Joseph Firth, Tine Van Damme, Lore Christiaansen, Brendon Stubbs, and Ai Koyanagi. 2019. Leisure-time sedentary behaviour and loneliness among 148,045 adolescents aged 12–15 years from 52 low- and middle-income countries. *Journal of Affective Disorders* 251: 149–55. [CrossRef] [PubMed]
- Veerendra. 2020. Grouping of Data | Definition, Frequency, Distribution Table, Examples. Available online: <https://www.learnbse.in/grouping-of-data/> (accessed on 15 August 2021).
- Victor, Christina R., and Keming Yang. 2012. The prevalence of loneliness among adults: A case study of the United Kingdom. *The Journal of Psychology* 146: 85–104. [CrossRef]
- von Känel, Roland, Sonja Weilenmann, and Tobias R. Spiller. 2021. Loneliness Is Associated with Depressive Affect, But Not with Most Other Symptoms of Depression in Community-Dwelling Individuals: A Network Analysis. *International journal of Environmental Research and Public health* 18: 2408. [CrossRef]
- Wallinheimo, Anna-Stiina, and Simon L. Evans. 2022. Patterns of Internet Use, and Associations with Loneliness, amongst Middle-Aged and Older Adults during the COVID-19 Pandemic. *Healthcare* 10: 1179. [CrossRef]
- Wang, Jingyi, Brynmor Lloyd-Evans, Louise Marston, Farhana Mann, Ruimin Ma, and Sonia Johnson. 2020. Loneliness as a predictor of outcomes in mental disorders among people who have experienced a mental health crisis: A 4-month prospective study. *BMC Psychiatry* 20: 249. [CrossRef]
- Wang, Jingyi, Brynmor Lloyd-Evans, Louise Marston, Ruimin Ma, Farhana Mann, Francesca Solmi, and Sonia Johnson. 2019. Epidemiology of loneliness in a cohort of UK mental health community crisis service users. *Social Psychiatry & Psychiatry Epidemiology* 55: 811–22.

- Williams, Christopher Y. K., Adam T. Townson, Milan Kapur, Alice F. Ferreira, Rebecca Nunn, Julieta Galante, Veronica Phillips, Sarah Gentry, and Juliet A. Usher-Smith. 2021. Interventions to reduce social isolation and loneliness during COVID-19 physical distancing measures: A rapid systematic review. *PLoS ONE* 16: e0247139. [[CrossRef](#)]
- Xue, Ying. 2017. The role of introverted personality and social support in the mediating effects of depression and loneliness for medical students. *Chinese Journal of Behavioural Medicine and Brain Science* 26: 820–24.