Psychiatry Research 312 (2022) 114571

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Loneliness is not a homogeneous experience: An empirical analysis of adaptive and maladaptive forms of loneliness in the UK

Antonia Ypsilanti *, Lambros Lazuras

Department of Psychology, Sociology and Politics, Centre for Behavioural Science and Applied Psychology, Sheffield Hallam University, United Kingdom

ARTICLE INFO

Keywords:
Loneliness
Hope
Optimism
Maladaptive
Self-disgust
Adaptive

ABSTRACT

Understanding loneliness is pivotal to informing relevant evidence-based preventive interventions. The present study examined the prevalence of loneliness in the UK, during the COVID-19 pandemic, and the association between loneliness, mental health outcomes, and risk and protective factors for loneliness, after controlling for the effects of social isolation. It was estimated that 18.1% of the population in our study experienced moderately high to very high loneliness. We also found that loneliness was positively associated with self-disgust and social inhibition, and negatively associated with trait optimism and hope. Cluster analysis indicated that two distinct groups emerged among those experiencing higher levels of loneliness: "adaptive" and "maladaptive" loneliness groups. The maladaptive loneliness group displayed psychological characteristics like self-disgust and social inhibition including symptoms of depression and anxiety that can potentially undermine their ability to connect with others and form meaningful social relationships. These findings suggest that not all people experience loneliness in the same way. It is possible that a one-size-fit-all approach to reducing loneliness, may be less effective because it does not take into account the differential psychological profiles and characteristics of lonely people, relevant to their capacity to connect with others.

Loneliness is a negative affective state that results from the lack of meaningful relationships with other people, or due to the discrepancy between actual and desired relationships

Perlman and Peplau, 1982). Loneliness is distinguished from, but significantly relates to, social isolation, which reflects the sheer number of social contacts or kin and non-kin relationships a person has (De Jong Gierveld et al., 2016). Over the last decade, increasing empirical evidence has indicated that loneliness and social isolation are associated with premature morbidity and mortality (Cacioppo and Cacioppo, 2018; Holt-Lunstad and Smith, 2016; Leigh-Hunt et al., 2017). Loneliness also tends to pose a greater risk to public health than other well-established risk factors, such as obesity and physical inactivity (Holt-Lunstad, 2017, 2010), and is a significant risk factor for poor mental health outcomes, such as depression (Cacioppo et al., 2016) and dementia (Cacioppo and Hawkley, 2009; Wilson et al., 2007). The impact of chronic loneliness on healthcare systems has also been evidenced, with higher levels of loneliness being associated with a higher volume of healthcare service utilization, such as physician visits and contact with community nurses (Burns et al., 2020; Wang et al., 2019). Although the prevalence of loneliness and social isolation are difficult to establish, different studies have indicated that more than a third of adults in developed countries self-report feeling lonely at any given time (Holt-Lunstad, 2017), with loneliness prevalence being higher among the elderly in both Western and Eastern cultures (Gerst-Emerson and Jayawardhana, 2015; Yang and Victor, 2008).

During the COVID-19 pandemic, loneliness became central to the health and social care agenda, mainly because a large number of people were required to socially isolate in order to mitigate the transmission of COVID-19 in the community and reduce its burden on healthcare systems. Research on the prevalence of loneliness during the pandemic has yielded mixed findings, with some studies reporting similar levels with pre-pandemic loneliness (e.g., Hansen et al., 2021), and others indicating that loneliness was dramatically increased during lockdown in the first half of 2020 across age groups and in different countries (Van Tilburg et al., 2020). A large epidemiological study in the UK further showed that young women with low income and mental health difficulties were amongst the highest loneliness groups during the pandemic, and that people experiencing loneliness before the pandemic, became even lonelier (Bu et al., 2020). Therefore, the need to inform policies and evidence-based interventions to tackle loneliness and reduce its burden

* Corresponding author.
E-mail address: A.Ypsilanti@shu.ac.uk (A. Ypsilanti).

https://doi.org/10.1016/j.psychres.2022.114571
Received 7 September 2021; Received in revised form 19 April 2022; Accepted 21 April 2022
Available online 23 April 2022

on public health remains timely and relevant (Cacioppo and Cacioppo, 2018; Klinenberg, 2016).

1. Loneliness & health outcomes: risk & protective factors

Understanding loneliness is pivotal to informing relevant evidence-based preventive interventions. Cacioppo and colleagues (Cacioppo et al., 2014; Cacioppo and Hawkley, 2009) suggested that in social species, loneliness has adaptive value and serves as an early warning system that motivates people to reconnect with others and restore possibly broken or disrupted social relationships, which are vital for one's survival (see also Inagaki et al., 2016). This perspective implies that social connectedness, reflected commonly in the number and frequency of social contacts one has, can alleviate the negative effects of loneliness on mental health and also reduce the levels of loneliness one experiences. In line with this perspective, public health and other interventions to reduce loneliness in the population have predominately focused on improving social skills, increasing opportunities for social contact, and providing social support (Masi et al., 2011). However, a critical analysis of the extant research indicates that such interventions have had limited success so far (Klinenberg, 2016; Masi et al., 2011).

A possible explanation for the limited effectiveness of such interventions is that they neglect psychological aspects associated with loneliness that may prevent people who feel lonely to connect with others. These aspects include maladaptive, transient, as well as more stable processes and self-perceptions, thoughts, and individual differences that may influence the motivation and self-efficacy for socialization, and/or increase the mental health burden of loneliness (Qualter et al., 2015; Ypsilanti, 2018). In support of this argument, social neuroscience research has shown that people experiencing higher levels of loneliness tend to display hypervigilance to social threats and other negative social stimuli (Cacioppo et al., 2009; J.T. Cacioppo et al., 2016). Accordingly, correlational studies using self-reports and lab-based tasks have shown that loneliness is associated with self-disgust (i.e., a negative self-referential emotional schema, whereby people experience dysphoria and disgust towards themselves; Overton et al., 2008), and that self-disgust mediated the association between loneliness and mental health symptoms in the general population (Ypsilanti et al., 2019), in older adults (Ypsilanti et al., 2020), and in clinical populations (Ypsilanti et al., 2020).

Other research has identified individual differences that may protect against loneliness and alleviate the effects of loneliness on mental health, such as hope and optimism. Whereas both optimism and hope are conceptually similar and represent the tendency to perceive future life as more fulfilling, hopeful, and positive, they are distinguishable traits (Alarcon et al., 2013). Trait hope is defined as the motivational energy to set and pursue goals (Snyder et al., 1991), and optimism is defined as the more general tendency to anticipate (and experience) more positive outcomes in the future (Carver and Scheier, 2014). Research has established a significant positive association between trait hope, optimism, and improved physical and mental health, quality of life, and more adaptive coping strategies (Alarcon et al., 2013; Nes and Segerstrom, 2006; Rozanski et al., 2019; Shanahan et al., 2021). More relevant to the current research, trait optimism has been associated with better social connections (Carver and Scheier, 2014), and negatively associated with loneliness across time (Rius-Ottenheim et al., 2012). Accordingly, trait hope has been negatively associated with loneliness (Bareket-Bojmel et al., 2021; Einav and Margalit, 2020; Muyan et al., 2016), and hope moderates the association between loneliness and mental health outcomes in adults (Muyan et al., 2016).

2. Understanding & preventing loneliness: a nuanced approach

Most research on loneliness and mental health outcomes has used the distinction between lonely and non-lonely individuals, who are commonly determined based on their responses in self-reported measures of loneliness (such as the UCLA). This grouping can be based on pre-defined cut-off scores (e.g., Gierveld and Van Tilburg, 2010), or on analysis of the distribution of self-reported loneliness scores, where the lower and upper quintiles or quadrants (e.g., Bangee et al., 2014; Cacioppo et al., 2000), respectively reflect groups with low or high levels of loneliness. Once determined lonely and non-lonely groupes are compared on a wide range of measures, including individual differences and self-reported physical and mental health outcomes (e.g., Cacioppo and Hawkley, 2003; Lauder et al., 2006), as well as neurophysiological measures, such as regional brain activity (J.T. Cacioppo et al., 2016). While the dichotomy (or in some cases, trichotomy) of loneliness groups represents a handy way to determine differences between lonely and non-lonely groups, it also represents a risk of neglecting individual differences in psychological traits and outcomes within the group of "lonely" people. In other words, considering that everyone in the lonely group experiences loneliness in the same way may prevent us from understanding loneliness as a nuanced experience, and this may explain why some loneliness interventions have limited effectiveness (McHugh Power et al., 2017,2018a). Accordingly, exploring whether individuals at the higher end of loneliness represent a heterogeneous (vs. homogenous) group in terms of mental health outcomes and other psychological characteristics is pivotal to better understanding loneliness experiences in the population and informing relevant, tailor-made interventions.

3. The present study

The present study aimed to assess loneliness and mental health outcomes in a sample of the UK population, and determine if loneliness groups differ in related risk (i.e., self-disgust and social inhibition) and protective factors (i.e., and trait optimism and hope). Specifically, self-disgust was one of the focal risk factors in the present study because previous research has indicated that this variable is positively associated with loneliness and also can partly explain the association between loneliness and mental health outcomes in different populations (e.g., Ypsilanti et al., 2019; 2020). In addition to self-disgust, we further examined the association between social inhibition and loneliness. Social inhibition reflects the stable tendency to inhibit social behavior and the expression of emotions in social interactions (Denollet, 2005; Emons et al., 2007) and can, therefore, potentially exacerbate loneliness experiences by disrupting the ability to socially interact and connect with others. Research has indicated that social inhibition has been associated with reduced sense of social belongingness (de Moor et al., 2018), but it has not been examined in the context of loneliness as yet. Accordingly, we hypothesised that loneliness will be positively associated with both self-disgust and social inhibition (Hypothesis 1). With respect to the effects of protective factors, we hypothesised that loneliness will be negatively associated with trait optimism and hope (Hypothesis 2), because previous research has shown that both traits are negatively associated with loneliness experiences and positively associated with improved social connectedness (Carver and Scheier, 2014; Rius-Ottenheim et al., 2012) – therefore, they could potentially buffer the effects of loneliness on mental health (e.g., Muyan et al., 2016). Furthermore, we hypothesised that individuals classified as the "lonely" group will have significantly higher scores in self-disgust and social inhibition, and lower scores in trait optimism and hope, compared to individuals classified as the "non-lonely" group (Hypothesis 3). Most importantly, in the present study we adopted a nuanced approach to loneliness and examined, for the first time in the literature, whether lonely individuals represent a single, homogeneous group or if there are within-group differences in mental health outcomes and psychological risk and protective factors. If lonely individuals indeed represent a single and homogeneous group, then they should not display any differences in their profile with respect to mental health outcomes, self-disgust, social inhibition, and trait optimism and hope.

4. Methods

4.1. Participants

A sample of 503 participants from the UK, was recruited via Prolific (www.prolific.co) a web-based research participant platform. For the present study, we requested a nationally representative sample based on biological sex, age groups, and ethnic background. Also, eligible participants were UK-based at the time of data collection, and all were native English speakers. The sample included 255 females (50.7%) and the distribution of age groups followed the representation of the healthy population in the UK (18–24=9.1%, 25–34=19.7%, 35–44=16.3%, 45–54=19.3%, 55–64=20.7%, 65–74=12.7%, 75+=2.2%). The majority of the sample identified as White British, Irish, other (80.3%), with the remaining participants identifying as Asian/Asian British - Indian, Pakistani, Bangladeshi, other (5.8%), Black/Black British - Caribbean, African, other (5%), Chinese/Chinese British (2.8%), Mixed race - White and Black/Black British (0.6%), Middle Eastern/Middle Eastern British - Arab, Turkish, other (0.6%), Mixed race – other (2.4%), Other ethnic group (1.8%), Prefer not to say (0.8%).

In terms of marital status, the majority were in a relationship/married and cohabiting (62.6%), with the remaining reporting that they were single, never married (20.7%), single, divorced or widowed (9.1%), or in a relationship/married but living apart (7.4%). Related to this, the majority lived in a household size of 2 people (41%) and the remaining in sizes 3–4 (35%), 1 (15.3%) and more than 4 (8.7%). The education level of the representative sample included 221 (43.9%) people with an undergraduate degree or professional qualification, 21.5% with a postgraduate degree, 17.1% with A-levels or equivalent (at school until aged 18), 10.7% had completed GCSE/CSE/O-levels or equivalent, 4.6% had completed post-16 vocational course and 1.6% had no formal qualifications. Finally, in terms of COVD-19 risk, the majority reported being not-at-risk (74.6%), 20.9% reported being at increased risk (e.g., being pregnant, aged over 70, etc.) and 4.6% being most at risk (e.g., suffering from advanced cancer, severe asthma/COPD, etc.).

4.2. Measures

4.2.1. Demographics

Demographic characteristics were assessed with a series of predetermined questions with categorical options for gender, age, ethnicity, educational background, marital status, and area of residence in the UK. Participants also reported COVID-related risk, using three categories: Most at risk (e.g., suffering from cancer, severe asthma/COPD etc.), at increased risk (e.g., aged over 70) and not at risk.

Participants also completed the following questionnaires online presented in random order.

4.2.2. Loneliness

The 10-item UCLA Loneliness Scale (Version 3; Russell, 1996) was used to measure loneliness, which asks participants to report how often they feel certain statements (e.g., "*How often do you feel that you lack companionship*", and "*How often do you feel close to people*"). Responses are rated on a 4-point continuous scale, from 1 (= never) to 4 (= always). UCLA Loneliness Scale scores can range from 10 to 40, with higher scores indicating higher levels of loneliness. Previous research has shown that the 10-item UCLA Loneliness Scale is highly reliable with internal consistency reliability Cronbach's α ranging from 0.89 to 0.94, and test-retest reliability over a 1-year period, $r = 0.73$. In the present study, the internal consistency reliability of the UCLA Loneliness Scale was high (Cronbach's $\alpha = 0.88$).

4.2.3. Anxiety

Generalized anxiety was measured using the GAD-7 (Spitzer et al., 2006), which asks participants to report how often they have been bothered by any of seven problems, over the last two weeks (e.g., Feeling nervous, anxious or on edge, Worrying too much about different things etc.). Responses are rated on a 4-point Likert scale (not at all to nearly every day), and a total score (ranging from 0 to 21) is calculated by summing the assigned scores of 0, 1, 2, and 3, to the response categories. The GAD-7 scores represent four categories in anxiety symptoms (0–5 mild, 6–10 moderate, 11–15 moderately severe anxiety, 15–21 severe anxiety). In the present study Cronbach's alpha was α=0.92.

4.2.4. Depression

Depression was assessed using the PHQ-9 (Spitzer et al., 1999), which reports on each of the 9 DSM-IV criteria for depression, using a 4-point Likert scale from "0″ (not at all) to "3″ (nearly every day). Participants state how often they have experienced nine symptoms over the past two weeks (e.g., Feeling down, depressed, or hopeless, feeling tired or having little energy). Depression severity is determined using categorical cut-off points, with total scores representing 0–5 = mild, 6–10 = moderate, 11–15 = moderately severe, 16–20 = severe depression. In the present study Cronbach's alpha was α=0.90.

4.2.5. Self-disgust

Self-disgust was assessed with the Self-Disgust Scale (SDS; Overton et al., 2008), an 18-item questionnaire reflecting disgust and repulsion directed to the self. Six items are filler items and 12 items reflect self-disgust towards the self (e.g., "I find myself repulsive"), and towards one's behavior/actions (e.g., "I often do things I find revolting"). Responses are rated on a 7-point Likert scale (1=strongly agree, 7=strongly disagree), with higher scores indicating higher levels of self-disgust. In the present study Cronbach's alpha was α=0.90.

4.2.6. Social network size

Social network size was assessed using the Lubben Social Network Scale – 6 (LSNS-6 Lubben et al., 2006), which evaluates the family and friendship ties using six items rated on a 6-point scale (0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more). Participants are asked to report the same 3 questions for relatives and friends separately: How many relatives do you see or hear from at least once a month? How many relatives do you feel close to such that you could call on them for help? How many relatives do you feel at ease with that you can talk about private matters? The total scale score is an equally weighted sum of the six items, with scores ranging from 0 to 30. In the present study Cronbach's alpha was α=0.84.

4.2.7. Social inhibition

Social inhibition was measured using the SI (social inhibition) subfactor of the DS14 (Denollet, 2005), which consists of seven items (e.g., "I find it hard to start a conversation"), and participants are instructed to report how they generally feel about each item on a 5-point Likert-type scale ranging from 0 to 4 (false, rather false, neutral, rather true, and true). In the present study Cronbach's alpha was α=0.89

4.2.8. Optimism

Dispositional optimism was measured using the Short Optimism Scale (Coelho et al., 2018), which consists of nine items (e.g., "I see the positive side of things") rated on a 5-point scale, (ranging from 1 Strongly Disagree to 5 Strongly Agree). In the present study Cronbach's alpha was α=0.92.

4.2.9. Hope

The Trait Hope Scale (Snyder et al., 1996), was used to assessed dispositional hope. The scale consists of twelve items (e.g., "I have been pretty successful in life"), rated on an 8-point scale (ranging from 1=definitely false to 8=definitely true). In the present study Cronbach's alpha was α=0.90.

4.3. Design/procedure

This is a cross-sectional study, using a correlational and quasi-experimental group design to investigate the stated hypotheses. All procedures were approved by the Sheffield Hallam University Research Ethics Committee. Self-report questionnaires were completed via Qualtrics, using a web-link on a smart phone or other portable device. Participants were recruited via Prolific (www.prolific.co) in April 2021, and were compensated for their time upon completion using the standard participation pay rates of the platform. No time restrictions were applied, and survey completion required approximately 15–20 min.

4.4. Data analysis

All data were analysed in SPSS v. 22 (IBM Corp., Armonk, NT, USA). Pearson's *r* correlations were used to explore bivariate associations between the study variables in the total sample. One-sample *t*-test was used to compare the prevalence of loneliness in the present study with normative data derived from Russell (2017). Quintile analysis in loneliness scores was used to create loneliness groups (i.e., non-lovely and lonely groups) as per Cacioppo et al. (2000; 2002). Pearson's chi square (χ^2) was used to examine age and gender differences between loneliness groups. Independent samples *t*-test was used to assess differences in mental health outcomes (i.e., symptoms of anxiety and depression), social isolation, self-disgust, social inhibition, hope, and optimism between lonely and non-lonely groups. Lastly, Two-Step and K-means cluster analysis and independent samples *t*-test were used to, respectively identify distinct clusters in the "lonely" group and whether those clusters differed significantly in mental health outcomes, social isolation, self-disgust, social inhibition, hope, and optimism.

5. Results

5.1. Prevalence of loneliness

The mean score of loneliness in the total sample was 22.25 (SD = 5.51), and scores ranged from 10 to 38. The possible range of scores in the 10-item UCLA Loneliness Scale v3 is between 10 and 40. One-sample *t*-test with 95% Confidence Intervals (Cis) was used to determine the mean difference between the score of loneliness observed in the present study against the normative data ($M = 20.10$, SD = 5.66) presented by Russell (2017) in a representative sample of the US population. The results showed that the mean score of loneliness was significantly higher in the UK sample used in the present study, compared to the normative data of the US population, $t\ (502) = 8.74$, $p < .001$, and the 95% Cis of the mean difference were 1.66 (lower bound) and 2.63 (upper bound).

Russell (2017) recognised that the selection of cut-off points in creating loneliness groups (e.g., low vs. high loneliness) can be arbitrary, and further recommended that moderately high levels of loneliness should be 1 SD above the mean score, and very high level of loneliness should be 2 SDs above the mean score. In the present study, this means that moderately high levels of loneliness should be reflected in a mean score ≥ 27.76, and very high levels of loneliness should be reflected in a mean score ≥ 33.27. Based on those criteria, in the present study, 16.1% ($n = 81$) of the population were in the moderately high loneliness group, and 2% ($n = 10$) were in the very high lonely group.

However, the cut-off score criteria recommended by Russell (2017) do not determine the low loneliness levels. For this reason, we used Cacioppo's approach (Cacioppo et al., 2002, 2000) to determine lonely and non-lonely groups based on quintile distribution. Using this analysis, in the present study the lower quintile (20%) of the distribution was reflected in mean loneliness scores ≤ 17.00, and the upper quintile (80%) of the distribution was reflected in mean loneliness scores ≥ 27.00. Respectively, we created two groups for subsequent analysis: non-lonely ($n = 103$, or 20.5% of the total sample) and lonely groups ($n = 119$, or 23.7% of the total sample).

5.2. Association between loneliness, social isolation & mental health outcomes in the total sample

Correlation analysis (Pearson's *r*) in the total sample indicated that loneliness was negatively associated with social network size ($r = -0.49$, $p < .001$), trait optimism ($r = -0.51$, $p < .001$), and hope ($r = -0.51$, $p < .001$). Conversely, higher loneliness scores were positively associated with more frequent anxiety ($r = 0.50$, $p < .001$) and depressive symptoms ($r = 0.57$, $p < 0.001$), and with higher scores in self-disgust ($r = 0.50$, $p < .001$) and social inhibition ($r = 0.36$, $p < .001$). The observed effect sizes were moderate-to-large in all the associations, according to Cohen's criteria (1992). The results from the correlation analysis are presented in Table 1.

5.3. Gender & age differences in loneliness groups

Analysis of frequencies with Pearson's chi-square (χ^2) was used to identify gender and age differences between the lonely and non-lonely groups. The results showed that there were no significant gender differences ($\chi^2 = 4.04$, $p = .13$, df = 2) or age differences ($\chi^2 = 11.90$, $p = .06$, df = 6) between lonely and non-lonely groups.

5.4. Differences in between loneliness groups

Independent samples *t*-test was used to compare the mean scores of the two loneliness groups on mental health outcomes (i.e., symptoms of anxiety and depression), self-disgust, social inhibition, social network size, trait optimism, and hope. Overall, compared to non-lonely participants, those in the lonely group reported significantly higher scores in anxiety $t(220) = -8.66$, $p < .001$, depression $t(220) = -9.53$, $p < 0.001$, self-disgust $t(220) = -10.09$, $p < 0.001$, social inhibition $t(220) = -6.95$, $p < 0.001$, and lower scores in social network size $t(220) = 10.17$, $p < 0.001$, trait optimism $t(220) = 10.62$, $p < 0.001$, and hope $t(220) = 10.17$, $p < 0.001$. The mean and SD scores for each group are presented in Table 2.

5.5. Cluster analysis in the lonely group

Two-step cluster analysis was used to initially determine how many possible clusters emerge within the lonely group, based on scores on mental health outcomes (i.e., anxiety and depression symptoms) and social networking. Ten iterations were selected, and Schwarz's Bayesian Criterion (BIC) was used to identify the number of clusters within the lonely group. The analysis showed that two clusters emerged, and the silhouette measure of cohesion and separation further indicated that the two-cluster solution was good (> 0.5).

Additionally, K-means cluster analysis was used to determine differences in mental health outcomes, social isolation, self-disgust, social inhibition, and trait optimism and hope. On the basis of the two-step clustering results, we defined 2 clusters in the K-mean cluster analysis and 10 iterations were selected. The final 2-cluster solution was completed at 6 iterations, thirty-eight participants (31.9%) belonged to Cluster 1, whereas 81 participants (68.1%) belonged to Cluster 2. One-Way ANOVA indicated that the two clusters differed significantly in mental health symptoms ($F_{\text{anxiety}} = 189.63$, $p < .001$; $F_{\text{depression}} = 210.01$, $p < .001$) but not in social isolation. Based on those differences we labelled the two clusters in the lonely group as "adaptive" and "maladaptive" loneliness. Given the sample size differences between the two clusters we used one-way ANOVA to to compare the two groups in negative and positive psychological characteristics related to loneliness, including self-disgust, social inhibition, trait optimism and hope. The results indicated that the adaptive and maladaptive loneliness clusters differed significantly on self-disgust scores $F(1, 117) = 18.68$, $p < 0.001$, social inhibition $F(1, 117) = 4.32$, $p < 0.05$, trait optimism $F(1, 117) = 26.12$, $p < 0.001$, and hope $F(1, 117) = 9.33$, $p = 0.003$. Therefore, the "adaptive" loneliness group is characterised by mild symptoms and

Table 1
Intercorrelations, means and stadnard deviation scores in the study variables.

	1	2	3	4	5	6	7	8
1. Loneliness	–	−0.49***	.41***	.48***	.50***	.36***	−0.51***	−0.51***
2. SNS		–	−0.19***	−0.25***	−0.31***	−0.40***	.36***	.36***
3. GAD-7			–	.68***	.42***	.25***	−0.36***	−0.45***
4. PHQ-9				–	.53***	.26***	−0.45***	−0.51***
5. SDS					–	.42***	−0.52***	−0.57***
6. SI						–	−0.40***	−0.36***
7. Hope							–	.78***
8. Optimism								–
M	22.25	19.46	1.73	2.16	32.29	13.87	44.28	3.53
SD	5.51	5.84	3.24	3.54	13.28	6.46	8.90	0.73

Notes. GAD-7: Generalized Anxiety Disorder; PHQ-9: Depression Scale; SDS: Self-disgust scale; SI: Social Inhibition; SNS: Social Network Size; ***$p \leq 0.001$.

Table 2
Differences between loneliness groups in the study variables.

	Loneliness groups	N	Mean	SD	95% Confidence Interval for means	
					Lower Bound	Upper Bound
GAD −7	Non-Lonely	103	0.15	0.65	0.02	0.28
	Lonely	119	3.75	4.17	2.99	4.51
PHQ-9	Non-Lonely	103	0.40	1.06	0.20	0.61
	Lonely	119	4.96	4.74	4.10	5.82
SDS	Non-Lonely	103	24.60	10.52	22.54	26.65
	Lonely	119	41.79	14.24	39.20	44.37
SI	Non-Lonely	103	11.20	5.66	10.09	12.31
	Lonely	119	17.00	6.61	15.79	18.20
SNS	Non-Lonely	103	22.40	5.65	21.30	23.51
	Lonely	119	15.27	4.78	14.40	16.14
Optimism	Non-Lonely	103	3.98	0.52	3.88	4.09
	Lonely	119	3.03	0.76	2.89	3.17
Hope	Non-Lonely	103	49.18	6.74	47.86	50.50
	Lonely	119	37.83	9.43	36.11	39.54

Notes. GAD: Generalized Anxiety Disorder; PHQ-9: Depression Scale; SDS: Self-disgust scale; SI: Social Inhibition; SNS: Social Network Size.

anxiety, lower social inhibition and self-disgust, and higher optimism and hope, whereas the "maladaptive" loneliness group is characterised by moderate levels of anxiety and depression symptoms, significantly higher scores in self-disgust and social inhibition, and lower optimism and hope. In fact, the mean self-disgust score in the maladaptive loneliness group was comparable to that of clinical populations (see Ypsilanti et al., 2020). The results are summarised in Table 3.

Further analysis of frequencies with Pearson's chi-square showed that there were no significant gender ($\chi^2 = 1.91, p = .16$, df = 1) and age differences ($\chi^2 = 11.27$, $p = .08$, df = 1) between the adaptive and maladaptive loneliness clusters.

Table 3
Differences in mental health outcomes, social isolation, and psychological characteristics between adaptive and maladaptive loneliness groups.

	Loneliness Clusters	N	Mean	SD	95% Confidence Interval for means	
					Lower Bound	Upper Bound
GAD −7	Adaptive	81	1.51	2.00	1.04	1.96
	Maladaptive	38	8.52	3.53	7.36	9.68
PHQ-9	Adaptive	81	2.37	2.45	1.87	2.91
	Maladaptive	38	10.50	3.56	9.32	11.67
SDS	Adaptive	81	38.18	13.03	35.30	41.06
	Maladaptive	38	49.47	13.79	44.94	54.00
SI	Adaptive	81	16.14	6.94	14.61	17.68
	Maladaptive	38	18.81	5.49	17.01	20.62
SNS	Adaptive	81	15.33	4.83	14.26	16.40
	Maladaptive	38	15.15	4.74	13.59	16.71
Optimism	Adaptive	81	3.26	0.76	3.09	3.42
	Maladaptive	38	2.56	0.52	2.38	2.73
Hope	Adaptive	81	39.58	9.80	37.41	41.74
	Maladaptive	38	34.10	7.40	31.67	36.53

Notes. GAD: Generalized Anxiety Disorder scale; PHQ-9: Patient Health Questionnaire; SDS: Self-disgust scale; SI: Social Inhibition; SNS: Social Network Size.

6. Discussion

The present study examined the prevalence of loneliness in the UK, during the COVID-19 pandemic, and the association between loneliness, mental health outcomes, and risk and protective factors for loneliness, and social isolation (i.e., number and frequency of close social contacts). With regards to the prevalence of loneliness, using the Russell (2017) criterion, we estimated that 18.1% of the population in our study experienced moderately high to very high loneliness. Using the quintile analysis recommended by Cacioppo et al. (2000; 2002), we estimated that 23.7% of the population experienced high levels of loneliness during the COVID-19 pandemic. Furthermore, the total mean score of loneliness in the present study was significantly higher than that reported in previous research using the same measurement method in representative samples of the US population.

Furthermore, we hypothesised that loneliness will be positively associated with both self-disgust and social inhibition, and negatively associated with trait optimism and hope. The results supported this hypothesis and further corroborate previous research indicating a positive relationship between loneliness and self-disgust across different populations (e.g., Ypsilanti et al., 2019; 2020; 2021), and an inverse association between loneliness and trait optimism and hope (Bareket-Bojmel et al., 2021; Rius-Ottenheim et al., 2012). Furthermore, our findings showed, for the first time, that loneliness was significantly associated with social inhibition: the tendency to avoid expressing behavior and emotions in social interactions and, thereby, perceive social interactions as more threatening (Denollet, 2005; Emons et al., 2007). The third hypothesis of our study was also supported as our findings indicated that compared to non-lonely individuals, participants classified as lonely reported higher scores in anxiety and depression symptoms, self-disgust and social inhibition and lower scores on trait optimism, hope and social network size. Taken together, our research supports the notion that negative and maladaptive self-perceptions, such as self-disgust, should be targeted by interventions against loneliness (see also Masi et al., 2011). Furthermore, the present findings contribute to our understanding of the psychological traits and characteristics that may perpetuate loneliness experiences in the population, such as self-disgust and social inhibition. Accordingly, based on the present findings we suggest that interventions against loneliness may benefit by incorporating strategies to enhance hope and optimism.

Most importantly, the present research provided novel evidence in support of the idea that loneliness is not a uniform experience, and that a nuanced approach is more suitable in better understanding loneliness experiences in the population. Specifically, the cluster analysis indicated that two distinct groups emerged among those experiencing higher levels of loneliness: "adaptive" and "maladaptive" loneliness groups. The groups were so-defined because individuals in the "maladaptive"

loneliness group reported moderate depression levels (according to the respective cut-off points in PHQ-9 measure), as well as higher levels of self-disgust and social inhibition, and lower levels of trait optimism and hope. There were no differences in the number of social contacts, (i.e., social isolation) as reflected in self-reported social network affiliation and relations. The maladaptive loneliness group, therefore, had higher risk for psychopathology, and displayed psychological characteristics (i.e., self-disgust and social inhibition) that can potentially undermine the ability to connect with others and form meaningful social relationships. The single most important conclusion we can draw from the cluster analysis reported here is that not all people with higher loneliness scores experience loneliness in the same way. Rather, loneliness is perhaps better understood as a nuanced experience and does not necessarily constitute a uniform condition. Our results indicate that the majority (68.1%) of the participants in the lonely group were classified in the adaptive loneliness group. Our findings may also potentially explain why interventions to tackle loneliness have yet had limited effectiveness (Masi et al., 2011). It is possible that a one-size-fit-all approach may be less effective because it tackles loneliness as a uniform experience, and does not take into account that people classified as "lonely" may display differential psychological profiles and characteristics relevant to their capacity to connect with others (e.g., social inhibition), their self-perceptions (e.g., self-disgust), and the expectations of positive future life outcomes (e.g., trait optimism and hope). On the basis of our findings, we argue that if the interventions are customised to reflect individual differences among lonely people, they could be more effective - a lonely person who experiences higher levels of social inhibition and self-disgust and is less hopeful and optimistic may respond differently to interventions aiming to boost social connections and interactions, as compared to a lonely person that possesses those traits at a more adaptive level.

Our study is not free of limitations. First of all, a wider set of measures could be used to establish general health and quality of life. Previous research has shown that loneliness experiences may stem from poor overall health and reduced quality of life (e.g., Khalaila and Vitman-Schorr, 2018). Future studies may further explore if nuanced loneliness experiences are associated with differences in general health and quality of life. Secondly, our study does not determine whether loneliness was chronic or acute, meaning that it is difficult to disentangle whether the self-reported loneliness levels reflect a chronic condition or whether they were intensified by the pandemic (e.g., having limited opportunities for social contact). Also, the group of people aged 75+ years was underrepresented in the present study. Specifically, although 8.8% of the national population in the UK are aged 75+ years, in the present study this age group consisted of 2.2% of the total sample. Notwithstanding those limitations the strengths of our study should also be mentioned. Firstly, this is the first study, to the best of the authors' knowledge, to provide empirical support for nuanced loneliness experiences based on scores of self-reported mental health difficulties, and maladaptive (i.e., social inhibition and self-disgust) and adaptive psychological characteristics (i.e., hope, and optimism), in the UK. Although our findings may be applicable at a local level, more research in other countries may further inquire whether lonely individuals represent a homogeneous or a heterogeneous group and determine the psychological and other characteristics that may differentiate loneliness experiences (i.e., what makes loneliness nuanced?). In terms of practical implications, the present findings could inform different intervention approaches for people with differing loneliness experiences. For instance, CBT and psychopharmacology treatment might be relevant to alleviate psychopathology symptoms and negative self-conscious emotions (e.g., self-disgust) among lonely people with moderately severe levels of anxiety and depression, and higher scores in self-disgust. Lastly, this is among the few studies to examine the association between loneliness, social isolation, and adaptive psychological traits, such as hope and optimism in a healthy UK population. The significant inverse associations between those traits and loneliness, suggest that loneliness experiences can be alleviated by interventions targeting optimism and hope (Malouff and Schutte, 2017; Hernandez and Overholser, 2021).

7. Conclusion

The present study is the first to analyze loneliness using a nuanced approach that includes adaptive and maladaptive psychological characteristics. Our results extend Cacioppo & Hawkley's model (2009) that views loneliness as a regulatory loop, in which lonely individuals express maladaptive psychological characteristics. Our analysis suggests that only a subgroup of lonely individuals exhibit such maladaptive characteristics – the so-called maladaptive loneliness group. This group is also characterized by mental health difficulties, which can make them less responsive to interventions against loneliness, particularly those that involve opportunities for social contact and improving social skills.

Declaration of Competing Interest

Authors do not have any conflicts of interest to declare.

Author Disclosure

AY and LL conceived the idea of the paper and coordinated data collection and overviewed the studies. AY drafted the manuscript. LL contributed to the writing up of the paper and the statistical analysis. Both authors have read the paper under submission and agree with its content. Research ethics guidelines for studies with human participants have been followed as appropriate.

Role of funding source

The study was internally funded by Sheffield Hallam University (departmental funding) and the funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Acknowledgements

None

References

Alarcon, G.M., Bowling, N.A., Khazon, S., 2013. Great expectations: a meta-analytic examination of optimism and hope. Pers. Individ Dif. 54 (7), 821–827.
Bangee, M., Harris, R.A., Bridges, N., Rotenberg, K.J., Qualter, P., 2014. Loneliness and attention to social threat in young adults: findings from an eye tracker study. Pers Individ Dif. 63, 16–23.
Bu, F., Steptoe, A., Fancourt, D., 2020. Loneliness during a strict lockdown: trajectories and predictors during the COVID-19 pandemic in 38,217 United Kingdom adults. Soc. Sci. Med. 265, 113521–113522.
Burns, A., Leavey, G., Ward, M., O'Sullivan, R, 2020. The impact of loneliness on healthcare use in older people: evidence from a nationally representative cohort. J. Public Health (Bangk.) 1–10.
Cacioppo, J.T., Cacioppo, S., 2018. The growing problem of loneliness. Lancet North Am. Ed. 391 (10119), 426.
Cacioppo, J.T., Hawkley, L.C., 2003. Social isolation and health, with an emphasis on underlying mechanisms. Perspect. Biol. Med. 46 (3), S39–S52.
Cacioppo, J.T., Hawkley, L.C., 2009. Perceived social isolation and cognition. Trends Cogn. Sci. (Regul. Ed.) 13 (10), 447–454.
Cacioppo, J.T., Cacioppo, S., Boomsma, D.I., 2014. Evolutionary mechanisms for loneliness. Cogn. Emot. 28 (1), 3–21.
Cacioppo, J.T., Cacioppo, S., Adler, A.B., Lester, P.B., McGurk, D., Thomas, J.L., Chen, H. Y., 2016a. The cultural context of loneliness: risk factors in active duty soldiers. J. Soc. Clin. Psychol. 35 (10), 865–882.
Cacioppo, J.T., Ernst, J.M., Burleson, M.H., McClintock, M.K., Malarkey, W.B., Hawkley, L.C., Berntson, G.G., 2000. Lonely traits and concomitant physiological processes: the MacArthur social neuroscience studies. Int. J. Psychophysiol. 35 (2–3), 143–154.
Cacioppo, J.T., Hawkley, L.C., Berntson, G.G., Ernst, J.M., Gibbs, A.C., Stickgold, R., Hobson, J.A., 2002. Do lonely days invade the nights? Potential social modulation of sleep efficiency. Psychol. Sci. 13 (4), 384–387.

Cacioppo, J.T., Norris, C.J., Decety, J., Monteleone, G., Nusbaum, H., 2009. In the eye of the beholder: individual differences in perceived social isolation predict regional brain activation to social stimuli. J. Cogn. Neurosci. 21, 83–92. https://doi.org/10.1162/jocn.2009.21007.

Carver, C.S., Scheier, M.F., 2014. Dispositional optimism. Trends Cogn. Sci. (Regul. Ed.) 18 (6), 293–299.

Coelho, G.L., Vilar, R., Hanel, P.H., Monteiro, R.P., Ribeiro, M.G., Gouveia, V.V., 2018. Optimism scale: evidence of psychometric validity in two countries and correlations with personality. Pers. Individ. Dif. 134, 245–251.

de Moor, E.L., Denollet, J., Laceulle, O.M., 2018. Social inhibition, sense of belonging and vulnerability to internalizing problems. J. Affect. Disord. 225, 207–213.

Denollet, J., 2005. DS14: standard assessment of negative affectivity, social inhibition, and type D personality. Psychosom. Med. 67 (1), 89–97.

Einav, M., Margalit, M., 2020. Hope, loneliness and sense of coherence among bereaved parents. Int. J. Environ. Res. Public Health 17 (8), 27.

Emons, W.H., Meijer, R.R., Denollet, J., 2007. Negative affectivity and social inhibition in cardiovascular disease: evaluating type-D personality and its assessment using item response theory. J. Psychosom. Res. 63 (1), 27–39.

Gerst-Emerson, K., Jayawardhana, J., 2015. Loneliness as a public health issue: the impact of loneliness on health care utilization among older adults. Am. J. Public Health 105 (5), 1013–1019.

Gierveld, J.D.J., Van Tilburg, T., 2010. The De Jong Gierveld short scales for emotional and social loneliness: tested on data from 7 countries in the UN generations and gender surveys. Eur. J. Ageing 7 (2), 121–130.

Hansen, T., Nilsen, T.S., Yu, B., Knapstad, M., Skogen, J.C., Vedaa, Ø., Nes, R.B., 2021. Locked and lonely? A longitudinal assessment of loneliness before and during the COVID-19 pandemic in Norway. Scand. J. Public Health, 1403494821993711.

Hernandez, S.C., Overholser, J.C., 2021. A systematic review of interventions for hope/hopelessness in older adults. Clin. Gerontol. 44 (2), 97–111.

Holt-Lunstad, J., 2017. The potential public health relevance of social isolation and loneliness: prevalence, epidemiology, and risk factors. Public Policy Aging Rep. 27 (4), 127–130.

Holt-Lunstad, J., Smith, T.B., 2016. Loneliness and social isolation as risk factors for CVD: implications for evidence-based patient care and scientific inquiry. Heart 102, 987–989.

Holt-Lunstad, J., Smith, T.B., Layton, J.B., 2010. Social relationships and mortality risk: a meta-analytic review. PLoS Med. 7 (7), 1000316.

Inagaki, T.K., Muscatell, K.A., Moieni, M., Dutcher, J.M., Jevtic, I., Irwin, M.R., Eisenberger, N.I., 2016. Yearning for connection? Loneliness is associated with increased ventral striatum activity to close others. Soc. Cogn. Affect. Neurosci. 11 (7), 1096–1101.

Khalaila, R., Vitman-Schorr, A., 2018. Internet use, social networks, loneliness, and quality of life among adults aged 50 and older: mediating and moderating effects. Qual. Life Res. 27 (2), 479–489.

Klinenberg, E., 2016. Social isolation, loneliness, and living alone: identifying the risks for public health. Am. J. Public Health 106 (5), 786.

Lauder, W., Mummery, K., Jones, M., Caperchione, C., 2006. A comparison of health behaviours in lonely and non-lonely populations. Psychol. Health Med. 11 (2), 233–245.

Leigh-Hunt, N., Bagguley, D., Bash, K., Turner, V., Turnbull, S., Valtorta, N., Caan, W., 2017. An overview of systematic reviews on the public health consequences of social isolation and loneliness. Public Health 152, 157–171.

Lubben, J., Blozik, E., Gillmann, G., Iliffe, S., von Renteln Kruse, W., Beck, J.C., Stuck, A. E., 2006. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. Gerontologist 46 (4), 503–513.

Masi, C.M., Chen, H.Y., Hawkley, L.C., Cacioppo, J.T., 2011. A meta-analysis of interventions to reduce loneliness. Pers. Soc. Psychol. Rev. 15 (3), 219–266. https://doi.org/10.1177/1088868310377394.

Malouff, J.M., Schutte, N.S., 2017. Can psychological interventions increase optimism? A meta-analysis. J. Posit. Psychol. 12 (6), 594–604.

McHugh Power, J.E., Dolezal, L., Kee, F., Lawlor, B.A., 2018. Conceptualizing loneliness in health research: philosophical and psychological ways forward. J. Theor. Philos. Psychol. 38 (4), 219.

McHugh Power, J.E., Hannigan, C., Carney, S., Lawlor, B.A., 2017. Exploring the meaning of loneliness among socially isolated older adults in rural Ireland: a qualitative investigation. Qual. Res. Psychol. 14 (4), 394–414.

Muyan, M., Chang, E.C., Jilani, Z., Yu, T., Lin, J., Hirsch, J.K., 2016. Loneliness and negative affective conditions in adults: is there any room for hope in predicting anxiety and depressive symptoms? J. Psychol. 150 (3), 333–341.

Nes, L.S., Segerstrom, S.C., 2006. Dispositional optimism and coping: a meta-analytic review. Pers. Soc. Psychol. Rev. 10 (3), 235–251.

Overton, P.G., Markland, F.E., Taggart, H.S., Bagshaw, G.L., Simpson, J., 2008. Self-disgust mediates the relationship between dysfunctional cognitions and depressive symptomatology. Emotion 8 (3), 379.

Perlman, D., Peplau, L.A., 1982. Theoretical approaches to loneliness. Loneliness A Sourceb. Curr. Theory, Res. Ther. 123–134.

Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., Verhagen, M., 2015. Loneliness across the life span. Perspect. Psychol. Sci. 10 (2), 250–264.

Rius-Ottenheim, N., Kromhout, D., van der Mast, R.C., Zitman, F.G., Geleijnse, J.M., Giltay, E.J., 2012. Dispositional optimism and loneliness in older men. Int. J. Geriatr. Psychiatry 27 (2), 151–159.

Rozanski, A., Bavishi, C., Kubzansky, L.D., Cohen, R., 2019. Association of optimism with cardiovascular events and all-cause mortality: a systematic review and meta-analysis. JAMA Netw. Open 2 (9), e1912200 e1912200.

Russell, D.W., 1996. UCLA loneliness scale (Version 3): reliability, validity, and factor structure. J. Pers. Assess. 66 (1), 20–40.

Russell, D.W., 2017. Normative Data for the UCLA Loneliness Scale. Unpublished document, Department of Human Development & Family Studies. Iowa State University, Ames, IA.

Shanahan, M.L., Fischer, I.C., Hirsh, A.T., Stewart, J.C., Rand, K.L., 2021. Hope, optimism, and clinical pain: a meta-analysis. Ann. Behav. Med.

Snyder, C.R., Sympson, S.C., Ybasco, F.C., Borders, T.F., Babyak, M.A., Higgins, R.L., 1996. Development and validation of the State Hope Scale. J. Pers. Soc. Psychol. 70 (2), 321–335. https://doi.org/10.1037//0022-3514.70.2.321.

Snyder, C.R., Harris, C., Anderson, J.R., Holleran, S.A., Irving, L.M., Sigmon, S.T., et al., 1991. The will and the ways: development and validation of an individual-differences measure of hope. J. Pers. Soc. Psychol. 60, 570–585.

Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch. Intern. Med. 166 (10), 1092–1097.

Spitzer, R.L., Kroenke, K., Williams, J.B., Patient Health Questionnaire Primary Care Study Group, & Patient Health Questionnaire Primary Care Study Group, 1999. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Jama 282 (18), 1737–1744.

Van Tilburg, T.G., Steinmetz, S., Stolte, E., van der Roest, H., de Vries, D.H., 2020. Loneliness and mental health during the COVID-19 pandemic: a study among Dutch older adults. J. Gerontol. Ser. B 1–7.

Wilson, R.S., Krueger, K.R., Arnold, S.E., Schneider, J.A., Kelly, J.F., Barnes, L.L., Bennett, D.A., 2007. Loneliness and risk of Alzheimer disease. Arch. Gen. Psychiatry 64 (2), 234–240.

Yang, K., Victor, C.R., 2008. The Prevalence of and Risk Factors For Loneliness Among Older People in China, 28. Ageing & Society, pp. 305–327.

Ypsilanti, A., 2018. Lonely But Avoidant—The Unfortunate Juxtaposition of Loneliness and Self-Disgust, 4. Palgrave Communications, pp. 1–4.

Ypsilanti, A., Gettings, R., Lazuras, L., Robson, A., Powell, P.A., Overton, P.G., 2020a. Self-disgust is associated with loneliness, mental health difficulties, and eye-gaze avoidance in war veterans with PTSD. Front Psychol. 11, 2948.

Ypsilanti, A., Lazuras, L., Powell, P., Overton, P., 2019. Self-disgust as a potential mechanism explaining the association between loneliness and depression. J. Affect. Disord. 243, 108–115.

Ypsilanti, A., Robson, A., Lazuras, L., Powell, P.A., Overton, P.G., 2020b. Self-disgust, loneliness and mental health outcomes in older adults: an eye-tracking study. J. Affect. Disord. 266, 646–654.