One Lone Item: Assessing loneliness with a single-item direct measure

Paddy Maher[1*], Yavor Dragostinov[2,3], Ross Stewart[4,5], René Mõttus[6,7], Andrew Cooper[1], Elliot Tucker-Drob[2,3]

[1]Goldsmiths, University of London, London, UK

[2]University of Texas at Austin, Austin, USA

[3]Population Research Center, University of Texas at Austin, Austin, USA

[4]University of Chester, Chester, UK

[5]Wrexham University, Wrexham, UK

[6]University of Edinburgh, Edinburgh, UK

[7]Institute of Psychology, University of Tartu, Tartu, Estonia

* **Corresponding author**: pmahe002@gold.ac.uk

Abstract

Across the most widely-used loneliness scales, the words 'loneliness' and 'lonely' are commonly avoided due to concerns about bias. These efforts, although made out of an abundance of caution, may have undermined scales' abilities to assess loneliness accurately. In this article, we validate the One-item Loneliness scale (1iL; "*I often feel lonely*"), and show using multi-rater data (N = 352 people, recruited from Prolific) that it induces no more bias than popular indirect scales. The 1iL had retest reliability superior to some short multi-item scales (r_{tt} = .74) and comparable cross-rater agreement (r_{CRA} = .39). Using multi-rater adjustment, we find near-perfect convergence with the Three-Item Loneliness Scale (r_{true} = .97), the most popular short measure of loneliness. We also find discriminant validity from a sister construct assessing social disconnection. Contrary to popular belief, loneliness is unidimensional, can be assessed directly, and is distinct from judgements about one's social circle.

Research Transparency Statement

General Disclosures

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Study One

Preregistration: No aspects of the study were preregistered. Data, materials, scripts: All study materials, anonymised primary data, and analysis scripts sufficient for replicating analyses are publicly available (https://osf.io/3zh45/).

Introduction

Loneliness, often summarised as perceived isolation (Veazie et al., 2019) or a perceived deficiency in relationships (Peplau & Perlman, 1982), has recently become a point of interest to policymakers and researchers. For close to 50 years, the loneliness literature has been built upon an unchallenged acceptance that because loneliness is stigmatised (Barreto et al., 2022), asking about it in a direct manner incites bias in respondents.

This assumption has been deeply entrenched in the literature. The authors of the most popular loneliness scale (the UCLA) were skeptical of direct items, arguing that previous studies' reliance "on a single self-report question about current loneliness ... is problematic since self-report measures may be easily affected by social desirability concerns" (Russell et al., 1978; p. 290). The authors of the more modern alternative to the UCLA, the de Jong Gierveld (DJG) loneliness scale, agreed, stating that direct questions are 'not sufficient' for the assessment of loneliness (De Jong Gierveld & Van Tilburg, 2010; p121).

However, the avoidance of directly asking about the experiences of loneliness may have the unintended effect of failing to accurately measure the phenomenology of loneliness: as a result of being expansive and indirect, the UCLA may assess more than just loneliness (Maher et al., 2025). There is also no conclusive evidence that indirect measures are less affected by social desirability. In fact, the DJG includes several highly negatively-charged items, such as '*I experience a general sense of emptiness*,' which do not appear to be less socially undesirable than a direct question about loneliness. Single item indirect measures such as "*I feel alone*" measures also produce highly similar mean scores and convergence correlations with other measures as directly-worded items (Mund et al., 2023).

Direct, single-item measures should be explored more thoroughly as an option for assessing loneliness. A face-valid single-item measure of lonely feelings can offer a useful potential avenue for research, improving efficiency while reducing ambiguity over interpretations.

The Current Work

The assumption that directly asking about stigmatised constructs induces unique bias has likely remained so widespread out of an abundance of caution: in single-rater data it is impossible to disprove the existence of bias. However, in recent years, new multi-rater methods have been developed, allowing researchers to estimate the true strength of the association between constructs (Mõttus et al., 2024). This allows us to understand how well a single directly-worded item assesses loneliness, before and after adjusting for the effects of noise and bias.

We selected a straightforward, popular item. Rather than selecting a wide array of potential items, we chose one originally from the IPIP pool (Goldberg, 1999) of items which was later included in the 100 Nuances of Personality item pool (100-NP; Henry & Mõttus, 2022) personality measure: "*I often feel lonely*". This is a direct and maximally face-valid single-item measure which we have named the '1iL' (the One-item Loneliness scale).

The item has above-median cross-rater agreement (the correlation between self- and informant-reports; r_{CRA} = .42), and test-retest reliability (r_{tt} = .73) within the 100-NP personality battery (Henry & Mõttus, 2022), and has produced comparable findings across Estonian, Russian, and English (Maher et al., 2024). This item is featured in multiple biobanks and national cohort studies (e.g. the Estonian Biobank, the Norwegian Biobank, and Generation Scotland) as part of the 100-NP, and a functionally-equivalent item ("*Do you often*

feel lonely?") is featured in the UK Biobank as a binary Yes/No item. With these resources, researchers can investigate lonely feelings' connection to hundreds of other genetic, demographic, physical, and mental health metrics. However, the item has not yet been comprehensively compared to other loneliness measures.

We estimated test-retest correlations, the most direct indicator of instrument reliability (Dragostinov & Mõttus, 2023; Henry et al., 2024b; Henry & Mõttus, 2022; Lord & Novick, 1968; McCrae et al., 2011), as well as cross-rater agreement as an indicator of the proportion of variance a scale captures that is independent of a single method (McCrae & Mõttus, 2019; Mõttus & Henry, 2025). Using multiple raters, we determined the convergent and discriminant validity of the 1iL with other common scales. Divergence between the 1iL's self- and informant-rated construct correlations with other measures would possibly indicate stigma or social desirability biases presumably less present in informant ratings. Combining self- and informant-reports, we assessed scales' 'true' discriminant and convergent validity with other measures, addressing both measurement error and systematic single-method biases (see: Mõttus et al., 2024), as well as their raw (unadjusted) associations. Additionally, we validated a two-item version (the 2iL) by including an optional reverse-coded item ("*I rarely feel lonely*").

As a supplementary analysis, we also examined how the 1iL relates to the DJG's two distinct factors, the DJG-E ("emotional" loneliness) and DJG-S ("social" loneliness). The DJG-E and DJG-S have been labelled as complementary and equal aspects of the experience of loneliness (Van Tilburg & de Jong Gierveld, 2023); however, their items suggests they may respectively capture loneliness and social disconnection, the latter of which may or may not entail feeling lonely. Direct measures of loneliness have previously been found to correlate more strongly with the DJG-E than the DJG-S, but this has been attributed to social desirability bias

(Van Tilburg, 2020). To explore this, we used structural equation modelling (SEM) across our multi-rater data to estimate latent loneliness factors that index the shared variance between self- and other-ratings, achieving a similar effect to the true correlations described above.

Methods

Measures & Participants

To determine the 1iL's convergent and discriminant validity with existing measures of loneliness and social support, we recruited paid participants who had self-registered for online research platform Prolific, filtering for those who had indicated that they had a partner (romantic, family, or friend) active on the service. Person A of each dyad completed the survey on their own behalf and then on their partner's (Person B) behalf, providing their partner's ID. Person Bs were contacted and asked to complete the survey on behalf of themselves and then person A. To detect dyads who did not know each other, we asked person Bs to state the age of person A, and anyone who was incorrect by more than 2 years was removed. 10–14 days later, valid person As were contacted again and asked to repeat the survey, on their own behalf only, to assess test-retest reliability. Data analysis began with several layers of screening to ensure that person As had rated person Bs, and person Bs had rated person As. In some cases, person As nominated people we had already recruited – these dyads were united where each had nominated the other. However, in some cases a person A had nominated another already-recruited person, who had in turn nominated a different person, creating a 'polycule'. We resolved these cases by removing any members who had not been rated by another person.

A small number of participants responded to the gender item with non-gender information, but their sex was input manually from their Prolific profile data. The final sample of dyads comprised 352 people, (161 men, 188 women, 3 non binary; ages 18–77, M = 32.11; Mdn = 29; SD = 10.75; 58% romantic partners, 30% friends, 12% family). The retest sample comprised 156 participants (65 men, 89 women, 2 non binary; ages 19–77, M = 32.13; Mdn = 29; SD = 10.84).

The measures included the 6-item version of the de Jong Gierveld Loneliness scale (De Jong Gierveld & Van Tilburg, 2010) comprising its two three-item subscales: emotional (DJG-E; example item: "*I experience a general sense of emptiness*"), and the social subscale (DJG-S; example item: "*There are many people I can trust completely*"). Additionally, we included the Oslo Social Support Scale (OSSS-3; example item: "*How easy is it to get practical help from neighbors if you should need it?*"; Kocalevent et al., 2018). We also included a reverse item for the 1iL ("*I rarely feel lonely*"), to make a 2iL, suitable for use in SEM, which may provide an alternative for modelling relationships free of measurement error, even when multi-rater or multi-time point data is not available. These results are reported in the supplementary materials.

We assessed loneliness with the widely-used Three-Item Loneliness Scale (TILS; Hughes et al., 2004), a short indirect measure. It was derived from the UCLA by factor analysis, identifying a three-factor structure and selecting three items from the top factor, which captures perceived isolation (e.g. "*I feel left out*").

Evidence shows that due to the methods it was developed with, the TILS measurably diverges from the R-UCLA (Maher et al., 2025). This precipitated the development of the first true three-item version of the UCLA (the UCLA-3.5; Maher et al., 2025). This short version was developed using a brute force method, measuring the correlation between the sum scores of every possible trio of items from the original R-UCLA and sum scores from the full R-UCLA in a large (N > 19,000) sample. The maximally-predictive item trio had an r of .92 with full R-UCLA scores, and this became the UCLA-3.5. The items were: "*I have a lot in common with the people around me*"; "*I feel isolated from others*" & "*There are people I can turn to*".

For the informant section of the survey, item wordings were adapted, swapping out "I" for "they" and "me" for "them" where appropriate. All scores and variables were scaled to $M = 0$ and $SD = 1$.

Analyses

We first assessed the retest reliability and cross-rater agreement of all measures. For retest-reliability (r_{tt}) these were the correlations between t_1 scores and t_2 scores. For cross-rater validity, these were the correlations between self-rated scores and informant-rated scores.

To estimate the associations between variables free of random error and systematic single-method biases, we also computed "true correlations" following the methodology of Mõttus and colleagues (2024) and Henry and colleagues (2024b). This approach uses the ratio of cross-rater cross-variable correlations to cross-rater same-variable correlations to derive noise- and bias-free estimates of the associations between variables. For example, in a sample of over 20,000 individuals, this method produced a true correlation of -.97 between the items "*I keep my promises*" and "*I break my promises*" (Maher et al., 2024). Using this procedure, we estimated true correlations between all included variables and subscales, as well as the raw (unadjusted) correlations.

To further establish the construct validity of the 1iL, and to determine how it relates to the factors of the DJG after noise and bias are accounted for, we implemented SEM using the lavaan package (Rosseel, 2012) in R. Similar to the true correlations described above, we constructed a model to regress the 1iL on the DJG's subscales, incorporating both self- and informant-rater data (Mõttus et al., 2024). These results, along with full model fit details and path diagrams, are reported in full in Supplementary Analysis S1.

We also determined the appropriateness of a two-item loneliness scale (2iL; "*I often feel lonely*"; "*I rarely feel lonely*") for use in single-rater data using SEM. Indicating the 2iL with each of its items in the self-rated data only, we determined whether associations calculated this way were more similar to those produced by the 1iL across multi-rater data – for cases where multi-rater data may not be possible or convenient to collect. These results, along with full model fit details and path diagrams, are reported in full in Supplementary Analysis S2.

Results

Table 1. Retest reliability (tt) and cross-rater agreement (CRA) across all measures

Scale/Item	r_{tt}		r_{CRA}	
	r	***CI***	***r***	***CI***
"*I often feel lonely*" (1iL)	.74	.65–.80	.39	.29–.47
"*I rarely feel lonely*"	.60	.49–.69	.31	.21–.40
2iL	.75	.67–.81	.44	.35–.52
DJG	.79	.72–.84	.48	.40–.56
DJG-E	.71	.62–.78	.42	.34–.51
DJG-S	.70	.61–.77	.42	.32–.50
UCLA-3.5	.68	.59–.79	.37	.28–.46
TILS	.72	.63–.79	.47	.39–.55
OSSS-3	.80	.73–.85	.45	.36–.53

Note: The 2iL comprises the 1iL ("*I often feel lonely*") plus the reverse-scored item "*I rarely feel lonely*". DJG = De Jong Gierveld Loneliness Scale; DJG-E = De Jong Gierveld Emotional Loneliness Scale; DJG-S = De Jong Gierveld Social Loneliness Scale; UCLA-3.5 = UCLA Loneliness Scale-3.5; TILS = Three-Item Loneliness Scale; OSSS-3 = Oslo Social Support Scale-3.

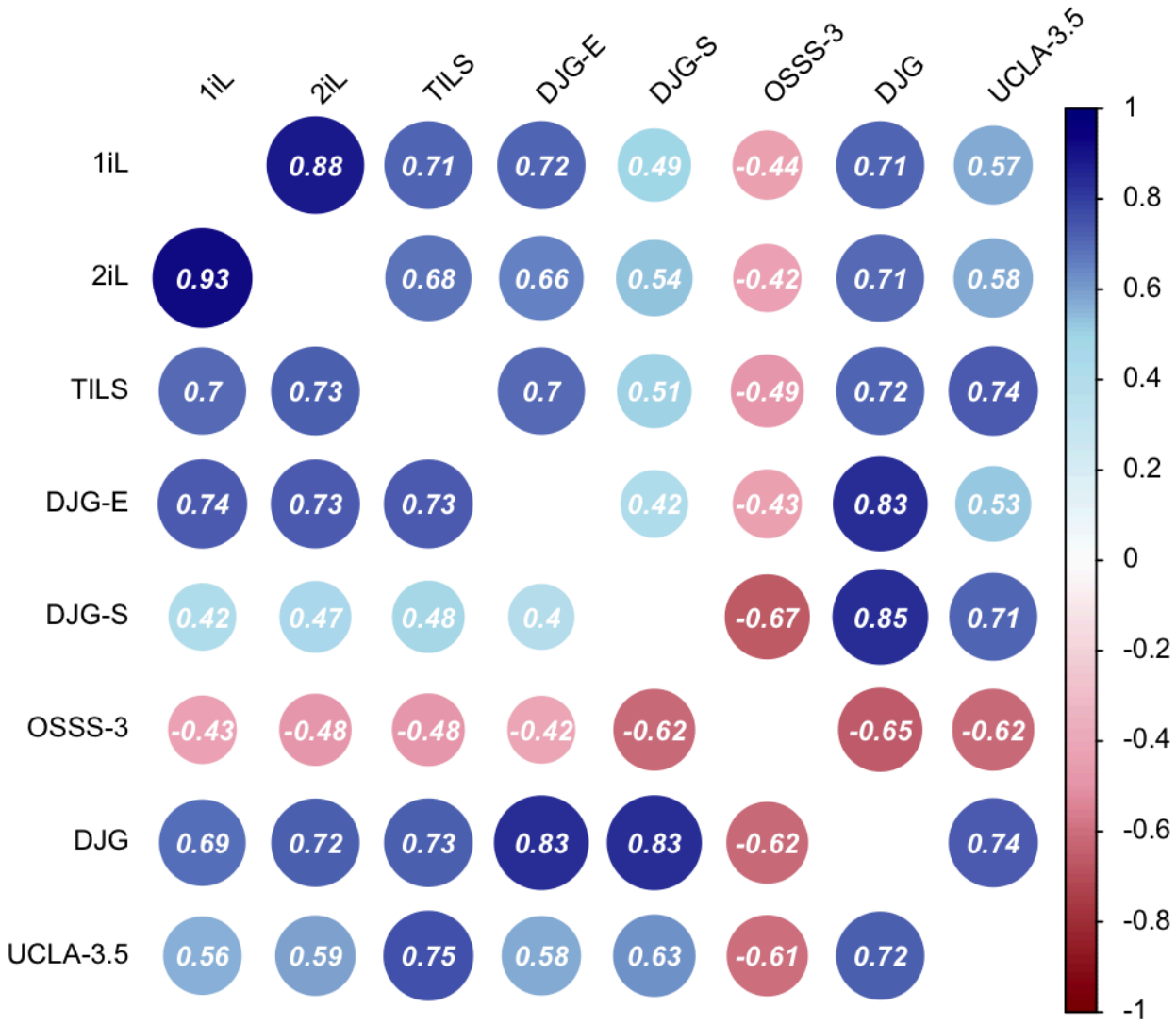
The 1iL had a retest correlation (r_{tt}) of .74 (Table 1, indicating above average reliability and very high reliability for a single item (Henry et al., 2024a). Although just one item, this was higher than some multi-item scales, such as the de Jong subscales and the UCLA-3.5. It also had a self-other correlation of .39, indicating comparable cross-rater agreement (i.e., consensual validity) to other loneliness measures, which was also well above average for a single item (Henry et al., 2024a). The 2iL improved marginally over the 1iL on both of these measures, with r_{tt} = .75 and r_{CRA} = .44.

The self-reported 1iL correlated r = .56 and .69 with the UCLA-3.5 and full DJG respectively (Figure 1). It correlated .42 and .43 with the social disconnection measures, the DJG-S and OSSS-3. Its highest correlations were with the DJG-E and TILS, our emotional loneliness measures (r = .74 and .75, respectively). The 1iL is closely aligned with existing measures of the emotional aspects of loneliness: in our single-rater analyses, the 1iL correlated .74 with the TILS, and .70 with the DJG-E (Figure 1). Findings in the informant-reported data were effectively identical to those from the self-reported data (Figure 1), with a correlation of r = .998 between the two vectorised correlation matrices.

In our noise- and bias-corrected analyses based on multi-rater data, the 1iL had corrected true correlations of r_{true} = .82 and .89 with the UCLA-3.5 and full DJG, the two broad loneliness measures, respectively (Figure 2). It correlated .70 and .65 respectively with the social loneliness/social support measures, the DJG-S and OSSS-3. It correlated .89 with the DJG-E, and .97 with the TILS – the two long measures that most directly capture feelings of loneliness.

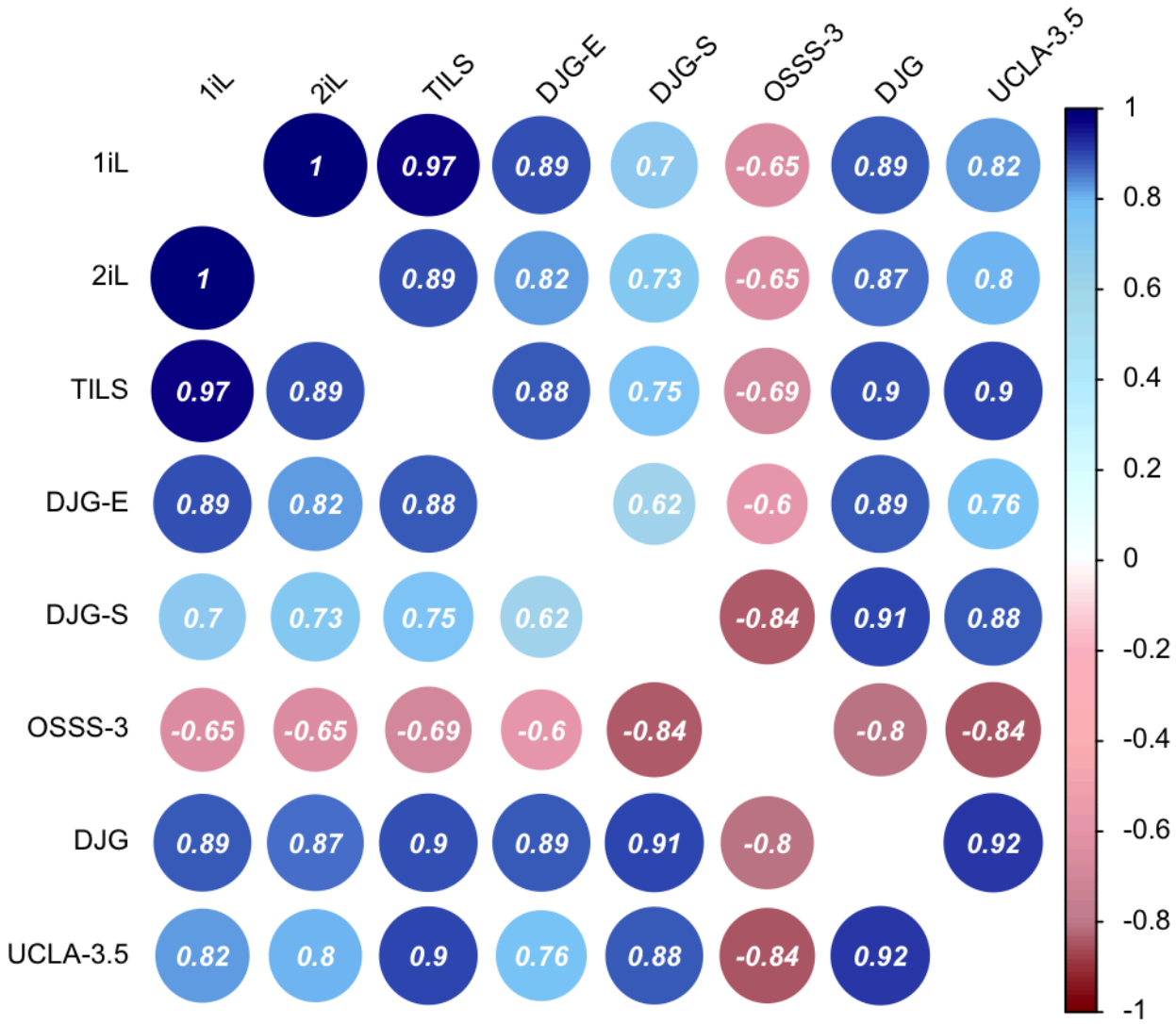
Crucially, both before (Figure 1) and after (Figure 2) our adjustment for noise and bias, the emotional measures (1iL, 2iL, TILS, and DJG-E) showed similar patterns of associations with the other included constructs (DJG-S, OSSS-3, DJG, and UCLA-3.5). Exceptions are the association between UCLA-3.5 and TILS, which is inflated due to sharing an item, and the DJG-E with the DJG, as the former is contained within the latter. Directness in loneliness assessment appears to have no obvious effect on construct intercorrelations, consistent with (unadjusted) findings by Mund and colleagues (2023).

Figure 1. Convergent and discriminant validity (unadjusted) across all measures



Note. Self-report correlations (Pearson's *r*) shown below the diagonal, informant-report correlations shown above. DJG = De Jong Gierveld Loneliness Scale; DJG-E = De Jong Gierveld Emotional Loneliness Scale; DJG-S = De Jong Gierveld Social Loneliness Scale; UCLA-3.5 = UCLA Loneliness Scale-3.5; TILS = Three-Item Loneliness Scale; OSSS-3 = Oslo Social Support Scale-3.

Figure 2. Convergent and discriminant validity (error-adjusted) across all measures



Note: True correlations are calculated by taking the averaged cross-rater cross-trait correlations for each construct pair and dividing them by the averaged cross-rater same-trait correlations for those constructs. DJG = De Jong Gierveld Loneliness Scale; DJG-E = De Jong Gierveld Emotional Loneliness Scale; DJG-S = De Jong Gierveld Social Loneliness Scale; UCLA-3.5 = UCLA Loneliness Scale-3.5; TILS = Three-Item Loneliness Scale; OSSS-3 = Oslo Social Support Scale-3.

Multivariate relationships

We also wanted to determine whether the 'social' and 'emotional' loneliness (De Jong Gierveld & Van Tilburg, 2010), are equal aspects of loneliness. To do this, we specified a SEM incorporating multi-rater data to determine whether a latent 1iL factor differentially relates to these two dimensions. Regressing the 1iL factor on the two DJG dimensions (each indicated by self and informant reports on their 3 respective items), we found a significant positive independent relationship between the DJG-E and 1iL (ß = .862; SE = 0.127, $p < .001$) and a weak and non-significant path between the DJG-S and the 1iL (ß = .101, SE = 0.148, $p = .493$). After correction for error and bias, the DJG-S did not predict the 1iL above and beyond the DJG-E, suggesting 'social loneliness' may not be a true aspect of loneliness (Figure S1).

2iL

The second item of the 2iL, '*I rarely feel lonely'* had a raw correlation of -.71 with its reciprocal, the 1iL, while in the disattenuated analyses, they had a true correlation of -1.02 (note that while correlations are bounded between -1 and 1, disattenuated correlations are not bounded, and can sometimes fall slightly outside of these boundaries due to sampling error; Maher et al., 2024). We found that in self-rater data, using SEM, the 2iL produced broadly comparable results to the disattenuated correlation analyses (Figure S2). However, this approach is still susceptible to single-method effects, and although these were small in our sample, they may not be in others. (See Supplementary Material, Section S1, for full analysis).

Discussion

In this study, we overturn the decades-old assumption that direct loneliness items induce bias, and that multi-item indirect scales have important advantages over direct measures. We have shown that researchers can administer a shorter scale without sacrificing validity, inducing bias, or even compromising on reliability: the 1iL demonstrated good psychometric properties, on par with existing widely-used short scales for loneliness.

The phenomenology of loneliness also appears to be both unidimensional and emotional, rather than relating directly to judgements about the quality and/or quantity of relationships. We find that the 1iL relates closely to existing measures of emotional loneliness across raw correlation analyses as well as error-corrected analyses, while being less related to measures of social disconnection (sometimes termed 'social loneliness'). Van Tilburg (2020) suggested that the DJG-E's stronger relationship with loneliness, relative to that of the DJG-S, is caused by bias; however, in regression models, correction for bias and noise increased this disparity, rather than decreasing it. Despite its high correlation with the 1iL, after error correction the DJG-S (characterising social disconnection) did not significantly predict loneliness when the DJG-E (characterising loneliness) was accounted for (Figure S2).

Psychometric implications

Without careful validation, it is often unclear whether indirect scales indeed capture only the construct they were designed to assess. By asking directly about loneliness, the 1iL offers a useful 'north star' (one with good validity and retest reliability) to which other measures can be compared. Doing so, we find that some measures (the TILS and the DJG-E) do appear to empirically converge on feelings of loneliness, while another (the DJG-S) does not, despite being termed a 'social loneliness' scale. Similarly, evidence has suggested that the R-UCLA

(Russell et al., 1980) is not unidimensional, capturing elements of (low) social support alongside feelings of loneliness (Maher et al., 2025). We suggest that it would be more appropriate to refer to 'social loneliness' scales (such as the DJG-S) as 'social disconnection' scales instead.

Our direct measure converges well with indirect measures in our current sample, but will this hold as perceptions (Figs. S3 & S4) of loneliness evolve over time? We conducted a supplementary analysis using data from the English Longitudinal Study of Ageing (Banks et al., 2025), in which the TILS was administered alongside a direct measure of loneliness in the last week. We assessed the correlation between these measures as well as the similarity of their demographic nomological nets over time. From 2004 to 2024 their relationship was highly stable (Table S2; Figs. S5 & S6). Any shifts in the public understanding of the word 'lonely' appear to be negligible (see Supplementary Material, Section S3, for full analysis).

While multi-rater data is maximally independent, it is not always available or convenient to collect. For these cases, the two-item version of the 1iL (the '2iL'), using a new item designed to be a simple reverse: '*I rarely feel lonely*'. It appeared to be effective, producing results that were broadly comparable to the disattenuated 1iL results (Table S2). Its use may help to avoid false negative results in some cases. However, this approach is still susceptible to single-method effects, and although these were small in our sample, may not be in others. (See Supplementary Material, Section S1, for full analysis).

Practical implications

While item directness enhances face validity and interpretability, some have suspected that this may also lead participants to underreport feelings of loneliness due to social desirability.

However, we find that in our unadjusted correlations, the 1iL's associations with other constructs show near-identical results between the self- and informant-rated data (Figure 1). Additionally, they were also highly comparable to the indirectly-worded, multi-item DJG-E scale (Figure 2), which is not consistent with the theory that direct measures are more affected by social desirability bias than long, indirect scales (Russell et al., 1978).

The prospect of reducing a short multi-item scale to a one-item scale in a large survey battery might not at first appear to be of much consequence. However, cohort studies and biobanks are expensive endeavours, and recruitment and retention have to be weighed against the benefits of their research output (Booker et al., 2011; Rush et al., 2024). The adoption of maximally-short scales increases cost-effectiveness and – by creating space for more variables to be assessed – the number of questions a given dataset has the capacity to answer. When trying to balance cost against output, the selection of single- or few-item constructs should be a priority.

In addition to its potential advantages for longitudinal and panel studies, the 1iL may be a practical choice in public health research and healthcare settings. For instance, loneliness has been linked to various adverse health outcomes, including heart disease and stroke (Valtorta et al., 2016); cancer mortality in both humans (Marcus et al., 2017) and mice (Liu & Wang, 2005), future depression (Lim et al., 2016), and cognitive decline (Cacioppo & Hawkley, 2009). By incorporating the 1iL into routine health screenings or large-scale epidemiological surveys, practitioners could efficiently identify individuals at risk for loneliness-related health concerns. The brevity of the measure ensures minimal disruption to workflows, making it a practical tool for both clinical use and public health monitoring, where time and resources are often under pressure.

Limitations

While the 1iL demonstrates strong validity and reliability, certain limitations warrant consideration. First, the sample was drawn from Prolific, which could limit the generalizability of findings to other populations. While the 1iL has been used across Estonian-, Russian- and English-speaking populations, validation in non-Western cultural contexts, where the conceptualization and expression of loneliness might differ, would be an appropriate next step. For our multivariate analyses using SEM, our results also contain wide confidence intervals. Although we report these findings as evidence that the 1iL and DJG-S are not related independently of the DJG-E, they should be replicated in a larger sample.

Conclusion

Explicit mentions of 'lonely' or 'loneliness' have been avoided across all of the most popular loneliness scales, due to concerns it can induce bias. While caution is prudent without evidence to suggest otherwise, this appears to have been unfounded. Using multi-rater analyses to investigate apparent associations between loneliness construct with and without the effects of bias and noise, we find that the 1iL ("I often feel lonely") appears to be highly comparable to other true loneliness measures, inducing no more noise or bias than indirect multi-item measures. The 1iL is a robust single-item measure, demonstrating strong reliability and validity without any evidence that its directness invites unique bias. While it offers efficiency to researchers, it also provides a clear, face-valid anchor for the loneliness literature, helping to resolve a core ambiguity, showing that loneliness is an emotional experience distinct from the cognitive appraisal of social disconnection. For researchers requiring error-corrected modelling in single-rater data, the 2iL also provides a partial solution. Ultimately, our findings show that the trade-off between brevity and validity is not real in practice. The adoption of direct measures can advance the field on both fronts, simultaneously.

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