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Research paper

Sense of purpose in life and concurrent loneliness and risk of incident loneliness: An individual-participant meta-analysis of 135,227 individuals from 36 cohorts

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ABSTRACT

Background: Sense of purpose, the feeling that one's life is goal-oriented and driven, tends to be protective for psychological health. Less is known about its relation with social health, particularly loneliness. We test whether the cross-sectional association between purpose and loneliness is replicable and whether purpose protects against the development of incident loneliness over time.

Methods: Participants from 36 cohorts (total $N = 135{,}227$; age range 18–109) reported on their sense of purpose, loneliness, and psychological distress. Follow-up measures of loneliness were available in 28 cohorts that ranged from six weeks to 15 years. Prospective, random-effect meta-analysis was used to summarize the cross-sectional and longitudinal associations from each cohort.

Results: Sense of purpose was associated significantly with less loneliness in all 36 cohorts, controlling for sociodemographic factors (meta-analytic mean effect estimate = −0.31, 95% CI = −0.34, −0.29, $p < .001$). This association was stronger among participants experiencing concurrent severe psychological distress. Sense of purpose was protective against the development of new incident loneliness (meta-analytic mean hazard ratio estimate = 0.85, 95% CI = 0.82, 0.87, $p < .001$). Age did not moderate any of the associations.

Limitations: Limitations include the lack of lower-income countries. The mechanisms that explain this association also need to be identified in future research.

Conclusions: Sense of purpose is associated with less loneliness and with protection against developing loneliness over time, associations that replicated across cohorts from North America, South America, Europe, and the Middle East. Sense of purpose may be a useful target of intervention to prevent or reduce loneliness, especially among individuals suffering from psychological distress.

Loneliness is the subjective experience of the discrepancy between the social connection that one wants and the social connection that one has (Cacioppo and Patrick, 2008). This discrepancy, which is related but not equivalent to social isolation, is meaningful for health. Often considered as a symptom of depression (Radloff, 1977), there is evidence that loneliness increases risk of depressive symptoms and the development of depression over time (Cacioppo et al., 2010). Loneliness is also a risk factor for poor physical health outcomes in older adulthood. Individuals who feel lonely, for example, are at greater risk of premature mortality than individuals who feel more socially connected (Holt-Lunstad et al., 2015). Prior to death, loneliness increases risk of chronic diseases, including diabetes (Hackett et al., 2020), hypertension (Momtaz et al., 2012), and Alzheimer's disease and related dementias (ADRD; Sutin et al., 2020c). Identifying factors that protect against loneliness is critical to inform interventions for more effective ways to reduce risk of loneliness.

One potential factor that may help protect against loneliness is a sense of purpose in life, which is the feeling that one's life is goal-oriented, directed, and worthwhile (McKnight and Kashdan, 2009; Scheier et al., 2006). It is one component of psychological well-being (Ryff, 1995) that is often considered a core aspect of a meaningful life (Martela and Steger, 2016). In fact, although conceptually distinct, a

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sense of purpose and meaning in life are often used interchangeably, and there tends to be similar health correlates of purpose versus meaning (Czekierda et al., 2017; Sutin et al., 2022). A sense of purpose is associated with a range of healthier outcomes, including lower risk of depression (Wood and Joseph, 2010), cardiovascular disease (Cohen et al., 2016), ADRD (Sutin et al., 2020b), and, ultimately, it protects against mortality (Cohen et al., 2016). A sense of purpose may also be associated with better social health outcomes. The aim of the present research is to examine the concurrent association between sense of purpose and loneliness and test whether a greater sense of purpose protects against the development of loneliness over time.

There are several theoretical reasons why a sense of purpose would be associated with less loneliness. One central aspect of sense of purpose, for example, is engagement (McKnight and Kashdan, 2009). Individuals with a higher sense of purpose tend to have more affective, cognitive, and behavioral engagement than individuals with less purpose (McKnight and Kashdan, 2009; Scheier et al., 2006). This engagement may serve to fill needs that either connect the individual with others or makes such connection less pressing (e.g., someone engrossed in a solitary activity that provides fulfillment may not need connection with others). In addition, many of the activities that support a greater sense of purpose are social in nature. Volunteering (Jongenelis et al., 2021), caregiving (Yu et al., 2018), teaching (Nickel and Zimmer, 2019), and other activities associated with greater purpose typically involve meaningful engagement with other people.

There is, indeed, some empirical evidence that higher purpose in life is associated with lower loneliness. Among men over the age of 60, for example, feeling more purposeful was associated with less loneliness, independent of lifestyle and mental health factors (Neville et al., 2018). Purpose and loneliness are likewise associated more broadly among midlife and older adults (Chan et al., 2019). Neuroimaging work suggests that purpose in life and loneliness have distinct yet interdependent neural correlates (Mwilambwe-Tshilobo et al., 2019). Loneliness has been found to be an important predictor of subsequent purpose in life (Chen et al., 2020). In addition, a machine learning approach to identify the strongest correlates of purpose in life from a range of psychological, social, and sociodemographic factors found loneliness to be the strongest correlate (Mei et al., 2021). More research is needed to address whether sense of purpose protects against the development of loneliness.

Loneliness is not static but is both malleable and tends to follow a normative trajectory across adulthood. Specifically, loneliness tends to be highest in young adulthood, decreases through middle and older adulthood, and then increases among the oldest old (Luhmann and Hawkley, 2016). That is, despite the stereotype that older adulthood brings loneliness (Pikhartova et al., 2016), feelings of loneliness tend not to increase until the very end of life, and, even then, do not match the levels of loneliness experienced in younger adulthood (Luhmann and Hawkley, 2016). Despite its lower prevalence in middle and early older adulthood, loneliness remains a critical concern because it is a significant determinant of health. That is, as described above, individuals who feel lonely are at greater risk of morbidity and premature mortality (Hackett et al., 2020; Holt-Lunstad et al., 2015; Momtaz et al., 2012). To the extent that loneliness is modifiable and can be treated (Jarvis et al., 2019), there is great promise that intervening to reduce loneliness will help improve health outcomes.

Individuals suffering from depression tend to report less purpose in life (Laird et al., 2019) and more loneliness (Fernandes et al., 2018). The extent to which severe psychological distress interferes with the relation between purpose and loneliness is not yet known. For example, purpose in life could serve as a psychological resource that protects against loneliness even while experiencing psychological distress. In contrast, it is also possible that severe psychological distress limits the benefits of purpose and/or that purpose among individuals with depression is too low to provide protection.

The present research examines the relation between sense of purpose and loneliness in three ways. Using 36 cohorts from 10 studies, we first examine the consistency of the cross-sectional association between a sense of purpose and loneliness. Second, among participants who did not feel lonely at baseline, we examine whether a sense of purpose protects against the development of incident loneliness longitudinally. The results, based on these individual participant data in each cohort, are then pooled in a meta-analysis to provide a summary of the association between sense of purpose and loneliness and incident loneliness. Third, because loneliness is a risk factor for poor health outcomes in older adulthood, we examine whether age moderates the association between purpose and loneliness, both cross-sectionally and longitudinally. Finally, we likewise examine whether the associations are moderated by depression status, both cross-sectionally and longitudinally. As with the main effects, we summarize the moderator findings across cohorts with a meta-analysis.

1. Method

1.1. Participants and procedure

Cohorts that had a measure of purpose in life and loneliness measured at the same time were selected for the cross-sectional analysis. Cohorts that also had loneliness measured at least one additional time were selected for the longitudinal analysis of incident loneliness. The cohorts with both cross-sectional and longitudinal data were the Health and Retirement Study (HRS; Sonnega et al., 2014), the Midlife Development in the United States study (MIDUS; Brim et al., 2004), the Wisconsin Longitudinal Study (WLS; Herd et al., 2014), the English Longitudinal Study of Ageing (ELSA; Steptoe et al., 2013), The Irish LongituDinal study on Ageing (TILDA; Kearney et al., 2011), the Survey of Health, Ageing and Retirement in Europe (SHARE; Börsch-Supan et al., 2013), the Understanding America Study (UAS; Laith et al., 2018), and the Psychological, Behavioral, and the Social Response to the 2020 Coronavirus Pandemic Study (BPSR; Sutin et al., 2020a). We also included two cohorts with cross-sectional data on sense of purpose and loneliness that did not have longitudinal data on loneliness: the Brazilian Longitudinal Study of Aging (ELSI; Lima-Costa et al., 2018) and the Panel Study of Income Dynamics (PSID; McGonagle et al., 2012). Each study had one cohort, with two exceptions: WLS included graduate (WLSG) and sibling (WLSS) cohorts and SHARE included cohorts from up 25 countries in Europe and Israel (26 countries total). We identified these datasets primarily through the Interuniversity Consortium for Political and Social Research, the Gateway to Global Aging, and the UK Data Service, as well as additional studies that we were aware of that had the relevant measures. The preregistration for this study can be found at https://osf.io/wfnd5/?view_only=61699e2b65954ef891145fde515b07bd.

Participants from each of the cohorts were included in the analytic samples if they had valid information on sense of purpose in life, loneliness, and the relevant covariates. The measure of either sense of purpose or loneliness could be from single item or from multi-item scales (see below). For the longitudinal analyses, participants without loneliness at baseline were selected (see classification below) and included in the survival analysis if they had at least one additional measure of loneliness at a subsequent wave. See Supplemental material for detailed information about the assessments used in each study. Data can be obtained through the websites listed for each study in the Supplemental material.

1.2. Measures

1.2.1. Sense of purpose

HRS, MIDUS, WLS, and BPSR used a 7-item version of the Purpose in Life subscale from the Ryff Scales of Psychological Well-Being (Keyes et al., 2002). Items were rated on a scale and reverse scored when necessary from 1 (*strongly disagree*) to 6 (*strongly agree*) in HRS and WLS, from 1 (*strongly disagree*) to 7 (*strongly agree*) in MIDUS, and from 1

(*strongly disagree*) to 5 (*strongly agree*) in BPSR. In ELSA, TILDA, ELSI, and SHARE, a single item on meaning in life ("How often do you feel that your life has meaning?") was drawn from the Pleasure scale of the control-autonomy-pleasure-self-realization scale (CASP-19) of quality of life in older adulthood (Hyde et al., 2003). The item was rated on a 4-point scale in ELSA, TILDA, and SHARE and reverse scored when necessary from 1 (*never*) to 4 (*often*) and a 3-point scale in ELSI, from 1 (*never*) to 3 (*always*). In PSID, purpose was measured with a single item ("I lead a purposeful and meaningful life.") from the Flourishing Scale (Diener et al., 2009). The item was rated on a 5-point scale, from 1 (*strongly disagree*) to 5 (*strongly agree*). In UAS, purpose was measured with the single item, "My life has a clear sense of purpose or meaning" on a 7-point scale from 1 (*absolutely untrue*) to 7 (*absolutely true*). Single-item measures of purpose in life have been found to have similar associations with important outcomes as multi-item scales (e.g., Sutin et al., 2021).

1.2.2. Loneliness

In HRS, ELSA, TILDA, SHARE, and BPSR, loneliness was measured with a version of the UCLA loneliness scale (e.g., "How much of the time do you feel you lack companionship?") (Russell et al., 1980). The HRS used a 3-item version, ELSA and SHARE used a 4-item version, TILDA used a 5-item version, and BPSR used an 11-item version. Items were either rated from 1 (*often*) to 3 (*hardly ever or never*) (HRS, TILDA, SHARE) or from 1 (*hardly ever or never*) to 3 (*often*) (ELSA, BPSR). The remaining cohorts used a single-item measure on loneliness. In MIDUS II and III, the item was, "During the past 30 days, how much of the time did you feel lonely," rated on a 5-point scale from 1 (*all of the time*) to 5 (*none of the time*). In the WLS, the item was "On how many days during the past week did you feel lonely?" and reported as the number of days (0–7 days). In UAS, loneliness was measured with the item, "Please tell us if each of the following was true for you much of the time during the past week: I felt lonely." Response options were yes and no. During the pandemic in UAS, participants answered the item "In the past seven days, how often have you felt lonely?" on a 4-point scale from 1 (not at all) to 4 (5–7 days). In ELSI, the item was, "How often do you feel alone/lonely?" rated on a 3-point scale from 1 (*never*) to 3 (*always*). In PSID, the item was, "Thinking about the whole day yesterday, how much of the day did you feel each of the following? Lonely?" and rated on a 5-point was from 1 (*all of the day*) to 5 (*none of the day*). Across all cohorts, when necessary, items were reverse coded into the direction of greater loneliness (i.e., higher scores indicated more loneliness). Single-item measures of loneliness have been found to have similar associations with important outcomes as multi-item scales (e.g., Rico-Uribe et al., 2018).

The continuous scale was used for the cross-sectional analysis. For the longitudinal analyses, loneliness was dichotomized to reflect no loneliness versus at least some loneliness based on thresholds identified by Hawkley and Kocherginsky (2018). In HRS, ELSA, TILDA, SHARE, and BPSR, a threshold of $\geq$1.5 was used to differentiate lonely (coded as 1) versus not lonely (coded as 0) based on the mean score on the UCLA Loneliness scale. In MIDUS, "none of the time" and "a little of the time" was coded as 0 and contrasted against "all of the time," "most of the time" and "some of the time," coded as 1. In UAS, the baseline loneliness measure was dichotomous (participants responded yes or no to the item). For the UAS assessment during the pandemic, "Not at all or less than 1 day" was coded as 0 and contrasted against "1–2 days," "3–4 days," and "5–7 days" coded as 1. In WLS, 0 days and 1 days were coded as 0 and contrasted against 2 or more days, coded as 1. In ELSI, "never" was coded as 0 and contrasted against "sometimes" and "always" coded as 1. In PSID, "a little of the day" and "none of the day" were coded as 0 and contrasted against "all of the day," "most of the day" and "some of the day" coded as 1. Incident loneliness was defined as the first instance of loneliness over the follow-up (coded as 1) compared to participants who did not meet the threshold for loneliness over any follow-up waves (coded as 0) among individuals who did not reach the threshold for loneliness at baseline.

1.2.3. Severe psychological distress status

Participants in all cohorts completed short measures of depressive symptoms that have established cutoffs for severe psychological distress. See Supplemental material for detailed information on the scale used in each study and how it was categorized.

1.2.4. Sociodemographic covariates

All sociodemographic factors were self-reported in each of the cohorts. Sociodemographic factors were age (in years), sex (0 = male, 1 = female), race, and education. Race was dummy coded into African American/Black (HRS, MIDUS, PSID, UAS, BPSR, ELSI) and other/unknown (HRS, MIDUS, PSID, UAS, ELSI) and contrasted against white as the reference group (1 for the comparison group, 0 for the reference group). WLS, ELSA, and TILDA are nearly all white, and SHARE does not collect information on the race/ethnicity of participants. Education was reported in years in HRS, WLS, PSID, and UAS. Education was reported as a range from 1 (*no qualification*) to 7 (*degree*) in ELSA, from 1 (*some primary, not complete*) to 7 (*postgraduate/higher degree*) in TILDA, from 1 (*less than high school*) to 7 (*PhD or equivalent*) in BPSR, from 1 (*no school*) to 12 (*advanced degree*) in MIDUS, and from 1 (*never studied*) to 18 (*doctoral degree/PhD*) in ELSI. Education in SHARE was categorized and harmonized across European countries using the 1997 International Standard Classification of Education, from 0 (*Pre-primary education*) to 6 (*Secondary of tertiary education*) (UNESCO, 2003).

1.3. Analytic approach

Linear regression was used to examine the association between purpose in life and loneliness, measured as a continuous variable. Specifically, loneliness was regressed on purpose in life and the sociodemographic covariates in each cohort. All variables were standardized before entered into the analysis. To address whether this association varied as a function of age, we tested for an interaction between purpose and age on loneliness, controlling for the covariates and the main effects of purpose and age. To address whether this association varied as a function of severe psychological distress, we tested for an interaction between purpose and severe distress on loneliness, controlling for the covariates and the main effects of purpose and severe distress. Each analysis was run in each cohort and then the results from the individual cohorts were summarized in a random-effects meta-analysis based on the t-value and sample size from each cohort. Q, I^2, tau, and tau^2 were used as measures of heterogeneity. We likewise summarized the moderation analyses with a random effects meta-analysis.

Cox regression was used to examine the risk of incident loneliness over the follow-up in the longitudinal cohorts among participants who reported no loneliness at baseline. Time was coded as time-to-incidence from baseline to the first instance of loneliness over the follow-up. Participants who did not develop loneliness were censored at their last available assessment. Sense of purpose was used to predict risk of incident loneliness over time, controlling for sociodemographic covariates. Moderation analyses tested whether the association between purpose and risk of loneliness varied by baseline age or severe distress in each cohort. As with the cross-sectional analyses, the analyses were run in each cohort, and then we did a random-effects meta-analysis to summarize the association between sense of purpose and risk of incident loneliness across the longitudinal cohorts. A random-effects meta-analysis was likewise done for the moderator analyses. For both the cross-sectional and longitudinal analyses, analyses of the primary data were conducted in SPSS; the meta-analyses were conducted with Comprehensive Meta-Analysis.

2. Results

Descriptive statistics for each cohort are in Table 1a–b. Fig. 1 shows the results of the cross-sectional linear regression analysis. Across 135,227 participants from the 36 cohorts, sense of purpose in life was

Table 1
Descriptive statistics for each cohort (A) and in SHARE (B).

a

	HRS	MIDUS	ELSA	TILDA	WLSG	WLSS	PBSR	UAS	ELSI	PSID
Age in years	64.72 (10.95)	56.21 (12.36)	65.05 (9.99)	62.64 (9.23)	53.19 (0.62)	53.00 (7.01)	44.18 (18.53)	50.41 (16.19)	62.58 (9.45)	50.42 (14.29)
Age range	18–104	30–84	23–90	49–80	51–56	30–75	18–100	18–109	50–99	30–97
Gender (female)	59% (12048)	53.9% (2002)	56.4% (4515)	55.3% (3789)	54.5 (3092)	54.1% (1431)	53.9% (2039)	58.8% (3669)	56.3% (4604)	56.2% (4576)
Education[a]	12.80 (3.07)	7.31 (2.54)	3.44 (2.24)	3.75 (1.57)	13.75 (2.32)	13.93 (2.56)	3.92 (1.58)	11.24 (2.26)	6.65 (4.38)	14.04 (2.22)
Race (white)	75.9% (15510)	91.9% (3416)	98.4% (7877)	–	100% (5673)	100% (2643)	70.3% (2657)	77.4% (4830)	37.5% (3068)	65.5% (5326)
Race (Black)	16.9% (3442)	3.7% (137)	–	–	–	–	20.2% (764)	8.5% (530)	55.6% (4547)	30.4% (2477)
Race (other)	7.2% (1474)	4.4% (162)	1.6% (127)	–	–	–	9.5% (359)	14.1% (883)	6.9% (567)	4.1% (336)
Sense of purpose[b]	4.62 (0.94)	5.53 (0.98)	3.54 (0.74)	3.72 (0.60)	4.89 (0.79)	4.76 (0.82)	3.53 (0.77)	5.17 (1.44)	2.77 (0.53)	4.12 (0.87)
Loneliness[c]	1.50 (0.55)	1.47 (0.78)	1.44 (0.44)	1.38 (0.43)	0.17 (0.38)	0.17 (0.38)	1.80 (0.50)	0.21 (0.41)	0.35 (0.48)	1.41 (0.88)
Max loneliness assessments	4	2	8	4	3	3	4	24	1	1
Length of Follow-up (years)	6.86 (2.90)	9.10 (0.54)	8.18 (4.82)	5.09 (1.93)	15.86 (3.27)	14.97 (2.80)	0.277 (0.291)	1.33 (0.45)	–	–
Incident loneliness[d]	30.2% (2411)	9.8% (226)	38.4% (1369)	24.6% (1018)	16.4% (773)	18.6% (406)	40.9% (343)	27.3% (629)	–	–
Severe distress (yes)	21.5% (4401)	1.4% (51)	21.3% (1686)	9.1% (620)	19.7% (1119)	21.8% (575)	27.4% (1037)	25.5% (1592)	46% (3766)	6.2% (519)
N	20,426	3715	8004	6847	5673	2643	3780	6243	8182	8139

b

	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland
Age in years	64.91 (10.14)	65.13 (10.68)	68.38 (9.36)	64.54 (9.45)	72.57 (9.81)	66.04 (9.36)	64.47 (10.21)	67.58 (9.83)	68.29 (9.36)
Age range	29–98	22–102	39–92	29–95	50–99	25–100	30–100	37–102	37–96
Gender (female)	58.6% (2563)	55.4% (3007)	60.5% (539)	55.7% (1356)	60.7% (309)	59.0% (3197)	54.2% (2188)	61.4% (3334)	53.8% (612)
Education	3.17 (1.32)	3.10 (1.54)	2.98 (1.10)	2.80 (1.25)	2.34 (1.63)	2.77 (1.13)	3.57 (1.38)	3.37 (0.82)	3.60 (0.70)
Sense of purpose	3.72 (0.59)	3.54 (0.77)	3.32 (0.78)	3.59 (0.65)	3.43 (0.83)	3.50 (0.70)	3.81 (0.50)	3.37 (0.82)	3.60 (0.70)
Loneliness	1.16 (0.34)	1.31 (0.48)	1.39 (0.53)	1.38 (0.48)	1.56 (0.60)	1.39 (0.47)	1.12 (0.30)	1.34 (0.48)	1.31 (0.41)
Max loneliness assessments	5	4	1	3	1	4	4	4	1
Length of Follow-up (years)	4.61 (2.65)	3.80 (2.14)	–	4.33 (0.47)	–	4.56 (2.21)	4.20 (2.35)	4.41 (2.23)	–
Incident loneliness	19.8% (590)	23.2% (712)	–	24.7% (160)	–	37.9% (1036)	11.9% (356)	28.8% (847)	–
Severe distress (yes)	20.6% (901)	29.0% (1577)	26.7% (238)	30.6% (744)	22.8% (116)	25.7% (1395)	17.2% (694)	36.7% (1993)	26.4% (300)
N	4377	5430	891	2433	509	5419	4039	5431	1138

	France	Germany	Greece	Hungary	Israel	Italy	Latvia	Luxembourg	Malta
Age in years	64.45 (10.84)	63.91 (10.27)	66.06 (10.30)	63.89 (9.62)	66.35 (9.76)	66.13 (10.04)	68.27 (10.04)	64.15 (9.86)	68.43 (8.61)
Age range	31–100	30–100	31–94	29–99	37–100	31–102	39–100	41–95	47–96
Gender (female)	57.7% (2765)	53.4% (3008)	56.9% (2703)	57.4% (1646)	56.6% (1242)	55.2% (2526)	63.1% (487)	53.2% (832)	55.4% (427)
Education	2.61 (1.67)	3.49 (1.11)	2.43 (1.63)	3.07 (1.04)	3.24 (1.63)	1.94 (1.36)	3.68 (1.11)	2.60 (1.55)	2.47 (3.37)
Sense of purpose	3.54 (0.76)	3.72 (0.62)	3.30 (0.77)	3.47 (0.84)	3.50 (0.77)	3.42 (0.83)	3.23 (0.78)	3.70 (0.66)	3.44 (0.70)
Loneliness	1.30 (0.48)	1.24 (0.39)	1.60 (0.57)	1.36 (0.51)	1.33 (0.50)	1.40 (0.56)	1.39 (0.52)	1.29 (0.45)	1.38 (0.54)
Max loneliness assessments	5	4	3	5	4	4	1	4	1
Length of Follow-up (years)	5.17 (2.88)	4.79 (2.24)	3.76 (1.15)	8.62 (0.49)	3.29 (2.07)	3.67 (2.09)	–	3.85 (2.39)	–
Incident loneliness	32.2% (836)	20.4% (682)	28.4% (433)	30.4% (143)	47.1% (522)	36.1% (831)	–	19.2% (156)	–
Severe distress (yes)	33.0% (1585)	24.8% (1388)	30.6% (1452)	36.9% (1058)	24.4% (535)	35.1% (1605)	33.8% (261)	28.1% (439)	27.6% (213)
N	4796	5635	4751	2869	2196	4577	772	1565	771

	Netherlands	Poland	Portugal	Slovakia	Slovenia	Spain	Sweden	Switzerland
Age in years	65.50 (9.74)	64.47 (10.95)	63.80 (9.75)	63.40 (8.29)	66.05 (10.12)	67.30 (10.92)	67.77 (9.39)	64.44 (10.46)
Age range	31–98	33–93	31–95	32–103	40–100	29–103	30–99	31–101

(*continued on next page*)

Table 1 (*continued*)

	Netherlands	Poland	Portugal	Slovakia	Slovenia	Spain	Sweden	Switzerland
Gender (female)	55.2% (2203)	56.0% (953)	56.2% (974)	55.4% (547)	57.4% (1658)	54.3% (3372)	53.7% (2364)	55.0% (1996)
Education	2.99 (3.40)	2.82 (1.44)	1.73 (1.43)	3.12 (0.71)	2.91 (1.28)	1.64 (1.51)	3.14 (1.54)	3.18 (1.13)
Sense of purpose	3.78 (0.58)	3.61 (0.70)	3.22 (0.87)	3.46 (0.70)	3.63 (0.64)	3.42 (0.77)	3.74 (0.56)	3.77 (0.56)
Loneliness	1.22 (0.38)	1.22 (0.44)	1.25 (0.46)	1.52 (0.53)	1.22 (0.40)	1.23 (0.43)	1.21 (0.38)	1.13 (0.31)
Max loneliness assessments	4	5	5	1	4	4	4	5
Length of Follow-up (years)	6.65 (0.49)	4.66 (2.65)	3.84 (0.47)	–	4.19 (2.43)	3.64 (2.16)	4.26 (2.29)	5.71 (2.84)
Incident loneliness	16.8% (219)	20.4% (165)	29.6% (282)	–	24.6% (465)	24.7% (900)	23.6% (650)	22.5% (587)
Severe distress (yes)	17.9% (713)	25.7% (437)	40.6% (703)	23.6% (233)	24.4% (706)	29.3% (1818)	19.0% (836)	18.8% (682)
N	3991	1701	1733	987	2890	6214	4402	3632

Note. Numbers are means (standard deviations) or percentages (n). HRS = Health and Retirement Study. MIDUS = Midlife in the United States. ELSA = English Longitudinal Study of Ageing. TILDA = The Irish LongituDinal study on Ageing. WLSG = Wisconsin Longitudinal Study Graduate sample. WLSS = Wisconsin Longitudinal Study Sibling sample. BPSR = Psychological, Behavioral, and Social Response to the 2020 Coronavirus Pandemic Study. UAS = Understanding America Study. ELSI = the Brazilian Longitudinal Study of Aging. PSID = Panel Study of Income Dynamics. SHARE = Survey of Health, Ageing and Retirement in Europe.

[a] Education was reported in years in HRS, WLS, PSID, and UAS. Education was reported as a range from 1 (*no qualification*) to 7 (*degree*) in ELSA, from 1 (*some primary, not complete*) to 7 (*postgraduate/higher degree*) in TILDA, from 1 (*less than high school*) to 7 (*PhD or equivalent*) in BPSR, from 1 (*no school*) to 12 (*advanced degree*) in MIDUS, and from 1 (*never studied*) to 18 (*doctoral degree/PhD*) in ELSI.

[b] Purpose in life was rated on a 3-point scale in ELSI, a 4-point scale in ELSA, TILDA, and SHARE, a 5-point scale in BPSR and PSID, a 6-point scale in HRS and WLS, and a 7-point scale in MIDUS and UAS. The scale was scored in the direction of higher purpose in each cohort.

[c] Loneliness was rated on 3-point scale in HRS, ELSA, TILDA, BPSR, ELSI and SHARE, a 5-point scale in MIDUS and PSID, and the number of days in the last week in WLS, and as yes/no (coded yes = 1, no = 0) in UAS.

[d] Participants who were not lonely at baseline and who reported loneliness at least once over the follow-up.

associated consistently with concurrent loneliness: Participants with a greater sense of purpose in life reported less loneliness. Of note, the association was in the same direction and statistically significant in all 36 cohorts, which indicated this association was apparent on three continents (North America, South America, Europe) and the Middle East. Full results of the regression analysis are in Supplemental Table S1. The meta-analytic effect estimate was −0.31 (95% CI = −0.34, −0.29, $p < .001$). There was significant heterogeneity in the association (Q = 1048.57, p < .001; I^2 = 96.66; tau = 0.082; tau^2 = 0.0068), which suggested differences in the magnitude of the association across cohorts included in the analysis. In follow-up, exploratory analyses that were not preregistered, we found that the associations were similar in cohorts that used measures of purpose (HRS, MIDUS, WLS, PBSR; effect estimate = −0.31, 95% CI = −0.39, −0.23, $p < .001$) versus meaning (ELSA, TILDA, ELSI, SHARE; effect estimate = −0.31, 95% CI = −0.34, −0.28, $p < .001$), in cohorts where purpose was measured with one item (ELSA, TILDA, ELSI, PSID, UAS; effect estimate = −0.31, 95% CI = −0.34, −0.28, $p < .001$) versus with multiple items (HRS, MIDUS, WLS, PBSR; effect estimate = −0.36, 95% CI = −0.41, −0.30, p < .001), and in cohorts from the US (effect estimate = −0.30, 95% CI = −0.36, −0.24, $p < .001$) versus other countries (effect estimate = −0.31, 95% CI = −0.34, −0.28, $p < .001$). The associations were slightly stronger in cohorts that used scales to assess loneliness (HRS, ELSA, TILDA, PBSR, SHARE; effect estimate = −0.32, 95% CI = −0.34, −0.30, p < .001) compared to cohorts that used a single item (MIDUS, WLS, ELSI, PSID, UAS; effect estimate = −0.26, 95% CI = −0.33, −0.19, p < .001). Of note, most cohorts were from high income countries, but among two upper-middle income countries, there was a weaker association in Brazil and a stronger association in Bulgaria (Fig. 1).

There was evidence that the association between sense of purpose and loneliness was moderated by severe psychological distress. Specifically, sense of purpose was associated negatively with loneliness among participants in both groups (i.e., among participants concurrently experiencing severe psychological distress and participants who were not), but the negative association was stronger among participants who were experiencing severe distress. The interaction was significant in 28 out of the 36 cohorts and in the meta-analysis (effect estimate = −0.07, 95% CI = −0.08, −0.05, $p < .001$; see Supplemental Table S2 for results from each cohort). There was significant heterogeneity (Q = 495.94, $p < .001$; I^2 = 92.94; tau = 0.056; tau^2 = 0.0031). When stratified by distress status, the meta-analytic association between purpose and loneliness was −0.17 (95% CI = −0.20, −0.14, $p < .001$) for participants not concurrently experiencing distress and −0.30 (95% CI = −0.34, −0.36, p < .001) for participants concurrently experiencing distress. The association between sense of purpose and loneliness was not moderated by age (effect estimate = 0.00, 95% CI = −0.01, 0.01, $p = .895$; Q = 266.88, p < .001; I^2 = 86.88; tau = 0.039, tau^2 = 0.0016; see Supplemental Table S3 for results from each cohort).

Across the 28 longitudinal cohorts, the prevalence of incident loneliness ranged from 9.8% in MIDUS to 47.1% in SHARE (Israel) over a follow-up that ranged from months in BPSR to about 15 years in WLS (Table 1). Similar to the cross-sectional analysis, the survival analysis with Cox regression indicated that sense of purpose was protective against incident loneliness over the follow-up (see Supplemental Table S4 for full results of the Cox regression analyses). Specifically, among participants who did not feel lonely at baseline, those with a greater sense of purpose were protected against developing loneliness over the follow-up. This association was apparent in 24 out of the 28 cohorts with longitudinal data (Fig. 2): For every standard deviation increase in purpose, there was a nearly 20% decreased risk of incident loneliness over the follow-up (meta-analytic hazard ratio [HR] = 0.85, 95% CI = 0.82, 0.87, $p < .001$). There was significant heterogeneity (Q = 118.85, p < .001; I^2 = 77.28; tau = 0.065; tau^2 = 0.0042). This association was not moderated consistently by either age (meta-analytic HR = 1.02, 95% CI = 1.00, 1.03; Q = 56.30, p < .001; I^2 = 52.04; tau = 0.021; tau^2 = 0.0004; see Supplemental Table S5 for results from each cohort) or distress (meta-analytic HR = 1.02, 95% CI = 0.99, 1.03; Q = 29.02, $p = .360$; I^2 = 6.95; tau = 0.016; tau^2 = 0.0002; see Supplemental Table S6 for results from each cohort).

3. Discussion

Across 36 cohorts that ranged in age from 18 to 109, there was clear evidence for a relation between sense of purpose in life and loneliness: Individuals who perceived more purpose in their lives felt less lonely. The meta-analytic mean effect was −0.31, which indicates a moderate effect size. Sense of purpose was further protective against the development of loneliness over time across follow-ups that ranged from months to 15 years. There was no evidence that either the cross-sectional or longitudinal associations varied by age, but there was some evidence that the negative cross-sectional association was stronger among individuals with concurrent severe psychological distress.

Consistent with theoretical conceptualizations of purpose (McKnight and Kashdan, 2009; Scheier et al., 2006) and its association with better mental health (Mei et al., 2021), there was strong, replicable evidence that sense of purpose in life is associated with less loneliness.

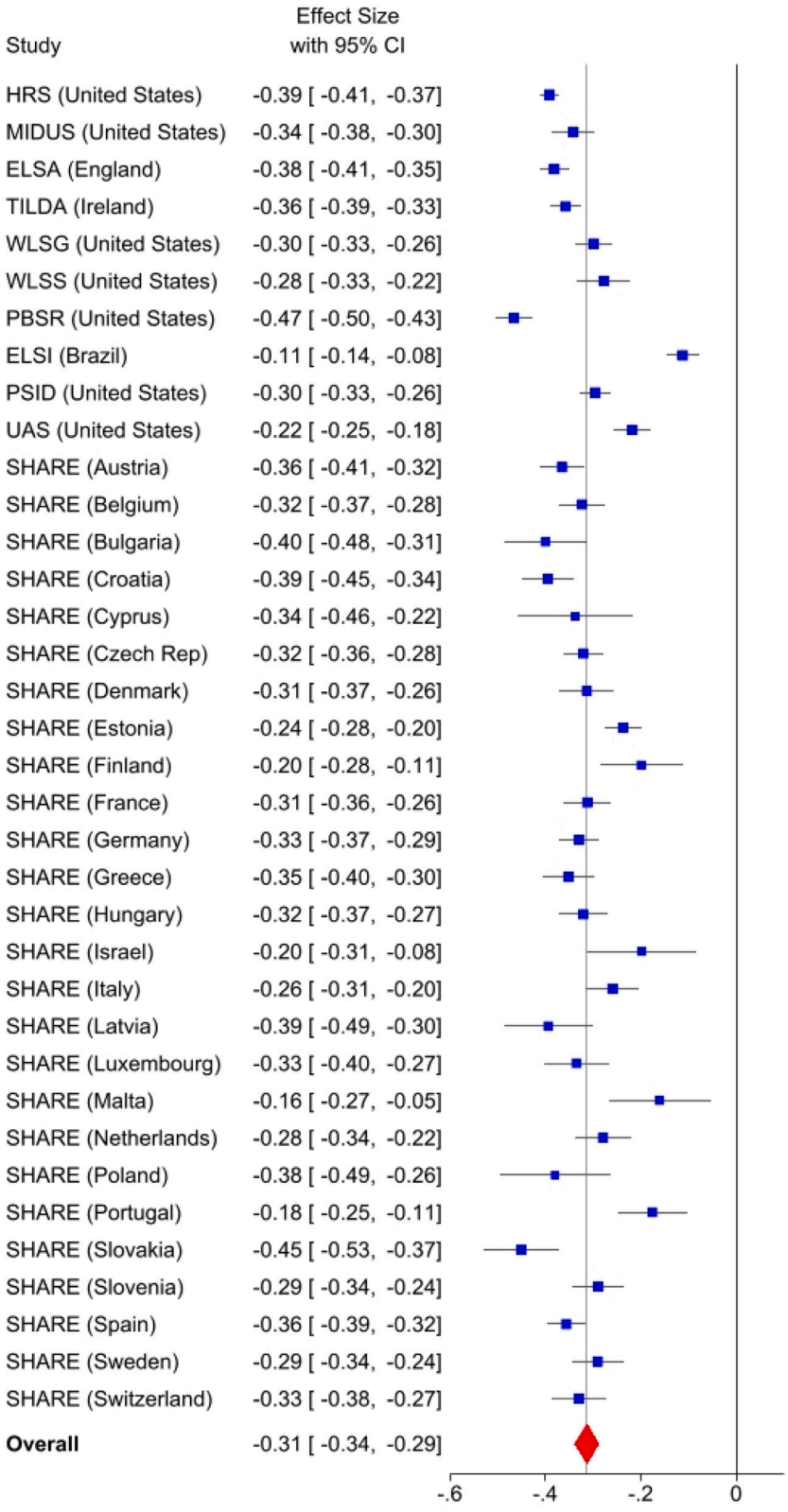

Fig. 1. Forest plot of the cross-sectional association between sense of purpose and loneliness in 36 cohorts.

Theoretically, greater engagement is one core aspect of sense of purpose (McKnight and Kashdan, 2009), and many types of engagement associated with purpose are inherently social (e.g., teaching [Nickel and Zimmer, 2019] and caregiving [Yu et al., 2018]; although caregiving can also be associated with greater loneliness [Luchetti et al., 2021]). Other forms of purpose (e.g., engagement in creative activities; Eakman et al., 2010) can also be satisfying regardless of whether engaged in with other people or not. Empirically, individuals with a greater sense of purpose tend to have better mental health over time (Laird et al., 2019; Wood and Joseph, 2010), and initial cross-sectional evidence indicates

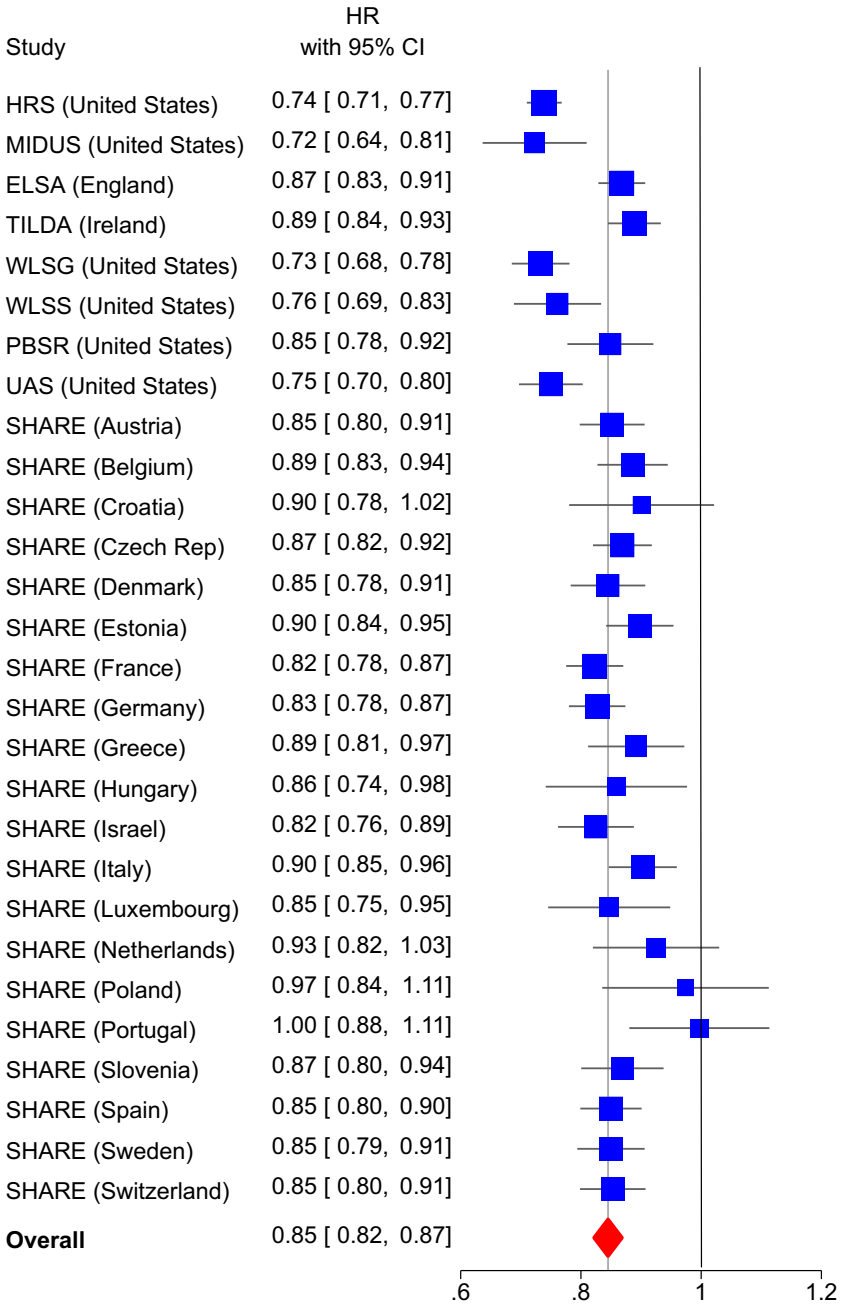

Fig. 2. Forest plot of the longitudinal association between sense of purpose and risk of incident loneliness in 28 cohorts. Sample size and prevalence of incident loneliness for each cohort can be found in Table 1.

that this protective association extends to less loneliness (Neville et al., 2018). The better physical health of individuals with a greater sense of purpose may also facilitate social interactions that help protect against loneliness. The present research expands this evidence base to demonstrate that the negative association between sense of purpose and loneliness is robust and apparent across populations that were sampled from North America, South America, Europe, and the Middle East. In addition, the present analysis showed that there were no differences in the association between cohorts from the United States versus other countries or when purpose was measured specifically as purpose in life versus meaning in life (the estimated association was essentially identical).

There was evidence that the association between sense of purpose and loneliness was moderated by concurrent severe psychological distress. Specifically, the association between purpose and loneliness was apparent in both groups, but it was stronger among participants also experiencing severe distress. This pattern suggests that purpose may be a psychological resource that is even more protective among individuals currently suffering from distress. It could also indicate that among individuals with severe distress, there is a stronger association between loneliness and feeling that one's life lacks purpose (i.e., both lack of purpose and greater loneliness may be symptoms of distress). Of note, however, the association was still apparent among individuals who were not distressed, which somewhat speaks against the latter interpretation. This moderation was not seen longitudinally, which was likely because most participants who were experiencing severe distress also reported loneliness at baseline and thus not included in the longitudinal analysis. As such, there was less power to detect an effect because the number of participants who experienced severe distress but did not feel lonely at baseline was small.

There was no consistent evidence that the association between sense of purpose and loneliness was moderated by age. Sense of purpose in life and loneliness tend to show both normative and nonnormative changes across adulthood (Hill and Weston, 2019; Luhmann and Hawkley, 2016). Given that loneliness tends to increase among the oldest old (Luhmann and Hawkley, 2016) and that loneliness is associated with poor health outcomes in older adulthood (Holt-Lunstad et al., 2015), identifying factors that can help promote resilience to loneliness may help to improve health outcomes among older adults. The present findings indicate that purpose has similar protective associations across adulthood, even in old age.

The longitudinal analyses provide perhaps stronger evidence for the protective role of sense of purpose and loneliness. Specifically, sense of purpose was protective against the development of loneliness among participants who were not feeling lonely at baseline. This longitudinal evidence is consistent with previous research that has found purpose to be protective against the development of depression over 10 years (Wood and Joseph, 2010). It expands the current evidence base to include social health as well as mental health. Similar to the cross-sectional associations, the protective association may be due to the greater social integration, greater engagement, and better health that is characteristic of individuals higher in purpose (McKnight and Kashdan, 2009). Loneliness may likewise serve as a mechanism for better health for sense of purpose. That is, less loneliness may be one pathway through which purpose leads to better physical, mental, and cognitive health outcomes.

Of note, two of the longitudinal cohorts had follow-up assessments specifically to measure psychological and behavioral responses to the coronavirus pandemic, both in the acute phase (BPSR) and across the first year of the pandemic (UAS). Although at the population level, there is little evidence that loneliness increased in response to the pandemic (Luchetti et al., 2020), there have been individual differences in loneliness during COVID (Bu et al., 2020). That is, some individuals felt lonelier during the pandemic, whereas others felt less lonely, which led to net stability in loneliness over time at the sample level. The present research indicates that a greater sense of purpose prior to the pandemic was protective against developing loneliness during the pandemic, and thus may be an individual difference factor that confers protection against the development of subjective social isolation, even in extreme circumstances. These results also suggest that the protective association may be independent of context, which may indicate that purpose has a robust protective association against the development of loneliness.

There is some evidence that purpose in life can be increased through intervention (Park et al., 2019). The work to date on interventions has focused primarily on increases in purpose and meaning as the outcome. It is likely that increasing purpose has consequences beyond greater purpose. That is, when individuals feel more purposeful, they may also seek out situations and experiences that result in meaningful connections with other people and/or a greater focus on goals that reduce the need to feel connected with others. The end result might thus be less loneliness. Such an intervention may have downstream consequences for health. Specifically, more loneliness has been associated with worse health, such as higher blood pressure (Momtaz et al., 2012) and diabetes (Hackett et al., 2020), as well as risk of premature mortality (Holt-Lunstad et al., 2015). As such, decreasing loneliness through increasing purpose may have beneficial effects of morbidity and mortality.

The present study had several strengths, including 36 cohorts with concurrent ratings, 28 cohorts with longitudinal data that spanned up to 15 years follow-up, and cohorts with longitudinal data that spanned from before to during the pandemic. There are also some limitations that could be addressed in future research. First, although the cohorts came from different regions across Europe, North and South America, and the Middle East, cohorts from large portions of the world are missing, including Africa, Asia, and Oceania. Likewise, all cohorts came from middle- or high-income countries. Future research would benefit from cohorts drawn from all continents and lower-income countries to improve generalizability of the findings. Second, we examined the replicability and longitudinal protective association of purpose on incident loneliness, but not the mechanisms that explain this association. Future research could take a mechanistic approach and a qualitative or mixed-method approach to why purpose protects against loneliness (e.g., greater daily engagement). Third, and likewise, future research could test loneliness as one mechanism through which purpose is associated with better health (i.e., higher purpose may be associated with better health through less loneliness). Fourth, the reader may also want to consider that these replicable and robust associations may be due to confounding factors not accounted for in the present study. Fifth, there were some methodological issues, including the use of two samples who were siblings, the covariates measured in different ways across cohorts, and that the analyses relied on secondary data sources and thus measures could not be standardized before data collection. Despite these limitations, the present research provides evidence for robust, replicable associations between sense of purpose and loneliness and that a greater sense of purpose is associated with protection against the development of loneliness.

CRediT authorship contribution statement

ARS designed the study, wrote the protocol, managed the analyses, and wrote the first draft of the manuscript. AT conducted the meta-analysis. ML, DA, JHL, AAS, YS, and AT provided critical feedback on the protocol development, interpretation of the findings, and assisted in manuscript development. All authors contributed to and have approved the final manuscript.

Declaration of competing interest

The authors have no conflicts of interest to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2022.04.084.

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