Online Supplementary Information (SI) for Publication in *The Gerontologist*:

Purpose in life, loneliness, and protective health behaviors during the COVID-19 pandemic

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Notes: This document includes main and exploratory analyses preregistered in https://osf.io/39vfg/. The current study used a subset of data from a larger preregistered study (https://osf.io/8hn2g/). Please see https://osf.io/bydv3/ for the complete list of survey measures included in the project and https://osf.io/xwbhu/ for data quality assessment standard operating procedures. All the data, analysis scripts and output statistics reported in the main manuscript and supplemental information are available at https://github.com/cnlab/covid_purpose.

SI1. Amazon's Mechanical Turk (MTurk) data collection, exclusions and quality control.
We recruited participants through MTurk as part of a larger study about COVID-19 prevention behaviors. Within the larger study, participants were randomly assigned to complete different subcomponents of a multi-part survey so that each participant was asked a smaller number of total questions, given that this study was part of a larger research project with multiple team members' questions included. This design helped minimize participant burden while allowing researchers to share some common metrics.

Data from 142 participants were excluded following preregistered data quality assessment standard operating procedures (https://osf.io/xwbhu/): 116 failed attention check, 10 failed English fluency check, 5 failed COVID comprehension checks (gave incorrect definitions of "COVID-19" or "social distancing" as determined by the research team, after being told the definitions), and 11 failed more than one of the aforementioned criteria.

MTurk data can be comparable in quality to data collected via more conventional means (Mortensen & Hughes, 2018), and MTurk workers tend to report similar levels of problematic respondent behavior as participants from in-person data collection (Necka et al., 2016). However, we took additional measures to improve data quality control and prevent the possibility that our participants might differ from the general population with regards to measures specific to our study. For example, we did not include key variables tested in this report (e.g., purpose in life, loneliness, age) to the study description on the MTurk platform (our study description said: "a research study about health messages and your thoughts") to avoid potentially attracting workers who seek purpose in life and/or experience loneliness. Further, in accordance with our preregistered standard operating procedures for data quality assessment (https://osf.io/xwbhu/),we included screen checks to exclude participants who were not paying attention, did not comprehend English, or did not understand definitions of COVID-19 and social distancing. However, we note that our sample differed from the general populations, for example, with 45% women vs. 51% in the United States national sample (www.census.gov/).

SI2. COVID-19 related outcomes. We examined the intentions to engage in health behavior known to prevent the spread of the novel coronavirus disease 2019 (COVID-19) as primary outcomes in the main text. In addition, we also tested whether higher self-reported purpose in life and lower perceived levels of loneliness were associated with more positive responses to other COVID-19 related measures, including norms and beliefs regarding COVID-19.

Intentions to engage in behaviors to slow the spread of COVID-19
Please rate how much you intend to do the following things over the next two weeks.
(1=definitely won't, 7=definitely will)
Participants answered ten question items described under "Perceived norms regarding COVID-19", below.

Perceived norms regarding COVID-19
For these questions, think about your closest friends and family. What proportion of them will do the following things in the next two weeks? (0%-100%)

Social distancing
1) Stay home and avoid all social contact, even if I'm not sick.
2) Limit my grocery shopping to once a week or less.
3) Stay at least 6 feet apart from others when I'm in public.
4) Avoid all public gatherings, even if I'm not sick.

Hand hygiene
5) Wash my hands for at least 20 seconds with soap and warm water each time I wash them.
6) Touch commonly used surfaces (e.g., doorknobs) with my hands when I'm in public. (r)
7) Touch my face when I'm in public. (r)
8) Shake hands when I meet others. (r)

Staying home
9) Stay home if I'm sick.
10) Work from home every day I need to work.

Notes: (r) Reverse coded; responses to the above ten items were averaged for the final intentions and perceived norms scores. Please see SI4 below for exploratory results using average scores within subcategories.

Beliefs regarding COVID-19
If I stay home every day for the next two weeks, and avoid social contact, even if I'm not sick: (1=strongly disagree, 7=strongly agree)

Norms
1) It will be awkward to avoid my friends. (r)
2) My family will approve of my decision.
3) My friends will approve of my decision.

Protect others
1) I will keep my family safe.
2) I will keep people in my community safe.
3) I will prevent others from getting COVID-19.
4) I will protect more vulnerable people in our society.
5) I will slow the spread of COVID-19.
6) It will be good for society.
7) It will help stop the spread of COVID-19.
8) It will help the healthcare system from being over flooded and enable people who need urgent medical care to receive it.

Keeping myself safe
1) I will avoid coming in contact with coronavirus.
2) I will be less likely to get COVID-19.

3) I will be less likely to get sick.
4) I will keep myself safe.
5) I will be able to take care of myself.

Notes: (r) Reverse coded; responses to the above question items were averaged within each category.

SI3. Associations between self-reported purpose in life and responses to COVID-19 related measures, including norms and beliefs. Across participants, higher self-reported purpose in life was associated with higher perceived norms about COVID protective behaviors among social ties (B=4.96, $t(508)$=7.31 , p<.001, $CI_{95\%}$[3.63, 6.29]). Further, having a stronger sense of purpose in life was associated with greater beliefs that taking COVID protective measures will be approved by their social ties (B=0.37, $t(511)$=7.85, p<.001, $CI_{95\%}$[0.28, 0.46]), protect others (B=0.31, $t(511)$=7.12, p<.001, $CI_{95\%}$[0.22, 0.39]), and keep themselves safe (B=0.30, $t(511)$=7.94, p<.001, $CI_{95\%}$[0.22, 0.37]). Although our data cannot directly answer precisely how purpose promotes protective health behavior, one possibility is that purpose may allow individuals to find a sense of meaning in the act of taking health measures that protect family and community members.

SI4. COVID-related outcomes specific to social distancing and other non-social distancing behaviors. We conducted exploratory analyses that included COVID-19 related outcome measures (intentions and norms) by grouping items explicitly related to social distancing behavior (n=4), given its stronger conceptual link to loneliness. In addition, we also separately tested other outcome scores averaged under the hand hygiene (n=4) and staying home (n=2) subcategories (see SI2).

First, having a stronger sense of purpose in life was associated with each of the preventive behavior type, including: greater intentions to maintain social distance (B=0.21, $t(511)$=5.85, p<.001, $CI_{95\%}$[0.14, 0.28]), maintain hand hygiene (B=0.55, $t(511)$=10.10, p<.001, $CI_{95\%}$[0.44, 0.65]), and stay home during the pandemic (B=0.16, $t(511)$=3.31, p=.001, $CI_{95\%}$[0.07, 0.26]). Having a stronger sense of purpose also predicted higher perceptions about the normative approval of protective health behaviors including social distancing (B=3.83, $t(509)$=4.75, p<.001, $CI_{95\%}$[2.24, 5.41]), hand hygiene maintenance (B=6.90, $t(508)$=7.92, p<.001, $CI_{95\%}$[5.19, 8.61]), and staying home (B=3.26, $t(509)$=3.74, p<.001, $CI_{95\%}$[1.55, 4.97]).

Next, we tested whether the association between loneliness and COVID-19 related outcomes was driven by specific types of protective behavior. Higher loneliness predicted worse outcomes for each of the preventive behavior type: higher loneliness was associated with lower intentions to maintain social distance (B=-0.07, $t(511)$=-3.76, p<.001, $CI_{95\%}$[-0.10, -0.03]), maintain hand hygiene (B=-0.18 , $t(511)$=-6.58, p<.001, $CI_{95\%}$[-0.24, -0.13]), and stay home during the pandemic (marginal: B=-0.05, $t(511)$=-1.95, p=0.052, $CI_{95\%}$[-0.09, 0.00]).

Higher loneliness also predicted lower perceptions about the normative approval of protective health behaviors including social distancing (B=-1.04, t(509)=-2.61, p=.009, $CI_{95\%}$[-1.83, -0.26]) and hand hygiene maintenance (B=-2.03, t(508)=-4.59, p<.001, $CI_{95\%}$[-2.90, -1.16]). Loneliness was not associated with the norms about staying home (B=-0.54, t(509)=-1.26, p=.207, $CI_{95\%}$[-1.39, 0.30]).

Taken together, although the current study was not designed to test different types of protective health behaviors, these results generally suggest that overall, the associations between purpose in life, loneliness, and COVID protective outcomes were not specific to health behaviors that may (e.g., social distancing) or may not (e.g., handwashing) affect social outcomes.

SI5. Associations between perceived loneliness and responses to COVID-19 related measures. Higher current loneliness was associated with lower perceived norms about COVID protective behaviors among social ties (B=-1.34, t(508)=-3.90, p<.001, $CI_{95\%}$[-2.02, -0.67]), and beliefs that taking COVID protective measures will be approved by others in a social network (B=-0.13, t(511)=-5.46, p<.001, $CI_{95\%}$[-0.18,-0.08]), protect others (B=-0.06, t(511)=-2.78, p=.006, $CI_{95\%}$[-0.10, -0.02]), or keep themselves safe (B=-0.06, t(511)=-3.13, p=.002, $CI_{95\%}$[-0.10, -0.02]).

SI6. Robustness checks. We conducted additional robustness checks by dividing the sample at the median purpose score (median=4.429). We examined the relationship between 1) age and current loneliness and 2) loneliness and COVID preventive intentions among individuals who have relatively stronger (n=260) and relatively weaker (n=257) senses of purpose in life. The results were consistent with the results from the simple slopes analysis described in the main text: 1) Older age was associated with less current loneliness only among individuals with a stronger sense of purpose in life (B=-0.03, t(254)=-2.78, p=.006,$CI_{95\%}$[-0.05, -0.01]). By contrast, age was not associated with loneliness among those with a weaker sense of purpose in life (B=-0.01, t(251)=-0.99, p=.324, $CI_{95\%}$[-0.03, 0.01]); 2) Higher loneliness was associated with lower COVID preventive intentions only for individuals with a weaker sense of purpose in life (B=-0.09, t(251)=-2.99, p=.003, $CI_{95\%}$[-0.15, -0.03]). By contrast, loneliness was not associated with preventive intentions among those with a stronger sense of purpose in life (B=-0.02, t(254)=-0.80, p=.427, $CI_{95\%}$[-0.06, 0.03]).

SI7. Potential demographic covariates. All primary analyses were repeated with potential covariates, including gender, ethnicity, socioeconomic status (SES), the total number of household members, and age (in models that did not include age as a predictor). When we repeated analyses with these potential covariates, all results remained parallel as described below. All output statistics are available at https://github.com/cnlab/covid_purpose.

The MacArthur Scale of Subjective Social Status (Adler et al., 2000) we used to measure SES asked: Think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who have the most money, the most education, and the most respected jobs. At the bottom are the people who have the least money, least education, and the least respected jobs or no job. Relative to other people in the United States right now, where would you place yourself on this ladder?"

Controlling for potential covariates, having a stronger sense of purpose continued to be associated with lower loneliness for both the current (B=-0.74, t(441)=-8.14, p<.001, CI$_{95\%}$[-0.92, -0.56]) and pre-pandemic levels of loneliness (B=-0.89, t(441)=-11.78, p<.001, CI$_{95\%}$[-1.04, -0.75]). Consistent with the results reported in the main text, having a greater sense of purpose was associated with stronger intentions to engage in COVID protective behaviors (B=0.32, t(441)=8.70, p<.001, CI$_{95\%}$[0.24, 0.39]). Likewise, individuals who reported higher levels of loneliness, for both the current (B=-0.08, t(441)=-4.40, p<.001, CI$_{95\%}$[-0.12, -0.05]) and pre-pandemic levels of loneliness (B=-0.16, t(441)=-7.81, p<.001, CI$_{95\%}$[-0.20, -0.12]), also reported lower intentions to engage in COVID protective behaviors controlling for covariates.

Consistent with the results reported in the main text, we did not detect a significant interaction between purpose in life and age in predicting current levels of loneliness (B=-0.01, t(440)=-0.99, p=.323, CI$_{95\%}$[-0.02, 0.01]). Likewise, the interaction between purpose and loneliness on preventive intentions was not significant (B=0.03, t(444)=0.35, p=.729, CI$_{95\%}$[-0.03, 0.04]).

SI8. Subsetting the sample. We repeated all preregistered analyses using a subset of the sample (n=178) with participants who were randomly assigned to a condition where they did not receive any COVID-19 messages as part of a larger study (https://osf.io/8hn2g/). Results from this subsample were consistent with the results described in the main manuscript:

In this subsample, having a stronger sense of purpose was associated with lower current levels of loneliness as in the main analysis (B=-0.81, t(176)=-5.51, p<.001, CI$_{95\%}$[-1.11, -0.52]). Having a stronger sense of purpose was also associated with higher COVID preventive intentions in this subsample (B=0.33, t(176)=5.18, p<.001, CI$_{95\%}$[0.20, 0.46]; for social distancing items exclusively: B=0.21, t(176)=3.61, p<.001, CI$_{95\%}$[0.10, 0.33]), perceived norms about COVID protective behaviors among social ties (B=3.86, t(176)=3.38, p<.001, CI$_{95\%}$[1.60, 6.11]; for social distancing items exclusively: B=3.08, t(176)=2.51, p=.013, CI$_{95\%}$[0.66, 5.50]), and beliefs that taking COVID protective measures will be approved by others in a social network (B=0.28, t(176)=3.41, p<.001, CI$_{95\%}$[0.12, 0.44]), protect others (B=0.40, t(176)=5.66, p<.001, CI$_{95\%}$[0.26, 0.54]), and keep themselves safe (B=0.33, t(176)=5.06, p<.001, CI$_{95\%}$[0.20, 0.46]).

Higher loneliness was associated with lower COVID preventive intentions in this subsample (B=-0.11, t(176)=-3.61, p<.001, CI$_{95\%}$[-0.17, -0.05]; for social distancing items exclusively: B=-0.08, t(176)=-2.68, p=.008, CI$_{95\%}$[-0.13, -0.02]).

Figure SI. A. Exploratory simple slopes analysis testing the relationship between current loneliness and COVID preventive intentions at three levels of purpose in life. Higher loneliness was significantly associated with lower intentions only at lower (B=-0.08, t(509)=-3.32, p=.001, CI$_{95\%}$[-0.13, -0.03]) and mean (B=-0.05, t(509)=-2.73, p=.006, CI$_{95\%}$[-0.09, -0.01]) levels of purpose in life. However, this relationship weakened at higher levels of purpose, such that loneliness was no longer associated with COVID preventive intentions at one standard deviation above the mean purpose (B=-0.02, t(509)=-0.83, p=.405, CI$_{95\%}$[-0.08, 0.03]). However, the

slopes did not significantly differ from one another (*p*s>.10). **B.** Exploratory simple slopes analyses displaying four levels of age, at one standard deviation below the mean (26.4 years), mean (37.7 years), one standard deviation above the mean (49 years), and two standard deviations above the mean (60.3 years) ages, across three levels of purpose in life. The link between loneliness and COVID preventive intentions weakened at higher levels of purpose across age. Raw scores are displayed for the ease of interpretation.
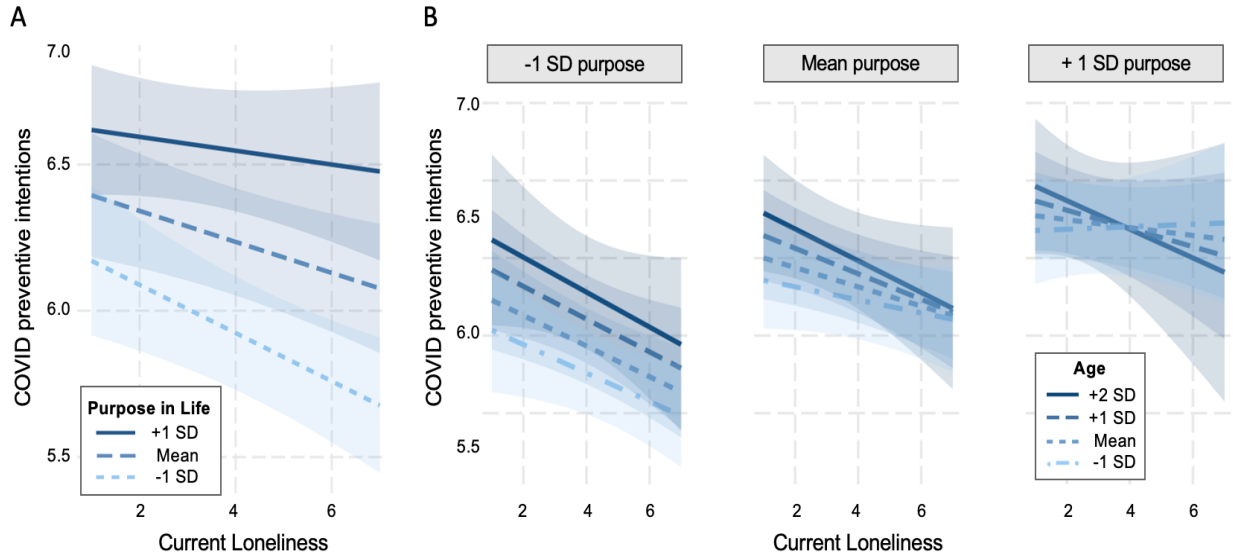
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