

Supplementary Material

Personal Resources and Structural–Relational Circumstances Are Consistent With an Additive Pattern of Association With Loneliness in Later Life

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This document reports three additional sensitivity analyses referred to in the main text (Section 3.2.1) but not required to follow the primary results.

1 S1. OLS diagnostics and heteroscedasticity-robust inference

The final hierarchical model (Table 1, main text) was checked for the standard OLS assumptions. A Breusch–Pagan test found no evidence of heteroscedasticity ($LM = 8.15$, $p = .614$). Residuals departed modestly from normality (Shapiro–Wilk $W = .963$, $p < .001$), consistent with the right-skewed, bounded nature of the loneliness count; this motivates the negative-binomial sensitivity check reported in the main text. Nineteen observations exceeded the conventional Cook’s distance threshold of $4/N$, with a maximum Cook’s distance of .029 — small in absolute terms and not indicative of individual points driving the results. Re-estimating the final model with heteroscedasticity-robust (HC3) standard errors left every coefficient’s significance pattern unchanged (Table 1).

Table 1: Final hierarchical model: ordinary least squares versus heteroscedasticity-robust (HC3) p -values.

Predictor	OLS p	HC3 p
Age	.570	.560
Sex (female)	.260	.279
Low education	.225	.209
Widowhood	.584	.600
Not with family	.086	.095
Pandemic fear	.059	.053
Messaging-app use	.632	.622
Empathy	.007	.007
Resilience	.005	.006
Meaning (presence)	<.001	.001

2 S2. Ordinal-outcome sensitivity analysis

Total loneliness (range 0–11) was recoded into three ordered categories (0–2, $n = 130$; 3–5, $n = 104$; 6–11, $n = 68$) and the final model re-estimated as an ordinal logistic regression. The pattern of significant predictors was essentially unchanged from the linear and negative-binomial specifications: empathy ($p = .010$), resilience ($p = .015$) and meaning ($p = .006$) were significant, and pandemic fear reached significance in this specification ($p = .010$) where it had only approached it in the linear model ($p = .059$). No structural–relational predictor other

than pandemic fear was significant. This is consistent with the main conclusions and does not depend on treating the bounded count as continuous.

3 S3. Cumulative structural-risk index

As a simpler alternative to the three separate binary risk indicators, we constructed a cumulative risk index (0–3) summing widowhood, not living with family, and low education. Distribution: 0 risks, $n = 70$; 1, $n = 112$; 2, $n = 72$; 3, $n = 48$. Mean total loneliness rose with the index (2.99, 2.92, 4.10, 4.44 respectively; Spearman $\rho = .233$, $p < .001$), consistent with the additive structural gradient reported in the main text. None of the three personal resources moderated this cumulative index (empathy $\times$ index $p = .554$; resilience $\times$ index $p = .879$; meaning $\times$ index $p = .575$), reinforcing the absence of a buffering interaction found with the disaggregated risks.