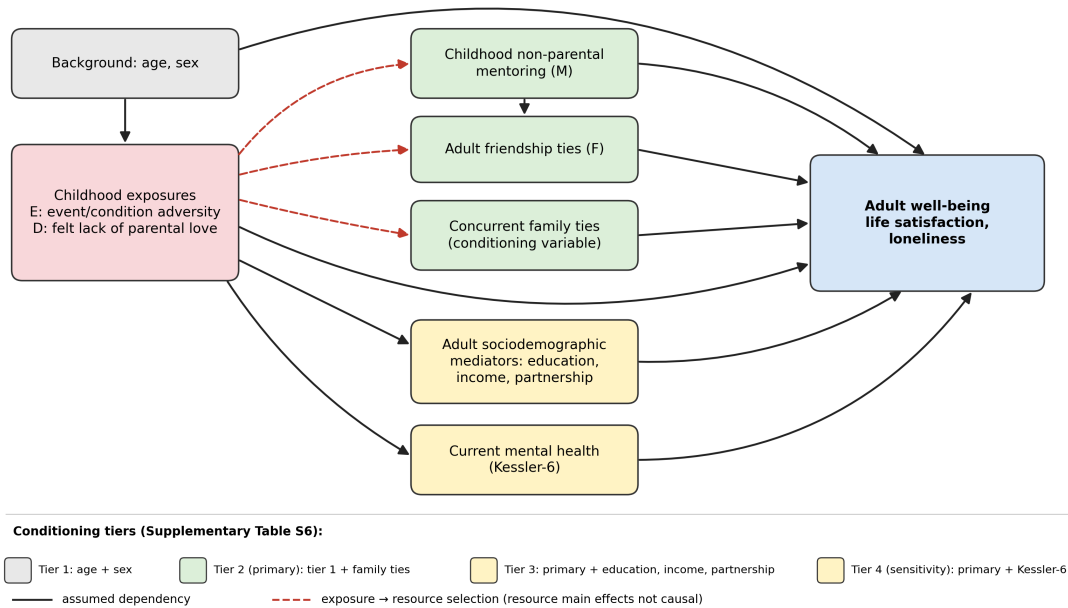


SUPPLEMENTARY INFORMATION

Childhood mentoring, adult friendships and well-being after childhood disadvantage

Contents: Supplementary Fig. 1 (conceptual dependency diagram); Supplementary Tables S1–S14; Supplementary References. Conventions: regression coefficients, contrasts and 95% confidence intervals are reported to three decimal places, means and predicted values to two, percentages to one; P values are given to two significant figures, with $P < 0.001$ in scientific notation; all P values outside the two Holm-controlled families are nominal.

Supplementary Fig. 1 Conceptual dependency structure motivating the conditioning tiers



Conceptual dependency diagram motivating the minimal primary conditioning set (age, sex and concurrent family ties); it is not a causal-identification DAG.

Education, income, partnership and current mental health are treated as potential mediators of childhood exposures; adjusting for them risks overcontrol (Schisterman et al., 2009). Concurrent family ties are included as a relationship-source specificity adjustment rather than as a causal confounder, and an age- and sex-only tier is reported alongside the primary tier. Extended sociodemographic and current-mental-health-adjusted models are reported as sensitivity tiers in Supplementary Table S6; the current-mental-health tier is interpreted as a

reporting-bias sensitivity, not as a causal estimate (estimates in Supplementary Table S6).

Supplementary Table S1 | Analytic universe and multiplicity families

Family	Tests	Multiplicity handling
Family 1 (co-primary)	H1 crossed contrast L (life satisfaction); H2 friend × E (loneliness)	Holm, two tests
Family 2 (broader sensitivity family)	The six principal confirmation-half tests (Table 2b)	Holm, six tests
Exploratory	Dyad models; intergenerational exchange; graded confidant-category pattern; lagged models; life-course-survey contrasts	None; each tested once and labelled as exploratory (nominal P values)

Supplementary Table S2 | Crossed contrast: operationalization and scale robustness

Specification	L	95% CI	P
Primary (binary E ≥ 2 , confirmation half)	+0.489	[+0.120, +0.858]	0.0094 (Holm 0.0172)
Continuous z-scored event count	+0.296	[+0.062, +0.531]	0.013
Full-sample standardization basis	+0.489	NA	0.0093
Loneliness outcome (predicted sign reversal)	-0.406	[-0.828, +0.016]	0.059
Scale anchors: 1 SD of the LSNS-6 friend subscale = 3.7 points; observed IQR = 1–7 (a 6-point shift); 1 SD mentor = 0.97 level	NA		
Narrow 6-item E (relational items excluded), ≥ 2	+0.559	[+0.142, +0.975]	0.0086
Event 9-item, ≥ 1 / ≥ 3	+0.301 / +0.846	[+0.000, +0.601] / [+0.425, +1.266]	0.050 / 8.1 $\times 10^{-5}$
Leave-one-adversity-out (9 estimates)	+0.448 to +0.651	NA	all ≤ 0.018

Supplementary Table S3 | Predicted satisfaction margins (confirmation half, weighted)

Predicted life satisfaction (0–10) from the frozen crossed-contrast model, covariates at weighted means. Friendship shift = subscale interquartile range (score 1 → 7; a 6-point shift, not 1 SD) at mean mentoring; mentor shift = 0 → 1 level at mean friendship ties.

Cell	Friend subscale = 1	Friend subscale = 7 (IQR shift, not 1 SD)	Mentor level 0	Mentor level 1
E0 D0	5.94	6.28	5.64	6.03
E0 D1	5.40	5.98	4.93	5.56
E1 D0	5.26	5.89	5.42	5.58
E1 D1	4.72	5.59	4.71	5.11

Supplementary Table S4 | Distribution of L across 100 alternative random splits

Statistic (100 alternative random splits)	Value
Splits with $L > 0$	100/100
Median L	+0.476
Interquartile range of L	+0.405 to +0.570
Range of L	+0.021 to +0.870
Splits with $P < 0.05$	84%
Splits with a negative $M \times E$ component	95/100
Median $M \times E$ component	-0.111

These analyses reuse the same observations and index robustness to the split choice; they are not independent replications.

Supplementary Table S5 | E and D construct robustness and parenting-factor diagnostics

Panel a: alternative exposure and D definitions (crossed contrast L unless stated; confirmation half)

Specification	Estimate	95% CI	P
Narrow-event index (neglect, verbal abuse and psychological control excluded; ≥ 2): L	+0.559	[+0.142, +0.975]	0.0086
Leave-one-out index excluding parental death: L	+0.546	[+0.174, +0.918]	0.0040
Leave-one-out index excluding parental divorce or separation: L	+0.651	[+0.265, +1.037]	9.4×10^{-4}
Leave-one-out index excluding parental mental illness: L	+0.514	[+0.135, +0.894]	0.0079
Leave-one-out index excluding parental addiction: L	+0.558	[+0.180, +0.936]	0.0038
Leave-one-out index excluding witnessed domestic violence: L	+0.448	[+0.075, +0.821]	0.018
Leave-one-out index excluding physical abuse: L	+0.485	[+0.111, +0.859]	0.011
Leave-one-out index excluding neglect: L	+0.499	[+0.129, +0.868]	0.0082
Leave-one-out index excluding verbal abuse: L	+0.528	[+0.121, +0.934]	0.011
Leave-one-out index excluding psychological control: L	+0.606	[+0.246, +0.966]	9.6×10^{-4}
Threshold ≥ 1 : L	+0.301	[+0.000, +0.601]	0.050
Threshold ≥ 3 : L	+0.846	[+0.425, +1.266]	8.1×10^{-5}
Continuous event count (z): L	+0.296	[+0.062, +0.531]	0.013
Alternative D, unconditional-love deficit (Q76.1, binary): L	+0.355	[-0.032, +0.741]	0.072
Alternative D, unconditional-love deficit (Q76.1, binary): M $\times$ D	+0.042	[-0.104, +0.188]	0.57
Union of D and the Q76.1 deficit: L	+0.503	[+0.135, +0.871]	0.0075

Specification	Estimate	95% CI	P
Intersection of D and the Q76.1 deficit: L	+0.334	[−0.086, +0.754]	0.12
Ordinal alternative D (Q76.1 four-point z-score; higher = less consistently loved): L	+0.271	[−0.050, +0.592]	0.098
Ordinal alternative D: M × D	−0.002	[−0.065, +0.062]	0.96
Ordinal alternative D: C_M	+0.154	[−0.049, +0.358]	0.14
Ordinal alternative D: C_F	+0.117	[−0.078, +0.311]	0.24
Respondents aged 18 or older (n = 13,869): L	+0.498	[+0.127, +0.870]	0.0085
Respondents aged 18 or older (n = 13,869): friend × E (loneliness)	−0.072	[−0.126, −0.018]	0.0086

M × D remained +0.218 to +0.249 across all E specifications. Attenuation under Q76.1 may reflect differences in construct content, overlap with the mentoring measure (the item asks about unconditional love from anyone; unconditional-love deficit 64.7% with no mentor versus 17.1% with consistent mentoring; Spearman ρ = −0.40), or measurement error; the present analyses cannot distinguish these explanations. The mentor-related pattern was clearest for the parental-love indicator; results with alternative indicators do not, by themselves, establish that the interaction is specific to parental love. D is a single binary item (Q75.9, felt loved before 18, yes/no; D = 1 if no), so no ordinal recoding of D itself exists; the ordinal alternative D result is consistent with the binarized Q76.1 result.

Panel b: post hoc model-form checks (confirmation half; calibration weights; HC3; not part of the frozen plan)

E/D group	n	Friend slope (per SD) [95% CI]	Mentor slope (per SD) [95% CI]
Neither	6,758	+0.220 [+0.136, +0.304]	+0.374 [+0.287, +0.462]
D only	4,742	+0.346 [+0.236, +0.457]	+0.624 [+0.519, +0.729]
E only	1,083	+0.325 [+0.105, +0.546]	+0.188 [−0.088, +0.464]
Both	1,347	+0.578 [+0.350, +0.806]	+0.342 [+0.141, +0.542]

Post hoc contrast or coefficient	Estimate	95% CI	P
Saturated four-group model: additivity-free contrast (friend – mentor slope, E only minus D only)	+0.415	[−0.018, +0.848]	0.061
Categorical mentor score: predicted satisfaction difference, score 3 versus 0, D only	+2.134	[+1.747, +2.521]	3.6×10^{-27}
Categorical mentor score: predicted satisfaction difference, score 3 versus 0, E only	+0.639	[−0.288, +1.565]	0.18
Categorical mentor score: difference (D only minus E only)	+1.495	[+0.495, +2.496]	0.0034
Four-interaction model for loneliness (per SD): friend × E	−0.309	[−0.512, −0.105]	0.0029
Four-interaction model for loneliness (per SD): friend × D	+0.073	[−0.068, +0.215]	0.31
Four-interaction model for loneliness (per SD): mentor × E	+0.070	[−0.140, +0.280]	0.51
Four-interaction model for loneliness (per SD): mentor × D	+0.046	[−0.101, +0.192]	0.54

Post hoc contrast or coefficient	Estimate	95% CI	P
Four-interaction model for loneliness: friend-side difference (friend × E – friend × D)	–0.382	[–0.635, –0.130]	0.0030

The loneliness coefficients are per SD of the resources and are not comparable with the per-point co-primary coefficient.

Panel c: raw-scale distributions by E/D group (confirmation half)

Measure	Neither	D only	E only	Both
n	6,758	4,742	1,083	1,347
Friend subscale, mean (SD)	4.90 (3.74)	4.18 (3.61)	4.41 (3.54)	3.18 (3.39)
Mentor score, mean (SD)	1.41 (0.94)	1.18 (0.97)	1.23 (0.96)	0.81 (0.91)
Mentor score = 0, %	19.1	29.8	26.2	46.4
Life satisfaction, mean (SD)	6.51 (2.20)	5.66 (2.53)	5.67 (2.59)	4.59 (2.82)
Life satisfaction = 0, %	1.8	5.4	6.2	11.7
Life satisfaction = 10, %	6.2	5.9	4.1	3.0
Loneliness, mean (SD)	5.44 (2.63)	5.50 (2.69)	6.77 (2.84)	7.64 (2.97)
Loneliness = 3 (minimum), %	42.1	42.0	24.3	16.1
Loneliness = 12, %	2.9	3.9	6.9	15.5

Satisfaction endpoints are sparse; the loneliness floor is substantial in the two low-E groups and is a limitation of the linear loneliness models.

Panel d: ten-item adversity index (nine event/condition items plus felt-unloved; ≥2; 23.3%): friend × index in the separate friendship × adversity model

Sample	Outcome	b	95% CI	P
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Sample	Outcome	b	95% CI	P
Confirmation half	Loneliness	-0.081	[-0.128, -0.034]	6.5×10^{-4}
Confirmation half	Life satisfaction	+0.065	[+0.026, +0.104]	1.0×10^{-3}
Discovery half	Loneliness	-0.082	[-0.132, -0.033]	0.0010
Discovery half	Life satisfaction	+0.055	[+0.013, +0.097]	0.0098
Full sample	Loneliness	-0.081	[-0.115, -0.047]	2.8×10^{-6}
Full sample	Life satisfaction	+0.059	[+0.030, +0.087]	5.6×10^{-5}

For comparison, the friend $\times$ index interaction for loneliness was -0.081 [-0.128, -0.034] under the ten-item index and -0.072 [-0.126, -0.018] under E.

Panel e: mentoring interaction by adversity indicator (confirmation half; life satisfaction; separate mentoring model; post hoc, descriptive)

Adversity indicator	b	95% CI	P
Felt lack of parental love (D)	+0.302	[+0.179, +0.425]	1.6×10^{-6}
Event/condition adversity (E, ≥ 2)	-0.109	[-0.284, +0.065]	0.22
Ten-item cumulative index (≥ 2 of 10, including the felt-unloved item)	-0.004	[-0.156, +0.148]	0.96
Ten-item count (z)	-0.014	[-0.074, +0.046]	0.65
Event count (z)	-0.057	[-0.118, +0.004]	0.068

Panel f: exploratory item-level sensitivity analyses (mentor $\times$ each adversity indicator; separate mentoring model; confirmation half)

Indicator	b	95% CI	P
Felt lack of parental love (D)	+0.302	[+0.179, +0.425]	1.6×10^{-6}
Parental death	-0.081	[-0.323, +0.162]	0.51
Divorce	-0.057	[-0.267, +0.153]	0.60
Parental mental illness	-0.086	[-0.399, +0.227]	0.59
Addiction	-0.063	[-0.312, +0.187]	0.62
Witnessed domestic violence	-0.280	[-0.547, -0.012]	0.040
Physical abuse	-0.183	[-0.473, +0.107]	0.22

Indicator	b	95% CI	P
Neglect	+0.019	[−0.333, +0.371]	0.91
Verbal abuse	−0.060	[−0.234, +0.113]	0.50
Psychological control	−0.144	[−0.344, +0.055]	0.16

D is the only indicator whose interval excludes zero in the positive direction; the neglect point estimate is also positive, and the indicators were not directly contrasted with one another.

Panel g: parenting-factor diagnostics (2024 life-course survey)

Factor	Variance-inflation factor
Trust	2.55
Autonomy support	2.35
Shared time	1.44
Norm imposition	1.48
Scolding	1.38
Indifference	1.23

Inter-factor correlations: maximum $r = 0.75$ (trust–autonomy); $r = 0.50$ (trust–shared time; norm–scolding); all others $|r| \leq 0.28$.

Supplementary Table S6 | Covariate tiers

Panel a: crossed contrast L (life satisfaction) and the co-primary friendship × E interaction (loneliness) by covariate tier (confirmation half)

Covariate tier	L	95% CI	P	Friend × E	95% CI	P
Age + sex	+0.391	[+0.008, +0.775]	0.046	−0.067	[−0.121, −0.014]	0.013
Age + sex + family ties (primary)	+0.489	[+0.120, +0.858]	0.0094	−0.072	[−0.126, −0.018]	0.0086
Extended sociodemographic (n = 13,849)	+0.482	[+0.110, +0.854]	0.011	−0.074	[−0.127, −0.022]	0.0053
Current mental health (Kessler-6)	+0.312	[−0.045, +0.669]	0.087	−0.013	[−0.060, +0.035]	0.60

Panel b: mentoring × D by covariate tier (separate mentoring × D model, and the M × D component of the crossed-contrast model; confirmation half)

Covariate tier	Mentor × D	95% CI	P	M × D component	95% CI	P
Age + sex	+0.333	[+0.203, +0.463]	4.8 × 10 ^{−7}	+0.246	[+0.111, +0.382]	3.7 × 10 ^{−4}
Age + sex + family ties (primary)	+0.302	[+0.179, +0.425]	1.6 × 10 ^{−6}	+0.239	[+0.111, +0.367]	2.6 × 10 ^{−4}
Extended sociodemographic (n = 13,849)	+0.305	[+0.181, +0.429]	1.5 × 10 ^{−6}	+0.247	[+0.118, +0.376]	1.8 × 10 ^{−4}
Current mental health (Kessler-6)	+0.271	[+0.153, +0.389]	6.6 × 10 ^{−6}	+0.223	[+0.100, +0.347]	4.0 × 10 ^{−4}

n = 13,930 unless stated. Extended tier: the primary set plus education Q25.1 as an ordered 1–9 variable with 'other' and 'unknown' set to missing, household income Q77.1 as an ordered 1–18 variable, both entered as ordered category numbers treated as linear, cohabiting partner Q2.1 ≥ 1 . Current-mental-health tier: the primary set plus the Kessler-6 sum; a reporting-bias sensitivity, not a causal estimate. An earlier run of the extended tier with an unrecoverable covariate coding produced +0.412, -0.077 and +0.286 (see the analysis decision log). Attenuation after Kessler-6 adjustment is compatible both with control of shared current evaluative state and with overadjustment of a construct downstream of childhood experience (Schisterman et al., 2009); this sensitivity analysis cannot distinguish these explanations.

Supplementary Table S7 | Loneliness-track panel sensitivity analyses

Specification	b (friend × E, unless stated)	95% CI	P
Friendship ties, within-person main effect (overall; model without the interaction term)	−0.040	[−0.048, −0.032]	1.7 × 10 ^{−20}
Primary 4-wave FE (E measured in 2024)	−0.030	[−0.055, −0.004]	0.024
Primary model, alternative variance estimator (absorbed person effects counted in the degrees of freedom; linearmodels PanelOLS)	−0.030	[−0.059, +0.000]	0.051
Ten-item index	−0.023	[−0.045, −0.002]	0.034
Same-anchor 3 JACSIS waves	−0.067	[−0.098, −0.035]	3.8 × 10 ^{−5}
Within-wave z-standardized outcome and friendship ties	−0.048	[−0.084, −0.012]	0.0084
Five-wave temporal extension (JASTIS spring 2024 inserted; no additional exclusion applied to that wave; n = 13,135 × 5)	−0.025	[−0.048, −0.002]	0.031
Adversity × wave interaction terms added (differential time trends; joint F = 47.0, P < 0.001)	−0.034	[−0.060, −0.009]	0.0092
Attrition-weighted (inverse probability of four-wave retention from a logistic model of 2022 loneliness, friendship ties, family ties, age and sex; weights renormalized)	−0.029	[−0.057, −0.002]	0.037
2025-measured adversity (n = 8,006 linked)	−0.029	[−0.065, +0.006]	0.11
2024-measured adversity on the same 8,006 respondents (agreement between the two measurements 90.5%)	−0.035	[−0.071, −0.000]	0.049
Unbalanced inclusion, ≥3 waves (n = 22,524)	−0.015	[−0.036, +0.007]	0.18
(All three directionally consistent with the primary estimate)			

Notes. Reported estimator: ordinary least squares on within-person-demeaned

data with wave indicators (statsmodels; cov_type = 'cluster', groups = respondent;

default small-sample factor $G/(G - 1) \times (N - 1)/(N - K)$, K = number of demeaned regressors, absorbed person effects not counted); confidence intervals and P values use the normal reference distribution. Alternative-estimator row: `linearmodels PanelOLS(entity_effects = True, time_effects = True).fit(cov_type = 'clustered', cluster_entity = True)` with default settings (`debiased = True`, `auto_df = True`, `count_effects = True`), which counts the absorbed person effects in the degrees-of-freedom correction; the point estimate is identical. All rows are reproduced by the deposited scripts (`supplementary_analyses_20260917.py`); the five-wave and attrition-weighted rows are the values of that re-implementation, whose exclusion and weighting definitions are stated in the row labels (an earlier run with unrecoverable definitions produced -0.020 and -0.030 , respectively; see the analysis decision log).

Supplementary Table S8 | Lagged fixed-effects (descriptive temporal ordering)

Lags	Direction	β	95% CI	P
One-lag	Friend ties → next-wave loneliness	-0.019	[-0.032, -0.006]	0.0051
One-lag	Loneliness → next-wave friend ties	-0.009	[-0.020, +0.003]	0.13
Two-lag	Friend ties (t-1) → loneliness	-0.021	[-0.039, -0.003]	0.024
Two-lag	Friend ties (t-2) → loneliness	-0.024	[-0.041, -0.007]	0.0056
Two-lag	Loneliness (t-1) → friend ties	-0.012	[-0.027, +0.004]	0.13
Two-lag	Loneliness (t-2) → friend ties	+0.003	[-0.013, +0.019]	0.70

One-lag models: both directions z-standardized, person and wave fixed effects, lagged outcome adjusted. Two-lag models: both directions, pooled z-standardization, person and wave fixed effects, lagged outcome at both lags and lagged family ties, waves 2024 and 2025 as outcomes, n obs = 27,158 (supplementary_analyses_20260917.py, panel.lag2). Because these models include lagged outcomes and individual fixed effects in a short panel ($T = 4$), the estimates are susceptible to dynamic-panel bias (Nickell, 1981; see also Hamaker et al., 2015) and are treated as descriptive, not causal. Lagged friendship ties were associated with later loneliness at both lags, whereas lagged loneliness was not clearly associated with later friendship ties; because one non-significant estimate does not establish a difference between directions, the lagged models are exploratory and are not interpreted as evidence of directional asymmetry. An

earlier two-lag run with an unrecoverable specification ($n \text{ obs} = 27,146$) is superseded.

Supplementary Table S9 | Satisfaction-track panel and cross-sectional analogue

Model	Sample	b	95% CI	P
Contact friends × felt lack of love, fixed effects	Four-wave satisfaction panel	+0.039	[+0.004, +0.075]	0.029
Contact friends × felt lack of love, fixed effects, subscale-controlled	Four-wave satisfaction panel	+0.032	[−0.003, +0.068]	0.072
Cross-sectional analogue	Confirmation half	+0.165	[+0.078, +0.253]	2.2×10^{-4}
Cross-sectional analogue	Full sample	+0.166	[+0.103, +0.229]	2.6×10^{-7}

Supplementary Table S10 | Two-generation dyad extension (exploratory)

Two-generation extension (exploratory; mothers n = 512)

Model → child well-being (z)	b [95% CI]	P
Mother's own-parent relationship × non-kin support (any)	−0.297 [−0.549, −0.044]	0.022
of which emotional support (3 items)	−0.298 [−0.551, −0.044]	0.021
of which instrumental support (3 items)	−0.193 [−0.566, +0.181]	0.31

Adjusted child well-being means among mothers with poor own-parent relationships: −0.17 SD without emotional non-kin support versus +0.04 SD with it. Joint-model emotional – instrumental Wald contrast: −0.246 [−0.819, +0.328], P = 0.40. Father model and parent-sex contrast: Extended Data Table 8.

Supplementary Table S11 | Weighting diagnostics

Panel a: calibration weights (analytic sample)

Quantity	Value
Calibration target	2022 Comprehensive Survey of Living Conditions (variable JAC SIS_WEIGHT_2025_byKisocho2022; 2019-calibrated alternative retained)
Minimum weight	0.055
Median weight	0.560
Maximum weight	20.619
Effective sample size	10,522 (38.1% of nominal)

Panel b: headline coefficients under alternative weighting (confirmation half)

Weighting	L	95% CI	P	Friend × E (loneliness)	95% CI	P
Calibration-weighted (primary)	+0.489	[+0.120, +0.858]	0.0094	-0.072	[-0.126, -0.018]	0.0086
Unweighted	+0.552	[+0.313, +0.791]	6.1 × 10 ⁻⁶	-0.097	[-0.129, -0.065]	2.4 × 10 ⁻⁹
Weights capped at the 99th percentile, renormalized	+0.481	[+0.132, +0.830]	0.0070	-0.091	[-0.137, -0.046]	8.8 × 10 ⁻⁵
Weights capped at the 95th percentile, renormalized	+0.527	[+0.200, +0.855]	0.0016	-0.093	[-0.136, -0.051]	1.6 × 10 ⁻⁵

Weighting	L	95% CI	P	Friend × E (loneliness)	95% CI	P
Weights calibrated to 2019 population margins (alternative set)	+0.36 2	[-0.039, +0.763]	0.077	-0.071	[-0.132, -0.010]	0.023

Both co-primary estimates were smaller in magnitude after calibration weighting than in the unweighted models. Estimates are unchanged or stronger under trimming, so extreme calibration weights do not drive the confirmation-half contrast; under the alternative 2019-calibrated weights the crossed contrast was smaller and its interval included zero, whereas the friendship × E interaction was similar. The calibration cell composition and raking algorithm follow the survey provider's weighting documentation, archived with the JACSIS consortium and available through the data-use framework. The authors did not estimate inclusion probabilities; the supplied weights were treated as fixed, renormalized to mean 1 in each analytic sample, and confidence intervals condition on them.

Supplementary Table S12 | UCLA-3 measurement

Cronbach's α by wave: JACSIS 2022 0.912, JACSIS 2023 0.913, JACSIS 2024 0.905, JASTIS spring 2025 0.88 (loneliness scored 3–12; higher = lonelier). Wave-by-wave measurement summary:

Wave series	Item wording	Response format	Raw numeric coding	Harmonization
JACSIS 2022, 2023, 2024	Identical (UCLA-3; items Q68S1.1–3, Q76.1–3, Q66.1–3)	Four ordered options, identical anchoring	Same direction across the three waves	Loneliness = 15 – sum of the three items (higher = lonelier)
JASTIS spring 2025	Identical (UCLA-3; items Q18.1–3)	Four ordered options, different anchoring	Reversed relative to the JACSIS series	Loneliness = sum of the three items; within-wave z-standardization as sensitivity

Formal ordinal-factor invariance testing across waves (Wu and Estabrook, 2016) was not performed and is noted as a limitation. Because anchoring differs in the JASTIS spring wave, the same-anchor three-JACSIS-wave fixed-effects model is the principal measurement-consistency sensitivity (Supplementary Table S7), complemented by within-wave z-standardization.

Supplementary Table S13 | Missingness, attrition and sample denominators

Sample or quantity	Value
JACSIS 2022 valid respondents	32,000
Balanced four-wave loneliness panel	13,579 respondents (54,316 person-waves)
Balanced four-wave satisfaction panel	Respondents with valid responses in JACSIS 2022, 2023, 2024 and winter 2025 (life-satisfaction items Q78.1, Q86.1, Q76.1 and Q74.1) and a winter-2025 measurement of D; 8,909 respondents (35,636 person-waves); no item-level missingness among linked respondents
JASTIS spring 2025 valid respondents after the four exclusion criteria	25,424 (matches the survey provider's valid-respondent list exactly)
Friend × E interaction on this cohort (E measured in 2024)	$b = -0.030 [-0.055, -0.004], P = 0.024$
Overall within-person friendship slope	$b = -0.040 [-0.048, -0.032], P = 1.7 \times 10^{-20}$
Retained versus non-retained baseline SMD: loneliness	-0.04
Retained versus non-retained baseline SMD: friendship ties	-0.14
Retained versus non-retained baseline SMD: family ties	-0.12
Dyad, analysed (512) versus not analysed (267) mothers: age SMD	1.11 (child well-being was not assessed for children aged 0–3 years, so the exclusion is by design rather than item missingness)
Dyad, analysed versus not analysed mothers: other observables	$ SMD \leq 0.19$ (own-parent relationship 0.19, any support 0.12, marital happiness -0.17, employed -0.07, number of children -0.09)
KINDL form-stratified, Kiddy form (parent-assisted; mothers, any non-kin support)	$b = -0.308, P = 0.097, n = 250$
KINDL form-stratified, Kid form (child-completed; mothers, any non-kin support)	$b = -0.285, P = 0.12, n = 262$
Life-course survey: 16-item Q4s2 module (design subset)	7,735 respondents missing all 16 items; 2,980 complete; zero partial

Sample or quantity	Value
Life-course survey: analytic six-factor sample	3,422 (complete provider-computed factor scores plus life satisfaction; 2,605 completed the Q4s2 module and 817 received factor scores without it)
Life-course survey: Q4s2 completers entering the analytic sample	2,605 of 2,980

Unrounded frozen values on this cohort: friend $\times$ E $b = -0.0296792$ ($P = 0.0239809$); overall friendship slope $b = -0.0399248$. Child well-being was not estimable for the excluded mothers because it was not assessed for their children. The KINDL form stratification also separates reporters. The two life-course-survey denominators refer to different item sets and are mutually consistent.

Supplementary Table S14 | 2024 life-course survey: unstandardized estimates

Parenting factor	b	95% CI	P
Trust	+1.677	[+1.105, +2.249]	9.1×10^{-9}
Autonomy support	+0.661	[+0.198, +1.125]	0.0052
Shared time	+0.159	[-0.166, +0.484]	0.34
Indifference	-0.449	[-0.788, -0.111]	0.0093
Norm imposition	-0.460	[-0.786, -0.134]	0.0057
Scolding	-0.132	[-0.411, +0.148]	0.36

Unstandardized coefficients from the joint model of life satisfaction (5–35; n = 3,422). A self-efficacy module ($\alpha = 0.857$; n = 1,430) was collected but no mediation model was estimated. Framed as convergent construct context for the deprivation side (parental trust largest standardized association; Extended Data Table 2).

Supplementary References

Works cited in this Supplementary Information (author–year citations in the SI text refer to this list; the main-text reference numbering is independent).

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