Original Article

Bidirectional Associations Between End-of-Life Communication and Depressive Symptoms in Older Adults

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Abstract

Context. Advance care planning (ACP) may prepare older adults for future health problems including cognitive and physical decline. Depressive symptoms are observed among those engaging in ACP. However, the directionality of the association between ACP engagement and depressive symptoms remains uncertain.

Objectives. To investigate bidirectional associations between engaging in ACP and depressive symptoms in older adults at a within-person level after accounting for cognitive and physical decline.

Methods. A longitudinal study design using random intercept cross-lagged panel models. Community-dwelling older adults from the Longitudinal Aging Study Amsterdam (LASA) with three assessments at T0 (2015−2016), T1 (2018−2019), and T2 (2021−2022). Discussion of end-of-life wishes with a physician was used as a proxy measure for ACP engagement.

Results. Participants included 1669 older adults (mean [SD] age, 69.7 [7.7] years at T0; 923 [55.3%] were women). Poor cognition at T0 was associated with having discussed end-of-life wishes at T1 ($\beta = -0.12$ [95% CI, −0.23 to −0.01]), that was prospectively associated with increased depressive symptoms (0.12 [0.01 to 0.24]), decreased cognition (−0.13 [−0.22 to −0.04]), and decreased physical performance (−0.16 [−0.27 to −0.04]) at T2.

Conclusion. Older adults appear at risk for having depressive symptoms following discussing end-of-life wishes with their physicians. End-of-life communication may reflect an ongoing trajectory of cognitive decline which could result in further functional decline and increased depressive symptoms. A better understanding of how and which elements of end-of-life discussions

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are associated with the mood of older adults will provide implications for the implementation of ACP. J Pain Symptom Manage 2026;71:437−446.

Key Words

Advance care planning, cognition, depression, health services for the aged, physical functional performance, physician's role

Key Message

In a cohort of 1669 older adults, poor cognition was prospectively associated with later discussion of end-of-life wishes with physicians, which was prospectively associated with increased depressive symptoms, decreased cognition, and decreased physical performance. Monitoring and prevention of mood changes are warranted in implementing advance care planning.

Introduction

Advance care planning (ACP) is a communication process to understand and share values, life goals, and preferences for future care that is meant to improve the quality of care for people with serious illness.[1] Decline in physical and cognitive health implies a need for planning future care among older adults, care partners, and healthcare providers.[2−4] ACP conversations could encourage people and family to discuss and express their values.[5] However, older adults often miss opportunities of being treated based on their values and preferences,[6,7] which is more likely to happen with frailty[8] and decreased cognitive functioning.[6,9−12] Although literature suggests that outcomes for ACP interventions include reduced depression and anxiety among older adults,[9,13,14] care partners and professionals may be concerned about potentially inducing fear and anxiety with the person in thinking about future capacity loss.[15−19] Further, older adults may prefer to complete advance directives to avoid engaging in ACP, anticipating discomfort in conversations with healthcare providers.[20] Evidence regarding older adults' emotional needs is called for to develop feasible ACP practice models.[4,6]

Recent literature suggests that ACP engagement is associated with depressive symptoms among older adults. In a cross-sectional hospital-based study in the USA, older adults who engaged in ACP more often presented with depressive symptoms,[21] which has also been observed in community-dwelling people with dementia in Japan.[22] However, evidence is limited to observed cross-sectional associations. Longitudinal associations involve complexities of potential roles of cognitive and physical decline evoking depressive symptoms. Studies have shown that older adults with physical decline experience increased risk of depression,[23] that is also associated with increased risk of cognitive impairment.[24] Therefore, there is no evidence as to whether engaging in ACP is prospectively associated with depressive symptoms or if the person experiencing depression accompanied with health decline would engage in ACP conversations as a result. Given the debate on the role of ACP in the provision of patient-centered care,[25,26] understanding patient experiences following ACP engagement is key for care quality improvement initiatives.[27] Assessing bidirectional associations will provide insights into whether ACP practices may affect mood of older adults who may face physical or cognitive decline.

This study aimed to investigate the direction and strength of longitudinal associations between ACP engagement and depressive symptoms in older adults accounting for decline in cognitive or physical health.

Methods

Study Design, Setting, and Data Collection

We used a longitudinal design analyzing data from the Longitudinal Aging Study Amsterdam (LASA), a population-based longitudinal study of older adults aged 55+ in the Netherlands.[28−31] The baseline survey included 3107 participants living in three different regions, stratified by age and sex in 1992−1993. We also included participants from samples that were added to the cohort in 2002−2003 (N = 1002) and 2012−2013 (N = 1023), from the same sampling frame.

Data collection in LASA was repeated about every 3 years, using combinations of face-to-face interviews and self-administered questionnaires (Supplementary Table 1). To maximize participation of vulnerable groups, telephone interviews were conducted with participants who were unable to or refused to participate in complete face-to-face interviews. Additionally, if participants were unable to participate for mental or physical reasons, telephone interviews with the participants' proxies were conducted (Supplementary Table 1).

We used the data from the three consecutive waves of I (2015−2016; T0), J (2018−2019; T1), and K (2021−2022; T2) wherein the main outcomes for this study were measured. Our inclusion criteria were 1) individuals who participated at T0 and 2) were alive when approached for T1 or T2 participation. We included missing cases at T1 or T2 who were not able to participate any more or could not be reached. The reporting of this study follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

Measurements

Given that data availability and the involvement of healthcare providers in conversations are important elements of ACP processes,[1,3,32] we used participants' discussion of end-of-life wishes with their physicians as a proxy measure of ACP engagement. Using self-administered questionnaires, participants were asked if they had discussed end-of-life wishes with their physician. The responses were recorded as a binary variable (1 = yes, 0 = no).

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression (CES-D) Scale.[33,34] The CES-D is a self-report scale consisting of 20 items rated on a four-point scale. The total score ranges from 0 to 60, with a higher value indicating more severe symptoms.

Anxiety was included in measures of psychological symptoms as well as depressive symptoms. Depression and anxiety often occur together among older adults[35] and anxiety can be atypical presentation of depression.[36] Anxiety in LASA surveys was measured using the anxiety subscale of the Hospital Anxiety Depression Scale (HADS-A).[37,38] The sum score ranges from 0 to 21. Cross-sectional correlations between depressive symptoms and anxiety were high with the Pearson's coefficients of 0.75−0.76 in this study.

Cognition was measured using the short form of Mini-Mental State Examination (MMSE).[39,40] The short MMSE consists of nine items with scores ranging from 0 to 16, higher scores indicating better cognitive functioning.

Performance-based physical functioning was measured using four physical performance tests including 1) chair stand, 2) walking, 3) cardigan, and 4) tandem stand (Supplementary Table 1). The time to execute each task was divided into quartiles determined at LASA Wave B survey and assigned scores to these quartiles.[41] The sum score ranges from 0 to 16, higher scores indicating better physical functioning.

Covariates

We included crystallized intelligence collected at baseline in this study. Crystallized intelligence is the ability to use skills, knowledge, and experience. It is considered a stable characteristic to be included as a covariate in studies using the MMSE.[42,43] Crystallized intelligence was assessed with the vocabulary test, a subtest of the Gruninger Intelligentie Test.[44] The total score ranged between 0 and 20, with higher scores reflecting a higher level of verbal intelligence.

Sociodemographic characteristics included sex, age, church membership, education, ethnicity, and marital and partner status at T0. We used these variables to describe participant characteristics and to estimate missing cases for time-variant variables in multiple imputation.

Statistical Analysis

We conducted multiple imputation to estimate missing values in cognition, physical performance, end-of-life communication, depressive symptoms, and anxiety for each wave. We used participants' demographic variables to attribute missing information.[45] We included crystallized intelligence in the imputed variables to improve the estimation of cognition.[42,43] We performed the imputations using a chained equation with 20 replications to construct the imputed dataset.

To examine the time effects on time-variant variables from T0 to T1 and to T2, we reshaped the imputed data in a panel format creating a time variable. We conducted multilevel modelling using the time (T1 or T2 versus T0) as an independent variable. Linear regression analyses were applied for cognition, physical performance, depressive symptoms, and anxiety. A binomial logistic analysis was applied for end-of-life communication.

We performed a random intercept cross-lagged panel model (RI-CLPM) to explore the bidirectional relationships between end-of-life communication and depressive symptoms across three waves. The random intercepts in RI-CLPM refer to time-invariant traits for each measured variable and capture between-person sources of variances in measured variables. Therefore, random intercepts account for time-invariant stability including unmeasured covariates. The factor loadings are constrained to one for each construct that is repeatedly assessed. The within-person longitudinal associations include autoregressive and cross-lagged associations. Autoregressive associations estimate effects of one time on a subsequent time point at the same variable. Cross-lagged associations estimate the effects of one variable on another at different time points.[46] To account for the roles of physical and cognitive decline in the association between end-of-life communication and depressive symptoms, we executed a four-variate RI-CLPM including cognition, physical performance, end-of-life communication and depressive symptoms. Based on the study aims, we focused on cross-lagged associations from and to end-of-life communication. Supplementary Fig. 1 illustrates the four-variate RI-CLPM.

We calculated and applied the fit indices of RI-CLPM to conventional thresholds including $\chi^2/\text{df} < 2$, comparative fit index (CFI) >0.95, root mean square error of approximation (RMSEA) <0.08 and standardized root mean square residual (SRMR) <0.05.[47,48] We conducted multiple imputation and multilevel modelling using Stata 18.0 MP (StataCorp, Texas, the United States). We performed RI-CLPMs using Mplus 8.10 (Muthén & Muthén, Los Angeles, the United States) based on the imputed dataset exported from Stata.

Sensitivity Analysis

To confirm the robustness of the cross-lagged associations at the within-person level, we reanalyzed the RI-CLPMs using anxiety instead of depressive symptoms. We repeated the RI-CLPMs using depressive symptoms stratified by age groups (≤60s years versus ≥70s years). We also performed another sensitivity analysis based on the original dataset using the full information maximum likelihood method to handle missing data.[49]

Results

Baseline Characteristics

Fig. 1 shows a flow chart of this study. A total of 2024 older adults participated in LASA wave I survey (2015−2016), baseline of this study. After excluding 355 older adults who died during the study period, we included 1669 in the analysis. Of the 1669 included older adults, 1393 participated in all three waves, 133 participated in two waves, and 143 participated in one wave. Table 1 summarizes the baseline characteristics of older adults. Of 1669 included adults, 923 (55.3%) were female and 746 (44.7%) were male, and mean (SD) age at T0 was 69.7 (7.7) years. Most of them were in their 60s (N = 844; 50.6%) or 70s (N = 505; 30.3%).

Table 2 summarizes estimated means or prevalences based on the imputed dataset. Prevalence of end-of-life communication increased from 11% to 21%. The estimated means and prevalences resembled descriptive statistics of the original sample (Supplementary Table 2). The estimated mean (95% confidence interval) of crystallized intelligence score was 13.9 (13.4−14.3). The estimated prevalence of end-of-life communication increased from T0 to T1 and to T2 (Supplementary Table 3). Depressive symptoms increased from T0 to T2. Anxiety decreased from T0 to T1; however, it increased from T0 to T2. The time effects on cognition were not observed from T0 either to T1 or to T2. Physical performance decreased from T0 to T1 and to T2. The missingness ranged 2.5%−16.2% at T0, 11.9%−30.1% at T1, and 21.8%−41.3% at T2 (Supplementary Table 2).

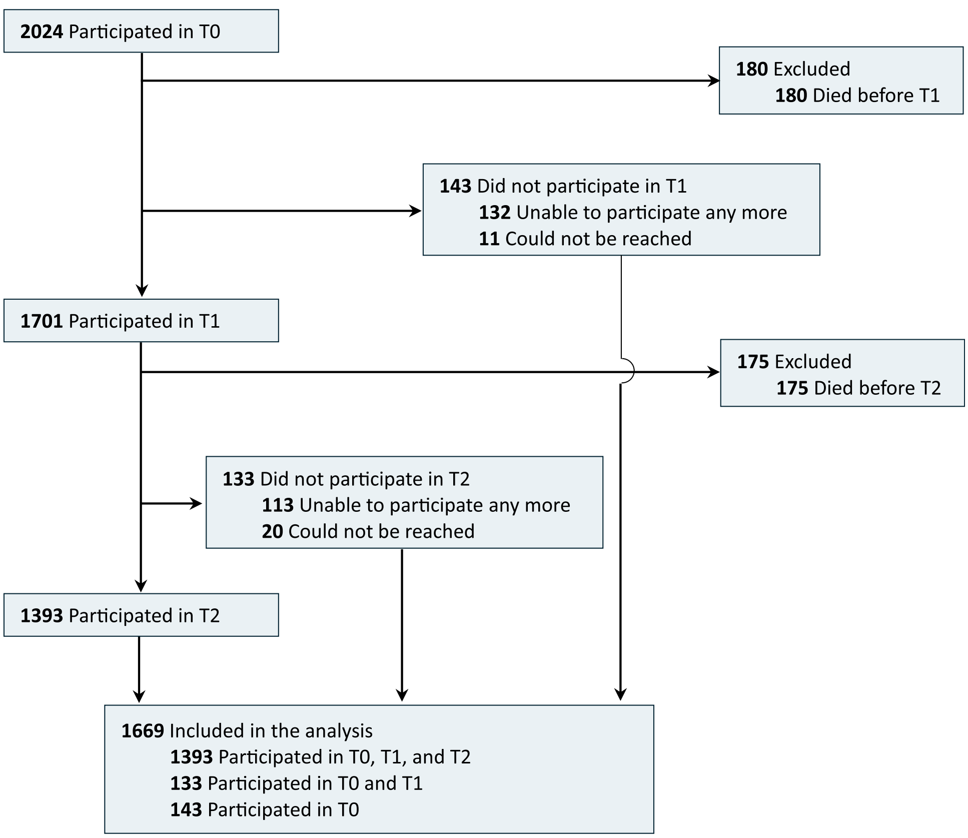

Fig. 1. Flow chart of this study. We extracted data of older adults who participated in the Longitudinal Aging Study Amsterdam (LASA) in the Netherlands, the Wave I in 2015−2016 (T0; baseline), Wave J in 2018−2019 (T1), and Wave K in 2021−2022 (T2). At each wave, participants who were interviewed during the previous wave were contacted to participate. Our inclusion criteria were 1) individuals who participated in T0 and 2) those who were alive when approached for T1 or T2 participation.

Table 1
Participant characteristics at baseline

Variables	Total (n = 1669)
Age, mean (SD), year	69.7 (7.7)
Sex, N (%)	
Female	923 (55.3)
Male	746 (44.7)
Church membership, N (%)	
Roman-Catholic	391 (23.4)
Protestant	456 (27.3)
Other membership, e.g., Humanistic Society, Islamic, Jewish, Hindu	36 (2.2)
No membership	786 (47.1)
Educational attainment, N (%)	
Elementary not completed	34 (2.0)
Elementary education	213 (12.8)
Lower vocational education	316 (18.9)
General intermediate education	267 (16.0)
Intermediate vocation education	330 (19.8)
General secondary education	57 (3.4)
Higher vocational education	295 (17.7)
College education	21 (1.3)
University education	136 (8.1)
Ethnicity, N (%)	
Dutch	1,636 (98.0)
Other	33 (2.0)
Marital and partner status, N (%)	
Married	1,092 (65.4)
Widowed	264 (15.8)
Divorced	159 (9.5)
Never married	134 (8.0)
Registered partnership	20 (1.2)

Random Intercept Cross-Lagged Panel Models

Fig. 2 and Supplementary Table 4 present estimates in the RI-CLPMs accounting for cognition and physical performance. A four-variate model demonstrated a cross-lagged association from poor cognition at T0 to end-of-life communication at T1 (−0.12; −0.23 to −0.01). The cross-lagged association from end-of-life communication at T1 to increased depressive symptoms (β = 0.12; 95% CI, 0.01 to 0.24), decreased cognition (−0.13; −0.22 to −0.04), and decreased physical performance (−0.16; −0.27 to −0.04) at T2 was also observed (Supplementary Table 4).

The cross-lagged associations from physical performance or depressive symptoms to end-of-life communication were not observed. Positive covariances with the random intercepts of end-of-life communication were observed with poor physical performance and severe depressive symptoms. Random intercepts of cognition had negative covariances with those of depressive symptoms. Fit indices demonstrated good model fit except for χ^2/df.

Sensitivity Analysis

Another model replacing depressive symptoms with anxiety did not show the cross-lagged association from end-of-life communication at T1 to anxiety at T2 (Supplementary Table 5). However, the model retained the cross-lagged associations from end-of-life communication at T1 to decreased cognition and physical performance at T2, and from poor cognition at T0 to end-of-life communication at T1. The cross-lagged association from anxiety at T1 to better cognition at T2 was observed.

The RI-CLPMs stratified by age groups did not show cross-lagged associations from end-of-life communication to depressive symptoms (Supplementary Table 6). A cross-lagged association was observed from depressive symptoms at T1 to better cognition at T2.

Another sensitivity analysis using FIML retained the cross-lagged associations from end-of-life communication at T1 to increased depressive symptoms, decreased cognition and decreased physical performance at T2 (Supplementary Table 7). The cross-lagged association from poor cognition at T0 to end-of-life communication at T1 was not observed.

Discussion

Key Findings

Older adults having discussed end-of-life wishes with their physician in 2018−2019 were more likely to have increased depressive symptoms in 2021−2022. In contrast, depressive symptoms did not show associations with subsequent engaging in end-of-life communication. Furthermore, older adults engaging in end-of-life communication in 2018−2019 were more likely to have decreased cognitive and physical functioning in 2021 −2022. Older adults with poor cognitive functioning in 2015−2016 were more likely to have engaged in end-

Table 2
Estimated Means or Prevalences and 95% Confidence Intervals of Time-Variant Variables

Variables	T0	T1	T2
End-of-life communication,[a] %	10.6 (9.0−12.2)	16.8 (14.9−18.8)	20.8 (18.2−23.3)
Depressive symptoms,[b] mean	7.1 (6.8−7.4)	7.3 (6.9−7.6)	7.9 (7.5−8.2)
Anxiety,[c] mean	2.8 (2.7−3.0)	2.6 (2.5−2.8)	3.0 (2.8−3.2)
Cognition,[d] mean	14.0 (13.9−14.1)	14.0 (13.9−14.1)	14.0 (13.9−14.1)
Physical performance,[e] mean	11.6 (11.4−11.7)	11.1 (10.9−11.2)	10.8 (10.7−11.0)

T0, baseline (2015−2016); T1, three-year follow-up (2018−2019); T2, six-year follow-up (2021−2022).
[a]End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
[b]Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.
[c]Anxiety was measured using the anxiety subscale of the Hospital Anxiety Depression Scale, ranging from 0 to 21.
[d]Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16.
[e]Physical performance was measured using four physical performance tests, ranging from 0 to 16.

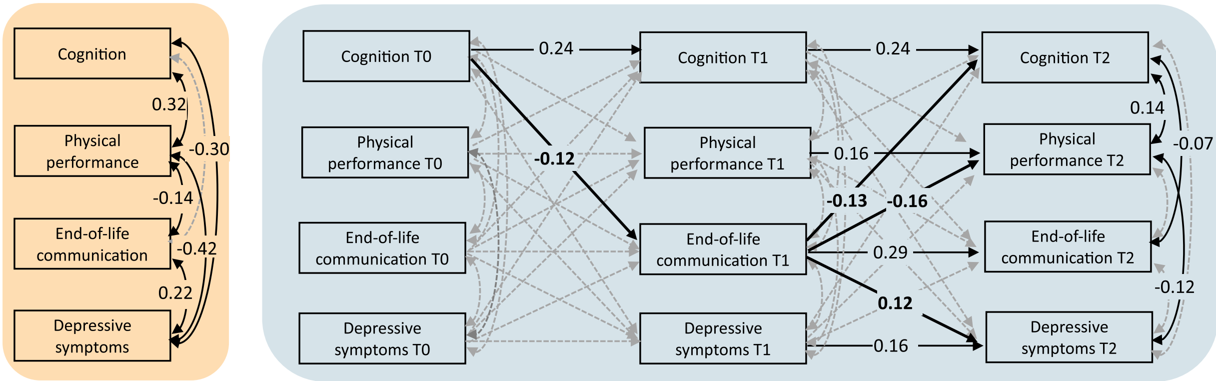

Fig. 2. The four-variate models of cognition, physical performance, end-of-life communication and depressive symptoms. Significant ($P < 0.05$) standardized estimates are reported. Dashed arrows represent nonsignificant parameters. Orange indicates between components; blue, within components. Cross-lagged associations from and to end-of-life communication are highlighted with bold arrows. T0, baseline (2015−2016); T1, three-year follow-up (2018−2019); T2, six-year follow-up (2021−2022). Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16. Physical performance was measured using four physical performance tests, ranging from 0 to 16. End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0). Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.

of-life communication in 2018−2019. The associations between end-of-life communication in 2018−2019 and increased depressive symptoms, decreased cognition, and decreased physical performance in 2021−2022 were robust across sensitivity analyses except for the age-stratified analyses.

End-of-Life Communication and Depressive Symptoms

This study first indicates the directional association from end-of-life communication to increased depressive symptoms after accounting for cognition and physical performance. Directional associations from cognitive decline to depressive symptoms were not evident. Therefore, the association between end-of-life communication and depressive symptoms might not be necessarily attributed to cognitive decline over time.

Our findings add the longitudinal direction to the association suggested by cross-sectional observations of ACP such as discussion of future plans[21,22] and documentation,[22] and underscore the need for integrating interventions to potential mood change into ACP approaches. The discrepancy between observational findings and clinical trials suggesting reduced depressive symptoms through the ACP interventions[13,14] might reflect the difference in length of observations. Our three-year intervals may have involved other time-variant confounders, such as reduced physical ability and increased healthcare use, evoking depressive symptoms.[23] However, we did not add other time-variant confounders to the RI-CLPM, as many time-variant variables may lead to large statistical models that rely on several statistical assumptions and could be difficult to estimate. Similarly, age-stratified RI-CLPMs may have failed to estimate due to the smaller sample size (<1000).[50] Future studies using alternative modeling approaches, such as the propensity score model,[51,52] may help assessing the roles of time-variant confounders and aging stages in the association between ACP engagement and depressive symptoms.

Additionally, end-of-life communication may be more confronting for older adults compared to broader ACP interventions, such as communicating goals of care than making end-of-life treatment preferences.[13,14] Communication regarding treatment options may confront patients with a poor prognosis, leading to more negative emotions.[53] Furthermore, the divergent quality of ACP conversations with healthcare providers could affect the individual's reflection and comfort.[54,55] Recommendations for ACP conversation include timely and personalized conversation, with a focus on what matters to the individual.[5,55] However, the LASA surveys did not collect information on older adults' perceived quality of and satisfaction with end-of-life communication with their physicians. To inform better ACP implementation, future studies should consider a quality indicator of ACP conversations to clarify how and which elements of discussing end-of-life wishes are associated with the mood changes among older adults. Additionally, ACP interventions should also monitor depression as an outcome of health status.[56]

End-of-Life Communication and Cognition

End-of-life communication was also associated with decreased cognition and physical performance at three-year follow-up assessment. Additionally, poor cognitive function was positively associated with more subsequent end-of-life communication. Our results appeared to reverse findings from cross-sectional observations[6,9−11] suggesting that older adults with cognitive impairment are less likely to engage in ACP. Discussing end-of-life wishes with their physician may reflect an ongoing trajectory of cognitive decline that necessitated end-of-life communication and resulted in subsequent cognitive and physical decline. Physicians' understanding and recognizing how ACP is relevant to the patient are essential facilitators for engaging in ACP,[57] that could be upheld by the Dutch dementia care standards acknowledging ACP an essential part of practice[58] and palliative care guidelines suggesting timely ACP initiation.[59] Furthermore, healthcare access and use can facilitate the patient's recognition, encouraging the individual to have a living will and healthcare proxy.[57,60] However, the LASA surveys did not assess who initiated the conversations or the perceived trigger that encouraged end-of-life discussions. Further investigation on underlying motivations for end-of-life communication will contribute to better understanding of the relationship between ACP engagement and cognition.

End-of-Life Communication and Anxiety

The longitudinal association between engaging in end-of-life communication and depressive symptoms was not replicated for anxiety. This is inconsistent with a cross-sectional observation between increased anxiety and reduced ACP engagement, including the possession of a living will and designation of a healthcare proxy, among Australian older adults.[61] Furthermore, anxiety was associated with subsequent better cognition. Anxiety measured in this study may reflect cognitive ability,[62] allowing one to process specific concerns about the future.[63] Informing about future loss can increase anxiety,[64–67] which would be short-lived mood changes, resolved later due to increased preparedness for what could happen in the future. Further, state anxiety can impair attention and cognitive test performance,[68] which could be improved after alleviating anxiety.

End-of-Life Communication and Physical Performance

Cross-lagged associations from physical performance to end-of-life communication was not evident. Our participants had few cases experiencing functional decline over time, limiting observations of variation in physical performance across three assessments. One half of our participants was in their 60s at baseline and most retained stable cognitive ability over six years of observation, though physical performance decreased over time. There could be a bottom effect due to drop-out of cases with severe impairment, limiting the variation in physical performance and cognitive function. Furthermore, we excluded decedents from the analysis, potentially resulting in samples with less readiness for end-of-life communication. Older adults who perceive that they are approaching their end of life are more likely to discuss care preferences with someone or have written directives.[69] Future replication using data from an older population may be helpful to explore the roles of physical decline in engaging ACP and depressive symptoms.

Strengths and Limitations

The strength of this study is that our bidirectional observations included three assessments over six years. Use of the RI-CLPMs elucidated directional associations between end-of-life communication and depressive symptoms after accounting for cognition and physical performance as well as autoregressive effects and time-invariant covariates.

However, our study had some limitations. The cross-lagged association from end-of-life communication at T0 to increased depressive symptoms at T1 was not observed. The level of depressive symptoms at T2 could be increased as the population's response to the COVID-19 pandemic and related restrictions in the Netherlands.[70] Similarly, the pandemic could increase the rate of end-of-life communication, underpinned by the individual's perception of reduced care capacity and the urgency in making choices.[71,72] The constant threat of COVID-19 might have increased their thinking about ACP topics regarding the end of life, though it has not necessarily led to an increase in discussing ACP topics with physicians.[73] These unmeasured factors may have caused an overall increase in depressive symptoms and end-of-life communication, resulting in underestimated strengths of association between end-of-life communication and depressive symptoms. Assessment of engaging in end-of-life communication was not defined in terms of timing, that could interact with its level of association with depressive symptoms and with functional limitations. Therefore, we could not exclude a reverse association from earlier functional limitations to end-of-life communication during a three-year interval. Additionally, our sample represented relatively young older adults (in their 60s and 70s), which limits the generalizability of the findings to older populations where end-of-life communication could occur under more prevalent physical and cognitive decline. Finally, our observation was limited to the Dutch population, while there may be socio-cultural differences in end-of-life decision making across countries.[74]

Conclusion

In a cohort study of 1669 older adults, participants having discussed end-of-life wishes with their physicians in 2018–2019, showed increased depressive symptoms and decreased cognitive and physical functioning in 2021–2022. Poor cognitive functioning in 2015–2016 was prospectively associated with having discussed end-of-life wishes in 2018–2019. The findings underscore the need for monitoring and prevention of mood changes in ACP implementation. The underlying mechanism on how and which elements of end-of-life discussions are associated with mood changes should be clarified.

Data Statement

Data from the Longitudinal Aging Study Amsterdam (LASA) are available for use for specific research questions. Research proposals should be submitted to the LASA Steering Group, using a standard analysis proposal form that can be obtained from the LASA website: www.lasa-vu.nl. Files with data published in this publication are freely available for replication purposes and can be obtained using the same analysis proposal form. The LASA Steering Group will review all requests for data to ensure that proposals for the use of LASA data do not violate privacy regulations and are in keeping with informed consent that is provided by all LASA participants.

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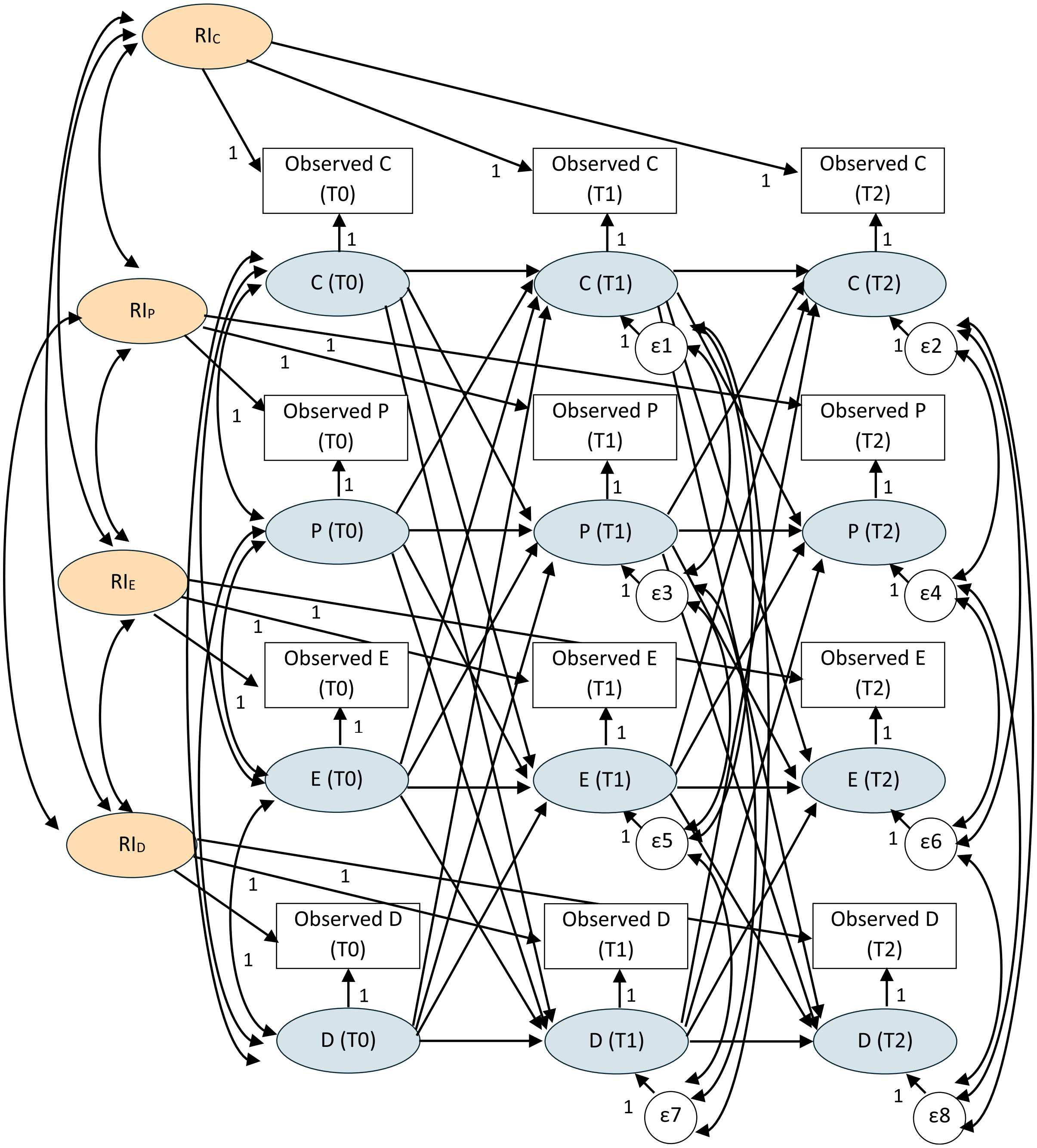
Appendix

Supplementary Fig. 1. Full specification of the four-variate random intercept cross-lagged panel model at T0, T1, and T2. T0, baseline; T1, three-year follow-up; T2, six-year follow-up; (C), cognition; (P), physical performance; (E), end-of-life communication; (D), depressive symptoms; RI, random-intercept. Orange indicates between components; blue, within components.



Supplementary Table 1
Time-Variant Variables Used in this Study

Domain	Variable	Description
Engaging in advance care planning	End-of-life communication	• Yes = 1, No = 0 • Single question "Have you discussed with your physician about your end-of-life wishes?" • Assessed in face-to-face interview with the person
Psychological symptoms	Depressive symptoms	• Center for epidemiologic studies depression scale • Ranged 0−60 • Assessed in face-to-face or telephone interview with the person
	Anxiety	• Anxiety subscale of the hospital anxiety depression scale • Ranged 0−21 • Assessed in face-to-face interview with the person
Cognitive health	Cognition	• Short form of the Mini-Mental State Examination (MMSE) • Ranged 0−16 • Assessed in face-to-face or telephone interview with the person[a]

Physical health	Physical performance	• Four physical performance tests
		  • Chair stand: time to stand up from and sit down on a chair five times without using the arms
		  • Walking: time to walk three meters and back
		  • Cardigan: time to put a cardigan on and take it off
		  • Tandem stand: time the participant was able to stand still on a straight line with one foot directly before the other
		• The scores on each of these measures were divided into quartiles determined at LASA Wave B survey
		• Ranged 0−16
		• Assessed in Face-to-face interview the person

[a]We chose the short form of the MMSE to include data from telephone interviews as well as face-to-face interviews. The full form of MMSE was completed in face-to-face interviews only.

Supplementary Table 2
Means or Prevalences of Main Variables in the Original Sample

	T0		T1		T2	
	N	Value	N	Value	N	Value
End-of-life communication,[a] N (%)	1410	147 (10.4)	1229	197 (16.0)	1042	203 (19.5)
Number of missing	259		440		627	
Depressive symptoms,[b] mean (SD)	1627	7.1 (6.5)	1471	7.2 (6.7)	1305	7.6 (6.7)
Number of missing	42		198		364	
Anxiety,[c] mean (SD)	1503	2.9 (2.9)	1292	2.7 (2.9)	1109	2.9 (3.0)
Number of missing	166		377		560	
Cognition,[d] mean (SD)	1611	14.1 (2.2)	1452	14.1 (2.3)	1280	14.2 (2.2)
Number of missing	58		217		389	
Physical performance,[e] N (%)	1399	11.7 (2.8)	1167	11.4 (2.7)	980	11.4 (2.8)
Number of missing	270		502		689	

N = 1669.
[a]End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
[b]Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.
[c]Anxiety was measured using the anxiety subscale of the Hospital Anxiety Depression Scale, ranging from 0 to 21. Cross-sectional correlations with depressive symptoms were high with the Pearson's coefficients of 0.75−0.76.
[d]Cognition was measured using the short Mini-Mental State Examination Short Form that ranges from 0 to 16.
[e]Physical performance was assessed using four physical performance tests, ranging from 0 to 16.

Supplementary Table 3
Estimated Coefficients or Odds Ratios, 95% Confidence Intervals and *P*-values of Time Effects on Cognition, Physical Performance, End-of-Life Communication, Depressive Symptoms, and Anxiety From T0 to T1, and T2

	T1			T2		
	Value	95% CI	*P*-value	Value	95% CI	*P*-value
End-of-life communication,[a] odds ratio	2.81***	2.03 to 3.89	<.001	4.78***	3.32 to 6.89	<.001
Depressive symptoms,[b] coefficient	0.18	−0.11 to 0.47	.227	0.78***	0.48 to 1.09	<.001
Anxiety,[c] coefficient	−0.17*	−0.32 to −0.03	.021	0.19*	0.03 to 0.34	.016
Cognition,[d] coefficient	−0.05	−0.16 to 0.07	.418	−0.04	−0.16 to 0.08	.541
Physical performance,[b] odds ratio	−0.51***	−0.66 to −0.37	<.001	−0.74***	−0.88 to −0.61	<.001

N = 1669; CI, confidence interval; *P < .05, **P < .01, ***P < .001; Multiple imputation was used to estimate missing data.
[a]End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
[b]Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.
[c]Anxiety was measured using the anxiety subscale of the Hospital Anxiety Depression Scale, ranging from 0 to 21.
[d]Cognition was measured using the short Mini-Mental State Examination Short From that ranges from 0 to 16.[e]Physical performance was assessed using four physical performance tests and quartiles, ranging from 1 to 4.

Supplementary Table 4

Standardized Coefficients, 95% Confidence Intervals and *P*-values of Parameters in the Random Intercept Cross-Lagged Panel Model Analysis of the Bidirectional Effects of Cognition, Physical Performance, End-of-Life Communication, and Depressive Symptoms at T0, T1, and T2

	β	95% CI	*P*-value
Within-person component			
Cross-lagged association			
P T0 → C T1	0.05	−0.16 to 0.26	.635
E T0 → C T1	−0.06	+0.19 to 0.06	.300
D T0 → C T1	−0.01	−0.12 to 0.11	.937
P T1 → C T2	−0.06	−0.14 to 0.03	.183
E T1 → C T2	−0.13**	−0.22 to −0.04	.005
D T1 → C T2	0.07	−0.02 to 0.16	.122
C T0 → P T1	−0.08	−0.48 to 0.32	.691
E T0 → P T1	0.12	−0.45 to 0.68	.683
D T0 → P T1	0.30	−0.19 to 0.80	.230
C T1 → P T2	0.10	−0.02 to 0.22	.097
E T1 → P T2	−0.16**	−0.27 to −0.04	.007
D T1 → P T2	−0.01	−0.12 to 0.09	.785
C T0 → E T1	−0.12*	−0.23 to −0.01	.041
P T0 → E T1	−0.20	−0.43 to 0.03	.088
D T0 → E T1	0.08	−0.05 to 0.21	.219
C T1 → E T2	−0.06	−0.15 to 0.02	.135
P T1 → E T2	0.04	−0.03 to 0.11	.283
D T1 → E T2	0.06	−0.03 to 0.15	.217
C T0 → D T1	0.09	−0.04 to 0.22	.158
P T0 → D T1	0.02	−0.22 to 0.25	.878
E T0 → D T1	0.03	−0.10 to 0.17	.630
C T1 → D T2	0.002	−0.11 to 0.11	.971
P T1 → D T2	0.01	−0.10 to 0.11	.900
E T1 → D T2	0.12*	0.01 to 0.24	.037
Autoregressive association			
C T0 → C T1	0.24***	0.13 to 0.36	<.001
C T1 → C T2	0.24***	0.14 to 0.34	<.001
P T0 → P T1	−1.00	−2.19 to 0.19	.100
P T1 → P T2	0.16*	0.02 to 0.30	.021
E T0 → E T1	0.12	−0.04 to 0.28	.136
E T1 → E T2	0.29***	0.19 to 0.39	<.001
D T0 → D T1	0.10	−0.05 to 0.25	.200
D T1 → D T2	0.11	−0.001 to 0.22	.052
Cross-sectional association			
C T0 ↔ P T0	−0.03	−0.22 to 0.16	.761
C T0 ↔ E T0	−0.09	−0.23 to 0.05	.213
C T0 ↔ D T0	−0.05	−0.17 to 0.07	.419
P T0 ↔ E T0	0.09	−0.16 to 0.34	.489
P T0 ↔ D T0	0.10	−0.11 to 0.31	.372
E T0 ↔ D T0	−0.01	−0.15 to 0.13	.892
C T1 ↔ P T1	0.18	−1.05 to 1.41	.779
C T1 ↔ E T1	−0.02	−0.12 to 0.08	.714
C T1 ↔ D T1	0.02	−0.09 to 0.14	.700
P T1 ↔ E T1	−0.66	−3.79 to 2.48	.681
P T1 ↔ D T1	0.02	−0.60 to 0.64	.957
E T1 ↔ D T1	0.11	−0.03 to 0.24	.120
C T2 ↔ P T2	0.14***	0.06 to 0.22	<.001
C T2 ↔ E T2	−0.07*	−0.15 to −0.002	.043
C T2 ↔ D T2	−0.01	−0.09 to 0.08	.912
P T2 ↔ E T2	−0.07	−0.15 to 0.004	.064
P T2 ↔ D T2	−0.12**	−0.20 to −0.04	.005
E T2 ↔ D T2	0.05	−0.03 to 0.13	.226
Between-person component			
C ↔ P	0.32***	0.23 to 0.41	<.001
C ↔ E	0.01	−0.13 to 0.14	.945
C ↔ D	−0.30***	−0.40 to −0.19	<.001
P ↔ E	−0.14**	−0.24 to −0.04	.007
P ↔ D	−0.42***	−0.48 to −0.36	<.001
E ↔ D	0.22***	0.12 to 0.32	<.001
Model fit indices			
χ^2/df(6)	10.820		
CFI	0.999		
RMSEA	0.022 [90%CI: 0.000 to 0.043]		
SRMR	0.006		

N = 1669; CI, confidence interval; C, cognition; P, physical performance; E, end-of-life communication; D; depressive symptoms; **P* < .05, ***P* < .01, ****P* < .001; Multiple imputation was used to estimate missing data.
Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16.
Physical performance was assessed using four physical performance tests, ranging from 0 to 16.
End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.

Supplementary Table 5

Sensitivity Analysis: Standardized Coefficients, 95% Confidence Intervals and *P*-values of Parameters in the Random Intercept Cross-Lagged Panel Model Analysis of the Bidirectional Effects of Cognition, Physical Performance, End-of-Life Communication, and Anxiety at T0, T1, and T2

	β	95% CI	*P*-value
Within-person component			
Cross-lagged association			
P T0 → C T1	0.06	−0.14 to 0.26	.555
E T0 → C T1	−0.07	−0.20 to 0.05	.236
A T0 → C T1	−0.003	−0.11 to 0.10	.957
P T1 → C T2	−0.05	−0.14 to 0.04	.246
E T1 → C T2	−0.13**	−0.22 to −0.04	.007
A T1 → C T2	0.12*	0.03 to 0.22	.010
C T0 → P T1	−0.06	−0.41 to 0.28	.721
E T0 → P T1	0.08	−0.39 to 0.54	.748
A T0 → P T1	0.14	−0.15 to 0.42	.340
C T1 → P T2	0.10	−0.02 to 0.22	.111
E T1 → P T2	−0.16**	−0.27 to −0.04	.008
A T1 → P T2	0.07	−0.05 to 0.18	.267
C T0 → E T1	−0.13*	−0.24 to −0.01	.027
P T0 → E T1	−0.20	−0.41 to 0.02	.073
A T0 → E T1	0.03	−0.08 to 0.14	.605
C T1 → E T2	−0.07	−0.15 to 0.02	.146
P T1 → E T2	0.04	−0.03 to 0.11	.294
A T1 → E T2	−0.02	−0.12 to 0.07	.605
C T0 → A T1	0.08	−0.05 to 0.22	.236
P T0 → A T1	0.18	−0.06 to 0.43	.137
E T0 → A T1	−0.08	−0.24 to 0.08	.332
C T1 → A T2	0.06	−0.08 to 0.19	.427
P T1 → A T2	−0.01	−0.11 to 0.10	.882
E T1 → A T2	0.10	−0.02 to 0.22	.102
Autoregressive association			
C T0 → C T1	0.24***	0.13 to 0.36	<.001
C T1 → C T2	0.23***	0.13 to 0.33	<.001
P T0 → P T1	−0.91	−1.92 to 0.10	.078
P T1 → P T2	0.16*	0.03 to 0.30	.021
E T0 → E T1	0.12	−0.05 to 0.28	.156
E T1 → E T2	0.29***	0.19 to 0.39	<.001
A T0 → A T1	−0.02	−0.15 to 0.12	.814
A T1 → A T2	−0.08	−0.21 to 0.06	.255
Cross-sectional association			
C T0 ↔ P T0	−0.01	−0.21 to 0.18	.894
C T0 ↔ E T0	−0.11	−0.24 to 0.03	.139
C T0 ↔ A T0	−0.01	−0.12 to 0.09	.803
P T0 ↔ E T0	0.07	−0.17 to 0.31	.565
P T0 ↔ A T0	0.03	−0.13 to 0.19	.678
E T0 ↔ A T0	−0.02	−0.15 to 0.11	.761
C T1 ↔ P T1	0.25	−3.02 to 3.51	.882
C T1 ↔ E T1	−0.02	−0.12 to 0.08	.654
C T1 ↔ A T1	0.08	−0.06 to 0.22	.247
P T1 ↔ E T1	−0.66	−6.76 to 5.44	.832
P T1 ↔ A T1	0.40	−5.33 to 6.13	.891
E T1 ↔ A T1	0.02	−0.14 to 0.17	.825
C T2 ↔ P T2	0.14**	0.06 to 0.22	.001
C T2 ↔ E T2	−0.07	−0.14 to 0.001	.055
C T2 ↔ A T2	0.10*	0.002 to 0.19	.046
P T2 ↔ E T2	−0.08	−0.15 to 0.003	.060
P T2 ↔ A T2	−0.03	−0.11 to 0.06	.582
E T2 ↔ A T2	0.03	−0.06 to 0.12	.551
Between-person component			
C ↔ P	0.31***	0.23 to 0.40	<.001
C ↔ E	0.02	−0.12 to 0.16	.782
C ↔ A	−0.19**	−0.30 to −0.08	.001
P ↔ E	−0.13**	−0.23 to −0.03	.009
P ↔ A	−0.21***	−0.28 to −0.14	<.001
E ↔ A	0.19***	0.09 to 0.30	<.001
Model fit indices			
χ^2/df(6)	7.051		
CFI	1.000		
RMSEA	0.010 [90%CI: 0.000 to 0.035]		
SRMR	0.006		

N = 1669; CI, confidence interval; C, cognition; P, physical performance; E, end-of-life communication; A; anxiety; **P* < .05, ***P* < .01, ****P* < .001; Multiple imputation was used to estimate missing data.
Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16.
Physical performance was assessed using four physical performance tests, ranging from 0 to 16.
End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
Anxiety was measured using the anxiety subscale of the Hospital Anxiety Depression Scale, ranging from 0 to 21.

Supplementary Table 6

Sensitivity Analysis: Standardized Coefficients, 95% Confidence Intervals and *P*-values of Parameters in the Random Intercept Cross-Lagged Panel Model Analysis of the Bidirectional Effects of Cognition, Physical Performance, End-of-Life Communication, and Depressive Symptoms at T0, T1, and T2 Stratified by Baseline Age Groups

	60s or Younger			70s or Older		
	β	95% CI	*P*-value	β	95% CI	*P*-value
Within-person component						
Cross-lagged association						
P T0 → C T1	0.08	−0.08 to 0.23	.331	−0.03	−0.33 to 0.28	.867
E T0 → C T1	0.01	−0.15 to 0.16	.931	−0.10	−0.29 to 0.09	.312
D T0 → C T1	0.003	−0.13 to 0.14	.960	0.02	−0.18 to 0.22	.876
P T1 → C T2	−0.07	−0.21 to 0.06	.272	−0.08	−0.20 to 0.04	.180
E T1 → C T2	−0.10	−0.22 to 0.03	.125	−0.12	−0.25 to 0.01	.078
D T1 → C T2	0.13*	0.01 to 0.25	.039	0.04	−0.10 to 0.17	.575
C T0 → P T1	0.004	−0.20 to 0.20	.968	−0.09	−0.69 to 0.52	.775
E T0 → P T1	−0.08	−0.34 to 0.18	.546	0.08	−0.74 to 0.90	.844
D T0 → P T1	0.004	−0.22 to 0.23	.973	0.37	−0.60 to 1.35	.455
C T1 → P T2	0.09	−0.07 to 0.24	.275	0.05	−0.12 to 0.23	.550
E T1 → P T2	−0.08	−0.24 to 0.07	.292	−0.11	−0.26 to 0.04	.135
D T1 → P T2	0.10	−0.04 to 0.25	.149	−0.08	−0.25 to 0.08	.325
C T0 → E T1	−0.09	−0.23 to 0.06	.233	−0.15	−0.35 to 0.04	.121
P T0 → E T1	−0.08	−0.28 to 0.11	.397	−0.18	−0.51 to 0.16	.306
D T0 → E T1	0.03	−0.12 to 0.18	.711	0.11	−0.10 to 0.32	.312
C T1 → E T2	−0.06	−0.17 to 0.04	.249	−0.05	−0.18 to 0.08	.452
P T1 → E T2	0.09	−0.01 to 0.19	.076	0.03	−0.09 to 0.15	.626
D T1 → E T2	0.01	−0.12 to 0.13	.917	0.09	−0.05 to 0.22	.196
C T0 → D T1	0.09	−0.04 to 0.23	.162	0.09	−0.12 to 0.30	.391
P T0 → D T1	−0.02	−0.18 to 0.14	.803	−0.06	−0.41 to 0.30	.742
E T0 → D T1	−0.001	−0.16 to 0.15	.985	0.08	−0.19 to 0.33	.427
C T1 → D T2	0.002	−0.15 to 0.16	.982	0.04	−0.10 to 0.18	.564
P T1 → D T2	0.08	−0.08 to 0.24	.307	−0.02	−0.16 to 0.12	.824
E T1 → D T2	0.10	−0.05 to 0.25	.209	0.09	−0.07 to 0.24	.273
Autoregressive association						
C T0 → C T1	0.23**	0.09 to 0.37	.001	0.24*	0.05 to 0.43	.016
C T1 → C T2	0.18*	0.04 to 0.32	.014	0.27**	0.12 to 0.43	.001
P T0 → P T1	−0.38	−0.75 to 0.003	.052	−0.79	−2.42 to 0.84	.342
P T1 → P T2	0.09	−0.06 to 0.25	.249	0.19*	0.003 to 0.37	.046
E T0 → E T1	0.08	−0.22 to 0.38	.609	0.08	−0.14 to 0.31	.470
E T1 → E T2	0.26*	0.12 to 0.40	<.001	0.27***	0.12 to 0.42	<.001
D T0 → D T1	0.12	−0.03 to 0.27	.114	0.07	−0.19 to 0.33	.576
D T1 → D T2	−0.01	−0.17 to 0.15	.903	0.20*	0.04 to 0.36	.013
Cross-sectional association						
C T0 ↔ P T0	0.11	−0.03 to 0.25	.126	−0.09	−0.37 to 0.19	.516
C T0 ↔ E T0	−0.01	−0.19 to 0.16	.881	−0.18	−0.37 to 0.01	.062
C T0 ↔ D T0	−0.07	−0.19 to 0.06	.278	−0.04	−0.24 to 0.16	.677
P T0 ↔ E T0	−0.12	−0.31 to 0.07	.197	0.10	−0.22 to 0.43	.534
P T0 ↔ D T0	−0.11	−0.26 to 0.03	.134	0.14	−0.22 to 0.49	.453
E T0 ↔ D T0	0.01	−0.15 to 0.17	.912	0.03	−0.18 to 0.23	.806
C T1 ↔ P T1	0.14	−0.12 to 0.39	.287	−0.07	−2.82 to 2.68	.959
C T1 ↔ E T1	0.03	−0.10 to 0.15	.706	−0.04	−0.21 to 0.13	.607
C T1 ↔ D T1	0.07	−0.07 to 0.21	.337	−0.002	−0.17 to 0.17	.983
P T1 ↔ E T1	−0.19	−0.49 to 0.11	.223	−0.54	−6.50 to 5.41	.858
P T1 ↔ D T1	0.09	−0.19 to 0.37	.538	−0.28	−2.07 to 1.52	.764
E T1 ↔ D T1	0.05	−0.10 to 0.20	.523	0.11	−0.08 to 0.30	.268
C T2 ↔ P T2	0.05	−0.07 to 0.16	.405	0.15*	0.03 to 0.27	.016
C T2 ↔ E T2	−0.08	−0.18 to 0.01	.085	−0.04	−0.15 to 0.07	.506
C T2 ↔ D T2	0.04	−0.08 to 0.15	.529	0.01	−0.11 to 0.13	.882
P T2 ↔ E T2	−0.04	−0.14 to 0.06	.440	−0.04	−0.17 to 0.09	.532
P T2 ↔ D T2	−0.01	−0.14 to 0.12	.830	−0.09	−0.21 to 0.03	.146
E T2 ↔ D T2	−0.004	−0.13 to 0.13	.956	0.05	−0.07 to 0.17	.383
Between-person component						
C ↔ P	0.20***	0.09 to 0.30	<.001	0.35***	0.19 to 0.51	<.001
C ↔ E	0.03	−0.15 to 0.20	.765	0.10	−0.15 to 0.35	.426
C ↔ D	−0.21**	−0.33 to −0.09	.001	−0.37***	−0.55 to −0.18	<.001
P ↔ E	−0.01	−0.13 to 0.11	.894	−0.04	−0.20 to 0.11	.601
P ↔ D	−0.39***	−0.47 to −0.31	<.001	−0.38***	−0.49 to −0.27	<.001
E ↔ D	0.18**	0.05 to 0.32	.007	0.19*	0.03 to 0.36	.021
Model fit indices						
χ^2/df(6)	2.909			8.992		
CFI	1.000			0.998		
RMSEA	0.000 [90%CI: 0.000 to 0.025]			0.027 [90%CI: 0.000 to 0.060]		
SRMR	0.007			0.007		

N = 973 (60s or younger) and 696 (70s or older); CI, confidence interval; C, cognition; P, physical performance; E, end-of-life communication; D; depressive symptoms; **P* <.05, ***P* <.01, ****P* <.001; Multiple imputation was used to estimate missing data.
Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16.
Physical performance was assessed using four physical performance tests, ranging from 0 to 16.
End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.

Supplementary Table 7

Sensitivity Analysis: Standardized Coefficients, 95% Confidence Intervals and *P*-values of Parameters in the Random Intercept Cross-Lagged Panel Model Analysis of the Bidirectional Effects of Cognition, Physical Performance, End-of-Life Communication, and Depressive Symptoms at T0, T1, and T2 Using Full Information Maximum Likelihood Method

	β	95% CI	*P*-value
Within-person component			
Cross-lagged association			
P T0 → C T1	0.05	−0.14 to 0.24	.620
E T0 → C T1	−0.06	−0.18 to 0.05	.278
D T0 → C T1	−0.004	−0.12 to 0.11	.944
P T1 → C T2	−0.07	−0.15 to 0.01	.091
E T1 → C T2	−0.10*	−0.19 to −0.01	.028
D T1 → C T2	0.07	−0.01 to 0.16	.102
C T0 → P T1	−0.03	−0.30 to 0.24	.813
E T0 → P T1	0.03	−0.32 to 0.37	.886
D T0 → P T1	0.25	−0.07 to 0.56	.127
C T1 → P T2	0.11	−0.01 to 0.22	.069
E T1 → P T2	−0.15*	−0.26 to −0.03	.012
D T1 → P T2	−0.01	−0.12 to 0.10	.852
C T0 → E T1	−0.09	−0.20 to 0.02	.112
P T0 → E T1	−0.20	−0.41 to 0.01	.057
D T0 → E T1	0.06	−0.07 to 0.19	.385
C T1 → E T2	−0.03	−0.12 to 0.06	.479
P T1 → E T2	0.05	−0.03 to 0.13	.196
D T1 → E T2	0.05	−0.04 to 0.13	.284
C T0 → D T1	0.07	−0.04 to 0.17	.205
P T0 → D T1	0.002	−0.21 to 0.21	.989
E T0 → D T1	0.02	−0.10 to 0.15	.711
C T1 → D T2	0.01	−0.10 to 0.11	.887
P T1 → D T2	0.02	−0.08 to 0.11	.712
E T1 → D T2	0.11*	0.01 to 0.22	.039
Autoregressive association			
C T0 → C T1	0.24***	0.13 to 0.35	<.001
C T1 → C T2	0.25***	0.14 to 0.36	<.001
P T0 → P T1	−0.77*	−1.38 to −0.16	.013
P T1 → P T2	0.15**	0.04 to 0.27	.009
E T0 → E T1	0.11	−0.06 to 0.28	.205
E T1 → E T2	0.29***	0.19 to 0.38	<.001
D T0 → D T1	0.11	−0.02 to 0.25	.104
D T1 → D T2	0.11*	0.003 to 0.23	.044
Cross-sectional association			
C T0 ↔ P T0	0.00	−0.18 to 0.18	.999
C T0 ↔ E T0	−0.10	−0.23 to 0.04	.157
C T0 ↔ D T0	−0.06	−0.16 to 0.05	.280
P T0 ↔ E T0	0.04	−0.19 to 0.27	.727
P T0 ↔ D T0	0.09	−0.11 to 0.29	.389
E T0 ↔ D T0	−0.03	−0.16 to 0.11	.693
C T1 ↔ P T1	0.17	−0.36 to 0.69	.538
C T1 ↔ E T1	−0.01	−0.11 to 0.09	.866
C T1 ↔ D T1	0.01	−0.09 to 0.12	.791
P T1 ↔ E T1	−0.63	−1.74 to 0.48	.266
P T1 ↔ D T1	0.02	−0.49 to 0.53	.935
E T1 ↔ D T1	0.07	−0.04 to 0.19	.229
C T2 ↔ P T2	0.13**	0.05 to 0.21	.002
C T2 ↔ E T2	−0.05	−0.13 to 0.03	.197
C T2 ↔ D T2	0.002	−0.08 to 0.08	.960
P T2 ↔ E T2	−0.06	−0.14 to 0.02	.115
P T2 ↔ D T2	−0.12**	−0.21 to −0.03	.009
E T2 ↔ D T2	0.03	−0.05 to 0.11	.452
Between-person component			
C ↔ P	0.29***	0.21 to 0.38	<.001
C ↔ E	0.02	−0.11 to 0.15	.759
C ↔ D	−0.28***	−0.38 to −0.19	<.001
P ↔ E	−0.10*	−0.20 to 0.00	.049
P ↔ D	−0.41***	−0.47 to −0.34	<.001
E ↔ D	0.22***	0.13 to 0.32	<.001
Model fit indices			
χ^2/df(6)	3.332		
CFI	1.000		
RMSEA	0.000 [90%CI: 0.000 to 0.022]		
SRMR	0.007		

N = 1635 (34 who did not report any time-variant variables were excluded); CI, confidence interval; C, cognition; P, physical performance; E, end-of-life communication; D; depressive symptoms; *P < .05, **P < .01, ***P < .001; Full information maximum likelihood method was used to handle missing data.
Cognition was measured using the Mini-Mental State Examination Short Form that ranges from 0 to 16.
Physical performance was assessed using four physical performance tests, ranging from 0 to 16.
End-of-life communication was measured using a question if the person has discussed end-of-life wishes with the physician (yes = 1, no = 0).
Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale, ranging from 0 to 60.