Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Symptoms of depression, anxiety, and perceived mastery in older adults before and during the COVID-19 pandemic: Results from the Longitudinal Aging Study Amsterdam

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ABSTRACT

Objective: Governmental measures to protect older adults from COVID-19 are hypothesized to cause anxiety and depression. Previous studies are heterogeneous and showed small effects. This study aims to assess depressive and anxiety symptoms and perceived mastery just after the first wave of the COVID-19 pandemic compared to previous years in community-dwelling older adults and to identify potential risk groups according to the comprehensive geriatric assessment framework.

Methods: Data were used from 1068 Dutch older adults (aged 55–93 at baseline in 2011–2013) participating in the Longitudinal Aging Study Amsterdam, including 4 follow-ups spanning 9 years. Depressive symptoms, anxiety symptoms and feelings of mastery were assessed with the short Center for Epidemiologic Studies Depression scale (CES-D-10), the Hospital Anxiety Depression Scale - Anxiety subscale (HADS-A) and the Pearlin Mastery Scale. Linear mixed regression was used to compare outcomes in June-August 2020 to previous years and to examine predictors to identify risk groups.

Results: Slight increases in CES-D-10 (1.37, 95% Confidence interval [CI] 1.12;1.62), HADS-A (0.74, 95% CI 0.56;0.94) and mastery (1.10, 95% CI 0.88;1.31) occurred during the COVID year compared to previous years. Older adults with functional limitations or with frailty showed a smaller increase in feelings of mastery in the COVID-year.

Conclusion: Our results suggest limited mental health effects on older adults from the first COVID-19 wave. Older adults have perhaps better coping strategies than younger adults, or preventive measures did not have extensive consequences for the daily life of older adults. Further monitoring of depression, anxiety and perceived mastery is recommended.

1. Introduction

Older adults are at elevated risk for severe Corona Virus Disease 2019 (COVID-19) morbidity and mortality [1,2] and for adverse economic, social and psychological consequences related to the pandemic [3,4]. For example, public health measures that conflict with personal freedom, contradictory messages from authorities, shortages of COVID-19 tests and personal protective equipment are hypothesized to cause emotional distress and increase risk for psychiatric illness [5,6]. Furthermore, the unexpectedness of the pandemic itself and the many

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consequences that seem uncontrollable by individuals, such as cancellations of treatments and restrictions to social contacts may reduce feelings of personal control over life (mastery), which is an essential coping resource for maintaining good mental health [7]. In the Netherlands, the government gave community-dwelling older adults additional recommendations next to the public health measures for the general population at the peaks of the pandemic from March-May 2020 and October 2020 until April 2021. The government advised older adults against the use of public transport, not to do their own groceries and not to receive any visitors (https://www.rijksoverheid.nl/documenten/rapporten/2020/10/14/aanvullende-corona-adviezen-aan-zelfstandig-wonende-ouderen). Therefore, older adults were even more restricted in their personal freedom compared to younger adults with possible risks for their mental health.

A meta-analysis showed that effects of lockdown on depression and anxiety were small on average but that study populations were heterogeneous [8]. Longitudinal studies which compared anxiety and depression before and during the COVID-19 pandemic showed younger age, female sex, and previous poor mental health as risk factors during the COVID-19 pandemic [9,10]. The younger age as risk factor for negative psychological effects of the lockdown suggests older adults are possibly protected instead of at risk. At the same time, in older adults, fear for COVID-19-related morbidity and mortality could also result in increased feelings of depression and anxiety. Unfortunately, limited longitudinal data including pre-pandemic measurements of mental health focusing on older adults has been published. If we would identify older adults at risk for the development of depression, anxiety, and loss of mastery during the COVID-19 pandemic it could guide the development of preventive strategies for future restrictive measures during a pandemic. Furthermore, extending previous studies focusing on affective symptoms, we additionally examined mastery as a central indicator of control beliefs, which are strongly related to mental health and wellbeing [11], and may change as a result of the unexpected and unprecedented events occurring during the COVID-pandemic.

Trajectories of mental health in older adults before and during the COVID-19 pandemic and risk factors for depressive and anxiety symptoms have been assessed in a few studies. Depressive and anxiety symptoms increased in older adults during the pandemic in Chile, however only one measurement was performed before the pandemic, therefore data on the trajectories of depressive and anxiety symptoms for multiple years is limited [12]. In a population aged 50-years and over, higher loneliness, reductions in physical activity, female gender and being retired were risk factors for increased depressive and anxiety symptoms during the COVID-year [13]. In older adults in Japan, internet use for communication had a protective influence on the probability of developing depression [14].

These studies suggest that determinants for depression, anxiety and mastery are heterogeneous. Therefore, a comprehensive assessment approach and systematic categorization of determinants may help to identify risk groups. To assess older adults at risk, we used the framework of the Comprehensive Geriatric Assessment (CGA). The CGA is a multidimensional, multidisciplinary diagnostic and therapeutic process focused on determining an older person's medical, functional, mental, and social capabilities and limitations with the goal of ensuring that problems are identified, quantified, and managed appropriately [15]. In a meta-analysis of risk factors for depressive symptoms in older adults, bereavement, sleep disturbance, disability, prior depression, and female gender were significant risk factors [16]. Based on the CGA-framework, we hypothesize that having multiple comorbidities (medical domain), cognitive impairment (mental domain), functional limitations (functional domain) or living alone (social domain) are possible risk factors in older adults living in the community for negative psychological impact during the lockdown measures. We also hypothesize that a higher frailty score, which summarizes limitations on the medical, mental, and functional domain, is a risk factor for an increase in affective symptoms and decrease in perceived control.

In this longitudinal observational study, we addressed the following two research questions: 1) Is there a change in depressive or anxiety symptoms or in perceived mastery in community dwelling older adults in the Netherlands during the COVID-19 pandemic compared to previous years? And 2) Are older adults with multiple chronic diseases, cognitive impairment, functional limitations, who are living alone or with frailty at risk for a change in depressive or anxiety symptoms or perceived mastery?

2. Materials and methods

2.1. Study sample and design

The Longitudinal Aging Study Amsterdam (LASA) is an ongoing prospective cohort study initiated in 1992 based on a representative sample of older adults aged 55–84 years in the Netherlands [17]. The primary objective of LASA was to study determinants, trajectories, and consequences of (changes in) functioning in four domains: physical, cognitive, emotional, and social. Participants are interviewed approximately every three years and in 2002 and 2012 refresher cohorts aged 55–64 were added to the study. Interviews include a main face-to-face interview and a subsequent medical interview with additional questionnaires and clinical tests. The LASA study was approved by the medical ethics committee of the VU University Medical Center. Written informed consent was obtained from all participants.

As the COVID-19 pandemic is an exceptional situation, an extra assessment after the measurement wave of 2018–2019 was added [18]. This was a questionnaire that was sent to LASA participants in June 2020, just after the first wave of the pandemic, in a period that most social distancing measures were eased (most governmental measures in the Netherlands were eased as of mid-May 2020). Of the 1701 respondents of the last measurement wave (Wave J, 2018–2019) 1485 were selected to participate. Respondents who were not selected had already died (n = 61) or were purposefully not selected (n = 155) because the questionnaire was expected to be too much of a burden [18]. These 155 people were older and more vulnerable than selected participants, for example, 98 of them had short or proxy interviews at the last measurement wave before the pandemic (2018–2019) because of cognitive impairment or poor health. The questionnaire was sent on June 8, 2020, by postal mail: participants could choose to return it by mail or fill it out online. Participants aged 80 years and older who initially did not respond were offered to answer the questionnaire in a telephone interview. Data collection ended on October 8, 2020, however 99% of all data were received before the end of August 2020. Of the 1485 LASA participants approached, 1128 (76%) returned the questionnaire. On average, responders had more years of education and a higher MMSE-score compared to non-responders. No differences in age, sex, chronic diseases, and functional limitations were found [18]. We restricted our sample to individuals with complete outcome measures for the COVID wave in 2020 (n = 1068; Fig. 1) and longitudinally followed the same individuals over 4 waves: T1: 2011–2013 (n = 1049), T2: 2015–2016 (n = 1026), T3: 2018–2019 (n = 984), T4: 2020 (n = 1068). The N of previous waves was slightly lower because of missing data (some participants of the COVID wave in 2020 did not complete all measurements at previous waves).

We applied STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) guidelines for reporting observational studies in epidemiology (Electronic Supplementary Material 1).

2.2. Mental health outcomes

To assess depressive symptoms, we used the Center for Epidemiologic Studies Depression scale (CES—D) short version (10-item scale) [19]. The CES-D-10 is a self-report questionnaire designed to measure depressive symptoms in the general population and has good psychometric properties and validity in elderly samples [20]. For the 10-item

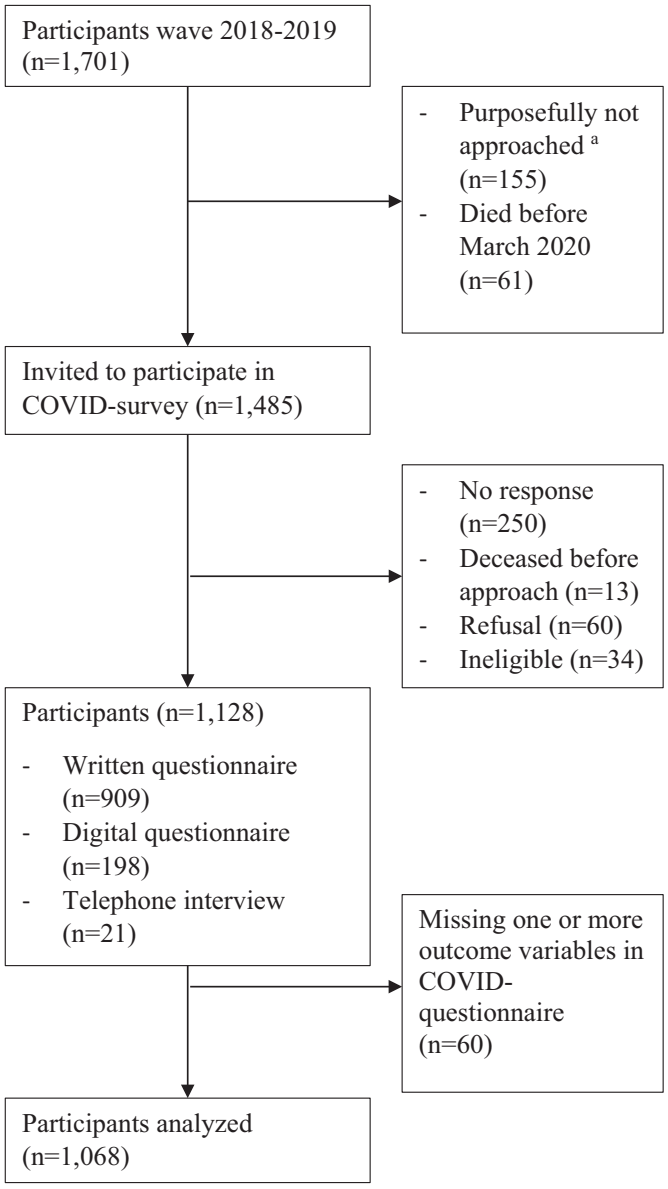

Fig. 1. Flow diagram on analysis of depressive symptoms, anxiety symptoms and mastery in an older cohort (aged 63–102 years) of the Longitudinal Aging Study Amsterdam (2011–2020).
[a]Participants for whom the questionnaire was expected to be too much of a burden, such as respondents who did only a short telephone interview or had a proxy interview at the last measurement cycle T3 (2018–2019).

list a cut-off score of ≥10 is used to determine a probable depression [21].

To assess anxiety symptoms, we used the Hospital Anxiety Depression Scale - Anxiety subscale (HADS-A) [22]. The HADS-A subscale consists of seven items for measuring symptoms of anxiety. A Likert-scale is used to compute a score with a range from 0 to 21. A clinically relevant cut-off for longitudinal analysis is based on two criteria: a score ≥ 8 and an increase of 0.5 times the standard deviation (SD) of the baseline score [23].

To assess mastery, we used the 5-item Pearlin Mastery Scale [24]. The Pearlin Mastery Scale items need to be answered with a Likert-scale. The scale score ranges from 0 to 25, where a higher score indicating internal locus of control (the perception that events in one's life relate to one's actions) and a low score indicating an external locus of control (the perception that events in one's life relate to external sources like chance, other persons/the government, or unpredictable circumstances).

2.3. Risk factors from CGA domains

Using the CGA framework, risk factors were chosen from four domains. For the medical domain, we assessed multiple chronic conditions by seven groups which were explicitly asked about: Chronic non-specific lung disease, cardiac disease, peripheral artery disease, stroke, diabetes mellitus, arthritis, and malignancies. This count variable could therefore range from 0 to 7.

For the mental domain, we assessed cognition by the Mini-Mental State Examination (MMSE) [25]. The MMSE is a brief primary screening test for cognitive functioning, which is strongly influenced by age and education. The MMSE consists of 23 items and the score ranges from 0 to 30, higher scores indicating better cognitive functioning.

For the functional domain, we described functional limitations in seven common daily activities: Can you walk up and down a staircase of 15 steps without resting? Can you dress and undress yourself? Can you sit down and stand up from a chair? Can you cut your own toenails? Can you walk outside during five minutes without stopping? Can you use your own public transportation? Can you take a shower or bath? A score of 0–7 was calculated counting the number of items answered with 'some difficulty' or worse. A higher score indicates more limitations.

We assessed the social domain with the living situation of the participant if the participant lived alone or with someone.

Last, we assessed frailty as reflecting an individual-level combination of the four domains, measured by the LASA frailty index (LASA-FI) [26]. This index is based on the idea that a greater number of deficits indicates higher frailty [27]. The LASA-FI is a 32-item frailty index, where 32 deficits were scored by absence (0) or presence (1). These deficits are items taken, among others, from the chronic diseases, functional limitations, MMSE and CES-D questionnaires. The score for each participant is calculated by dividing the sum of the health deficit score by the total number of health deficits measured, resulting in a score between 0 and 1. A cut-off of 0.25 is used to indicate frailty [28,29].

The risk factors and FI were measured at T3 (2018–2019), because the COVID-questionnaire did not include all necessary items.

2.4. Covariates

We adjusted for baseline age (years, continuous), gender (male/female) and educational level (years, continuous). These were selected as potential confounders because they do not lie on the causal pathway between risk factors and the outcomes.

2.5. Statistical analyses

Baseline characteristics were described with mean values for continuous variables and with percentages for categorical variables. Prevalence estimates (with interquartile ranges) for each outcome were calculated in repeated cross-sectional analysis using all responses of the COVID and previous waves. A sensitivity analysis for baseline characteristics between participants who had complete and incomplete outcome variables was performed.

We conducted a linear mixed model to assess change in outcomes over time, using time in days as predictor; additionally, we added a dummy for the year 2020 to test differences between the COVID-wave and pre-COVID waves and adjusted model for age (continuous), gender (dichotomous) and educational level (continuous in years of education). Predicted residuals were plotted to evaluate model assumptions.

Additional analyses to assess if the change was associated with the selected predictors chronic diseases (continuous per 1 increment), MMSE (continuous per 1 increment), functional limitations (continuous per 1 increment), living with someone (dichotomous, living alone or with someone) or frailty (dichotomous yes/no, with cut-off at 0.25) were done by fitting interaction terms between the dummy variable for the year 2020 and the predictors. Predictors were time-fixed variables

from T3 (2018–2019). Analysis was conducted with Stata version 15 (StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC).

3. Results

The 1068 participants had a mean age of 73.8 years and 47.2% were male. Regarding the potential risk factors, 14.2% of the participants had three or more chronic conditions, 18.9% had three or more functional limitations, 71.8% of participants were living together with someone and 20.0% of participants had a LASA-FI of 0.25 or above and were considered frail (Table 1). Last, the median MMSE score of participants was 29 (interquartile range [IQR] 28;30). Regarding COVID-19 infections, 2.6% of participants reported a COVID-infection in themselves and 3.5% reported a COVID infection in a close relative (partner, parent, child). Sensitivity analysis in which participants of the LASA COVID study with complete (n = 1068) and incomplete (n = 60) data on outcome measures were compared showed that the participants with complete outcomes were younger, had a higher MMSE score and less functional limitations (Electronic supplementary material 2).

The mean follow-up time was 7.8 years with a standard deviation of 0.54 years. Mean and median scores of outcome variables for all waves are described in Fig. 2 and in the appendix (Electronic supplementary material 3). Median CES-D-10 score showed a gradual increase over time (Fig. 2A). Median HADS-A score was stable for the three pre-COVID time points and increased during the pandemic (Fig. 2B). Mean values of CES-D-10 and HADS-A did not reach cut off values at any time point. Also, median scores of the mastery outcome were stable for the three pre-COVID time points and increased during the pandemic (Fig. 2C).

Mixed linear regression showed that CES-D-10 (β = 1.37, 95% Confidence interval [CI] 1.12;1.62), HADS-A (β = 0.74, 95%CI 0.56;0.94) and mastery (β = 1.10, 95%CI 0.88;1.31) increased in the COVID year compared to pre-COVID waves (Table 2).

Each additional functional limitation was associated with a 0.11 smaller increase in mastery in the COVID year compared to previous years (95%CI -0.20; −0.02). Being frail was associated with a 0.43 smaller increase in mastery score in the COVID year compared to previous years (95%CI -0.84; −0.02, Table 2). Having more chronic conditions, a higher MMSE-score or living with someone were not associated with change in CES-D-10, HADS-A or mastery during the COVID-year. Having more functional limitations was not associated with a change in CES-D-10 or HADS-A in the COVID year.

Table 1
Characteristics of the cohort members (aged 63–102 years) of the Longitudinal Aging Study Amsterdam (2011−2020).

	Total
N[a]	1068
Age[b], mean ± SD	73.8 (7.5)
Male[b], (%)	47.2
Educational level[c], (%)	
Primary/lower vocation	29.1
Junior/senior high school	40.5
Higher vocational/university	30.4
Medical domain: Number of chronic diseases from 7 majors[c], (%)	
0	23.2
1	37.4
2	25.2
3 or more	14.2
Mental domain: MMSE (0−30)[c], median (IQR)	29 (28;30)
Functional domain: Functional limitations (of 7 items)[c], (%)	
0	44.9
1	24.2
2	11.9
3 or more	18.9
Social domain: household[c], (%)	
Living alone	28.3
Living with someone	71.6
LASA frailty index 32 items[c], (%)	
Not frail	80.0
Frail (cut off 0.25)	20.0

Note: MMSE = Mini-Mental State Examination Score.
[a] Number of participants with complete information on symptoms of depressions, symptoms of anxiety and mastery at the COVID-questionnaire.
[b] Measured at T4(2020).
[c] Measured at T3(2018–2019), excluding missing data.

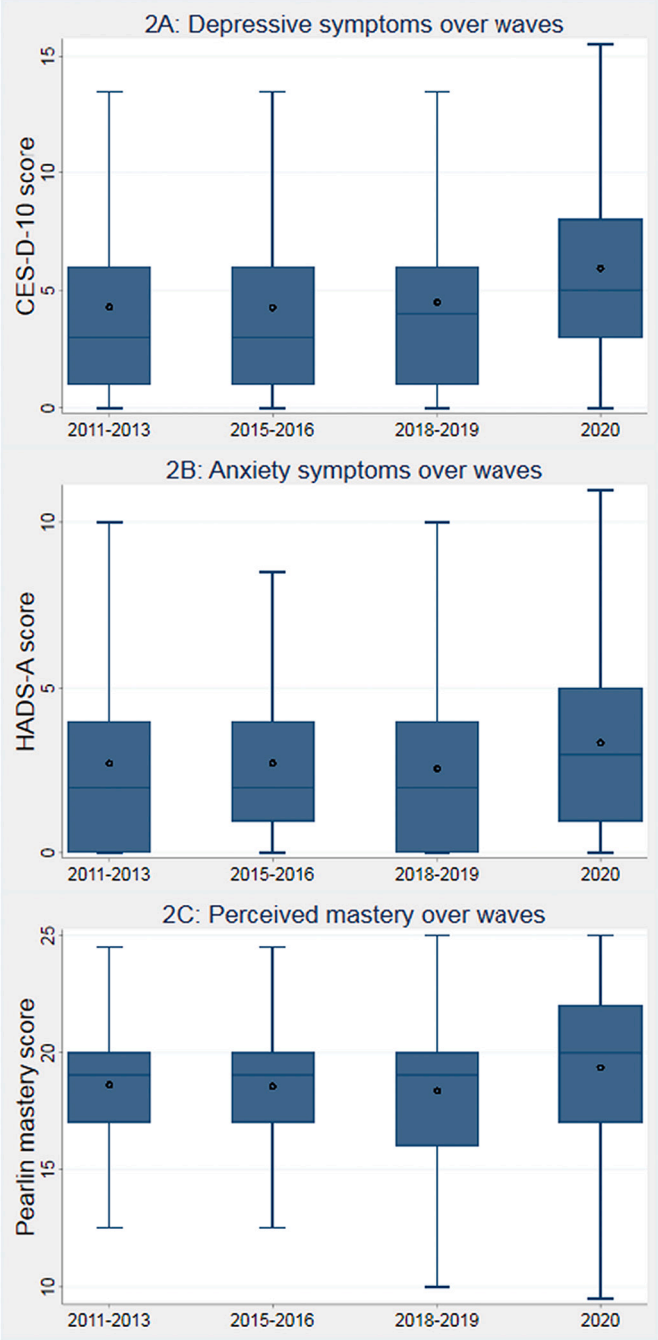

Fig. 2. A–C. Depressive symptoms, anxiety symptoms and mastery before and during COVID in an older cohort (aged 63–102 years) of the Longitudinal Aging Study Amsterdam (2011–2020).
Note: CES-D-10 = Center for Epidemiologic Studies Depression scale 10 item list; HADS-A = Hospital Anxiety Depression Scale - Anxiety subscale. Boxes represent the median and the interquartile range (IQR), whiskers represent minimum and maximum of the observed values, excluding outliers (+/− 3 IQR). The dot represents the mean.

Table 2
Adjusted mixed linear models for depressive symptoms, anxiety symptoms and mastery and possible risk factors according to Comprehensive Geriatric Assessment framework in an older cohort (aged 63–102 years) of the Longitudinal Aging Study Amsterdam (2011–2020).

	CES-D-10	HADS-A	Mastery
	Coeff (95% CI)	Coeff (95% CI)	Coeff (95% CI)
Base model:			
Year 2020[b]	1.37 (1.12;1.62)*	0.74 (0.56;0.94)*	1.10 (0.88;1.31)*
Model 1: Medical domain[a]			
Year 2020[b]	1.45 (1.10;1.81)*	0.94 (0.68;1.21)*	1.11 (0.82;1.41)*
Chronic conditions (0-7)[c]	0.31 (0.18;0.43)*	0.18 (0.08;0.27)*	−0.18 (−0.28;−0.08)*
Chronic conditions × year2020	−0.05 (−0.23;0.13)	−0.14 (−0.27;0.0004)	−0.03 (−0.17;0.12)
Model 2: Mental domain			
Year 2020[b]	0.54 (−2.69;3.77)	0.21 (−2.27;2.68)	0.23 (−2.49;2.94)
MMSE (0-30)[c]	−0.11 (−0.19;−0.03)*	−0.48 (−0.11;0.01)	0.09 (0.03;0.15)*
MMSE × year2020	0.03 (−0.08;0.14)	0.02 (−0.07;0.11)	0.03 (−0.07;0.13)
Model 3: Functional domain			
Year 2020[b]	1.42 (1.23–1.71)*	0.73 (0.54;0.91)*	1.23 (0.99;1.48)*
Functional limitations (0-7)[c]	0.40 (0.32;0.48)*	0.19 (0.13;0.24)*	−0.15 (−0.21;−0.09)*
Functional limitations × year2020	−0.02 (−0.12;0.09)	−0.04 (−0.12;0.04)	−0.11 (−0.20;−0.02)*
Model 4: Social domain			
Year 2020[b]	1.28 (0.86;1.68)*	0.58 (0.27;0.88)*	1.09 (0.75;1.43)*
Living with someone[d]	−0.55 (−0.86;−0.24)*	−0.09 (−0.32;0.13)	−0.03 (−0.27;0.22)
Living with someone × year2020	0.17 (−0.26;0.60)	0.26 (−0.07;0.59)	−0.01 (−0.36;0.36)
Model 5: Frailty			
Year 2020[b]	1.41 (1.14;1.68)*	0.83 (0.62;1.03)*	1.16 (0.94;1.39)*
Frailty[e]	1.92 (1.59;2.27)*	0.95 (0.69;1.20)*	−0.80 (−1.07;−0.53)*
Frailty × year2020	−0.06 (−0.55;0.43)	−0.34 (−2.91;0.04)	−0.43 (−0.84;−0.02)*

Notes: Models are all adjusted for time, age, sex, educational level and baseline measurement of outcome variable (wave 2011-2013); 95% CI = confidence interval; CES-D-10 = Center for Epidemiologic Studies Depression scale 10 item list; HADS-A = Hospital Anxiety Depression Scale - Anxiety subscale.

[a] The CGA consists of four domains: medical, mental, functional, and social. For each domain, a potential group at risk for negative outcome is chosen.

[b] Questionnaire was before 2020 is reference group.

[c] Continuous per 1 pt increment.

[d] Living alone is reference group.

[e] Frailty according to LASA Frailty Index (LASA-FI): frail if LASA-FI score is ≥0.25, not being frail is reference group.

[*] Significant $p < 0.05$

4. Discussion

This longitudinal observational study showed that depressive and anxiety symptoms slightly increased in community dwelling older adults in the Netherlands during the COVID-19 pandemic compared to previous years. However, perceived mastery also increased. Having more functional limitations or being frail was associated with a smaller increase in mastery during the COVID-pandemic. No other risk factors for a change in CES-D-10, HADS-A or mastery could be identified. Since absolute changes of depressive and anxiety symptoms were small and mean values did not reach cut-off scores, our study suggests that the possible negative effect of the pandemic on mental health – at least in the first months – is limited. Also, the modest increase in mastery scores suggests a positive effect from the lockdown measures on mental health in older adults occurred.

Our findings of a limited effect of the pandemic on depressive and anxiety symptoms is consistent with previous research. In cross-sectional cohorts of older adults in the Netherlands and Germany mental health did not change during the pandemic [30,31]. Also, a 5-year longitudinal cohort study among the general population in the UK showed that mild symptoms of anxiety and depression increased in the COVID-year while moderate to severe scores remained the same [13]. Further, anxiety and depression symptoms increased in longitudinal population-based cohorts in the US, but especially in young adults aged 18–39 [32,33]. The LASA cohort consists only of older adults, which could explain the minor increase of depressive and anxiety symptoms in our study. A possible explanation could be that older adults have better coping strategies than younger adults. A narrative review highlights psychosocial strengths of older people such as reflection, adaptive use of personal memory and a focus on generativity [34]. Lind et al. [34] hypothesize that life expertise may protect older adults from negative psychological effects. A second explanation for the mild increase of depressive and anxiety symptoms could be the period of sampling: In a population based cohort in the US the increase of anxiety was at the beginning of the pandemic in April 2020, but decreased in May and remained 3% above the level of 2019 in December [33]. Questionnaires of LASA were completed in summer 2020, when most of the lockdown measures were stopped in the Netherlands and cover a later stage of the first wave of the pandemic, when levels of depression and anxiety were almost back to pre-pandemic levels like observed in the US, so the mild increase in anxiety symptoms could be explained by the period of the sampling [32,33].

The current study showed an unexpected increase of perceived mastery during the COVID pandemic. A longitudinal study of adults of 60 years and older in Chile showed comparable results of increased resilience measured by the Brief Resilient Coping Scale (BRCS), next to an increase in symptoms of anxiety and depression [12]. A possible explanation is that the public health measures resulted in a more quiet and clear everyday life for older adults which could have led to an increase of perceived mastery. To our best knowledge, no other data on mastery during the COVID-pandemic has been published so far. Unpublished data from the LASA COVID-questionnaire showed that the participants had more attention for the things they enjoyed doing and reflected more on the things that were valuable in their lives. This would also fit in the theory of psychological strength of older adults of Lind [34].

In our study no risk factors for increased symptoms of depression or anxiety in older adults could be identified. Other longitudinal studies identified the following risk factors; however these studies were not restricted to an older adult population. For the medical domain, lung problems were associated with high anxiety and depressive symptom scores before and during COVID-pandemic [35]. Having heart problems was a risk factor during but not before COVID-pandemic [35]. Also, low self-rated physical health was associated with higher risk of increased anxiety (GAD-7 score) [36]. The authors of the latter study used different self-reported outcomes which may have caused the

discrepancy with our study.

To our knowledge, we are the first to report on longitudinal data which explores the relation between MMSE and symptoms of depression, anxiety, or perceived mastery during the COVID-19 pandemic. A cross-sectional study evaluating older adults with mild cognitive impairment (MCI) and subjective cognitive decline (SCD) during lock-down measures reported that 27.2% of 125 respondents felt sad or depressed. Depression was significantly associated with living alone or being in a poor relationship with cohabitants, low sleep quality and not owning a pet [37]. However, no control group was described.

For the social domain, we did not find an association between living alone and an increase in the feelings of depression or anxiety in the COVID-year. This is inconsistent with a population-based study in the UK describing living alone was associated with increased depressive symptoms scores [10]. A possible explanation could be that the questionnaire took place after most lock-down measures were elevated. Also as described earlier, other studies showed that older adults were more in touch with family and friends through internet and smartphone use [12] and could relate this to depressive symptoms [14]: the amount of communication possibilities would probably better explain negative psychological effects of the lockdown than the household composition.

We were able to study trajectories of feelings of depression, anxiety, and perceived mastery in a large cohort of community dwelling older adults over a 10-year period. An important limitation of our study is possible survivorship bias: previous analysis of non-responders of the LASA COVID study showed that the participants were younger and had a higher MMSE score [18]. Furthermore, as shown in sensitivity analyses of the current paper, participants with complete outcomes were younger, had a higher MMSE score and less functional limitations compared to participants without complete outcomes. Also, our cohort has an overrepresentation of participants of the last refresher wave of 2012, which consisted of older adults aged 55–64 and could explain the high MMSE score in general and the limited comorbidities and functional limitations. This could have resulted in bias of a cohort of older adults with limited health and social problems, but with the protective effect of life experience and so limited negative psychological effects.

In conclusion, negative psychological effects of the pandemic are limited in community dwelling older adults of the LASA cohort in the Netherlands. The observed increase in perceived mastery during the pandemic adds to the theory of the resilience of older adults for negative effects of lockdown measures. No risk factors for feelings of depression or anxiety could be identified, however functional limitations and being frail tempered the increased perceived mastery older adults experienced. To evaluate if the changes are persistent, follow-up data are needed to evaluate further trajectories.

Data statement

The data underlying the results presented in this study are available from the Longitudinal Aging Study Amsterdam (LASA). Data of LASA, including data from the LASA COVID-19 questionnaire, may be requested for research purposes. More information on data requests can be found on the LASA website: www.lasa-vu.nl.

Author contributions

Study concept and design: MH, AK, EH. Acquisition of data: MH, AK, EH. Analysis and interpretation: JB, JMV, AK, EH. Preparation of manuscript: JB, JMV, BB, CH, MH, AK, EH. All authors read and approved the final version of the manuscript.

Declaration of Competing Interest

The authors have no competing interests to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2021.110656.

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