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Original Study

Effects of the COVID-19 Pandemic on Anxiety Symptoms in Long-Term Care Residents: A Multilevel Growth Curve Analysis

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A B S T R A C T

Objectives: The coronavirus disease 2019 (COVID-19) pandemic has negatively impacted the mental health functioning of older adults residing in long-term care (LTC) settings. This study examines the impact of the lockdown on anxiety symptoms over time in LTC residents.
Design: Secondary data analysis was conducted on clinical data obtained with permission from a large behavioral health company that provides behavioral health services in long-term care (LTC) and assisted living (AL) facilities.
Setting and Participants: Data were obtained from 1149 adults (mean age 72.37, 70% female) in LTC and AL facilities across the United States who were receiving psychological services 1 year prior, and 1 year after, the COVID-19 pandemic lockdown.
Methods: Changes in anxiety (measured using a clinician rating scale) over time before and after the pandemic were assessed using latent growth curve modeling with psychiatric diagnosis, psychiatric medication, and demographic factors included as covariates.
Results: Anxiety severity decreased over time before and after the onset of the COVID-19 pandemic. Although pandemic-level factors such as facility closure and telehealth availability did not affect anxiety over time, individual treatment factors such as obsessive compulsive disorder diagnosis, initial anxiety severity, bipolar disorder diagnosis, and prescriptions for anxiolytic and antipsychotic medications affected the trajectory of anxiety during the pandemic.
Conclusions and Implications: These results demonstrate that individual covariates such as diagnosis, symptom severity, and medication use impacted the trajectory of anxiety symptoms before and during the COVID-19 pandemic more strongly than pandemic-related circumstances (facility closure, telehealth availability). The impact of the COVID-19 pandemic may be better observed through treatment-relevant variables, rather than pure symptom severity. In preparation for future pandemics or other large-scale disasters potentially impacting service delivery, facilities should continue to prioritize continuity of care or a timely resumption of services attending to individual treatment factors.

In the first year of the COVID-19 pandemic that particularly impacted individuals residing in long-term care (LTC) settings, there was a 25.6% increase in cases of anxiety disorders worldwide.[1] Following recommendations from the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare & Medicaid Services (CMS), nursing homes restricted entry for visitors and nonessential personnel and ceased communal activities inside nursing homes on March 13, 2020.[2] Although these measures aimed to reduce the spread of the COVID-19 virus to vulnerable older adults, they resulted in a delay or cessation of mental health services for many LTC residents.[3] Research surrounding the impact of reduced access to mental health services in LTC residents is limited, has not explored how the pandemic has impacted the trajectory of anxiety symptoms over time in LTC residents. Anxiety symptoms increased worldwide because of the pandemic,[4-6] and research should explore changes in anxiety of LTC residents at a time when there was limited access to mental health care.

Prior to the pandemic, dementia, depression, and anxiety disorders were the most common psychiatric disorders among older adults in LTC. Anxiety disorders ranged from 5% to 11% of the psychiatric

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diagnoses among older adults in LTC settings, with anywhere from 6.5% to 58.4% of older adults in LTC having clinically significant anxiety symptoms regardless of the presence of an anxiety disorder diagnosis.[7,8] During the initial onset of the pandemic, older adults residing in LTC facilities were at an increased risk for negative mental health outcomes because of factors such as rapid spread of COVID-19 among medically vulnerable adults, high mortality rates, and strict public health measures resulting in social isolation[3,9-12] that were compounded by issues with staffing and availability of personal protective equipment.[13] Some studies found higher rates of anxiety in older adults during the pandemic,[14-16] whereas others did not find higher rates of COVID-related stress and anxiety in community dwelling older adults compared with younger age groups.[17-19] This discrepancy highlights the need to examine how the pandemic affected anxiety symptoms within older adults, especially those in LTC settings who may have been more vulnerable to disruptions in access to care during the pandemic.

Mental health providers in LTC settings 7 months into the pandemic observed increased sadness, loneliness, anxiety, fear, and worry in their patients because of the COVID-19 restrictions and lack of access to routine mental health services.[3] Other reports suggest that the emotional, cognitive, and social well-being of LTC patients has been negatively impacted, evidenced by increased loneliness, depression, and behavioral problems measured by both self-report and clinician report.[20-22]

Given the discrepancies in research examining the impact of the pandemic on anxiety in older adults and the importance of understanding the impact of the pandemic on anxiety in LTC residents, continued examination of the effect of the pandemic in this vulnerable population is warranted. Although studies explored how the pandemic has impacted the trajectory of mental health symptoms in other populations,[23,24] more research is needed to investigate this in LTC settings. This study explored the effect of the passage of time on anxiety symptoms in LTC residents during the COVID-19 pandemic, while accounting for confounding factors such as psychiatric medication, psychiatric diagnoses, and demographic characteristics. Given the changes in LTC functioning during the pandemic, we hypothesize that the effect of time on anxiety symptoms before onset of the pandemic will differ from the effect of time on anxiety symptoms post COVID-19 outbreak.

Methods

After obtaining institutional review board (IRB) approval, secondary data analysis was conducted on clinical data obtained with permission from a large behavioral health company that provides behavioral health services in LTC and assisted living (AL) facilities across the United States. Data were obtained from psychological visits occurring between March 2019, 1 year prior to COVID-19 lockdowns, and March 2021, 1 year following the initiation of COVID-19 lockdowns. Records before March 15, 2020, were considered pre-covid scores and records after this date were considered post-covid scores.

Participants

The overall database consisted of >5000 administrative mental health records from a large behavioral health company providing mental health services to residents in LTC and AL settings in 29 states. The study sample, pulled from this database, include 1149 adults who received at least 2 psychological services in a LTC or AL setting during the period of March 2019—March 2021. All participants included had at least 1 measurement before and after the initial COVID-19 outbreak. A majority of the sample were female (70%) and White (69%), with a mean age of 72 (12.42) years. Depression (64%) was the most common primary diagnosis, followed by anxiety (13%). A summary of sample demographics can be found in Table 1.

Table 1
Demographics

	Mean (SD) or Frequency (%)
Age, y, mean (SD)	72.37 (12.42)
Gender	
Male	343 (30)
Female	806 (70)
Race	
Hispanic/Latinx	92 (8)
Black	172 (15)
Asian	5 (<1)
Native American	5 (<1)
White	796 (69)
NA	79 (7)
Region	
West	50 (4)
Midwest	221 (19)
Northeast	43 (4)
South	835 (73)
Diagnosis	
Anxiety diagnoses	153 (13)
Bipolar diagnoses	89 (8)
Depressive diagnoses	729 (64)
Neurocognitive diagnoses	18 (2)
OCD diagnoses	1 (<1)
Psychotic spectrum diagnoses	118 (10)
Trauma-related diagnoses	31 (3)
Medication	
Antidepressants	782 (68)
Antipsychotics	325 (29)
Anxiolytics	347 (30)
Cognition enhancers	211 (18)
Mood stabilizers	213 (19)

Measures

The administrative clinical data included objective emotional assessments as part of each patient's record. As a general clinical practice, objective emotional assessments are administered approximately every 4 months to assess progress in emotional symptoms. Clinician ratings of depression and anxiety were captured using the Brief Psychiatric Rating Scale.[25] Treatment variables, such as psychiatric medication, and demographic variables, such as race, gender, and age, were pulled from an electronic health record system.

Data Analyses

Latent growth curve analysis (LGC) was selected to evaluate the statistical effect of the passage of time on anxiety symptoms rather than measuring change in anxiety symptoms from one time point to another. This allows us to construct trajectories (eg, slopes) of anxiety symptoms over time before and after the onset of the pandemic and directly compare these trajectories and allows for factors such as regression to the mean to be accounted for. Multilevel Modeling (MLM) allows for a similar estimation, but assumes equal person-level variation at all time points which may not hold true in real world data. We used latent constructs (intercept and slope) to statistically account for individual variability in all aspects of the model allowing for a more accurate estimation compared to a model that uses fixed effects (group-level means). This approach was especially useful given the variability inherent in nonexperimental data and allows for better generalization of results to clinical application.

Parameters in LGC models were computed using Bayesian estimation. Gibbs sampling, a variant of Markov chain Monte Carlo, was used to conduct Bayesian analysis within Mplus.[26,27] Compared to traditional frequentists methods, Bayesian estimation better accommodates nonnormality and was thus chosen for these analyses.[26] Missing values across time points were handled using multiple

imputation.[28] To evaluate the effects of time on anxiety, both unconditional (models without covariates) and conditional (models including covariates) models were estimated for anxiety using Mplus.[29] These models were estimated for time periods before and after the initial outbreak of COVID-19.

The unconditional model provided a baseline comparison for other models by estimating a linear model with time as a predictor. In these models, the latent intercept represents the starting value of anxiety on the first measurement occasion (eg, intake or first visit post-covid), and the latent slope represents the change in anxiety over time (eg, subsequent mental health appointments). Factor loadings are fixed to represent the time associated with each measurement occasion, with 0 representing the first measurement and each number thereafter representing the fixed effect of that measurement occasion. This facilitates easier interpretation of the intercept and subsequent effects of time.

The conditional models included the following covariates: medication status (antidepressants, antipsychotics, anxiolytics, cognition-enhancing, and mood stabilizers), diagnoses (anxiety disorders, bipolar disorder, depressive disorders, neurocognitive disorders, obsessive compulsive disorder [OCD] diagnosis, psychotic disorders), and demographic factors (age, race). These factors were included to account for their effect on the shape of the growth curve across time points before and after the initial outbreak of COVID-19 and the resulting shelter in place order (latent intercept, latent slope, and covariates). In the conditional models, covariate parameters represent the way in which each covariate affects the linear relationship between time and anxiety symptoms.

Model fit was evaluated using conventional indices [ie, root mean square error of approximation (RMSEA), standardized mean square residual, comparative fit index (CFI), and Tucker-Lewis index (TLI)].[30] To evaluate the differences between pre- and post-covid growth curves, the mean intercept and slope for each pre-covid model was compared to the corresponding post-covid model using repeated measures *t* tests in R.[31] The effect sizes for significant differences were calculated using Cohen *d*.[32]

Results

Correlation of anxiety at each time point before and after the initial COVID-19 outbreak showed strong correlations between anxiety at intake and anxiety across time. Correlation matrices for pre- and postoutbreak anxiety can be found in Supplementary Material and Supplementary Tables 1 and 2.

Unconditional Models

The unconditional linear model for anxiety prepandemic outbreak demonstrated good model fit (RMSEA = 0.022, CFI = 0.997, TLI = 0.996), suggesting that anxiety changed in a linear fashion. The model revealed a statistically significant effect of time on anxiety severity (b = 0.161, 95% CI = 0.061, 0.260) with a small effect (R^2 = 0.147, 95% CI = 0.065, 0.267) and a statistically significant interaction between time and anxiety severity at intake (b = −0.074, 95% CI = −0.099, −0.049). Additional results from the unconditional linear model prepandemic outbreak can be found in Table 2.

The unconditional linear models for anxiety post outbreak also demonstrated good model fit (RMSEA = 0.038, CFI = 0.988, TLI = 0.987) and revealed a statistically significant effect of time on anxiety severity (b = 0.127, 95% CI = 0.048, 0.212), with a small effect size (R^2 = 0.077, 95% CI = 0.034, 0.140) and a statistically significant interaction between time and anxiety severity at intake (b = −0.056, 95% CI = −0.076, −0.037). Additional results from the unconditional linear model prepandemic outbreak can be found in Table 3.

Table 2
Preoutbreak Unconditional Model Results

Preoutbreak Unconditional Model	Parameter Estimate	Standard Error	95% Credibility Intervals
Intercept	0.607	0.097	0.418, 0.800
Anxiety at Pre-T1	0.846	0.024	0.800, 0.892
Depression at Pre-T1	−0.027	0.025	−0.075, 0.022
Slope	0.161	0.051	0.061, 0.260
Anxiety at Pre-T1	−0.074	0.013	−0.09, −0.049
Depression at Pre-T1	0.021	0.013	−0.005, 0.046
Intercept with slope	−0.033	0.018	−0.070, 0.002
Anxiety at Pre-T1 with depression at Pre-T1	0.407	0.036	0.337, 0.479
Variances			
Var (intercept)	0.303	0.047	0.214, 0.396
Var (slope)	0.036	0.008	0.022, 0.053

Pre-T1, pre–COVID-19 outbreak measurement 1.
Intercept: starting value of anxiety on the first measurement occasion; slope = change in anxiety over time.

Comparison of Pre- and Post-Covid Models

A comparison of the linear effects of time and intercepts for the pre- and postoutbreak unconditional models for anxiety over time revealed a significant difference between the pre- and postoutbreak anxiety intercepts [mean difference (MD) = −0.058, $P < .005$, Cohen d = −0.059, 95% CI = −0.140, 0.023]. Preoutbreak average anxiety levels at baseline (anxiety = 3.35) were lower than average postoutbreak anxiety levels at baseline (anxiety = 3.41). Comparisons between pre- and postoutbreak effects of time (slopes) did not reveal significant differences for anxiety (MD = −0.000, P = .848).

Conditional Models

The conditional linear models for anxiety preoutbreak of the pandemic demonstrated good model fit (RMSEA = 0.032, CFI = 0.960, TLI = 0.945) and did not reveal a statistically significant effect of time on anxiety (b = 0.162, 95% CI = −0.142, 0.459). However, the model revealed statistically significant interactions between the effect of time on anxiety and anxiety at intake (b = −0.079, 95%

Table 3
Postoutbreak Unconditional Model Results

Postoutbreak Unconditional Model	Parameter Estimate	Standard Error	95% Credibility Intervals
Intercept	1.085	0.118	0.850, 1.315
Anxiety at Pre-T1	0.628	0.028	0.572, 0.682
Depression at Pre-T1	0.061	0.030	0.002, 0.120
Slope	0.127	0.042	0.048, 0.212
Anxiety at Pre-T1	−0.056	0.010	−0.076, −0.037
Depression at Pre-T1	0.013	0.011	−0.009, 0.035
Intercept with slope	−0.080	0.015	−0.111, −0.052
Anxiety at Pre-T1 with depression at Pre-T1	0.406	0.037	0.337, 0.479
Variances			
Var (intercept)	0.609	0.045	0.525, 0.699
Var (slope)	0.043	0.007	0.030, 0.056

Pre-T1, pre–COVID-19 outbreak measurement 1.
Intercept: starting value of anxiety on the first measurement occasion; slope: change in anxiety over time.

CI = −0.105, −0.053), anxiolytics usage (b = −0.073, 95% CI = −0.128, −0.017), and OCD diagnosis (b = 29.027, 95% CI = 11.972, 43.644). The model also showed statistically significant interactions between anxiety at the first assessment at the start of the pandemic and anxiety at intake (b = 0.838, 95% CI = 0.788, 0.888), anxiolytics usage (b = 0.184, 95% CI = 0.073, 0.291), cognition-enhancing medication usage (b = 0.158, 95% CI = 0.027, 0.292), neurocognitive disorder (b = −0.669, 95% CI = −1.281, −0.050), and OCD diagnosis (b = −29.235, 95% CI = −43.675, −11.620). For additional model results see Table 4.

The conditional linear models for anxiety post outbreak demonstrated adequate model fit (RMSEA = 0.032, CFI = 0.956, TLI = 0.943) and did not reveal a statistically significant effect of time on anxiety (b = −0.008, 95% CI = −0.274, 0.265). However, the model revealed statistically significant interactions between the effect of time on anxiety and anxiety severity at intake (b = −0.054, 95% CI = −0.076, −0.03), antipsychotic medication usage (b = −0.056, 95% CI = −0.109, −0.002), bipolar diagnosis (b = 0.245, 95% CI = 0.013, 0.472), and psychotic diagnosis (b = 0.230, 95% CI = 0.007, 0.454), respectively. The model also showed statistically significant interactions between anxiety at the first assessment at the start of the pandemic and anxiety at intake (b = 0.608, 95% CI = 0.549, 0.667), bipolar diagnosis (b = −0.679, 95% CI = −1.332, −0.039), depression diagnosis (b = −0.736, 95% CI = −1.244, −0.032), and trauma diagnosis (b = −0.828, 95% CI = −1.535, −0.145). For additional model results see Table 5.

Comparison of Pre- and Post-Covid Conditional Models

A comparison of the linear effects of time and intercepts for the pre- and postoutbreak unconditional models for anxiety over time did reveal a significant difference between the pre- and postoutbreak anxiety intercepts (MD = −0.060, P = .002, Cohen d = −0.061, 95% CI = −0.142, −0.020). In both models, preoutbreak average anxiety levels at baseline (anxiety = 3.35) were lower than the average post outbreak at baseline (anxiety = 3.41). Comparisons between pre- and postoutbreak effects of time (slopes) did not reveal significant differences for anxiety (MD = −0.003, P = .531).

Comparison of Pre-Covid and Post-Covid Unconditional and Conditional Models

A comparison of the linear effects of time and intercepts for the pre–covid outbreak conditional and unconditional models for anxiety over time did not reveal a significant difference between the conditional and unconditional anxiety intercepts (MD = 0.003, P = .503) or conditional and unconditional effects of time (slopes; MD = −0.004, P = .312).

Discussion

This study explored the impact of the COVID-19 pandemic on anxiety symptoms over time in LTC residents. Anxiety increased immediately after the onset of the COVID-19 pandemic; however, the magnitude of this difference was small, suggesting that it is unlikely to be clinically relevant. Anxiety severity decreased over the following time points. Given that LTC residents were unable to maintain connections with their social support system, and mental health providers, because of mandatory visitor restrictions, this decrease in anxiety over time is heartening. This trajectory over time was impacted by treatment and demographic factors such as initial anxiety severity, multiple diagnoses, and prescribed medications. The impact of these covariates differed before and after the onset of the pandemic. Clinical and research implications, limitations, and future directions for research will be discussed.

Table 4
Preoutbreak Conditional Model Results

Preoutbreak Conditional Model	Parameter Estimate	Standard Error	95% Credibility Intervals
Intercept	1.091	0.322	0.461, 1.714
Anxiety at Pre-T1	0.838	0.025	0.788, 0.888
Depression at Pre-T1	−0.030	0.026	−0.081, 0.021
Antidepressant prescription	−0.028	0.054	−0.133, 0.078
Antipsychotic prescription	0.034	0.063	−0.087, 0.156
Anxiolytic prescription	0.184	0.055	0.073, 0.291
Cognition enhancer prescription	0.158	0.067	0.027, 0.292
Mood stabilizer prescription	−0.121	0.069	−0.257, 0.012
Diagnosis: anxiety-related	−0.401	0.258	−0.907, 0.101
Diagnosis: bipolar-related	−0.265	0.264	−0.777, 0.255
Diagnosis: depression-related	−0.331	0.252	−0.829, 0.163
Diagnosis: neurocognitive disorder	−0.669	0.314	−1.281, 0.05
Diagnosis: obsessive-compulsive–related	−29.235	7.586	−43.675, −11.62
Diagnosis: psychotic spectrum	−0.270	0.262	−0.787, 0.244
Diagnosis: trauma-related	−0.317	0.297	−0.899, 0.268
Age	−0.001	0.002	−0.005, 0.003
Gender (male/female)	−0.048	0.055	−0.155, 0.061
Hispanic	−0.183	0.128	−0.431, 0.071
Black	−0.088	0.115	−0.313, 0.138
Asian	0.106	0.391	−0.668, 0.854
Native American	−0.732	0.413	−10.525, 0.092
White	−0.081	0.101	−0.277, 0.115
Slope	0.162	0.154	−0.142, 0.459
Anxiety at Pre-T1	−0.079	0.013	−0.105, −0.053
Depression at Pre-T1	0.020	0.014	−0.007, 0.047
Antidepressant prescription	0.029	0.028	−0.025, 0.085
Antipsychotic prescription	−0.005	0.032	−0.068, 0.058
Anxiolytic prescription	−0.073	0.029	−0.128, −017
Cognitive enhancer prescription	−0.039	0.038	−0.113, 0.035
Mood stabilizer prescription	0.027	0.036	−0.044, 0.097
Diagnosis: anxiety-related	0.123	0.116	−0.109, 0.350
Diagnosis: bipolar-related	0.088	0.120	−0.151, 0.321
Diagnosis: depression-related	0.058	0.112	−0.166, 0.277
Diagnosis: neurocognitive disorder	0.013	0.142	−0.268, 0.290
Diagnosis: obsessive-compulsive-related	29.027	7.550	11.611, 43.644
Diagnosis: psychotic spectrum	0.036	0.119	−0.200, 0.269
Diagnosis: trauma-related	0.068	0.146	−0.217, 0.357
Age	−0.001	0.001	−0.004, 0.001
Gender (male/female)	−0.044	0.029	−0.101, 0.014
Hispanic	0.061	0.071	−0.080, 0.199
Black	0.042	0.064	−0.083, 0.168
Asian	−0.199	0.220	−0.627, 0.227
Native American	0.368	0.236	−0.091, 0.838
White	0.086	0.058	−0.029, 0.201
Intercept with slope	−0.038	0.018	−0.077, −0.008
Anxiety at Pre-T1 with depression at Pre-T1	0.406	0.037	0.336, 0.481
Variances			
Var (intercept)	0.314	0.045	0.236, 0.414
Var (slope)	0.036	0.008	0.023, 0.054

Pre-T1, pre–COVID-19 outbreak measurement 1.
Intercept: starting value of anxiety on the first measurement occasion; slope: change in anxiety over time, prescriptions, diagnoses, and race variables are dummy coded, with the reference group being unknown or not available. Gender is dummy coded, with the reference group being female.

Research and Clinical Implications

Although the COVID-19 pandemic impacted anxiety symptoms in LTC residents, it did not impact the trajectory of anxiety symptoms. Treatment and demographic variables did impact this trajectory, with

Table 5
Postoutbreak Conditional Model Results

Postoutbreak Conditional Model	Parameter Estimate	Standard Error	95% Credibility Intervals
Intercept	2.043	0.393	1.286, 2.814
Anxiety at Pre-T1	0.061	0.031	−0.001, 0.122
Depression at Pre-T1	0.608	0.030	0.549, 0.667
Antidepressant prescription	0.006	0.065	−0.118, 0.132
Antipsychotic prescription	0.021	0.075	−0.125, 0.168
Anxiolytic prescription	0.024	0.065	−0.101, 0.156
Cognition enhancer prescription	0.003	0.077	−0.150, 0.155
Mood stabilizer prescription	−0.027	0.082	−0.187, 0.130
Diagnosis: anxiety-related	−0.596	0.321	−1.222, 0.028
Diagnosis: bipolar-related	−0.679	0.328	−1.332, −0.039
Diagnosis: depression-related	−0.637	0.310	−1.244, −0.032
Diagnosis: neurocognitive disorder	−0.545	0.388	−1.307, −0.206
Diagnosis: obsessive-compulsive-related	−0.538	1.239	−2.993, 1.911
Diagnosis: psychotic spectrum	−0.584	0.323	−1.21, 0.044
Diagnosis: trauma-related	−0.828	0.354	−1.535, −0.145
Age	−0.004	0.003	−0.009, 0.001
Gender (male/female)	−0.128	0.065	−0.256, 0.001
Hispanic	−0.054	0.149	−0.343, 0.245
Black	−0.137	0.132	−0.394, 0.123
Asian	0.208	0.472	−0.710, 1.127
Native American	−0.008	0.484	−0.939, 0.955
White	0.103	0.113	−0.119, 0.326
Slope	−0.008	0.139	−0.274, 0.265
Anxiety at Pre-T1	0.014	0.012	−0.009, 0.037
Depression at Pre-T1	−0.054	0.011	−0.076, −0.033
Antidepressant prescription	−0.009	0.024	−0.055, 0.038
Antipsychotic prescription	−0.056	0.028	−0.109, −0.002
Anxiolytic prescription	0.015	0.023	−0.032, 0.061
Cognitive enhancer prescription	0.039	0.028	−0.015, 0.094
Mood stabilizer prescription	−0.03	0.029	−0.088, 0.027
Diagnosis: anxiety-related	0.192	0.113	−0.026, 0.425
Diagnosis: bipolar-related	0.245	0.116	0.013, 0.472
Diagnosis: depression-related	0.19	0.108	−0.022, 0.399
Diagnosis: neurocognitive disorder	0.123	0.137	−0.146, 0.385
Diagnosis: obsessive-compulsive-related	0.196	0.606	−0.927, 1.423
Diagnosis: psychotic spectrum	0.230	0.113	0.007, 0.454
Diagnosis: trauma-related	0.198	0.123	−0.044, 0.441
Age	0.000	0.001	−0.002, 0.001
Gender (male/female)	−0.003	0.024	−0.048, 0.045
Hispanic	−0.012	0.055	−0.117, 0.097
Black	−0.003	0.048	−0.096, 0.089
Asian	−0.046	0.182	−0.409, 0.322
Native American	0.078	0.197	−0.325, 0.447
White	−0.039	0.041	−0.121, 0.043
Intercept with slope	−0.079	0.014	−0.107, −0.053
Anxiety at Pre-T1 with depression at Pre-T1	0.405	0.037	0.337, 0.481
Variances			
Var (intercept)	0.596	0.042	0.523, 0.687
Var (slope)	0.043	0.006	0.031, 0.056

Pre-T1, pre–COVID-19 outbreak measurement 1.
Intercept: starting value of anxiety on the first measurement occasion; slope = change in anxiety over time, prescriptions, diagnoses, and race variables are dummy coded, with the reference group being unknown or not available. Gender is dummy coded, with the reference group being female.

different covariates impacting anxiety trajectories before and after the pandemic. Prior to the pandemic, those with more severe anxiety at baseline or prescriptions for anxiolytics showed less increase in anxiety symptoms over time. This suggests that the use of anxiolytics may be beneficial in the event of a major event such as a pandemic for those with significant anxiety symptoms. Residents with OCD-related diagnoses displayed a sharper increase in anxiety symptoms over time, suggesting that treatment addressing OCD symptoms will be particularly important for these individuals at times of a major stressor. These findings may help guide response to future pandemics and suggest that residents with premorbid severe anxiety, and OCD diagnoses, should be monitored carefully and offered mental health services.

After the onset of the pandemic, individuals with more severe anxiety at intake showed a greater decrease in anxiety over time, whereas those with bipolar diagnoses showed less decline in anxiety over time. Residents with psychotic spectrum diagnoses or prescribed antipsychotic medications showed a greater decrease in anxiety over time. Although there were no notable differences in the intercepts or slopes of anxiety symptoms in the models, the difference in which covariates affected the slope when looking at anxiety symptoms and how these covariates affect the trajectory of anxiety symptoms suggests the impact of the COVID-19 pandemic may be better observed through treatment-relevant variables, rather than pure symptom severity.

Limitations and Future Directions

This study has several limitations, many of which are inherent to the use of existing clinical information that is not part of standardized research protocol. Given this, and the disruption of mental health services occurring during the pandemic, there was heterogeneity in the timelines of assessment administration and administration of self-report measures. To limit this heterogeneity and maintain an adequate sample size, we examined a clinician-rated measure of anxiety symptoms that was administered most frequently and consistently. This precluded the use of self-report measures or other objective measures of anxiety symptom severity that could have provided a more precise measure of our construct of interest. The geographic distribution of the data limits the generalizability of findings. The sample largely consisted of White female residents from Southern and Midwestern states suggesting that results may differ if studied in samples gathered from other parts of the country or world, all of which had different experiences of and responses to the pandemic. Additionally, while our sample was gathered from residents residing in hundreds of different facilities, they are restricted to certain geographical locations and may not be generalizable to some areas of the United States.

Future research should replicate these findings with a more diverse sample and more experimental control, using objective or self-report measures of anxiety symptoms severity. Cognitive impairment is an especially important consideration for treatment effectiveness and psychiatric distress in older adults. Although a direct measure of cognitive functioning was not available for analysis, future studies should include severity of cognitive impairment (rather than neurocognitive disorder diagnosis) as a predictor of anxiety symptomology. As differences appear to lay more in tertiary mechanisms like treatment variables, future research should look at how the COVID-19 pandemic affected these variables by exploring differing responses to treatment interventions along the course of the pandemic. Other individual differences, such as a history of traumatic events, may impact how the pandemic affected individuals. This study is the first to examine the impact of the pandemic on anxiety symptom severity over time in LTC residents and highlights the need for further exploration into how to best support these facilities in providing quality care for our elders.

Conclusions and Implications

These results demonstrate that individual covariates such as diagnosis, symptom severity, and medication use impacted the trajectory of anxiety symptoms before and during the COVID-19 pandemic more strongly than pandemic-related circumstances (facility closure,

telehealth availability). The impact of the COVID-19 pandemic may be better observed through treatment-relevant variables, rather than pure symptom severity. Residents showed a slow decline in anxiety severity over time both before and after the pandemic. This highlights the importance of therapeutic services in attending to the needs of LTC residents and suggests that although individual differences impacted symptom severity, the additional support provided by resuming services aided residents' well-being. In preparation for future pandemics or other large-scale disasters potentially impacting service delivery, facilities should continue to prioritize continuity of care or a timely resumption of services attending to individual treatment factors. Routine monitoring of anxiety symptoms in residents, particularly those with premorbid anxiety disorders, will be essential to maintaining emotional wellbeing.

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Supplementary Table 1
Preoutbreak Anxiety Correlations Over Time

	PrT1	PrT2	PrT3	PrT4	PrT5	PrT6
PrT1	—					
PrT2	0.810*	—				
PrT3	0.727*	0.842*	—			
PrT4	0.754*	0.847*	0.893*	—		
PrT5	0.711*	0.749*	0.809*	0.864*	—	
PrT6	0.444	0.714*	0.723*	0.804*	0.804*	—
Mean	3.359	3.337	3.387	3.288	3.394	3.278
SD	1.101	1.048	1.045	1.017	1.024	.894
n	1149	1149	684	382	137	18

*$P < .05$.

Supplementary Table 2
Postoutbreak Anxiety Correlations Over Time

	PoT1	PoT2	PoT3	PoT4	PoT5	PoT6
PoT1	—					
PoT2	0.826*	—				
PoT3	0.752*	0.848*	—			
PoT4	0.696*	0.753*	0.827*	—		
PoT5	0.640*	0.738*	0.775*	0.899*	—	
PoT6	0.738*	1.000*	0.976*	0.976*	1.000*	—
Mean	3.399	3.369	3.354	3.320	3.369	3.00
SD	1.029	.999	1.025	.993	.961	1.414
n	1149	1149	743	319	65	8

*$P < .05$.