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Original Study

The Effects of the 2020 COVID-19 Lockdown on Mood, Behavior, and Social and Cognitive Functioning in Older Long-Term Care Residents



Milou J. Angevaare MD, MSc^{a,b,*}, Karlijn J. Joling PhD^a, Martin Smalbrugge MD, PhD^a, Cees M.P.M. Hertogh MD, PhD^a, Jos W.R. Twisk PhD^c, Hein P.J. van Hout PhD^{a,b}

^a Department of Medicine for Older People, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

^b Department of General Practice, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

^c Department of Epidemiology and Data Science, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

A B S T R A C T

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visitor ban
nursing home

Objectives: We aimed to explore the effects of the Dutch COVID-19 lockdown (March 20–May 25, 2020) on mood, behavior, and social and cognitive functioning of older residents of long-term care facilities (LTCFs) prospectively.

Design: Mixed methods: historically controlled longitudinal cohort study and focus groups.

Setting and Participants: Residents of Dutch LTCFs.

Methods: Residents who were assessed during and prior to the lockdown were compared to residents of the same wards with 2 assessments prior to the lockdown. We used mixed models and generalized estimating equation analyses to explore differences in changes in mood, withdrawal and aggressive behavior, loneliness and conflict, and cognition and delirium. We also explored whether the effect of the lockdown differed for different subgroups. In 2 online focus groups, LTCF care professionals, ranging from care staff to physicians, reflected on their experiences of the effect of the lockdown and the cohort study results.

Results: The lockdown group of 298 residents was compared to the control group of 625 residents. Self-reported mood symptoms showed a slightly greater increase during the lockdown. During the first half of the lockdown, the level of conflict with other residents decreased whereas it increased in the control group. The subgroup with moderate-severe cognitive impairment showed a decrease in withdrawal during the lockdown, whereas the group with no-mild cognitive impairment showed a statistically nonsignificant relative increase. Professionals described great individual variation in the effects of the lockdown on residents. Facilities attempted to preserve the experienced positive effects, for example, by promoting tranquility in shared rooms and continuing to organize individualized ward-based activities.

Conclusions and Implications: We did not find clinically relevant negative effects of the lockdown on mood, behavior, and social and cognitive functioning in older residents of LTCFs at the group level. Possibly, staff mitigated the negative effects at the group level. Meanwhile, they learned lessons that they continue to apply to enhance resident well-being.

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To prevent the spread of COVID-19, the Dutch government imposed a complete lockdown on long-term care facilities (LTCFs) in the Netherlands on March 20, 2020.¹ This lockdown consisted of a

complete ban on visitors, including friends, family (including informal caregivers), and volunteers. Additionally, residents were banned from leaving the LTCFs. Contact with professionals such as doctors, physical therapists, and psychologists was also kept to a minimum and social activities were cancelled.² In case of a (suspected) COVID-19 outbreak in a ward, residents were further confined to their rooms.^{3,4} Several cross-sectional studies employed surveys and interviews among LTCF staff and family members of residents to explore the effect of this lockdown on residents. In general, these studies reported an increase

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* Address correspondence to Milou J. Angevaare, MD, MSc, Department of Medicine for Older People, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Van der Boerhorststraat 7, Amsterdam, the Netherlands.

E-mail address: m.angevaare@amsterdamumc.nl (M.J. Angevaare).

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in challenging behaviors and mood symptoms with a negative effect on quality of life/well-being, especially in residents with no or mild cognitive impairment.^{5–10} This was attributed to a decrease in social contact, loneliness, and understimulation. The general negative perception of the effect of the lockdown led to the composing of a manifest in October 2020 by several Dutch prominent researchers, managers, and opinion formers calling on the minister of Health, Welfare and Sport to keep LTCFs open during future COVID-19 waves.¹¹

Some studies, however, described a decrease in challenging behavior in some cognitively impaired residents. This decrease in challenging behavior was attributed to a reduction in stimuli, increased social cohesion among residents, and solidarity and inventiveness among nursing staff.^{5,8} Additional research to help disentangle the possibly complex effects of the lockdown on resident well-being has been called for to help inform future policy.²

Longitudinal prospective studies describing the effects of the lockdown on LTCF residents may contribute to this disentangling, but are currently lacking in the Dutch setting. McArthur et al¹² utilized longitudinal interRAI data from Canadian LTCFs to explore the effect of the COVID-19 lockdown (similar to the Dutch lockdown) on residents. In this study of 765 residents in 7 facilities, the lockdown did not have a significant effect on depression, delirium, or behavioral problems. Residents with a dementia diagnosis were less likely to experience delirium during the lockdown than outside of the lockdown. Authors hypothesized that this decrease in delirium was a result of calmer environments in wards. Levere et al¹³ similarly described the effect of the COVID-19 pandemic between March and July 2020 on residents of LTCFs in Connecticut, USA, using Minimum Data Set data. In contrast with the Canadian findings, they reported a substantial increase in depressive symptoms, unplanned weight loss, and incontinence and a decrease in cognitive functioning during the first months of the pandemic.

We aimed to explore the effect of the Dutch COVID-19 lockdown (March 20–May 25, 2020) on mood, behavior, and social and cognitive functioning of older residents of long-term care facilities (LTCFs) prospectively. We additionally explored whether this association differed for residents with different characteristics, such as different levels of cognitive impairment and residents who were assessed during the first or second half of the lockdown. We hypothesized that the effect of the lockdown on some outcomes might have differed between early and late lockdown because of residents and staff getting used to the lockdown, or conversely, because of the lockdown wearing on residents over time.

Methods

Study Design

Using a mixed methods design (historically controlled longitudinal analyses and focus groups), we explored if changes in mood, behavior, and social and cognitive functioning in Dutch LTCF residents were different during the lockdown than in the years preceding the lockdown.

Historically Controlled Longitudinal Cohort Study

Data and population

Analyses were conducted using interRAI Long-Term Care Facility assessments of residents (≥ 60 years) of LTCFs in the Netherlands. These routine care assessments consist of ± 250 items across 19 domains of health and functioning and are conducted approximately every 6 months by nursing staff. All items are scored by a

trained staff member who is familiar with the resident, unless stated otherwise, that is, self-reported. LTCFs in the Netherlands provide 24-hour care, are publically funded and subject to governmental inspection, and include both residential care homes (medical care provided by the general practitioner) and nursing homes (treatment by an in-house team, eg, elderly care physicians and psychologists). Data collection has been described in more detail previously.¹⁴

All participating residents provided informed consent for transferring of the data to the interRAI-LTCF database at Amsterdam University Medical Centers, Vrije Universiteit after deidentification in compliance with European legislation on data protection.

Assessment Selection

The complete population consisted of 5653 assessments involving 2685 residents in 42 facilities (2017–2020). We selected the lockdown and control group from among the routine assessments in residents aged ≥ 60 years.

The lockdown group consisted of all residents with an assessment within the lockdown period and an assessment preceding this lockdown assessment. The period of the government imposed visitor ban in the Netherlands (lockdown) was March 20, 2020, until May 25, 2020.¹ The resident's first lockdown assessment and the assessment prior to this lockdown assessment (within 30–400 days prior) in the same ward were included in the analyses.

The control period was determined to be prior to March 9, 2020, the date of the first government-imposed COVID-19 measure in the Netherlands (ban on handshaking).¹⁵ The control population was selected from residents who were not part of the lockdown population, but who resided in the same wards as those in the lockdown population. For each resident we selected the last assessment prior to 9–3–2020 and the assessment prior to that assessment in the same ward (within 30–400 days prior).

Measures

See [Table 1](#) for a description of all explored resident outcome measures. Based on the literature, we selected 9 outcomes within the domains of mood (observer-reported mood symptoms, self-reported mood symptoms), behavior (withdrawal and aggressive behavior), and social (loneliness, conflict with other care recipient, conflict with care staff) and cognitive functioning (cognitive performance scale, delirium).^{5–7,12,13}

Covariates included the number of days between the 2 assessments and demographics at baseline: 5-year age category, gender, cognition (Cognitive Performance Scale score), and length of stay (LOS) in months.

Statistical Analyses

The baseline characteristics of the different groups were compared using Mann Whitney, *t* tests, or χ^2 tests, depending on the distribution of the characteristic. The unadjusted means and rates of all lockdown characteristics and resident outcomes described in [Table 1](#) were calculated for both assessments within the 2 groups.

To analyze whether the changes in each outcome differed between the control and lockdown groups, mixed model analyses were used. The model included the group (control/lockdown), the assessment (first/second), and the interaction between group and assessment. Both an unadjusted and an adjusted model was performed for each of the outcomes. All covariates described above were included in all adjusted models. Basically, 3-level mixed model analyses were performed in which the repeated assessments were clustered within the residents, and the residents were clustered within the facility. All models only included random intercepts. An overview of the models is provided in [Supplementary Table 1](#).

Table 1
Description and Use of Outcomes

Domain	Outcome	Scale/Item	Description	Utilization in Model	Validity/Reliability of Scales
Mood	Observer-reported mood	Depression Rating Scale (DRS)	Based on 7 observed mood symptoms, such as made negative comments, and crying or tearfulness. The scale ranges from 0 to 14, with 14 indicating all mood symptoms were present during the last 3 d. ¹⁶	Continuous	In a sample of 4156 residents in 7 EU countries, the average weighted kappas for test-retest and interrater reliability were 0.75 and 0.70, respectively, across all 14 interRAI mood symptoms, both observer reported and self-reported. ¹⁷ In a Korean sample of 434 residents, the kappa for interrater reliability for all (11) observer-reported mood outcomes was 0.67. The Cronbach alpha for internal consistency of the items in the DRS in this sample was 0.82. ¹⁸
	Self-reported mood	Self-reported mood (SRM)	Based on 3 self-reported mood items: loss of interest, sadness, and anxiety. The resident is asked to report if she or he has experienced these mood symptoms in the last 3 d. The SRM is a composite scale we created ranging from 0 to 6, calculated in a similar fashion as the DRS. Not willing or able to respond was coded as missing. A score of 6 signifies that all 3 mood symptoms were present during the last 3 d.	Continuous	In the Korean sample, the kappa for the interrater reliability for the 3 self-reported symptoms was 0.72. ¹⁸
Behavior	Withdrawal	Withdrawal	The occurrence of withdrawal from activities of interest (longstanding interests, being with family/friends) in the last 3 d. ¹⁹	Dichotomous: yes/no	
	Aggressive behavior	Aggressive Behavior Scale (ABS)	Based on items on the occurrence of verbal and physical abuse, socially disruptive behavior, and resistance to care in the last 3 d. Scored 0-12, higher scores indicate more frequent and more diverse occurrence of behaviors. ²⁰	Dichotomous: score of 0 (no aggressive behaviors) or 1 (≥ 1 aggressive behavior)	
Social functioning	Loneliness	Loneliness	Resident has said or indicated that she or he was lonely in last 3 d. ¹⁹	Dichotomous: yes/no	
	Conflict with other care recipient	Conflict with other care recipient	Occurrence of conflict with or repeated criticism of other care recipient in last 3 d. ¹⁹	Dichotomous: yes/no	
	Conflict with staff	Conflict with staff	Occurrence of conflict with or repeated criticism of staff in last 3 d. ¹⁹	Dichotomous: yes/no	
Cognitive functioning	Cognition	Cognitive Performance Scale (CPS)	Calculated based on items on short-term memory impairment and executive functioning in the last 3 d. Scores range from 0 (intact) to 6 (very severe impairment). A score of ≥ 3 indicated moderate to severe impairment. ^{21,22}	Continuous	The CPS has been shown to be correlated with the Mini Mental State Examination in validation studies. ^{21,22} In an international sample of 783 individuals in 12 nations, a weighted kappa for interrater reliability of 0.77 was found for the CPS in the LTCF setting. ²³

Delirium Clinical Assessment Protocol (CAP) Dichotomous: triggered/yes/no

Clinical assessment protocol triggered, in the case of at least 1 of the following in the last 3 d:

- acute changes in mental status from person's usual functioning
- different from usual functioning: easily distracted, episodes of disorganized speech, mental function varies over the course of a day.²⁴

For the continuous outcome cognition, we performed linear mixed model analyses. However, Tobit mixed model analyses were performed for both the observer-reported mood and self-reported mood as they demonstrated substantial floor effects (30% and 56% of the scores being 0, respectively).^{25,26}

We performed complete case analyses as there was a minimal amount of missing data for all variables, except SRM. In about 18% of included assessments, residents could not or would not respond to all of the self-reported mood questions. Therefore, the models with SRM as outcome were based solely on the residents who were capable or willing to respond to the questions.

For the dichotomous outcomes (delirium, loneliness, withdrawal, aggressive behavior, conflict with other care recipient or staff), logistic mixed model analyses could have been used. However, including a random intercept for facility led to unstable models. As logistic generalized estimating equation (GEE) analyses provide more reliable regression coefficients than logistic mixed model analysis for 2-level models, we performed 2-level (repeated assessments clustered within residents) GEE analyses for the dichotomous outcomes.²⁷

Additionally, we explored if differences between the lockdown and control group in change over time differed for various subgroups. To explore the difference in change between the 2 halves of the lockdown (split on the median date of assessment) and the control group, we included 3 groups (control, first half of the lockdown, and second half of the lockdown) in the mixed model and GEE analyses. To explore the role of different baseline characteristics in the effect of the lockdown we consecutively included gender, age category (60-79 years, 80-84 years, 85-90 years, and ≥ 90 years), length of stay category (0-6 months, 7-16 months, 17-35 months, and ≥ 36 months), cognition category (no-mild and moderate-severe impairment: based on the cutoff of 3 or more), and type of ward (residential care home/nursing home) in a 3-way interaction with population (lockdown or control) and assessment (first or second). In case of significant interaction, we explored differences in changes in outcome between the lockdown and control group for each of the characteristics' subgroups.

Additional post hoc analyses were based on the focus group input on the effect of the lockdown and associated resident characteristics. All data preparation and descriptive statistics were performed in IBM SPSS statistics, version 26. All mixed model and GEE analyses were performed in Stata, versions 14 and 17.

Focus Groups With Care Professionals

In 2 online focus groups, LTCF care professionals who worked directly with residents during the lockdown reflected on their experience of the effect of the lockdown and the cohort study results. Professionals were approached via email, requesting their participation and/or their help in recruiting among colleagues. Purposive sampling among the network of the research group was employed to ensure recruitment across different professions (ranging from nursing staff to elderly care physicians) and organizations throughout the Netherlands.

The online focus groups of ≈ 90 minutes were organized using Microsoft Teams, with M.S. as moderator and M.A. as observer. First, participants were asked to summarize their own experience with the effect of the lockdown on the residents they worked with without prior knowledge of the cohort study results. Subsequently, a summary presentation of the cohort study results was provided by M.A. The participants were asked to reflect on these results based on their own experience and additionally provide possible explanations for differences between their experience and these results. Audio recordings of the focus groups were transcribed verbatim. M.A. coded these transcripts, focusing on (1) the experiences with and lessons learned from the lockdown and (2)

explanations for differences between experiences and cohort study results.

Each participant gave written informed consent for participation. The medical ethics review committee of VU University Medical Center concluded that, according to Dutch legislation, the study was exempt from their approval; reference number 2021.0092.

Results

Cohort Study

The initial selection led to 5230 assessments in 2580 residents in 42 facilities (Figure 1). Applying the inclusion criteria, 298 participants were included in the lockdown group and 625 residents were

included in the control group. Table 2 shows that at baseline these groups did not differ in sex, age, number of somatic diagnoses, LOS, and cognition. On average, the time between assessments was almost 6 months, and barely differed between the groups. Supplementary Table 2 shows that the 2 halves of the lockdown group (split on the median date of the lockdown assessments) also did not significantly differ on any of the baseline characteristics.

The average increase in self-reported mood symptoms for those with a second assessment in the lockdown period (lockdown group) was 0.33 points greater than those with both assessments prior to the lockdown (control group) (95% CI 0.01–0.64). For all other outcomes, the change from the first to second assessment did not significantly differ between the 2 groups (Tables 3 and 4, Supplementary Figure 1).

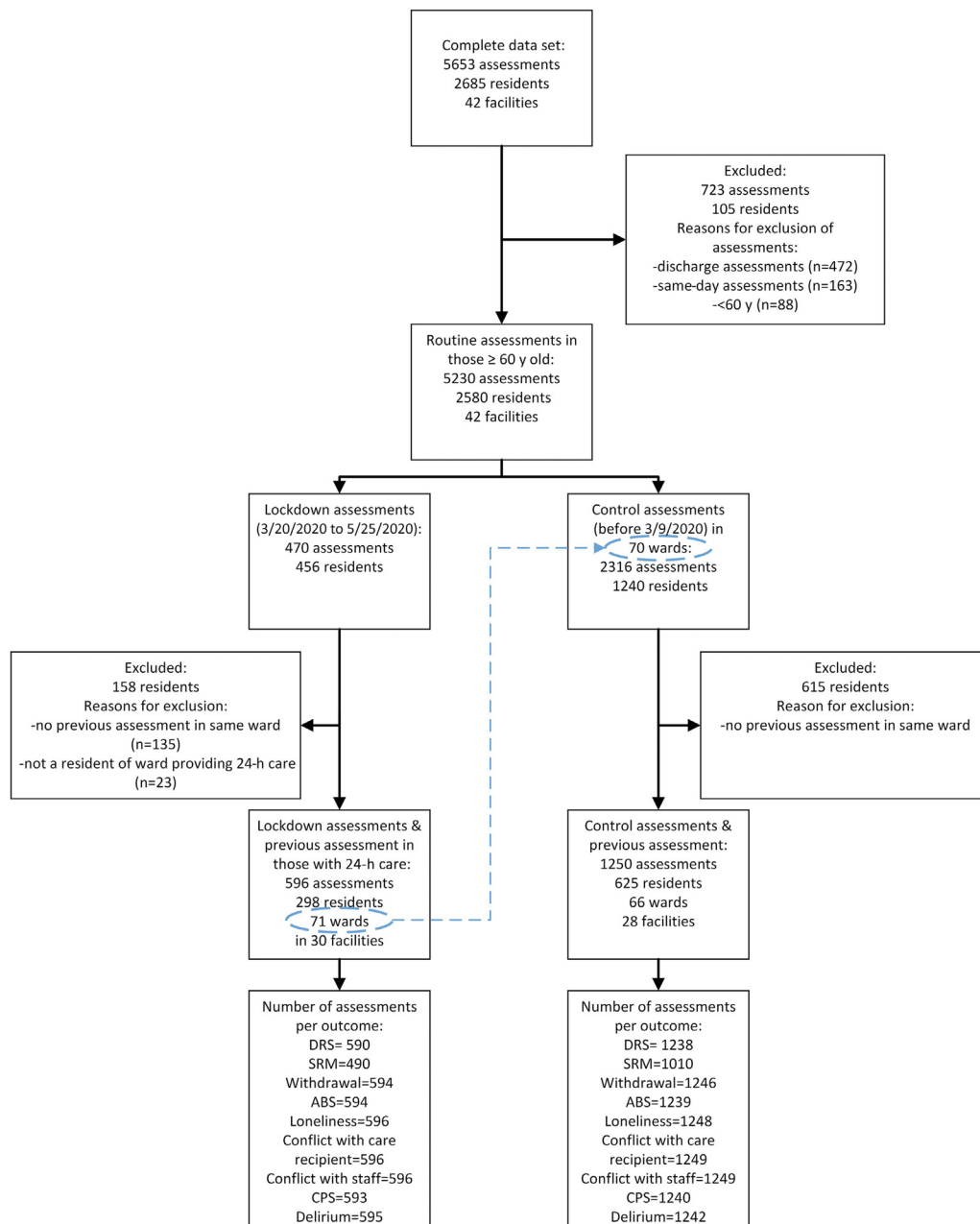


Fig. 1. Flowchart of participant selection. Control group residents selected from among wards included in lockdown group. ABS, Aggressive Behavior Scale; DRS, Depression Rating Scale; SRM, self-reported mood.

Table 2
Baseline Characteristics of the Lockdown and Control Groups

	Lockdown Group (n = 298)	Control Group (n = 625)	P
Time period			
Assessment 1	3/12/2019–3/19/2020	3/1/2018–2/3/2020	N/A
Assessment 2	3/20/2020–5/24/2020	8/16/2018–3/8/2020	N/A
Facilities, n	30	28 (selection)	N/A
Wards, n	71	66 (selection)	N/A
COVID-19 cases, n (%)	45 (63)	N/A	N/A
Nursing home wards, n (%)	48 (68)	44 (67)	N/A
Female, n (%)	204 (69)	394 (63)	.12*
Age, n (%)			.51*
60–79 y	89 (30)	159 (25)	
80–84 y	56 (19)	135 (22)	
85–89 y	84 (28)	182 (29)	
≥90 y	69 (23)	149 (24)	
Number of diagnoses, mean (SD)	2.2 (1.3)	2.3 (1.3)	.72 [†]
Length of stay, mo, mean (SD); median	27.9 (30.0); 19.0	26.5 (32.9); 16.0	.16 [‡]
CPS score, mean (SD); median	2.6 (1.6); 2.0	2.5 (1.6); 2.0	.40 [‡]
Number of days between assessments, mean (SD)	179.2 (67.2)	174.9 (82.0)	<.001[‡]

CPS, Cognitive Performance Scale.

P values < .05 are bolded.

*P based on χ^2 .

[†]Independent t test.

[‡]Mann-Whitney.

The increase in self-reported mood proved to be significantly greater for the first half of the lockdown, while not being significantly different for the second half of the lockdown relative to the control group. The odds ratio (OR) for conflict with other care recipients at the second assessment relative to the first was 1.31 times higher in the control group than the first half of the lockdown group (95% CI 1.02–1.68). For none of the other outcomes the first or second half of the lockdown groups differed significantly from the control group (Tables 5 and 6).

Regarding the other subgroup analyses, in the subgroup of residents with no or mild cognitive impairment, the rate of withdrawal significantly decreased in the lockdown group relative to the control group. Conversely, the cognitively impaired group had a statistically nonsignificant relative increase in withdrawal. Only for the oldest residents (≥90 years old), the increase in aggressive behavior was significantly greater in the control group than the lockdown group. None of the subgroups explored differed significantly for any of the other outcomes (Tables 5 and 6).

Sensitivity analyses exploring the influence of the interval between assessments on the main analyses led to no new insights (Supplementary Textbox 1).

Post Hoc Quantitative Analyses Based on Focus Group Input

Contrary to the experiences of some of the focus group participants, we found no significant effect of the lockdown on change in weight or sleep during the day in the interRAI-LTCF data. In their description of lockdown effects, the participants distinguished 3 groups of cognitive impairment, namely, no or mild cognitive impairment, moderate cognitive impairment, and severe cognitive impairment. Exploration of the effect of the lockdown on the outcomes in Table 1 in these 3 groups, operationalized as Cognitive Performance Scale scores 0–1, 2–3, and 4–6, respectively, led to no new insights.

The lockdown and control group did not significantly differ in change in wandering (restlessness) in the last 3 days (OR for the difference 1.26, 95% CI 0.99–1.62). However, the increase during the lockdown was significantly greater than during the control period for women (OR 1.55, 95% CI 1.09–2.19) and those with moderate cognitive impairment (OR 1.86, 95% CI 1.24–2.80).

Focus Groups With Care Professionals

A total of 15 participants from 6 different organizations participated in the focus groups. One nurse, 2 care staff, 1 nurse practitioner,

Table 3
Observed Means and Results of the Mixed Model Analyses for Each Continuous Outcome

Outcome	Observed Means (SD)		Unadjusted				Adjusted*			
	Assessment 1	Assessment 2	n	Coefficient	95% CI	P	n	Coefficient	95% CI	P
Observer-reported mood (DRS) [†]										
Control	2.77 (2.9)	2.92 (2.9)	1828	–0.01	–0.27, 0.25	.94	1748	0.03	–0.24, 0.30	.82
Lockdown	2.69 (3.0)	2.88 (3.1)								
Self-reported mood (SRM) [†]										
Control	1.11 (1.7)	1.26 (1.7)	1500	0.28	–0.01, 0.57	.06	1428	0.33	0.01, 0.64	.04
Lockdown	1.04 (1.6)	1.28 (1.8)								
Cognition (CPS) [‡]										
Control	2.50 (1.6)	2.67 (1.7)	1833	0.03	–0.06, 0.12	.57	1764	0.03	–0.05, 0.12	.45
Lockdown	2.60 (1.6)	2.80 (1.7)								

CPS, Cognitive Performance Scale; DRS, Depression Rating Scale.

The observed means for each population group at each assessment are provided for all continuous outcomes. Additionally, regression coefficients are provided for the interaction between population (lockdown/control) and assessment (first/second) for the mixed model analyses with these outcomes. These coefficients represent the difference between the groups in change over time in the outcome. Significant coefficients are bolded. For each of these mixed model analyses facility was added as a third level.

*Adjusted for number of days between the 2 assessments, 5-year age category, gender, cognition (CPS score), and length of stay in months.

[†]Tobit mixed models.

[‡]Linear mixed models.

Table 4
Observed Rates and Results of the Logistic GEE Analyses for Each Dichotomous Outcome

Outcome	Observed Rates		Unadjusted				Adjusted*			
	Assessment 1, %	Assessment 2, %	n	OR	95% CI	P	n	OR	95% CI	P
Withdrawal										
Control	15.6	17.9	1840	0.96	0.74-1.25	.79	1762	0.95	0.72-1.25	.70
Lockdown	17.2	19.2								
Aggressive behavior										
Control	36.9	40.9	1833	0.97	0.82-1.15	.74	1747	0.98	0.80-1.20	.85
Lockdown	37.5	40.9								
Loneliness										
Control	20.5	22.8	1844	0.95	0.77-1.16	.59	1756	0.94	0.77-1.15	.55
Lockdown	19.1	20.5								
Conflict with other care recipient										
Control	28.5	29.8	1845	0.85	0.70-1.03	.09	1757	0.84	0.68-1.02	.08
Lockdown	27.2	25.2								
Conflict with staff										
Control	20.7	20.8	1845	1.05	0.83-1.33	.68	1757	1.09	0.85-1.40	.51
Lockdown	21.5	22.5								
Delirium										
Control	18.1	24.1	1837	1.11	0.85-1.46	.44	1749	1.09	0.81-1.46	.58
Lockdown	17.2	24.8								

GEE, generalized estimating equation.

The observed rates for each population group at each assessment for all dichotomous outcomes are provided. Additionally, ORs are provided for the interaction between population (lockdown or control) and assessment (first or second) in the GEE models. The OR represents the ratio between the OR for the outcome at assessment 1 relative to assessment 0 of the lockdown group relative to the control group.

*Adjusted for number of days between the 2 assessments, 5-year age category, gender, cognition (Cognitive Performance Scale score), and length of stay in months.

2 physiotherapists, and 1 psychologist participated in the first focus group. The second focus group included 2 nurses, 2 care staff, 3 elderly care physicians, and 1 physiotherapist.

Some participants described the effect of the lockdown on residents to be profoundly negative and could not relate to the cohort study results. Some participants could completely relate to the cohort study results, and some were initially surprised by the results but could relate on reflection. Overall, both prior to and following the summary of the cohort study results, the participants described the effects of the lockdown to vary between residents in different facilities or wards, between individual residents within a ward and even within individuals over time. [Supplementary Table 3a](#) lists the effects of the lockdown on residents as described by the participants, based on their own experience, including quotes.

Different factors, such as level of cognitive impairment, were regarded to play a role in the effect of the lockdown on individuals. Residents with no to mild and those with moderate cognitive impairment were described to be most affected by loneliness/sadness and anger/restlessness, respectively. It was suggested that because shared living rooms were more tranquil (fewer visitors and less movement of residents), severely cognitively impaired residents portrayed less agitated behavior.

All the people who were in the second stage of dementia (moderate cognitive impairment) and actually still had some control over their own lives. That they were angry that they were no longer allowed to leave the ward on their own.... On the other hand, I have to say that the residents with more advanced dementia found it very peaceful in the shared living room....

They functioned much better there, because there were far fewer stimuli coming into the home all day. So there were two sides. (FG 1, participant 8, care staff)

The built environment of a ward was also thought to play a role in the effect of the lockdown. For example, the presence of a garden or courtyard, allowing residents to go outside during the lockdown, was thought to positively influence residents. In another illustrative example, a participant described having worked in a ward on the ground floor during the lockdown. The participant felt the presence of family of residents gathered in front of the windows attributed to the unrest she perceived among the residents of this ward. Participants described particular negative effects in those residents for whom family played an important role in care and daily activities and those residents who were able to leave the ward before the lockdown.

This great amount of individual variation was one explanation provided for the difference between the cohort study results and the more pronounced effects described in earlier studies and the media, and by some of the participants ([Supplementary Table 3b](#)). Participants also suggested that perception was possibly influenced by the (negative) public debate, and by specific cases.

Yes, because some people who respond really badly, that has an enormous impact on the team and of course they stand out much more than people who react OK. (FG 2, participant 6, elderly care physician)

The effect of the lockdown was thought to possibly be mitigated by the team spirit among staff and their effort and commitment to the well-being of residents during the lockdown. Staff described spending

Table 5
Observed Means and Results of the Mixed Model Analyses for Subgroups for Self-Reported Mood

Outcome	Subgroup	Observed Means (sd)		Unadjusted				Adjusted			
		Assessment 1	Assessment 2	n	Coefficient	95% CI	P	n	Coefficient	95% CI	P
Self-reported mood (SRM)*	Control	1.11 (1.7)	1.26 (1.7)	1500	Referent			1428	Referent		
	First half of lockdown	1.13 (1.6)	1.51 (1.9)		0.46	0.06, 0.85	.024		0.50	0.10, 0.90	.013
	Second half of lockdown	0.97 (1.6)	1.07 (1.6)		0.09	-0.31, 0.50	.65		0.14	-0.27, 0.54	.511

P values < .05 are bolded.

*Adjusted for number of days between the 2 assessments, 5-year age category, gender, cognition (Cognitive Performance Scale score), and length of stay in months.

Table 6
Observed Rates and Results of the Logistic GEE Analyses per Subgroup for Dichotomous Outcomes

Outcome	Subgroup	Observed Rates		Unadjusted				Adjusted*			
		Assessment 1, %	Assessment 2, %	n	OR	95% CI	P	n	OR	95% CI	P
Conflict with other care recipient ^{*,†}	Control	28.5	29.8	1845	Referent			Referent			
	First half of lockdown	35.2	30.3		0.75	0.59, 0.96	.022	1757	0.76	0.59, 0.98	.034
	Second half of lockdown	19.6	20.3		0.98	0.74, 1.30	.89		0.93	0.70, 1.25	.64
Withdrawal [‡]	Cognition: intact			1005	0.63	0.41, 0.98	.04	949	0.61	0.39, 0.94	.025
	Control	10.5	10.9								
	Lockdown	15.8	12.8								
Aggressive behavior [‡]	Cognition: impaired			817	1.36	0.97, 1.90	.07	791	1.35	0.96, 1.90	.08
	Control	22.1	25.5								
	Lockdown	18.4	25.5								
	Age: 60–79 y			494	1.13	0.85, 1.51	.39	478	1.18	0.84, 1.66	.34
	Control	48.7	50.6								
	Lockdown	49.4	53.9								
	Age: 80–84 y			378	1.18	0.79, 1.74	.42	366	1.17	0.75, 1.82	.49
	Control	36.1	40.3								
	Lockdown	25.5	32.1								
	Age: 85–90 y			527	1.02	0.70, 1.49	.92	503	0.99	0.62, 1.60	.98
	Control	35.0	38.3								
	Lockdown	33.7	38.1								
Age: ≥90 y			434	0.66	0.48, 0.91	.012	408	0.65	0.44, 0.96	.03	
Control	27.2	34.2									
Lockdown	36.2	34.8									

Cognition: intact = no to mild cognitive impairment, Cognition: impaired=moderate to severe cognitive impairment.

Significant values are bolded.

*Adjusted for number of days between the 2 assessments, 5-year age category, gender, cognition (Cognitive Performance Scale score), and length of stay in months.

†The significant associations of the interaction of population in 3 groups with assessment for each outcome. Only observed rates and coefficients or ORs of the outcomes of the models with at least 1 coefficient or OR with $P < .05$ are provided.

‡Stratified rates and coefficients or ORs are provided for outcomes per baseline characteristic and outcome combination for which a significant interaction was found in the 3-way interactions of population × assessment × baseline characteristic.

more time with residents and came up with and executed both creative ways to stay in contact with family and friends (eg, video-calling and window visits) and small-scale innovative ward-based activities.

The tranquility and personalized activities in the shared living rooms during the lockdown was also described to lead to more interaction with some residents who previously suffered from apathy and led a more isolated existence. Therefore, participants described attempts to preserve this tranquility by continuing to organize small-scale activities in the wards rather than transporting individuals to activities elsewhere and/or by requesting that visits take place outside of the shared living rooms.

We have a very active shared living room. And it makes getting together cosy, compared to the large, public rooms. And that is experienced as very positive by clients as well as by family. So, that's a really good thing and we're continuing it now. (FG 2, participant 2, nurse)

Discussion

We did not find clinically relevant negative effects of the lockdown on mood, behavior, and social and cognitive functioning in residents of Dutch LTCFs at the group level. Although the increase in self-reported mood symptoms was significantly greater during the lockdown, the size of the effect was small. The adjusted coefficient for SRM was 0.33, which can be interpreted as the SRM increasing 0.33 points more for the residents in the lockdown than the control group. The absolute difference in change based on the observed means was even smaller, namely, 0.09. The SRM is a 6-point scale, with a 1-point increase indicating an increase (in frequency) of 1 symptom, and the SD at baseline was 1.64. Therefore, the research team interpreted the coefficient of 0.33 not to be clinically relevant. In addition, this difference was completely attributable to a difference in the first weeks of the lockdown relative to the control period. This is most likely a result of

the fact that in many facilities included in the interRAI-LTCF data set, residents were initially kept in individual rooms during the lockdown (anecdotal evidence). After several weeks, wards began functioning as households, allowing residents to interact with each other and staff to develop innovative ward-based activities. The initial isolation in rooms is also a likely explanation for the decrease in conflicts with other care recipients during the first half of the lockdown.

The decrease in withdrawal for the relatively cognitive intact may be explained by the activation of residents prone to apathy as a result of the small-scale ward-based activities during the lockdown, as described by the focus group participants. Similar to the relative increase in withdrawal (nonsignificant) in the cognitively impaired found in this study, an increase in apathy in Dutch nursing home residents with advanced dementia has been described previously. This increase in apathy was attributed to understimulation.⁵

The results of the cohort study differ from the results of several earlier studies (an increase in loneliness, mood, and behavior symptoms severely affecting quality of life and well-being^{6–8,10}) and the trend in public debate on the effect of the lockdown in the Netherlands. In the focus groups, we reflected on possible explanations for this difference. One of the important explanations was the great variation in effect on the individual and facility level and the way this influenced perception of staff. Focus group participants described that there were some residents for whom the lockdown clearly had a negative effect, but there were others for whom the lockdown had little or even a positive effect, and many different individual and ward characteristics were described to play a role. Participants of a survey study similarly described both an increase and decrease of challenging behaviors in Dutch LTCF residents.² The cognition-dependent effect of the lockdown on withdrawal and wandering and the age-dependent effect on aggressive behavior found in the cohort analyses are additional evidence of the importance of individual characteristics in the effect of the lockdown. Individual cases in which the lockdown had a profound negative effect may have influenced the perception of the

lockdown's effects on both staff and family. Additionally, media reported anecdotal accounts of deterioration by relatives during the lockdown, leading to societal upset. These factors may have led to selection and perception bias in earlier studies based on interviews and surveys with family and staff, especially when the focus of these studies was the negative effects of the lockdown.

Another important possible explanation is that care staff mitigated the effect of the lockdown. Despite the already high workload and increased absences during COVID-19,²⁸ care staff provided the residents with opportunities to video-call and receive window visits, often had more one-on-one attention for residents, and organized innovative small-scale activities within the wards. An earlier study describing the effect of the lockdown in New Brunswick, Canada, using interRAI data similarly did not find lockdown effects on depression, delirium, or behavioral problems and concluded that staff intervention mitigated the effects.¹² Another prospective longitudinal study, with MDS data from Connecticut, USA, attributed worse outcomes to isolation as well as reduction in direct care provision as a result of staffing shortage. This staffing shortage may have interfered with the mitigation by staff in this context.¹³

Strengths and Limitations

The standardized interRAI assessments used in this study allow for the unique opportunity to explore the effect of the lockdown prospectively in a historically controlled design. The mixed-method design allowed us to combine these longitudinal results with insights into the day-to-day reality of the lockdown in LTCFs as provided by focus group participants.

However, the interRAI assessments may not have been sensitive enough to capture all effects of the lockdown. Focus group participants suggested that more extensive conversations with the residents themselves may be necessary to get a complete picture of the effects. The fact that self-reported mood significantly differed between the lockdown and the control group suggests that, in this case, resident report may be more sensitive to change than observation parameters. The models with SRM as outcome were based solely on the residents who were capable and willing to respond to the questions. However, as sensitivity analyses showed that there were no significant effects of the lockdown on the DRS in the population with SRM complete, it is unlikely that the significant finding for the SRM is the result of the selection inherent to the SRM. The adjusted coefficient for the lockdown group relative to the control group for the DRS in this sub-population was 0.096 (95% CI: -0.21-0.40).

Participants of the focus groups posited that the lockdown and the (time) pressure it incurred for staff might have reduced the quality of the interRAI observations. As we shared this concern, we conducted a survey among the staff who completed interRAI assessments during the lockdown. The responses showed that in general the completion of assessments itself was not greatly affected by the lockdown.

It may be argued that not finding clinically relevant effects of the lockdown could have been a result of the relatively short duration of the lockdown in the Netherlands. The second half of the lockdown group, consisting of residents who had lockdown exposure for at least 34 days, did not differ from the control group for any of the outcomes. Therefore, there is no evidence of the lockdown effect having increased over time. We additionally conducted sensitivity analyses in which the lockdown group was divided into 4 groups based on quartiles of the date of the assessment within the lockdown (group 1: March 20–April 9, 2020; group 2: April 10–April 22, 2020; group 3: April 23, 2020–May 8, 2020; group 4: May 9, 2020–May 24, 2020). The results of these analyses with 4 lockdown groups were consistent with the analyses comparing the 2 halves of the lockdown with the control group.

The historical control group allowed us to compare the change during the lockdown with the “usual” change, but its selection may have led to historical control bias. However, because of the temporal proximity between periods and the fact that control and lockdown groups did not differ significantly on baseline characteristics, we do not expect this type of bias to have greatly affected the results.

The participants of the focus groups rightly noted that the effect on family of residents and staff members were not included in the quantitative study. Some participants hypothesized that these effects may in many cases have been greater than on the residents themselves. The effect on these groups should not be forgotten when forming a complete view of the effect of the lockdown in LTCFs.²⁹

Conclusions and Implications

We did not find clinically relevant negative effects of the lockdown on mood, behavior, and social and cognitive functioning in residents of LTCFs at the group level. Care professionals described a great amount of individual variation in the effect of the lockdown. Possibly, the efforts of care staff mitigated the effect of the lockdown at the group level. LTCFs also learned lessons from this historical event. In order to preserve the tranquility in common rooms while activating individual residents, facilities continue to organize small-scale activities adapted to individuals and ask that visits take place outside of the shared living rooms. It is essential that as many lessons as possible from different perspectives are learned from the lockdown, to ensure well-being in residents, now and in the future.^{29–31}

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