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Original Study

Factors Associated With the Quality of Life of Nursing Home Residents During the COVID-19 Pandemic: A Cross-Sectional Study

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A B S T R A C T

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Objectives: Quality of life (QoL) of nursing home (NH) residents is critical, yet understudied, particularly during the COVID-19 pandemic. Our objective was to examine whether COVID-19 outbreaks, lack of access to geriatric professionals, and care aide burnout were associated with NH residents' QoL.
Design: Cross-sectional study (July to December 2021).
Setting and Participants: We purposefully selected 9 NHs in Alberta, Canada, based on their COVID-19 exposure (no or minor/short outbreaks vs repeated or extensive outbreaks). We included data for 689 residents from 18 care units.
Methods: We used the DEMQOL-CH to assess resident QoL through video-based care aide interviews. Independent variables included a COVID-19 outbreak in the NH in the past 2 weeks (health authority records), care unit-levels of care aide burnout (9-item short-form Maslach Burnout Inventory), and resident access to geriatric professionals (validated facility survey). We ran mixed-effects regression models, adjusted for facility and care unit (validated surveys), and resident covariates (Resident Assessment Instrument–Minimum Data Set 2.0).
Results: Recent COVID-19 outbreaks ($\beta = 0.189$; 95% CI: 0.058–0.320), higher proportions of emotionally exhausted care aides on a care unit ($\beta = 0.681$; 95% CI: 0.246–1.115), and lack of access to geriatric professionals ($\beta = 0.216$; 95% CI: 0.003–0.428) were significantly associated with poorer resident QoL.
Conclusions and Implications: Policies aimed at reducing infection outbreaks, better supporting staff, and increasing access to specialist providers may help to mitigate how COVID-19 has negatively affected NH resident QoL.

Long-term care systems have struggled for decades to enable good quality of life (QoL) for nursing home (NH) residents.[1,2] Unlike quality of care, defined as *objective measures* of appropriate care provision (eg, rates of falls or pressure ulcers),[3] QoL describes a person's *subjective rating* of their physical, emotional, and social well-being—or, "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."[4(p. 1405)] Measures of NH quality of care are routinely collected and publicly reported in the United States, Canada, and other countries.[5] Substandard performance is monitored and acted on by NH regulatory bodies; however, with notable exceptions,[6] the QoL of NH residents is often not routinely measured.[7] This is concerning, given that enabling QoL is an important component of NH care,[1,2] especially for individuals with dementia.[8] People with dementia comprise at least 60% of all long-stay NH residents in the United States,[9] and 70% in Canada[10] and the United Kingdom.[11] In Canada, 90% of NH residents have some cognitive impairment.[10]

Those who provide and receive care in NHs have been marginalized and neglected by health care reforms for decades, predicating the tragedy that unfolded during the COVID-19 pandemic,[1,2] and imposing disproportionate levels of suffering on residents and care staff. Visitor and activity restrictions increased residents' social isolation, loneliness,[12] mental health issues, and responsive behaviors.[13] Although these factors decrease a person's QoL, they do not directly assess QoL. Three small-scale cross-sectional studies[14-16] assessed NH residents' QoL directly during the COVID-19 pandemic, but none of them included the facilities' COVID-19 exposure or variables affected by COVID-19 exposure (eg, staff burnout) in their analyses. Another cross-sectional study[17] assessed the impact of COVID-19 on NH residents' QoL, using a COVID-19–specific questionnaire (COV19–QoL[18]). The study suggested that based on resident self-reports, COVID-19 did not deteriorate their QoL. However, we lack studies including residents with more severe cognitive impairment, studies using well-validated measures of QoL, and those exploring how the NH's outbreak status affected resident QoL.

The objective of this study was to assess whether recent NH COVID-19 outbreaks, higher levels of care aide burnout, and access to a geriatrician or a geriatric psychiatrist (adjusted for resident, care unit, and facility characteristics) were associated with lower levels of resident QoL during the pandemic.

Methods

This cross-sectional study was part of Translating Research in Elder Care (TREC), a longitudinal program of health services research, aiming to improve the QoL and quality of care of NH residents and quality of work-life of NH care staff. TREC is currently evaluating the impact of COVID-19 on NHs in the Canadian province of Alberta. Using validated surveys,[19,20] TREC collected data from NH care staff, care units, and facilities before (December 2019 to February 2020) and during the COVID-19 pandemic (August to December 2021). These survey data were linked with Resident Assessment Instrument–Minimum Data Set 2.0 (RAI-MDS 2.0) data, the version currently used in Canada for routine NH resident assessment[21] (a more recent version, the RAI-MDS 3.0, is used in the United States). For this study, we collected additional care staff proxy assessments of resident QoL (July to September 2021) in a subsample of these NHs and linked QoL data with RAI-MDS 2.0 data collected during the same time frame and the aforementioned survey data.

Setting, Sample, Data Collection

From TREC COVID-19 sample of 28 urban NHs in Alberta, stratified by bedsize (small: <80, medium 80–120, large: >120) and owner-

operator model (public not for profit, voluntary, private for profit), we purposefully selected 9 NHs for this QoL study, based on their exposure to COVID-19 (no or minor outbreaks vs repeated and/or ongoing outbreaks before the QoL data collections) and their capacity to participate. Using an approach successfully tested in a previous study,[22] we conducted video calls with care aides to obtain proxy assessments of resident QoL, because due to COVID-19 we could not visit sites in-person. A key contact in each participating NH (usually a director of care or a care manager) identified all eligible residents. Residents were eligible if they had lived in the NH for at least 3 months and were cared for by an eligible care aide who agreed to provide a proxy QoL assessment. Care aides were eligible if they had worked in the NH for ≥3 months and had cared for the resident on ≥4 days and during morning and evening shifts in the week before the QoL assessment. Residents remained de-identified to the study team at all times and we linked resident QoL and RAI-MDS 2.0 data using random IDs shared with the key contact. After completion of the QoL data collection, the TREC study team collected survey data from care aides, care managers and directors of care via video calls, using computer-assisted interviews. Alberta Health provided us with data on COVID-19 outbreaks in each facility between March 1, 2020, and December 31, 2021. Using unique care unit and facility IDs, these TREC survey data and COVID-19 outbreak data were linked to the resident-level data.

Dependent Variable: QoL

We measured QoL using the DEMQOL-CH.[22,23] The tool was developed and validated for completion by a care aide who knows the resident well, as a means to measure dementia-specific QoL (ie, the perceived impact of dementia on a person's life) of NH residents. To include residents at all levels of cognitive impairment (including those who cannot self-report and those without family support), and to collect data without the ability to visit NHs, staff proxy assessments were the only consistent method available to assess QoL. The DEMQOL-CH is based on the DEMQOL-Proxy,[24] an extensively validated tool.[25,26] Its 31 items assess a resident's feelings (11 items), worries about daily life (11 items), and worries about memory (9 items). Items are rated on a 4-point scale (4 = *A Lot*, 3 = *Quite A Bit*, 2 = *A Little*, 1 = *Not At All*) and summed (range: 31–124), with higher scores indicating better QoL.

Well-known predictors of QoL associate with DEMQOL-CH scores, internal consistency reliability is excellent (0.9), and test-retest reliability is acceptable (0.72).[23] Inter-rater reliability was borderline-acceptable (0.4) in a study conducted in the United Kingdom. Our previous Canadian feasibility study[22] found improved internal consistency reliability (0.83) and inter-rater reliability (0.74) by explicitly asking administrators to select 2 care staff members for assessments who both knew the respective resident well (see care aide eligibility in the preceding section). In this study, our team completed the DEMQOL-CH with 1 care staff member who knew the resident well via structured video conference interviews, as per the methods successfully pretested in our feasibility study.[22] In the following we will use the term QoL consistently, recognizing that in the context of this study, this refers to *NH residents' dementia-specific QoL, as perceived by care aides*.

Independent Variables

Our independent variables included NH COVID-19 outbreaks, access to a geriatrician or a geriatric psychiatrist, and care aide burnout. Alberta Health defined a COVID-19 outbreak as at least one resident or staff member with a positive COVID-19 test. Based on Alberta Health documentation, our data set included a dichotomous variable indicating for each facility whether there was a COVID-19 outbreak within 14 days of our QoL data collection. A dichotomous variable based on

Table 1
Covariates

Covariate	Definition	Expected Association
Resident demographics		
Age	Date difference between RAI-MDS 2.0 items A3 (assessment reference date) and AA3a (birth date), categorized as follows: • <65 years • 65 to <75 years • 75 to <85 years • 85 to <95 years • 95+ years	Older individuals have lower QoL
Female sex	RAI-MDS 2.0 item AA2 (sex) = F (female)	Females have lower QoL than males or others
Marital status	RAI-MDS 2.0 item A5 (marital status), categorized as follows: • Married • Widowed • Other (never married, separated, divorced, unknown)	Married individuals have higher QoL than widowed individuals or others
White race/ethnicity	Using an item used in Stats Canada population surveys, care aides were asked at the end of the DEMQOL-CH survey, which of the following racial or cultural groups the resident belonged to: • White • South Asian (eg, East Indian, Pakistani, Sri Lankan) • Chinese • Black • Filipino • Latin American • Arab • Southeast Asian (eg, Vietnamese, Cambodian, Malaysian, Laotian) • West Asian (eg, Iranian, Afghan) • Korean • Japanese • Other (please specify)	White individuals have higher QoL than racialized individuals
Resident conditions		
Moderate to severe physical impairment	RAI-MDS 2.0 Activities of Daily Living Hierarchy scale score of >3	Those with higher physical impairment have lower QoL
Physical decline in past 90 days	RAI-MDS 2.0 item G9 = 2 (deteriorated)	Those whose physical functioning declined have lower QoL
Moderate to severe cognitive impairment	RAI-MDS 2.0 Cognitive Performance Scale score of >3	Those with higher cognitive impairment have lower QoL
Physical decline in past 90 days	RAI-MDS 2.0 item B6 = 2 (deteriorated)	Those whose cognitive functioning declined have lower QoL
Responsive behaviors	RAI-MDS 2.0 Aggressive Behavior Scale score of >2	Those with responsive behaviors have lower QoL
Depressive symptoms	RAI-MDS 2.0 Depression Rating Scale score of >2	Those with depressive symptoms have lower QoL
Unstable/end-stage conditions	RAI-MDS 2.0 Changes in Health, End-stage disease, and Signs and Symptoms scale score of >1	Those with unstable and/or end-stage conditions have lower QoL
Low social engagement	RAI-MDS 2.0 Index of Social Engagement score of <2	Those with low social engagement have lower QoL
Daily moderate pain or pain that was at times horrible or excruciating	A dichotomous variable based on the RAI-MDS 2.0 items J2a (pain frequency) and J2b (pain intensity): • The variable was coded as 1 (pain present) if J2a = 2 (daily pain) and J2b = 2 (moderate pain intensity) or if J2b = 3 (horrible or excruciating pain), regardless of frequency • Elsewise, the variable was coded as 0 (pain absent)	Those with daily moderate pain or with times of horrible or excruciating pain have lower QoL
Dehydration	RAI-MDS 2.0 item J1c = 1 (dehydration present)	Those with dehydration have lower QoL
Edema	RAI-MDS 2.0 item J1g = 1 (edema present)	Those with edema have lower QoL
Shortness of breath	RAI-MDS 2.0 item J1l = 1 (shortness of breath present)	Those with shortness of breath have lower QoL
Vomiting	RAI-MDS 2.0 item J1o = 1 (vomiting present)	Those who experience vomiting have lower QoL
Weight loss	RAI-MDS 2.0 item K3a = 1 (weight loss of 5% or more in the past 30 days or 10% or more in the past 180 days)	Those with weight loss have lower QoL

Table 1 (continued)

Covariate	Definition	Expected Association
Care unit characteristics		
Dementia care unit	Variable collected in the TREC care unit survey (competed by the care unit's care manager), asking for the type of the care unit: • General long-term care • Secure dementia • Secure mental health/psychiatric • Nonsecure dementia • Nonsecure mental health/psychiatric • Other We created a dichotomous variable indicating whether or not the care unit was a dementia care unit (either secure or nonsecure)	Those who live on a dementia care unit have lower QoL
Low staffing levels	Variable collected in the TREC care unit survey, assessing care hours per resident day of care aides, licensed practical nurses, and registered nurses. Staffing was considered low if the care unit had a total number of care hours per resident day (sum of care aide, licensed practical nurse and registered nurse hours per resident day) below the 25th sample percentile	Those on care units with low staffing levels have lower QoL
Low skill mix	Skill mix was calculated as care aide hours per resident day on a care unit divided by that care unit's total care hours per resident day. Skill mix was considered low if the care aide hour proportion was above the 75th sample percentile	Those on care units with low skill mix have lower QoL
High proportion of care aides who speak English as additional language	In the TREC care aide survey, each participating care aide indicates whether English is their first language (yes/no). The proportion of care aides on a care unit who spoke English as an additional language was considered high if it was above the 75th sample percentile	Those on care units with a high proportion of care aides who speak English as an additional language have lower QoL
Facility characteristics		
Location	Variable in the TREC facility survey (completed by directors of care or facility administrators) indicating whether the facility was located in the Edmonton Health Zone or the Calgary Health Zone	NA
Bedsize	Variable in the TREC facility survey indicating whether the facility was small (<80 beds), medium (80—120 beds), or large (>120 beds)	Those living in small facilities have better QoL than those in medium or large facilities
Ownership model	Variable in the TREC facility survey indicating whether the ownership model of the facility was public, not for profit; voluntary, not for profit; or private, for profit	Those living in for-profit facilities have lower QoL than those in nonprofit facilities

NA, not applicable; TREC, Translating Research in Elder Care.

our facility survey indicated whether residents had access to a geriatrician or a geriatric psychiatrist (yes), or to neither (no).

Care aide burnout was assessed, using the reliable, valid, and widely used Maslach Burnout Inventory.[27] We used the 9-item short-form version that rated items on a scale from 0 to 6 to form the subscales of care aide emotional exhaustion, cynicism, and job efficacy. Because multiple care aides cared for each resident at different times, we could not link an individual care aide's survey to a resident's QoL and RAI-MDS 2.0 record. Therefore, we aggregated burnout scores to the care unit level. For each unit, we calculated the proportion of care aides with emotional exhaustion scores >3.00 and cynicism scores >2.33, respectively. Consistent with previous work,[28] these cutoffs represent high risk of burnout.

Covariates

Guided by a recent systematic review and meta-analysis,[29] we adjusted our models for variables known to be associated with NH residents' QoL (Table 1). Resident covariate data came from the routinely collected RAI-MDS 2.0,[21] care aide data from the TREC care aide survey, and care unit and facility data came from the TREC unit

and facility surveys, respectively. TREC surveys have been comprehensively described elsewhere and robust evidence supports the reliability and validity of the included scales.[19,20]

Statistical Analysis

We described our sample, using frequencies and proportions for categorical variables and means and SDs for continuous variables. DEMQOL-CH scores were highly skewed to the left, violating normal distribution requirements. To normalize the raw score (possible range: 31—124, higher values indicate better QoL), we transformed it using an inverse cube root transformation ($QoL_{trans} = \sqrt[3]{(124 + 1 - QoL_{raw})}$, possible range: 1—4.55, lower values indicate better QoL). We conducted mixed-effects regression analyses with the transformed DEMQOL-CH score as dependent variable and including random intercepts to account for clustering (residents nested within care units and care units nested within facilities). We added variables stepwise, starting with our 3 main independent variables and then adding covariates one-by-one. We removed variables that caused collinearity issues or negatively affected model fit based on the Akaike information criterion (AIC), the corrected AIC (AICC), and the Bayesian

Table 2
Facility Characteristics (n = 9 Care Facilities) and Unit Characteristics (n = 18 Care Units)

	n	%		
Facility characteristics				
Total number of facilities	9	100		
Location				
Calgary	2	22		
Edmonton	7	78		
Size				
Large (>120 beds)	4	44		
Medium (80–120 beds)	1	11		
Small (<80 beds)	4	44		
Owner-operator model				
For profit	3	33		
Not for profit	6	67		
COVID-19 outbreak within 2 weeks of data collection	3	33		
No access to a geriatrician or to a geriatric psychiatrist	1	11		
Unit characteristics				
Total number of units	18	100		
Dementia care unit	2	11		
	M	SD	Mdn	IQR
Staffing				
Care aide hours per resident day	1.83	0.70	2.29	1.13; 2.40
LPN hours per resident day	0.50	0.16	0.45	0.42; 0.54
RN hours per resident day	0.40	0.08	0.39	0.33; 0.45
Total care hours per resident day	2.73	0.81	3.11	1.88; 3.45
Percent care aide hours	65.32	9.50	65.84	58.82; 73.17
Percent care aides who speak English as additional language	76.38	23.94	81.67	65.00; 100.00
Care aide burnout				
Proportion of care aides with critical emotional exhaustion scores (>3.00)	46.93	16.38	40.00	35.00; 60.00
Proportion of care aides with critical cynicism scores (>2.33)	46.00	17.38	41.43	36.36; 53.85
Proportion of care aides with critical efficacy scores (<3.30)	3.74	5.69	0.00	0.00; 5.00

LPN, licensed practical nurse; RN, registered nurse.

information criterion. To assess the representativeness of our QoL subsamples, we compared our QoL samples with all other residents, care units, and facilities in the larger TREC sample in Alberta, using Fisher's exact tests for categorical variables, or *t* tests for 2 independent samples for continuous variables.

Ethics Approval

This study was approved by the University of Alberta Health Research Ethics Board (Pro00096355, Pro00037937). Informed consent to participate was obtained from care aides (verbal in the QoL study, written in the TREC survey study) and managers. Researchers were not aware of resident names or other identifying details at any time. Therefore, the requirement to obtain resident consent was waived.

Results

We included 9 NHs with 18 care units (Table 2) and collected QoL data for 689 residents (Table 3). The number of residents per NH ranged between 35 and 132, with a mean of 76.6 residents per NH (SD = 34.7). Compared with TREC NHs (n = 19) and care units (n = 80) not participating in this study (TREC sample), characteristics of NHs and care units participating in this study (QoL sample) did not notably differ (Supplementary File, Supplementary Table 1). However, compared with the TREC sample, residents in the QoL sample were older, and our QoL sample had lower proportions of physical or cognitive decline 90 days before the assessment, low social engagement, and unstable conditions or end-stage disease (Supplementary File, Supplementary Table 2). Compared with the TREC sample, our QoL sample also had higher proportions of residents living on a care unit with low staffing skill mix, and in a facility that could not provide access to either a geriatrician or a geriatric psychiatrist. Compared

with the TREC sample, more residents lived in small NHs and fewer residents lived in medium NHs in the QoL sample.

In our bivariate analyses (Table 3), most of the covariates were associated with QoL in the expected direction. Some associations differed when using the raw vs the transformed DEMQOL-CH score (Supplementary Table 3), supporting the use of the transformed score.

Our multivariable regression models (Table 4) showed that having a COVID-19 outbreak within the past 2 weeks, having more care aides on a unit reporting high levels of emotional exhaustion, and not having access to a geriatrician or a geriatric psychiatrist were each associated with poorer resident QoL. Higher care unit proportions of care aides with cynicism scores >2.33 were associated with better resident QoL. Compared with married residents, those who were never married, separated, divorced, or had an unknown marital status had better QoL. QoL was also better for residents with moderate to severe cognitive impairment, compared with those with lower levels of cognitive impairment. Resident age and sex were not associated with QoL. QoL did not differ between large and small facilities, but residents in medium-sized facilities had lower QoL than those in small facilities. All other covariates were associated with lower QoL as expected.

Discussion

Facility characteristics, including recent COVID-19 outbreaks, and not having access to specialist geriatric professionals, and having more emotionally exhausted care aides on a care unit were each associated with poorer resident QoL during the COVID-19 pandemic. Living on a dementia care unit, in a for-profit facility, or in a medium-sized (vs small) facility were also associated with poorer resident QoL. For resident characteristics, not being White, having depressive symptoms, experiencing recent cognitive decline, and exhibiting responsive behavior were associated with poorer QoL. Residents with moderate

Table 3
Resident Characteristics and Their Association With the Transformed DEMQOL-CH Summary Score

	n	%	DEMQOL-CH Transformed Score		
			M	SD	P*
Total number of residents	689	100	3.09	0.58	—
Age category, y					
<65	17	2.5	2.84	0.71	**.0219**
65 to <75	67	9.7	3.02	0.63	
75 to <85	186	27.0	3.01	0.61	
85 to <95	320	46.4	3.14	0.56	
95+	99	14.4	3.17	0.53	
Sex					
Female	502	72.9	3.10	0.58	.4467
Male	187	27.1	3.06	0.60	
Marital status					
Married	188	27.3	3.11	0.60	**.0293**
Widowed	362	52.5	3.12	0.54	
Never married, separated, divorced, unknown	139	20.2	2.97	0.65	
Race/ethnicity					
White	578	83.9	3.07	0.60	**.0860**
Other than White	111	16.1	3.18	0.52	
Moderate-severe physical impairment					
No	198	28.7	3.16	0.57	**.0492**
Yes	491	71.3	3.06	0.59	
Physical decline in past 90 days					
No	597	86.7	3.09	0.58	.7011
Yes	92	13.4	3.11	0.60	
Moderate-severe cognitive impairment					
No	440	63.9	3.17	0.59	**<.0001**
Yes	249	36.1	2.96	0.55	
Cognitive decline in past 90 days					
No	628	91.2	3.08	0.59	**.0684**
Yes	61	8.9	3.22	0.52	
Responsive behaviors					
No	552	80.1	3.06	0.59	**.0121**
Yes	137	19.9	3.20	0.55	
Depressive symptoms					
No	503	73.0	3.02	0.59	**<.0001**
Yes	186	27.0	3.28	0.54	
Unstable condition, end-stage disease					
No	556	80.7	3.06	0.58	**.0166**
Yes	133	19.3	3.20	0.59	
Low social engagement					
No	600	87.1	3.12	0.58	**.0008**
Yes	89	12.9	2.90	0.60	
Daily or excruciating pain					
No	650	94.3	3.09	0.59	.4330
Yes	39	5.7	3.02	0.56	
Dehydration					
No	686	99.6	3.09	0.59	.5392
Yes	3	0.4	3.30	0.48	
Edema					
No	620	90.0	3.08	0.59	.3232
Yes	69	10.0	3.16	0.58	
Shortness of breath					
No	653	94.8	3.08	0.58	.3436
Yes	36	5.2	3.18	0.65	
Vomiting					
No	684	99.3	3.09	0.59	**.0071**
Yes	5	0.7	2.82	0.13	
Weight loss					
No	636	92.3	3.08	0.59	**.0681**
Yes	53	7.7	3.23	0.57	
Living on a care unit with the following characteristics:					
Dementia care unit					
No	613	89.0	3.06	0.58	**.0003**
Yes	76	11.0	3.32	0.56	
Low staffing (≤25th pctl.)					
No	530	76.9	3.11	0.59	.1441
Yes	159	23.1	3.03	0.56	
High proportion of care aide hours (≥75th pctl.)					
No	155	22.5	3.01	0.64	**.0647**
Yes	534	77.5	3.11	0.57	
High proportion (≥75th pctl.) of care aides speaking English as a second language					
No	464	67.3	3.07	0.56	.2325
Yes	225	32.7	3.13	0.64	

Table 3 (*continued*)

	n	%	DEMQOL-CH Transformed Score		
			M	SD	*P**
High proportion (≥75th pctl.) of care aides with critical emotional exhaustion scores (>3.00)					
No	510	74.0	3.05	0.61	**.0009**
Yes	179	26.0	3.20	0.49	
High proportion (≥75th pctl.) of care aides with critical cynicism scores (>2.33)					
No	601	87.2	3.08	0.59	.3840
Yes	88	12.8	3.14	0.51	
High proportion (≥75th pctl.) of care aides with critical efficacy scores (<3.30)					
No	417	60.5	3.07	0.60	.2893
Yes	272	39.5	3.12	0.57	
Living in a care facility with the following characteristics:					
COVID-19 outbreak within 2 weeks of the data collection					
No	496	72.0	3.09	0.59	.7187
Yes	193	28.0	3.08	0.56	
Access to a geriatrician or a geriatric psychiatrist					
No (access to neither)	107	15.5	3.24	0.53	**.0037**
Yes (access to either)	582	84.5	3.06	0.59	
Located in					
Calgary	186	27.0	3.17	0.57	**.0252**
Edmonton	503	73.0	3.06	0.59	
Size					
Large (>120 beds)	446	64.7	3.09	0.57	.9518
Medium (80-120 beds)	55	8.0	3.09	0.49	
Small (<80 beds)	188	27.3	3.08	0.63	
For-profit owner-operator model					
No	500	72.6	3.11	0.60	.1270
Yes	189	27.4	3.03	0.55	

*P values are based on *t* tests for 2 independent samples for variables with 2 categories or on analysis of variance for variables with more than 2 categories.

to severe cognitive impairment and those who were separated, divorced, never married, or had an unknown marital status (compared to married residents) had better QoL.

To the best of our knowledge, this is the first quantitative analysis to provide data to support the issue raised by several qualitative studies (eg, Smith et al.[30]), commentaries (eg, Bethell et al.[31]), and media articles (eg, Xu[32]), collectively showing that COVID-19 outbreaks and restrictions negatively affected NH residents' QoL.[33] Here we connect for the first time poor clinical resident outcomes (such as depressive symptoms or responsive behaviors) with poor QoL for NH

Table 4
Factors Associated With Long-Term Care Resident QoL, Based on Mixed-Effects Regression Models With Unit- and Facility-Level Random Intercepts

	Bivariate Model			Final, Fully Adjusted Model			
	Est.	LCL	UCL	Est.	LCL	UCL	P
Intercept				2.959	2.608	3.310	<.0001
Facility had a COVID-19 outbreak within 2 weeks of the QoL data collection	−0.014	−0.187	0.159	**0.189**	**0.058**	**0.320**	**.0046**
Care aide burnout							
Percent care aides on care unit with emotional exhaustion scores >3.00	**0.586**	**0.157**	**1.015**	**0.681**	**0.246**	**1.115**	**.0022**
Percent care aides on care unit with cynicism scores >2.33	−0.073	−0.556	0.410	**−0.586**	**−1.043**	**−0.128**	**.0122**
No access to a geriatrician nor to a geriatric psychiatrist in the facility	0.164	−0.053	0.380	**0.216**	**0.003**	**0.428**	**.0468**
Resident age, y (ref.: 95+ years)							
<65	**−0.317**	**−0.612**	**−0.023**	−0.201	−0.496	0.094	.1806
65 to <75	−0.155	−0.332	0.022	−0.103	−0.286	0.080	.2709
75 to <85	**−0.172**	**−0.311**	**−0.032**	−0.125	−0.265	0.016	.0820
85 to <95	−0.030	−0.158	0.099	−0.009	−0.134	0.116	.8885
Resident is female	0.022	0.076	0.120	0.019	−0.081	0.119	.7121
Resident marital status (ref.: married)							
Widowed	0.013	−0.089	0.114	−0.044	−0.152	0.063	.4184
Other (never married, separated, divorced, unknown)	−0.138	−0.264	−0.013	**−0.154**	**−0.276**	**−0.032**	**.0138**
Resident race/ethnicity other than White	0.107	−0.011	0.224	**0.140**	**0.028**	**0.253**	**.0143**
Resident has moderate to severe cognitive impairment	**−0.234**	**−0.324**	**−0.144**	**−0.303**	**−0.393**	**−0.212**	**<.0001**
Resident has depressive symptoms	**0.253**	**0.155**	**0.350**	**0.196**	**0.093**	**0.298**	**.0002**
Resident had a cognitive decline in the past 90 days	**0.182**	**0.029**	**0.335**	**0.153**	**0.007**	**0.299**	**.0401**
Resident responsive behavior	**0.160**	**0.052**	**0.269**	**0.137**	**0.025**	**0.249**	**.0168**
Resident lives in a dementia care unit	**0.237**	**0.017**	**0.457**	**0.293**	**0.113**	**0.472**	**.0014**
Facility is located in Calgary	0.113	−0.052	0.277	0.091	−0.068	0.250	.2616
Facility for-profit ownership	−0.053	−0.224	0.118	**0.137**	**0.005**	**0.269**	**.0420**
Facility size (ref.: Small)							
Medium	−0.008	−0.271	0.255	**0.259**	**0.033**	**0.485**	**.0250**
Large	−0.010	−0.188	0.167	−0.060	−0.182	0.061	.3294

Est, estimate; LCL, lower 95% confidence interval level; UCL, upper 95% confidence interval level.
Values are bold if *P* < .05.

residents in the pandemic. Although at the time we conducted this study (July to December 2021) visitor restrictions had been released substantially, NHs in Alberta had to implement stricter measures as soon as at least 1 resident or staff member tested positive for COVID-19.[34] These measures included a restriction of nonessential visitors and reduced social group activities. Furthermore, caring for infected residents confined to their rooms and implementing the increased protective measures likely increased care staff workload considerably, leaving limited time to interact with residents.

Access to specifically trained geriatric professionals is crucial for older adults' health and well-being, especially for those with complex care needs, such as NH residents.[35,36] However, compared with other countries, Canada has substantially fewer geriatricians per capita, and COVID-19 increased barriers to accessing these professionals.[35] Nursing practitioners have played a critical and effective role in addressing complex resident care needs in NHs during the pandemic[37]—a strategy that health systems should consider sustaining and further extending, given the lack of geriatric medical professionals. In our study, reduced access to specialist input of 107 residents in 1 NH was associated with lower resident QoL, highlighting the critical role of these professionals in the care of NH residents. This is in line with a cohort study on people living with dementia in the community during the pandemic, where poor QoL of family carers was associated with a lack of support from specialist services.[38]

Many care aides in this study reported high levels of emotional exhaustion and cynicism, which confirms findings of qualitative studies highlighting the hardships care aides encountered during the pandemic.[39–42] A higher proportion of emotionally exhausted care aides on a care unit was associated with lower resident QoL. Care aides who are emotionally exhausted struggle to provide quality care even in the best of circumstances,[28,43,44] and when coupled with COVID-19 restrictions and staffing shortages, this negatively affects resident QoL. Surprisingly, we found that a high proportion of care aides with high cynicism scores was associated with better resident QoL. A possible explanation is that cynicism may be a possible "strategic virtue,"[45] a coping mechanism that can help care providers to detach themselves from the struggles they face, acting as a vent, applying strategies such as dark humor,[45,46] and therefore improving, rather than deteriorating their interactions with residents.

In line with previous literature,[29,47,48] we found that racialized residents, those who experienced depressive symptoms, responsive behaviors, and those who lived on a dementia care unit or in a for-profit facility had lower QoL. Of note is our finding that more severe cognitive impairment was associated with better QoL, suggesting in line with previous findings that individuals with dementia can experience high QoL even at advanced stages of the disease.[49] Interestingly, we also found that recent cognitive decline was negatively associated with a resident's QoL. This is in line with QoL studies from the field of disability studies, suggesting that acute events (such as the onset or the exacerbation of symptoms or disabilities) decrease an individual's QoL.[50] However, with the right supports, individuals can cope with these challenges and return to or even exceed their previous levels of QoL.[50]

Strengths and Limitations

This is, to the best of our knowledge, the first quantitative study involving a larger sample of NH residents that examines the effect of NH COVID-19 outbreaks with resident QoL. We applied robust measurement tools and statistical methods. The notable differences in bivariate associations of study outcomes with raw vs transformed DEMQOL-CH scores point to the importance of ensuring study outcomes meet model assumptions. However, there are important limitations. Analyses were conducted on a convenience sample of 9 NHs in

1 Canadian province, limiting the generalizability of our findings. When comparing our QoL sample with our larger TREC sample, we found that facilities that cared for residents with lower care needs were more likely to participate in our study. This is not surprising, given the multiple pressures NHs faced during the COVID-19 pandemic, but it suggests some selection bias. The associations we found may differ in larger, more representative samples of NHs and residents in other regions. The cross-sectional nature of this study also limits the strength of the conclusions that can be drawn. Unfortunately, unlike quality of care, QoL is not routinely measured. Therefore, we lack pre-pandemic data on this outcome. Longitudinal studies on resident QoL are needed. We also did not have access to data indicating whether the residents included in this study had a COVID-19 infection. COVID-19 infections most likely affect a resident's QoL negatively, but the lack of this covariate did not allow us to test this assumption. We acknowledge that although the DEMQOL-CH is validated for proxy-completion by care aides, care aides may have a biased view on a resident's QoL that may have influenced the associations identified in this study. For example, it is possible that care aides viewed unmarried residents as less affected by visitation pandemic restrictions, or care staff may have rated visitation restrictions as less important for those with moderate to severe impairment, who may have already participated less in social activities. Furthermore, it is possible that there is a relationship between care aides' experience of emotional exhaustion and cynicism and their views of residents' QoL. Future studies need to assess the association of care aide reported cynicism and emotional exhaustion with resident self-reports of QoL. Our finding that residents with more severe cognitive impairment have better QoL may reflect difficulties of care aides to assess QoL among residents whose verbal expressions are limited. DEMQOL-CH was specifically validated for proxy measurement of those with severe dementia, but further research is needed, assessing the level of accuracy of care aide QoL assessments by varying levels of NH resident cognitive impairment. That said, our finding that residents with recent decline in cognition had lower QoL suggests that care aides can pick up on poor QoL among those with impaired cognition. Also, we found many resident outcomes were associated with QoL as expected based on robust literature, further supporting the construct validity of the DEMQOL-CH. Finally, our association of lack of access to geriatric specialist care with poor resident QoL is driven by only 1 NH in our sample, in which residents did not have access to these specialists. Although 107 residents in this NH were affected by this issue and the association was statistically significant, future studies are needed to further investigate this finding.

Conclusions and Implications

Modifiable factors that can be targeted by health system and organizational policies were associated with poor resident QoL. These factors included access to geriatric professionals and care aide emotional exhaustion. The fact that recent COVID-19 outbreaks were independently associated with resident QoL suggests that public health and facility restrictions may generally affect resident QoL negatively. Health systems and NH organizations need to find ways to protect resident safety in humane ways that prioritize safety and QoL equally. Our findings suggest that experiencing good QoL is possible even during crises such as this pandemic and when residents face severe cognitive impairment.

Acknowledgments

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Supplementary Table 1
Comparison of Facility Characteristics and Unit Characteristics Between the Overall TREC Sample and the QoL Subsample

	TREC sample*		QoL Sample			P†
	n	%	n	%		
Facility characteristics						
Total number of facilities	19	100	9	100		NA
Location						
Calgary	11	59	2	22		.1145
Edmonton	8	42	7	78		
Size						
Large (>120 beds)	11	58	4	44		.7496
Medium (80−120 beds)	3	16	1	11		
Small (<80 beds)	5	26	4	44		
Owner-operator model						
For profit	5	26	3	33		1.0000
Not for profit	14	74	6	67		
COVID-19 outbreak within 2 weeks of QoL data collection	NA	NA	3	33		NA
No access to a geriatrician nor to a geriatric psychiatrist	0	0	1	11		.3214
Unit characteristics						
Total number of units	80	100	18	100		NA
Dementia care unit	27	34	2	11		.7122

	M	SD	Mdn	IQR	M	SD	Mdn	IQR	
Staffing									
Care aide hours per resident day	2.09	1.03	1.96	1.41; 2.46	1.83	0.70	2.29	1.13; 2.40	.3116
LPN hours per resident day	0.46	0.25	0.42	0.36; 0.56	0.50	0.16	0.45	0.42; 0.54	.5184
RN hours per resident day	0.41	0.29	0.39	0.30; 0.44	0.40	0.08	0.39	0.33; 0.45	.8854
Total care hours per resident day	2.96	1.28	2.74	2.14; 3.23	2.73	0.81	3.11	1.88; 3.45	.4681
Percent care aide hours	69.72	7.93	71.43	63.41; 76.83	65.32	9.50	65.84	58.82; 73.17	**.0432**
Percent care aides who speak English as additional language	72.48	28.79	80.00	64.58; 100.00	76.38	23.94	81.67	65.00; 100.00	.5945
Care aide burnout									
Proportion of care aides with emotional exhaustion scores >3.00	41.06	27.27	37.50	24.04; 56.35	46.93	16.38	40.00	35.00; 60.00	.3831
Proportion of care aides with cynicism scores >2.33	47.93	27.08	50.00	30.63; 66.67	46.00	17.38	41.43	36.36; 53.85	.7735
Proportion of care aides with efficacy scores <3.30	5.52	10.78	0.00	0.00; 10.26	3.74	5.69	0.00	0.00; 5.00	.4996

LPN, licensed practical nurse; NA, not applicable; RN, registered nurse; TREC, Translating Research in Elder Care.

*TREC sample minus those facilities and care units included in the QoL sample.

†P values are based on Fisher's exact tests (categorical variables) or t tests for 2 independent samples (continuous variables).

Supplementary Table 2
Comparison of Resident Characteristics Between the Overall TREC Sample and the QoL Subsample

	TREC sample*		QoL Sample		P†
	n	%	n	%	
Total number of residents	820	100	689	100	
Age category, y					
<65	32	3.9	17	2.5	**<.0001**
65 to <75	102	12.4	67	9.7	
75 to <85	284	34.6	186	27.0	
85 to <95	346	42.2	320	46.4	
95+	56	6.8	99	14.4	
Sex					
Female	586	71.5	502	72.9	.5648
Male	234	28.5	187	27.1	
Marital status					
Married	232	28.3	188	27.3	.9094
Widowed	426	52.0	362	52.5	
Never married, separated, divorced, unknown	162	19.8	139	20.2	
Race/ethnicity					
White	NA	NA	578	83.9	NA
Other than White	NA	NA	111	16.1	
Moderate-severe physical impairment					
No	218	26.59	198	28.7	.3554
Yes	602	73.41	491	71.3	
Physical decline in past 90 days					
No	651	79.39	597	86.7	**.0002**
Yes	169	20.61	92	13.4	
Moderate-severe cognitive impairment					
No	498	60.73	440	63.9	.2206
Yes	322	39.27	249	36.1	
Cognitive decline in past 90 days					
No	719	87.68	628	91.2	**.0366**
Yes	101	12.32	61	8.9	
Responsive behaviors					
No	667	81.34	552	80.1	.5556
Yes	153	18.66	137	19.9	
Depressive symptoms					
No	627	76.46	503	73.0	.1363
Yes	193	23.54	186	27.0	
Unstable condition, end-stage disease					
No	599	73.05	556	80.7	**.0005**
Yes	221	26.95	133	19.3	
Low social engagement					
No	673	82.07	600	87.1	**.0084**
Yes	147	17.93	89	12.9	
Daily or excruciating pain					
No	763	93.05	650	94.3	.3411
Yes	57	6.95	39	5.7	
Dehydration					
No	814	99.27	686	99.6	.5213
Yes	6	0.73	3	0.4	
Edema					
No	720	87.80	620	90.0	.1904
Yes	100	12.20	69	10.0	
Shortness of breath					
No	774	94.39	653	94.8	.8199
Yes	46	5.61	36	5.2	
Vomiting					
No	807	98.41	684	99.3	.1555
Yes	13	1.59	5	0.7	
Weight loss					
No	761	92.81	636	92.3	.7676
Yes	59	7.20	53	7.7	
Living on a care unit with the following characteristics:					
Dementia care unit					
No	739	90.12	613	89.0	.4986
Yes	81	9.88	76	11.0	
Low staffing (≤25th pctl.)					
No	615	75.00	530	76.9	.3981
Yes	205	25.00	159	23.1	
High proportion of care aide hours (≥75th pctl.)					
No	464	56.59	155	22.5	**<.0001**
Yes	356	43.41	534	77.5	
High proportion (≥75th pctl.) of care aides speaking English as a second language					
No	540	65.85	464	67.3	.5474
Yes	280	34.15	225	32.7	

(*continued on next page*)

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Supplementary Table 2 (*continued*)

	TREC sample*		QoL Sample		P†
	n	%	n	%	
High proportion (≥75th pctl.) of care aides with critical emotional exhaustion scores (>3.00)					
No	586	71.46	510	74.0	.2714
Yes	234	28.54	179	26.0	
High proportion (≥75th pctl.) of care aides with critical cynicism scores (>2.33)					
No	687	83.78	601	87.2	.0675
Yes	133	16.22	88	12.8	
High proportion (≥75th pctl.) of care aides with critical efficacy scores (<3.30)					
No	525	64.02	417	60.5	.1657
Yes	295	35.98	272	39.5	
Living in a care facility with the following characteristics:					
COVID-19 outbreak within 2 weeks of the data collection					
No	NA	NA	496	72.0	NA
Yes	NA	NA	193	28.0	
Access to a geriatrician or a geriatric psychiatrist					
No (to neither)	0	0.00	107	15.5	**<.0001**
Yes (to either)	820	100.00	582	84.5	
Located in					
Calgary	232	28.29	186	27.0	.6034
Edmonton	588	71.71	503	73.0	
Size					
Large (>120 beds)	509	62.07	446	64.7	**<.0001**
Medium (80−120 beds)	210	25.61	55	8.0	
Small (<80 beds)	101	12.32	188	27.3	
For-profit owner-operator model					
No	612	74.63	500	72.6	.3789
Yes	208	25.37	189	27.4	

NA, not applicable; TREC, Translating Research in Elder Care.

 *TREC sample minus those residents included in the QoL sample.

 †P values are based on Fisher's exact tests (categorical variables) or *t* tests for 2 independent samples (continuous variables).

Supplementary Table 3
Comparison of DEMQOL-CH Raw and Transformed Scores by Resident Characteristics

	N	%	DEMQOL-CH Raw Score			DEMQOL-CH Transformed Score		
			M	SD	P*	M	SD	P*
Age category, y			92.42	16.66	—	3.09	0.58	—
<65	17	2.5	98.35	14.57	.0732	2.84	0.71	**.0219**
65 to <75	67	9.7	94.01	16.39		3.02	0.63	
75 to <85	186	27.0	94.44	16.66		3.01	0.61	
85 to <95	320	46.4	91.14	16.90		3.14	0.56	
95+	99	14.4	90.64	15.95		3.17	0.53	
Sex								
Female	502	72.9	92.14	16.74	.4802	3.10	0.58	.4467
Male	187	27.1	93.15	16.44		3.06	0.60	
Marital status								
Married	188	27.3	91.64	17.02	.0939	3.11	0.60	**.0293**
Widowed	362	52.5	91.76	16.54		3.12	0.54	
Never married, separated, divorced, unknown	139	20.2	95.16	16.29		2.97	0.65	
Race/ethnicity								
White	578	83.9	92.80	16.70	.1634	3.07	0.60	**.0860**
Other than White	111	16.1	90.40	16.33		3.18	0.52	
Moderate-severe physical impairment								
No	198	28.7	90.47	17.15	**.0521**	3.16	0.57	**.0492**
Yes	491	71.3	93.20	16.41		3.06	0.59	
Physical decline in past 90 days								
No	597	86.7	92.54	16.60	.6277	3.09	0.58	.7011
Yes	92	13.4	91.63	17.06		3.11	0.60	
Moderate-severe cognitive impairment								
No	440	63.9	90.08	17.16	**<.0001**	3.17	0.59	**<.0001**
Yes	249	36.1	96.55	14.88		2.96	0.55	
Cognitive decline in past 90 days								
No	628	91.2	92.74	16.67	.1016	3.08	0.59	**.0684**
Yes	61	8.9	89.08	16.24		3.22	0.52	
Responsive behaviors								
No	552	80.1	93.16	16.68	**.0187**	3.06	0.59	**.0121**
Yes	137	19.9	89.42	16.30		3.20	0.55	
Depressive symptoms								
No	503	73.0	94.39	16.21	**<.0001**	3.02	0.59	**<.0001**
Yes	186	27.0	87.08	16.72		3.28	0.54	
Unstable condition, end-stage disease								
No	556	80.7	93.21	16.48	**.0099**	3.06	0.58	**.0166**
Yes	133	19.3	89.08	17.05		3.20	0.59	
Low social engagement								
No	600	87.1	91.63	16.71	**.0013**	3.12	0.58	**.0008**
Yes	89	12.9	97.69	15.39		2.90	0.60	
Daily or excruciating pain								
No	650	94.3	92.26	16.82	.3333	3.09	0.59	.4330
Yes	39	5.7	94.92	13.58		3.02	0.56	
Dehydration								
No	686	99.6	92.44	16.67	.6210	3.09	0.59	.5392
Yes	3	0.4	87.67	15.50		3.30	0.48	
Edema								
No	620	90.0	92.63	16.59	.3053	3.08	0.59	.3232
Yes	69	10.0	90.46	17.28		3.16	0.58	
Shortness of breath								
No	653	94.8	92.59	16.64	.2377	3.08	0.58	.3436
Yes	36	5.2	89.22	16.79		3.18	0.65	
Vomiting								
No	684	99.3	92.34	16.69	**.0006**	3.09	0.59	**.0071**
Yes	5	0.7	102.40	3.05		2.82	0.13	
Weight loss								
No	636	92.3	92.75	16.63	.0637	3.08	0.59	.0681
Yes	53	7.7	88.34	16.59		3.23	0.57	
Living on a care unit with the following characteristics:								
Dementia care unit								
No	613	89.0	93.28	16.22	**<.0001**	3.06	0.58	**.0003**
Yes	76	11.0	85.43	18.54		3.32	0.56	
Low staffing (≤25th pctl.)								
No	530	76.9	91.83	16.78	.0903	3.11	0.59	.1441
Yes	159	23.1	94.38	16.13		3.03	0.56	
Low skill mix (high proportion of care aide hours; ≥75th pctl.)								
No	155	22.5	94.26	16.77	.1177	3.01	0.64	**.0647**
Yes	534	77.5	91.88	16.60		3.11	0.57	
High proportion (≥75th pctl.) of care aides speaking English as a second language								
No	464	67.3	93.20	16.38	.0739	3.07	0.56	.2325
Yes	225	32.7	90.79	17.13		3.13	0.64	

Supplementary Table 3 (*continued*)

	N	%	DEMQOL-CH Raw Score			DEMQOL-CH Transformed Score		
			M	SD	P*	M	SD	P*
High proportion (≥75th pctl.) of care aides with critical emotional exhaustion scores (>3.00)								
No	510	74.0	93.30	17.04	**.0190**	3.05	0.61	**.0009**
Yes	179	26.0	89.91	15.28		3.20	0.49	
High proportion (≥75th pctl.) of care aides with critical cynicism scores (>2.33)								
No	601	87.2	92.55	16.67	.5861	3.08	0.59	.3840
Yes	88	12.8	91.51	16.64		3.14	0.51	
High proportion (≥75th pctl.) of care aides with critical efficacy scores (<3.30)								
No	417	60.5	92.89	16.60	.3572	3.07	0.60	.2893
Yes	272	39.5	91.69	16.75		3.12	0.57	
Living in a care facility with the following characteristics:								
COVID-19 outbreak within 2 weeks of the data collection								
No	496	72.0	92.20	16.52	.5865	3.09	0.59	.7187
Yes	193	28.0	92.97	17.03		3.08	0.56	
Access to a geriatrician or a geriatric psychiatrist								
No (to neither)	107	15.5	88.34	16.70	**.0058**	3.24	0.53	**.0037**
Yes (to either)	582	84.5	93.16	16.55		3.06	0.59	
Located in								
Calgary	186	27.0	90.13	16.98	**.0284**	3.17	0.57	**.0252**
Edmonton	503	73.0	93.26	16.47		3.06	0.59	
Size								
Large (>120 beds)	446	64.7	92.35	16.69	.8927	3.09	0.57	.9518
Medium (80–120 beds)	55	8.0	93.44	14.32		3.09	0.49	
Small (<80 beds)	188	27.3	92.27	17.28		3.08	0.63	
For-profit owner-operator model								
No	500	72.6	91.70	17.05	**.0660**	3.11	0.60	.1270
Yes	189	27.4	94.31	15.44		3.03	0.55	

*P values are based on *t* tests for 2 independent samples for variables with 2 categories or on analysis of variance for variables with more than 2 categories.