Research Article **IJOAR (2022) 5:97**

International Journal of Aging Research
(ISSN:2637-3742)

Lifestyle Behaviors of Older Adults in Independent Living during COVID-19

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ABSTRACT

A cross-sectional survey of older adults in independent living sought to find the impacts of the COVID-19 pandemic on their physical activity, socialization, and nutrition. A sample of 115 consenting adults ages 60 and older living in independent senior neighborhoods completed a lifestyle behavior survey during the height of the pandemic. The survey probed self-reported changes in the respondent's physical activity, socialization, and nutrition. Chi-square (X^2) goodness of fit tests of sample demographics suggests the results were representative of the local population of seniors in independent living environments. Point-biserial correlations produced significant changes in physical activity, socialization, and nutrition based on dwelling type and education level. Cross tabulations revealed significant relationships between physical activity and socialization to participant age and dwelling type. Overall, the project finds changes in physical activity, socialization, and nutrition that can help identify needed programs, initiatives, and resources to improve the resilience of seniors aging in place during pandemics and disasters.

Keywords: aged, coronavirus infections, pandemics, physical activity, socialization

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How to cite this article:
Heather J. Braden, Connor Goode, Kenneth Stewart. Lifestyle Behaviors of Older Adults in Independent Living during COVID-19. International Journal of Aging Research, 2022, 5:97.

eSciPub LLC, Houston, TX USA.
Website: https://escipub.com/

Introduction

The SARS-COV2 pandemic altered lifestyles across demographic groups when the World Health Organization declared it a global pandemic on March 11, 2020 [1]. After early and continuing reports showing that most mortalities attributable to SARS-COV2 concerned elderly individuals[2], seniors were among the most restricted groups under the protocols to mitigate the spread and prevent healthcare systems from being overwhelmed. At the onset of the pandemic, elder living facilities began to implement social distancing and quarantine protocols for residents. While social distancing and quarantine are well-established practices for preventing the spread of contagious diseases, the global scale of these protocols during this pandemic has been unprecedented [3,4].

Social distancing and quarantine practices have trade-offs. During the SARS-COV2 pandemic, studies have shown that such protocols have psychosocial effects such as increased anxiety, panic, stress, insomnia, and depression among individuals in all demographics[5,6]. The CDC advised living facilities that housed elderly citizens to limit visitation, cancel large social gatherings, and limit overall interaction to the bare minimum [7]. As the pandemic lingered, new research continued to shed light on the ramifications that follow these restrictions.

Physical Activity

Pre-SARS-COV2 pandemic literature established a correlation between social isolation, and reduced physical activity, as well as increased elder sedentary time [8,9]. This led to speculation that SARS-COV2 protocols further increased sedentary behavior and physical activity among the geriatric population. Ironically, exercise is known to yield a multifaceted response that enhances an individual's immune system. Just a single dose of high cardio exercise can mobilize over a billion lymphocytes that help prevent and address infection[9,10].

Although exercise does not directly prevent an individual from contracting SARS-COV2, physically active individuals are known to have less severe symptoms, shorter recovery times, and are less likely to transmit the infection to others[9-11]. Also, physically active seniors manifest better immune responses to both influenza and pneumococcal vaccines compared to their sedentary counterparts [12]. Overall, reports show a positive role of physical activity in preventing the spread of contagions, mitigating viral symptoms, and enhancing vaccine responses.

Socialization

Social distancing guidelines during the start of the SARS-COV2 pandemic recommended limits on face-to-face interaction. Residents in living facilities confined to their living spaces had restrictions on visitation and facility-run functions such as exercise classes, game nights, residential meetings, and religious services [6]. A primary reason for residents to transition into a living facility is the social dynamic that facilities provide. Elimination of these events and requiring residents to confine themselves can impair social support systems and create detrimental effects on mood, cognition, memory recall, and overall health. By extension, social distancing guidelines contribute to the diminution of healthy behaviors such as exercise [11,13].

The National Academy of Science said that social isolation could hasten premature death from all causes, with a mortality risk potentially on par, or even greater than, smoking and obesity [11]. The study of lifestyle behaviors of older adults in independent living looked to understand whether the pandemic limits on face-to-face interaction had a significant impact on perceived changes in healthy behaviors.

Nutrition

The pandemic brought stress, inflation, closed dining, food shortages, increased isolation, and other factors that can negatively affect an individual’s nutrition levels [5,14]. Sudden nutrition alterations change cortisol levels, the primary

stress hormone that can further facilitate poor dietary habits [15]. Social distancing during dining was most prevalent in the geriatric population as living facilities restricted dining with groups[6]. Furthermore, studies show that seniors who eat meals alone exhibit a decrease in quality and quantity of food intake and an increased likelihood of depression[16]. Ironically, the negative effect of malnourishment on the immune system makes the geriatric population susceptible to SARS-COV2 infection [17-18].

Along with its inquiries into physical activity and socialization, the study of senior lifestyles probed the perceived alterations of nutrition among residents of independent living facilities during the peak of the social distancing guidelines. By uncovering significant changes in these factors, the study can help medical professionals better understand the impact of pandemic public health guidelines. The researchers hypothesized that the COVID-19 pandemic negatively changed the physical, social, and nutritional aspects of lifestyle behavior. Thus, a need for applicable programs for seniors to regain and keep healthy lifestyle behaviors while aging in place.

Materials, Methods and Analysis

A cross-sectional survey of older adults in independent living sought to show the impacts of the COVID-19 pandemic on their physical activity, socialization, and nutrition. The target population required sampling of persons aged 60 years or older who lived in the same independent senior living neighborhood before the onset of the COVID-19 pandemic in February 2020, who were cognitively able to answer the questions on the survey tool verbally or on paper, and who agreed to take part in the study. Respondents received auditory and visual accommodations as needed.

A sample of 115 consenting adults ages 60 and older living in independent senior neighborhoods in the Concho Valley of West Texas volunteered to complete an adapted Lifestyle Related Behavior Questionnaire[19] between May and November of 2020. The sample included 39 (33.9%) participants from Christian Village independent senior living and 76 (66.1%) from Baptist Memorials independent senior living. Table 1 describes the age, gender, race/ethnicity, education, dwelling type, and facility of residence of the participants.

Table 1
Sample Demographics

Age	Number	Percent	Education	Number	Percent
60-80	53	46.9%	None	2	1.9%
81-98	60	53.1%	High School	28	26.2%
Total	113	100.0%	Some College	38	35.5%
Average	80.9		College	39	36.5%
Gender	Number	Percent	Total	107	100.0%
Female	78	68.4%	Dwelling Type	Number	Percent
Male	36	31.6%	Home	62	53.9%
Total	114	100.0%	Apartment	53	46.1%
Race/Ethnicity	Number	Percent	Total	115	100.0%
White	101	92.7%	Facility	Number	Percent
Latinx	5	4.6%	Baptist Memorial	76	66.1%
Asian or Pacific Islander	1	0.9%	Christian Village	39	33.9%
Native American	2	1.8%	Total	115	100.0%
Total	109	100.0%	Average Years at Facility	6.6	

Researchers from the Department of Physical Therapy at Angelo State University adapted the Lifestyle Related Behavior Questionnaire to the local context of the SARS-COV2 pandemic when the senior living neighborhoods were implementing social distancing protocols. Accordingly, some participants completed virtual phone call interviews, while others filled out paper and pencil survey forms. Assistance of a neighborhood representative who collaborated with the research team to help participants who were visually impaired or not literate. The Institutional Review Board (IRB) of Angelo State University reviewed and approved the study plan in the spring of 2020.

The researchers collected, preserved, and analyzed the data in compliance with standard privacy guidelines. Paper surveys were coded for confidentiality and locked in a file cabinet for three years per Angelo State's IRB guidelines. All participant volunteers gave informed consent after learning about the aim of the study and the storage and use of data.

The survey probed self-reported changes in physical activity, socialization, and nutrition at the height of the pandemic. The Appendix contains the Lifestyle Related Behavior Survey as adapted with permission to address the study's specific aims of physical activity, socialization, and nutrition. In addition to the demographic data described in Table 1, the survey used a 5-point Likert scale from significantly decreased to significantly increased response options to collect data on the physical activity, socialization, and nutrition behavior of respondents.

The research team used the Statistical Package for the Social Sciences (SPSS) 18.0 software (Chicago, IL, USA) to analyze the data. Researchers digitally recorded completed surveys in a passcode-protected spreadsheet and double-checked for accuracy.

Results

The researchers employed point-biserial correlations to analyze changes in physical activity, socialization, and nutrition based on dwelling type and high school vs. some college-level or more education. Further analysis collapsed the 5-point Likert scale results to enable 2x2 cross-tabulation comparisons between participants who reported decreased vs. same or increased levels of physical activity and socialization based on age and dwelling type. Details of the results are below.

Physical Activity

The single sample goodness of fit tests in Table 2 indicates that senior participants in the study perceived statistically significant changes in their physical activity at the height of the quarantine restrictions during the pandemic. Indeed, 50 or 45.5% of 110 respondents reported slight or significant decreases in their aerobic exercise activity, and 55 or 50.0% said that their exercise program had declined slightly or significantly. Additionally, just 15 or 13.4% of 112 seniors perceived that their sitting and screen time decreased during the pandemic protocols.

Table 2
Single Sample Chi-Square (X^2) Goodness of Fit Test Results

Physical Activity Items	Responses	X^2	DF	p =
Aerobic exercise/walking	110	62.8	4	0.0001
Exercise program	110	67.4	4	0.0001
Sitting and screen time	112	54.7	4	0.0001
Socialization Items	Responses	X^2	DF	p =
Neighborhood activities	98	24.3	3	0.0001
Stress/ anxiety levels	112	116.5	4	0.0001
Face-to-face communication	110	46.6	4	0.0001
Nutrition Item	Responses	X^2	DF	p =
Eating/drinking unhealthy food or meals	113	152.1	4	0.0001

More analyses revealed statistically significant relationships between these changes based on the age, dwelling type, and education of respondents. One analysis used a strategy of grouping respondents into age categories below and above the average age and collapsing the 5-point Likert scaled answers to the physical activity questions into a group of participants who indicated slight or significant decreases and a second group saying the same or increased levels of physical activity. This procedure enabled the researchers to employ chi-square tests of statistical significance to 2x2 crosstabulation tables of age by the change in the respondent's aerobic exercise and exercise program. Table 3 reports the results.

The panel on the left side of Table 3 shows that 30 or 57.7% of 52 seniors aged 60-80 reported that their aerobic exercise activity decreased with the restrictions of the pandemic. Comparatively, just 19 or 33.9% of 56 seniors aged 81-98 reported a decrease. Similarly, the panel on the right side of Table 3 shows that 60.4% of 60–80-year-old respondents versus just 40.0% of 81-98-year-old seniors experienced decreases in their exercise program. The age-based differences for both the aerobic exercise and exercise program tests produced statistically significant p values at 0.0132 and 0.0342 respectively.

Table 3
Chi-Square Tests on Physical Activity Items

Aerobic exercise/walking				Exercise program			
	Ages 60-80	Ages 81-98	Total		Ages 60-80	Ages 81-98	Total
Decrease	30	19	49	Decrease	32	22	54
	57.7%	33.9%	45.4%		60.4%	40.0%	50.0%
Same or Increase	22	37	59	Same or Increase	21	33	54
	42.3%	66.1%	54.6%		39.6%	60.0%	50.0%
Total	52	56	108	Total	53	55	108
	Value	DF	p =		Value	DF	p =
Chi-square	6.1	1	0.0132	Chi-square	4.5	1	0.0342

Grouping the data into a 2x2 crosstabulation format provides the advantage of facilitating the computation of odds ratios as presented in Table 4. According to self-reported experiences, the odds of younger seniors under 80 years old reducing aerobic exercise activity during the pandemic were about 2.7 times higher compared to older seniors over age 80. Similarly, the chances of the younger group curtailing their exercise program were about 2.3 times higher.

Table 4
Odds Ratio Results on Physical Activity Older v Younger Seniors

Questionnaire Item	Odds Ratio	Standard Error	95% Confidence Interval	
			Lower	Upper
Aerobic exercise/walking	2.7	0.398	1.217	5.794
Exercise program	2.3	0.393	1.058	4.94

Applying a point-biserial correlation strategy to the data also revealed statistically significant associations of sitting and screen time activity to dwelling type and education level (see Table 5). The first point-biserial process compares the distribution of 5-point Likert scaled responses of

seniors living in single-family home dwellings to those living in apartments.

The comparison revealed a higher mean (3.58) and smaller standard deviation (0.86) in the Likert scale responses of home dwellers compared to apartment residents (mean =3.18; standard deviation = 1.16). The t-test confirms that these differences between the two distributions are statistically significant (p = 0.0377), and the correlation coefficient (-0.197) indicates a modest tendency for more apartments than home dwellers to report a decrease in sitting and screen time at the height of the pandemic restrictions.

Another point-biserial procedure uncovered a lower mean (3.04) and smaller standard deviation (0.84) in the scaled answers on sitting and screen time from seniors with a high school or less education. Again, the t-test confirmed a statistically significant difference (p = 0.0181) in the scaled distribution of answers from respondents with a high school or less education compared to those with some college or more education. The correlation coefficient (0.231) indicates a moderate tendency for more high school or less educated seniors to report a decrease in sitting and screen time during the pandemic.

Table 5

Point-Biserial Correlations on Physical Activity

Dwelling Type by Sitting and Screen time			
	Home	Apartment	Total
Mean	3.58	3.18	3.40
Standard Deviation	0.86	1.16	1.02
Sample Size	62	50	112
t-Test	-2.103	p =	0.0377
Correlation Coefficient	-0.197		
Education Level by Sitting and Screen time			
	High School or Less	Some College or More	Total
Mean	3.04	3.57	3.42
Standard Deviation	0.84	1.05	1.02
Sample Size	28	76	104
t-Test	2.402	p =	0.0181
Correlation Coefficient	0.231		

Socialization

The point-biserial strategy also uncovered two correlations related to changes in stress and anxiety during the pandemic (Table 6). One connects change in stress and anxiety to dwelling type, and the other relates it to education level.

Seniors living in single-family homes reported a higher average change in stress and anxiety (3.42) on the 5-point Likert scale compared to apartment dwellers (3.02). Dispersion of responses from the mean was nearly equal in each group with standard deviations of 0.83 and 0.78 respectively. The difference in means t-test (-2.6007) was statically significant (p = 0.0106), and the negative correlation coefficient (-0.2407) indicates a moderate tendency toward more increase in self-reported stress and anxiety among home dwellers at the height of pandemic restrictions. Similarly, the t-test of difference in the average change in stress in anxiety reported by seniors with a high school or less education

(2.97) and those with some college or more education (3.36) reached statistical significance (p = .032), and the point-biserial correlation coefficient of 0.2095 indicates a modest trend toward a greater increase of stress and anxiety among seniors with some college or more education.

A third point-biserial result in Table 6 depicts a notably stronger relationship between dwelling type and change in face-to-face communication with neighbors or family members. In this case, the difference of means t-Test between home (2.23) and apartment (2.96) dwellers was significant at 0.0004. The correlation coefficient of 0.3341 indicates a somewhat strong tendency for apartment dwellers to report more face-to-face encounters with friends and family during the pandemic.

Since a strategy of grouping the data into a 2x2 crosstabulation format also produced a statistically significant chi-square test (p = 0.001), it was possible to calculate a valid odds ratio reflecting the relationship between dwelling type and face-to-face communication. This strategy revealed that 76.0% of apartments compared to 45.0% of home dwellers reported the same or increased levels of face-to-face contact at the height of the pandemic protocols. The odds were 3.87 times higher than apartment dwellers who had the same or increased levels of face-to-face socialization.

Table 6
Point-Biserial Correlations on Socialization

Dwelling Type by Stress and Anxiety			
	Home	Apartment	Total
Mean	3.42	3.02	3.23
Standard Deviation	0.83	0.78	0.83
Sample Size	60	52	112
t Test	-2.6007	p =	0.0106
Correlation Coefficient	-0.2407		
Education Level by Stress and Anxiety			
	High School or Less	Some College or More	Total
Mean	2.97	3.36	3.25
Standard Deviation	0.76	0.86	0.85
Sample Size	30	75	105
t Test	2.174	p =	0.032
Correlation Coefficient	0.2095		
Dwelling Type by Face-to-Face Communication			
	Home	Apartment	Total
Mean	2.23	2.96	2.56
Standard Deviation	1.05	1.01	1.10
Sample Size	60	50	110
t Test	3.6831	p =	0.0004
Correlation Coefficient	0.3341		

Nutrition

Finally, the point-biserial analytic strategy revealed a connection between dwelling type and nutrition behavior (Table 7). When asked about changes in eating unhealthy food or meals, the average response of apartment residents was 3.45 on the 5-point Likert scale. This compared to a mean of 3.15 among single-family home dwellers. In this case, the t-test produced a significant result at 0.0251, and the

correlation of 0.2107 indicates a modest trend toward higher levels of unhealthy food consumption among seniors living in apartments.

Table 7
Point-Biserial Correlation on Nutrition

Dwelling Type by Unhealthy Food or Meals			
	Home	Apartment	Total
Mean	3.15	3.45	3.28
Standard Deviation	0.51	0.90	0.73
Sample Size	62	51	113
t Test	2.2711	p =	0.0251
Correlation Coefficient	0.2107		

Discussion

The goodness of fit results for the seven questions used to generate data on healthy lifestyles among older adults in independent living show significant self-perceived behavior changes during the pandemic. These findings support the hypothesis that changes in physical activity, socialization, and nutrition occurred in the older adult populations during lockdowns. The results also followed the findings of comparable studies [20,21].

The findings inform living facilities for independent seniors that quarantine policies during pandemics or other disasters can alter aspects of the lifestyles of residents that are strongly correlated with their overall health and well-being. The results also give policymakers reason to reconsider how they implement future quarantine guidelines while mitigating potential adverse effects of disasters affecting seniors in independent living facilities.

Although the results are critical to defining the next logical step in assisting older adults to age in place, they do not precisely determine the magnitude of the impact of lockdown or quarantine policies on the overall health and wellbeing of this population. Since the study relies on self-reported perceptions of changes, it did not directly measure the impact. Future studies can improve on the findings by utilizing more direct measurements of changes in physical activity, socialization, and nutrition associated with various disaster mitigation public health policies.

Physical Activity

The results reported in Table 2 demonstrate a significant change in the self-perceived daily aerobic exercise, exercise programs, and screen time of senior participants. Furthermore, the significant difference between age groups seems to be a somewhat novel finding not seen in comparable studies. Knowledge of the differential impact of lockdowns on younger and older seniors can better prepare healthcare professionals to address the potential ramifications of policy protocols on independent living seniors. Future studies can seek a more refined understanding of the causal factors leading to age-based differences. Perhaps older residents place greater value on doing physical activity than their younger peers. On the other hand, it may be older residents do not normally engage in as much physical activity as their younger peers, and therefore do not experience reduced levels of activity under quarantine restrictions.

The findings also revealed a significant association relating type of dwelling and education level to sitting and screen time activity. As reported in Table 5, non-college-educated residents and apartment-dwelling residents demonstrated modest tendencies to decrease screen time and sedentary behavior compared to their college-educated and house-dwelling peers during the pandemic. Studies could further explore this finding by looking for similar trends using more refined measurements to directly

monitor physical activity and screen during peak times pandemics or other disasters.

Socialization

The results in Table 6 demonstrated a difference in self-perceived stress and anxiety levels among residents with differing education levels and types of dwelling. House-dwelling seniors significantly more likely to report increased stress and anxiety compared to their apartment-dwelling peers. Similarly, college-educated seniors were significantly more likely to report changes toward more stress and anxiety compared to their non-college-educated peers. Future research can explore additional lifestyle behaviors, such as use of social media or media consumption, which may be correlated with increases in self-perceived stress among seniors during quarantines or lockdowns.

A strong relationship was recorded between dwelling type and self-reported face-to-face communication. Apartment-dwelling seniors participating in our study were more likely than house dwellers to say they kept the same or had increased levels of face-to-face interaction during the height of the pandemic. Overall, the correlations between house-dwelling and self-reported increases in perceived sedentary time, anxiety, and stress levels, and decreased face-to-face interactions can aid independent living facilities in identifying negatively impacted residents during quarantines and lockdowns in pandemics or other disasters. Future research can improve on these findings by adding refined measures of dwelling types and increasing the number of independent living facilities and members of the senior population observed under restrictive public health policies.

Nutrition

Apartment dwelling residents were significantly more likely to report eating and drinking unhealthy foods/meals compared to house dwelling residents in this study. The data suggest that apartment compared to house dwelling residents were affected more by the dining changes under quarantine protocols. Living facilities can appreciate that the type of dwelling can play a role in affecting healthy nutrition consumption levels, and facility resources could be implemented to mitigate potential negative effects. Future research can explore different methods of providing meals to residents during quarantine or lockdowns protocols to evaluate the potentials for mitigating adverse effects on nutrition and health.

Limitations

This study suggests improvements in the ability of geriatric facilities and health providers to identify services that older adults may be lacking to support their physical and social activities and nutritional behavior under restrictive public health policies during pandemics or disasters. Some helpful solutions may be found in methods to deliver services using portable exercise equipment, streaming activity programs, nutrition counseling, and healthy meal planning via video connectedness. Senior living facilities and families can cooperatively implement new services and programs to assist the vulnerable geriatric population.

Still, it is important to recognize the important limitations of the study. Since data was collected from two West Texas senior living neighborhoods that were willing to participate, the generalizability of findings to other independent senior living populations is limited.

In addition, females were over-sample and people of color were under-sampled in the data collection. These are typical sampling challenges to be assessed against the facts showing that both males and people of color are underrepresented in independent living populations across the nation. Likewise, seniors who achieved only a high school or less education are also known to be underrepresent in independent living facilities and were under-sampled in this study.

In addition to implementing more refined measurements as previously noted, future studies may focus on over-sampling underrepresented groups in independent living

geriatric populations. Future studies can also investigate and assess interventions designed to support physical activity, socialization, and healthy nutrition under public health restrictions in all environments where seniors may be aging in place.

Acknowledgements

We thank the activity directors of the senior living neighborhoods for their assistance.

Declaration of financial and non-financial conflicts of interest

The authors declare no conflicts of interest. The research received an internal enhancement grant from Angelo State University (grant # 0010-45175) to assist in the costs of conducting the research study.

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Appendix: The Adapted Lifestyle Related Behavior Questionnaire

Initials:
Gender: 1 Male 2 Female Age: _____
Circle where you live: High Rise Patio Home other: _____
Years in your current location: _____

Race: 1 White 2 Hispanic/Latino 3 Asian/Pacific Islander 4 Native American/Indian 5 Black 6 Other
Education: 1 no formal education 2 high school degree 3 some college 4 college degree
Do you have a phone? Yes No
Do you have a tablet, ipad, laptop, or computer of any kind? Yes No

For each of the following questions, circle the number that best describes you.

Physical Activity

1. At the HEIGHT of quarantine, how did your participation in daily aerobic exercise, such as walking, change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

2. At the HEIGHT of quarantine, how did your exercise plan/program change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

3. At the HEIGHT of quarantine, how did your sitting and screen time change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

Socialization

4. At the HEIGHT of quarantine, how did your building's activities change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

5. At the HEIGHT of quarantine, how did your stress and anxiety levels change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

6. At the HEIGHT of quarantine, how did talking to a neighbor or family member face-to-face change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

Nutrition

7. At the HEIGHT of quarantine, how did your eating or drinking of unhealthy food/meals change?
   (1) Significantly decreased (2) Slightly decreased (3) Stayed the Same (4) Slightly increased (5) Significantly increased

Form adapted from Lifestyle Related Behavior Questionnaire (Kumari et al, 2020)