A Proactive Behavioral Activities Program (EWA) and the Influence of COVID-19 among Seniors in Congregate Living Communities

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Abstract
Older adults in affordable housing are at risk for mental health problems, physical vulnerability, and isolation. We examine the role of an activities program in buffering the influence of life stressors on the mental health of seniors in congregate housing, using a non-experimental pretest–posttest study design. Results based upon repeated measures analyses (N = 29), found statistically significant (p < .05) program by time effects for depression, coping strategies, positive affect, isolation, and resident satisfaction. Analyses based upon independent samples of pretest and posttest measures (N = 60) were considerably less strong, but consistent in yielding similar patterns to those of the longitudinally gathered data. Our longitudinal findings substantiate the positive impact of the Engage with Age program in supporting older adults living in congregate housing. Researchers need to develop strategies to assess and support the mental health of older persons in low-income urban congregate living in the larger context of COVID-19.

Keywords
COVID-19, mental health, African Americans

Introduction

The number of older adults receiving federal housing program assistance has been increasing during the past decade, ranging from 25% to 50% (Collinson et al., 2019). Older adults in affordable housing receive federal assistance to lower their rent and utilities using programs such as public housing, privately owned project section 8 assistance, or tenant-based vouchers for housing tax credit. Research findings indicate that those older adults in affordable housing are at risk for mental illness problems, physical and medical vulnerability, loneliness and social isolation (Gonyea, et al., 2018; Taylor et al., 2018; Treichler et al., 2020). Moreover, the prevalence of mental health problems among seniors in housing programs is higher among racial and ethnic minorities, in particular for African Americans and Latinos. (Gonyea et al., 2018; Jang et al., 2010; Robison et al., 2009). Since the demand for low-income housing for older persons will continue to rise with the aging of the population, it is important to identify the mental health and supportive needs among older adults in urban housing where most low-income minority reside.

Moreover, it is important to examine correlates of stress, depression, vulnerabilities, loneliness and well-being, and identify factors that moderate the negative influence of social determinants of health on the older adults' ability to successfully age in place. A deeper understanding of "aging in place" for residents in congregate housing is timely, given the recent impacts of the COVID-19 outbreak which has necessitated social distance practices, thus limiting personal interactions and restricting access to health services.

Conceptual Framework

Successful development across the lifespan entails the avoidance of disease and disability, the maintenance of high physical and cognitive functioning, and sustained engagement in social and productive activities (Rowe & Kahn, 1998). Using a biopsychosocial comprehensive stress model, the Preventive and Corrective Proactivity (PCP) model of successful aging developed by Kahana and colleagues emphasizes the role of proactive behavioral adaptations available to older

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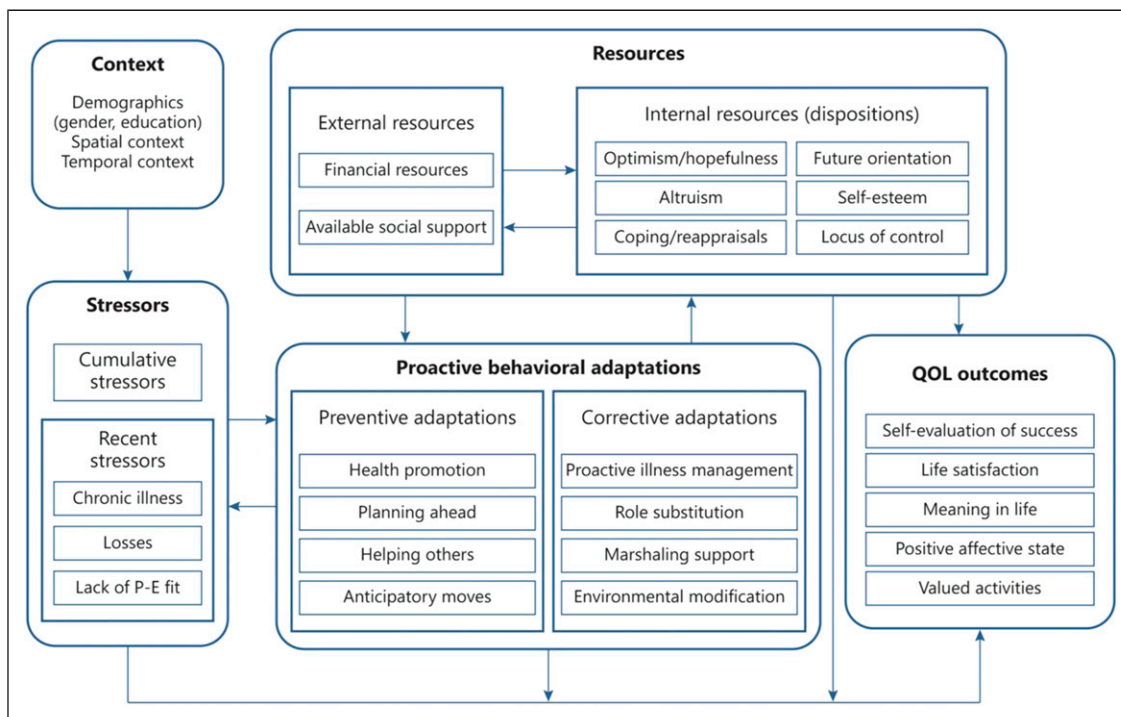Email: jmontoro@uncc.edu

Figure 1. Successful aging: A comprehensive PCP model. P-E = person-environment. Kahana et al., 2014.

adults to preserve their quality of life. (Kahana et al., 2014). The PCP model proposes that proactive adaptations are effective strategies to improve resilience and well-being in old age (see Figure 1). Numerous research studies indicate that proactive strategies help people with chronic conditions and disability to cope with health challenges (Kahana et al., 2014). Research evidence also confirms the significant role of proactive help-seeking strategies to manage health and quality of life among older adults. The PCP model incorporates the roles of external and internal resources in reducing adverse stress effects that otherwise undermine quality of life among older persons. It also emphasizes the buffering moderating roles of proactive behaviors to maintain quality of life, while recognizing the roles of spatial and temporal influences in components of the model (Kahana et al., 2014). This pilot study examines the buffering role of a behavioral program on psychosocial outcomes of older adults at congregate housing in Charlotte, North Carolina.

Intervention Programs, Health and Quality of Life for Adults in Affordable Housing

Drawing on the life-course and environmental perspectives, researchers have recognized that the living environment, that is, the physical and social context among low-income adults, significantly influences their ability to age well (Wahl et al., 2012). Recent work suggests that older adults living in congregate housing (independent living, assisted living, co-housing) report higher levels of "thriving" than those

"aging in place" in the community, despite experiencing lessened functional independence and self-rated health (Corneliusson et al., 2020). Some features of congregated senior housing contribute to positive effects on the well-being of these residents as they may experience increased social interaction, participation, activities, safer environment, and access to supportive services than adults aging at home (Litwin & Stoeckel, 2014; Taube et al., 2014). Results from an innovative pragmatic trial of a group intervention in senior housing communities to increase resilience and associated positive outcomes showed no changes in physical and mental well-being (Treichler et al., 2020). However, when compared to the initial control period, resilience improved among participants from pre-intervention to 3-month follow-up, and perceived stress and wisdom improved from pre to post-intervention (Treichler et al., 2020). The authors also observed significant improvements consistent with preventing declines in health and well-being even in the presence of a ceiling effect due to a highly resilient sample of participants ($N = 89$). These findings, though promising, lack an independent control condition against which to compare pre-post program changes.

Likewise, researchers using data from six waves of the Health and Retirement Study (HRS) analyzed developmental patterns of cognitive function over time among elders living alone and found a positive role of senior housing in groups of "life-course SES disadvantage" and "cognitive function and cumulative disadvantage" (Park et al., 2018). The association between the combinations of "old age SES disadvantage

only" or both "childhood and old age (unstable mobility)" suggested that declines in cognitive function may begin earlier in adulthood for older persons who are living alone. The strongest critical period effect regarding such decline was for the combination of "SES disadvantage in adulthood only." The Park et al. (2018) findings indicate that over time, the positive role of senior housing for the unstable and most vulnerable group persisted.

Researchers conducting a qualitative community-based participatory action research project in Western Canada also examined how to best use the shared amenity spaces in a low-income senior housing to connect services and programs with residents and engage them with providers and community leaders (Canham et al., 2018). These authors' collaborative planning method identified opportunities for enhancing social interaction and wellness programs to bring support, and address challenges to the delivery of such services. This action plan puts a focus on the effective use of social programming in the housing environment and the generation of ways to improve the social environment of apartment dwelling for low-income adults. Canham et al. (2018) reported that the experiential emphasis of their project allowed older adult residents to develop a sense of home, community, identity and belonging. Findings moreover reflected the identification of risks associated with isolation and loneliness for tenants, in part due to the physical and social environment. Overall, incorporating residents as active participants in the coordination and organization of services contributed to improve quality of life.

Engage with Age Behavioral Program

The main goal of Engage with Age (EWA) activities program is to improve the health and quality of life of senior residents in low-income affordable housing. Based on residents' feedback, program coordinators develop a proactive behavioral program to support residents to age well in place. The expected benefits for residents include the potential buffering of negative life stressors on their health and quality of life. The range of activities targeted physical, cognitive, socio-emotional health, and well-being needs. Activities include informational lectures, community social activities, exercising, or health education (see Table 1). Staff service coordinators in collaboration with health professionals synchronized the program implementation. Standard support included support from service coordinators who provide residents with information and acted as liaisons between community agencies, service providers, and residents via occasional transportation to off-site services, and coordination of services. However, regular services offered do not include consistent programming explicitly designed to target the health and well-being needs of residents. The EWA activities evaluated here provided residents with structured programming designed to address specifically physical, social, and cognitive well-being outcomes (Table 1).

Method

The goal of this pilot intervention study was to examine the role of a theoretically based proactive behavioral program in buffering the influence of life stressors on the health and well-being of low-income older adults in urban public housing. We also utilize a no-treatment (control) condition wherein participants did not receive stress-buffering instruction and training. The EWA program uses a variety of programs/ activities (see Table 1) aimed to improve mental and physical health, cognitive ability, and social interaction as well as reducing loneliness among residents at congregate communities. We screened and collected pre and post-intervention trend and panel data in both sites: Site 1 is the intervention site, and Site 2 the control site.

Sample and Procedure

Our study sample included 86 older adult residents across both public housing communities. There were 38 participants from Site 1, and 48 residents at Site 2. We obtained pretest and posttest longitudinal data for 29 participants, and 37 residents completed either the pretest or the posttest only. Sociodemographic profile data (see Table 2) indicates that residents were on average 70 years old ($SD = 6.9$) and predominantly female (73%, $n = 63$). Eighty-nine percent ($n = 77$) were African American, 6 were Caucasian, and three were Puerto-Rican. Participants had lived at the senior communities for an average of 6.9 years ($SD = 5.2$). Thirty-six percent ($n = 31$) did not graduate from high school, forty-percent ($n = 35$) reported having completed high school, and 20 (23%) reported having some college or technical school education. None of the sample was married, but instead were divorced/separated ($n = 41$, 48%) or widowed ($n = 19$, 22%). The majority were retired ($n = 65$, 76%). Participants reported having on average 2.9 children. Eighty-nine percent of the sample reported an annual family income under $15,000, while the remainder had annual incomes exceeding $15,000. About half of participants were worried/stressed about having enough money to buy nutritious meals. Differences across residents in sociodemographic characteristics (see Table 2) show that in comparison to the control site (Site 2), residents at the intervention site (Site 1) reported higher levels of education, income, and fewer years of residency ($p < .05$).

After receiving approval from the first author's university IRB committee, in collaboration with Charlotte Housing Authority and the staff and service coordinators of both Sites, we collected pretest data from participants in both communities. We delivered the EWA program at Site 1 in coordination with their staff. We informed participants about the study goals, confidentiality and voluntary participation. As this project began, in-person surveys (pre–COVID-19) and written consent were collected, and later we transitioned to phone interviews and verbal consent. At Site 1 (intervention), we engaged residents in focus groups to learn about their

Table 1. EWA Behavioral Activities Monthly Programming (SITE 1).

Programming per Month	Targeted Domain
Focus Groups with Residents at the Retreat	
February 2019	
Healthy Connections: Heart Health	Physical health
Keep the Beat	Physical health
The Five Love Languages	Socio-emotional
Valentine's Day Cookie Decorating	Socio-emotional
March 2019	
Fire Safety Lecture	Physical health
April 2019	
Better Sleep Bingo	Cognitive; physical health
May 2019	
4-week Bechtler Museum of Art Series	Cognitive; socio-emotional
Crime Prevention Lecture	Cognitive; physical health
June 2019	
Bagged Lunches for the Homeless	Socio-emotional
Alzheimer's Association Early Detection Lecture	Cognitive
Laughter is the Best Medicine Lecture	Physical health; socio-emotional
July 2019	
Fitness Equipment 101	Physical health
Healthy Living for Your Brain and Body Lecture	Cognitive; physical health
Healing Hands Trio	Socio-emotional
Myrtle Beach Day Trip	Socio-emotional
August 2019	
Summer social	Socio-emotional
September 2019	
Alzheimer's Association Effective Communication Strategies Lecture	Cognitive
Nutrition Label Reading Lecture	Cognitive; physical health
Be Tobacco Free Series	Physical health
October 2019	
4-week Bechtler Museum of Art Series	Cognitive; socio-emotional
Healing Hands Trio	Socio-emotional
November 2019	
Thanksgiving Dinner at Tyvola Senior Center	Socio-emotional
December 2019	
Healing Hands Trio	Socio-emotional
February 2020	
Southminster Nutrition Class	Physical health
4-week Bechtler Museum of Art Series	Cognitive; socio-emotional
Healing Hands Trio	Socio-emotional

needs and aspirations. Residents identified specific areas of interest such as fostering intergenerational interactions, increasing socialization, improving health, accessing information and services. The EWA program was delivered at Site 1 from September 2019 to January 2020. At the control Site 2 community, pretest and posttest data was collected in March and June 2020.

Regarding baseline health and service utilization data, residents reported more days over the last month having trouble with physical health ($M = 4.77$, $SD = 6.8$) than with mental health ($M = 2.78$ $SD = 6.4$) (see Table 3). About half of the residents experienced disability interference on their ability to exercise ($n = 28$, 47%) and engage with housework

($n = 27$, 45%). On average residents reported three chronic conditions, with a higher prevalence of hypertension ($n = 52$, 87%), arthritis ($n = 26$, 67%), and diabetes ($n = 15$, 47%) in the sample. Most residents were not worried about having enough money to pay for rent/mortgage ($n = 43$, 72%) or for healthy food ($n = 36$, 60%). Many engaged in regular physical activity during previous month ($n = 39$, 65%), and reported on average 6.2 ($SD = 7.2$) visits to a doctor or nurse during the previous year. Health differences across housing communities indicate that, in comparison to Site 1, residents at Site 2 (control community) reported higher disability interference on housework and activities, more days of physical health

Table 2. Demographic Information for Seniors in Affordable Housing.

Data Variables	Site 1 (N = 38)	Site 2 (N = 48)	ALL (N = 86)
Collection time			
Pretest	Spring 2019	Summer 2019	2019
Posttest	Winter 2020	Spring 2020	2020
Panel surveys			
Pretest only	12 (32%)	19 (40%)	31 (36%)
Posttest only	14 (36%)	12 (25%)	26 (30%)
Pretest and posttest	12 (32%)	17 (35%)	29 (34%)
Socio-demographics	N/Mean SD % range	N/Mean SD % range	N/Mean SD % range
Age			
Years	72 (5.3) 61-86	69 (7.6) 56-91	70 (6.9) 56-91
Gender			
Female	33 (87%)	30 (62.1%)	63 (73%)
Race			
African American	33 (87%)	44 (92%)	77 (89%)
Education			
Up to high school	8 (21%)	23 (48%)	31 (36%)
High school graduate	18 (47%)	17 (35%)	35 (41%)
College/tech school	12 (32%)	8 (17%)	20 (23%)
Retired/work status			
Retired/do not work	37 (97%)	46 (96%)	83 (97%)
Length in residency			
Years	4.4 (1.7) 1–7	8.6 (6.2) 1–26	6.9 (5.2) 1–26
Marital status			
Divorced/separated	21 (55%)	20 (42%)	41 (48%)
Widowed	13 (34%)	13 (27%)	26 (30%)
Never married	4 (11%)	15 (31%)	19 (22%)
Family size			
Number of children	2.7 (2.2) 0-9	3 (2.4) 0-9	2.9 (2.3) 0-9
Annual income			
Under $15,000	28 (78%)	47 (98%)	75 (89%)
Worried paying rent			
Never	17 (71%)	26 (72%)	43 (72%)

Note. Site 1 = Intervention, Site 2 =Control.

troubles, higher incidence of hypertension and arthritis, and more annual visits to the doctor or nurse professional (see Table 3).

Design

The intervention community (Site 1) was established in 2012 to address public housing using a holistic community redevelopment approach, and focusing on mixed-income housing, educational opportunities, youth and adult development programs and health services. The control community (Site 2) was established in 1967 and is open to adults 62 years old and/or over 50 with a disability.

The EWA program delivered monthly activities for residents at Site 1 targeting physical, cognitive, socio-emotional health dimensions. Staff service coordinators invited residents interested on a leadership role to participate in the coordination of the EWA program. Resident leaders worked closely with the team to identify resident's needs and promote voluntary participation (see Table 1). Each participant received a $20 gift card for completing focus groups and/or assessment. Residents participated at time 1 (pretest) but could choose not to participate at time 2 (posttest). Of the 132 residents at the intervention site, 24 completed the pretest survey. There was a 50% attrition rate at the time 2 survey. An additional 14 residents completed the time 2 survey but did not participate during time 1. Of the 176 residents at the control site, 36 completed the survey at time 1, with 50% attrition at time 2. An additional 12 residents who did not participate at time 1 completed the survey at time 2.

Measures

Health and Socio-Emotional Outcomes. In addition to socio-demographic data, we used the following PCP quality of life measures to assess the residents' physical and mental health,

Table 3. Health Baseline Information for Seniors in Affordable Housing*.

Health Variables	Site 1 (*N* = 38) N % Mean SD	Site 2 (*N*= 48) N % Mean SD	ALL (*N*=86) N % Mean SD
Disability interference			
House work	7 (29%)	20 (56%)	27 (45%)
Exercising	10 (42%)	18 (50%)	28 (47%)
Resident activities	4 (17%)	13 (37%)	17 (29%)
Family events	4 (17%)	13 (37%)	17 (29%)
Days bad health (month)			
Physical health	3.83 (5.3)	5.11 (7.0)	4.60 (6.3)
Mental health	3.13 (6.3)	2.28 (5.4)	2.62 (5.8)
Health chronic conditions			
# Health conditions	3.33 (1.6)	3.72 (1.8)	3.57 (1.7)
Hypertension	19 (79%)	33 (92%)	52 (87%)
Arthritis	14 (58%)	26 (72%)	40 (67%)
Diabetes	13 (56%)	15 (41%)	28 (47%)
Cardio vascular	9 (37%)	23 (36%)	22 (37%)
Worried healthy food			
Not at all	17 (71%)	28 (80%)	45 (76%)
Physical activity (month)			
Never	10 (42%)	11 (31%)	21 (35%)
Health care visits (year)			
Doctor/nurse/other	5.00 (3.8)	7.14 (8.7)	6.28 (7.2)
Hospital/ER/UC	1.00 (1.5)	1.00 (1.2)	1.0 (1.3)
Medical specialist	2.00 (3.0)	0.47 (1.5)	1.0 (2.3)
Mental health specialist	0.92 (3.1)	0.72 (2.0)	0.8 (2.5)

Note. Site 1 = Intervention, Site 2 = Control.

coping strategies, socio-emotional outcomes and living situation satisfaction at two (pretest-posttest) occasions:

Self-Reported Depression: We used the 10-item CES-D scale (Radloff, 1977). For each item, participants endorsed the response indicating how often they felt a particular way in the past week. Each item is measured with a 4-point scale (0 = never to 3 = often). Higher scores (range = 0–30) indexed greater depressive symptomology (α = 0.78).

Perceived Global Physical Health: Measured with a single item asking residents, in general, would you say your health is "poor" (1) to "excellent" (5). Higher scores indicate better overall global health.

Perceived Mental Health: Residents were asked to rate their overall mental health/emotional well-being with a single item using a 5-point scale (1 = poor to 5 = excellent). Higher scores indicate better overall mental health/emotional well-being.

Perceived Self-Esteem: We used a 10-item scale (Rosenberg, 1965) that measures global self-worth in measuring both positive and negative feelings about the self. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree (range values = 10–40). Higher total scores indicated greater self- esteem (α = 0.78).

Perceived Stress/Anxiety: Residents were asked to rate their level of anxiety and stress with a single item using a 10-point scale (1 = Not stressed to 10 = Very stressed). Higher scores indicate higher levels of anxiety and stress.

Positive Affect: We used the PANAS subscale (Watson et al., 1988) that assesses a person's positive trait affect using a 5-point scale (1 = Not at all; 5 = Extremely). Higher scores (range values = 10–50) indicated greater positive affect (α = 0.88).

Coping Strategies: We utilized a 10-item Selection, Optimization, and Compensation (SOC) effective coping measure related to goal setting and attainment (Baltes & Baltes, 1990). Items use a 4-point scale, measured *effective target strategies regarding selection of goals* as they applied to the pursuit of important personal goals. Participants indicated their agreement with statements such as "I concentrate all my energy on a few things," "I always focus on the one most important goal at a given time," and "I commit myself to one or two important goals." Higher scores indicate greater use of effective strategies (range = 6–24) in selecting and pursuing goals (α = 0.83).

Loneliness and Social Isolation: We used the 3-item loneliness Scale (Hughes et al., 2004) developed to measure the perception of social connectedness. Residents were asked how often they felt that they: (1) lacked companionship; (2) were left out; and (3) were isolated from others, on a 4-point scale (range = 4–12), where each response was coded from 1 "hardly ever" to 3 "often." Higher scores indicated greater isolation and loneliness (α = 0.73).

Satisfaction with Housing Community:

Satisfaction Living at Housing Residence: We used a 4-item scale indicating how residents rated the housing residence as: a place to live; the quality of services received; whether it was recommended it to others; and regarding plans to remain throughout their retirement, using a 4-point scale (range = 4–16). Higher scores indexed greater satisfaction with living at the housing residency (α = 0.76).

Analytical Strategy

To examine the influence of the EWA program we analyzed longitudinal data (N = 29) using a series of 2 (group = Site 1 vs. Site 2) by 2 (occasion = pretest vs. posttest) repeated measures MANCOVAs for the above dependent variables. We followed with ANCOVAs, while utilizing the following pretest variables as covariates: educational level, income, and years of residence. These factors differentiated (p < .05) residents living at Site 1 versus Site 2 (see Tables 2 and 3). Additionally, we also utilized the number of days that poor health interfered with everyday activities as a covariate given its potential impact on well-being and the fact that such scores to an extent favored Site 1 participants (M = 5.32, SD = 8.40) over Site 2 participants (M = 2.53, SD = 6.59) ($F_{1, 52}$ = 3.01, p < .08). The use of these covariates statistically minimized them as potential confounds in comparing participants across sites. Complementary independent samples/cross-sectional data, based on residents who completed either the pretest or the posttest (but not both) (N = 60) were analyzed using a two-way (pretest–posttest occasion, residence-Site 1 vs. Site 2) MANCOVA with supplementary ANCOVAs, again with pretest education, days that poor health interfered with everyday activities, income, and length of residence as covariates.

In each analysis, our focus was on the group by time interaction to reflect differential change over time for the EWA program treatment versus the control condition. Thus, the presence of a statistically significant (p < .05) group (residence) by occasion (pretest–posttest) interaction speaks to the impact of the activities program treatment on multiple resident outcomes.

Results

Self-reported data for older persons' living at two congregate communities (N = 86) were captured at pretest and posttest during 10 months. Residents at Site 1 received the EWA activities program during pre–COVID-19. Pretest data at Site 1 was collected during spring 2019 *and* the posttest data during winter 2020 (early COVID-19). At the control Site 2, we collected pretest data during summer 2019 and posttest data over spring 2020 (under COVID-19 restrictions). While residents at the intervention Site 1 received the activities program and completed both assessments for the most part pre–COVID-19, residents at the control site, Site 2, completed the posttest assessment data at the time of COVID-19 restrictive measures.

Multivariate Repeated Measures Findings

Multivariate analyses are typically first conducted utilizing multiple measures simultaneously, taking into consideration the inter-correlations among variables and enabling one to control for chance findings otherwise associated with multiple univariate analyses (see Tabachnick & Fidell, 2013). Multivariate analyses represent the complete or general case regarding relationships among variables, while univariate analyses are a special case of the multivariate model (Tabachnick & Fidell, 2013).

We first analyzed outcome data at the multivariate level initially focusing on three categories of logically organized outcome measures: (1) positive psychosocial adjustment (satisfaction with residence, positive affect, rated mental health, coping strategies, self-esteem), (2) negative psychosocial adjustment (self-rated stress, depression, perceived isolation/loneliness), and (3) global physical health. The first two above categories of dependent measures parallel the two-factor (positive and negative well-being) model of successful aging established by Pruchno and her colleagues in multiple studies (Pruchno et al., 2010). Given its independence (with correlations less than .10, p > .05) regarding the remaining measures, we analyzed the potential impact of the EWA program intervention on self-rated global physical health separately utilizing univariate (ANCOVA) analyses.

Repeated Measures Multivariate Findings

At the multivariate level, for the measures of positive psychosocial adjustment, considered simultaneously as a set, the group by time interaction was statistically significant ($F_{9, 15}$ = 5.47, p < .01). For the measures of negative psychosocial adjustment, again considered simultaneously as a set, the group by time interaction was also statistically significant ($F_{5, 19}$ = 3.22, p < .03). The inclusion of self-rated global physical health, not surprisingly, rendered the multivariate group by occasion effect for the measures of negative psychosocial adjustment statistically non-significant (p < .11).

Repeated Measures Univariate Findings

Having established that statistically significant group by occasion multivariate effects existed (see above), we then conducted analyses at the univariate level to identify what outcome variables were most impacted by a group by occasion interaction. Results for the repeated measures longitudinal data yielded a statistically significant group by time interaction differences for several dependent variables (see Table 4): (a) *CES-Depression* ($F_{1, 23}$ = 7.78, p < .01), where small declines over time were observed for the intervention Site 1 vs. large increases over time for the control Site 2; (b)

Positive Affect, ($F_{1, 23}$ = 5.98, p < .02) indicative of a EWA programmatic effect with larger increases over time reported for residents at intervention group (Site 1) versus smaller increases for residents at the control group (Site 2) and c) *Isolation/Loneliness* ($F_{1, 23}$ = 13.93, p < .01) indicative of programmatic influence with declines over time observed for the intervention (Site 1), and increases over time reported for residents at the control (Site 2). Finally, residents' *Satisfaction Living in the Community* improved significantly over time for participants at the intervention group Site 1 in comparison to residents at the control (Site 2), who remained stable over time ($F_{1, 24}$ = 17.88, p < .01).

We note that a statistically non-significant group by occasion interaction was observed for *Effective Coping* (p < .07). Strictly post hoc inspection of this data indicated that somewhat larger increases were observed in effective strategies over time for Site 1 versus smaller increases over time for residents at Site 2. Moreover, though statistically non-significant (p > .10), the data for several dependent variables (global physical health, mental health, perceived anxiety/

stress) nevertheless **also** fit the pattern of more adaptive/stability in functioning for the intervention Site 1 over time and less adaptive functioning for the control Site 2 across occasions (see Table 4).

Independent Samples Multivariate Findings

For the independent samples multivariate analysis, we again focused on the above three categories of outcome measures (see above): (1) positive psychosocial adjustment (satisfaction with residence, positive affect, rated mental health, coping strategies, self-esteem) and (2) negative psychosocial adjustment (self-rated stress, depression, perceived isolation/loneliness). Self-rated global physical health was analyzed separately utilizing an ANCOVA.

At the multivariate level, for the measures of positive psychosocial adjustment considered simultaneously as a set, the group by time interaction was statistically non-significant ($F_{5,42}$ = .987, p >.05). This was also the case for the measures of negative psychosocial adjustment as a set ($F_{3, 46}$ = 1.10,

Table 4. Repeated Measures ANCOVAs of Participant Health and Socio-Emotional Outcomes.

Variable	Site 1	Site 2	Time	Residence	Time X Residence
CES-depression					
T1	3.36	5.91	ns*	ns	$F_{1,23}$ = 7.78, p <.01
T2	3.20	8.32			
Perceived global physical health					
T1	2.69	3.08	ns	ns	ns
T2	2.68	2.44			
Perceived mental health					
T1	3.00	3.12	ns	ns	ns
T2	3.24	2.83			
Perceived anxiety/stress					
T1	2.72	3.78	ns	ns	ns
T2	4.50	6.05			
Effective coping					
T1	33.40	28.57	ns	<.01	$F_{1,21}$ = 3.74, p < .07
T2	39.21	30.28			
Positive affect					
T1	34.67	34.69	ns	ns	$F_{1,23}$ = 5.98, p < .02
T2	45.26	38.69			
Isolation/loneliness					
T1	4.14	4.31	ns	<.01	$F_{1,23}$ = 13.93, p < .01
T2	3.10	6.16			
Satisfaction living in the community					
T1	10.01	13.57	ns	ns	$F_{1,24}$ = 17.88, p < .01
T2	14.61	13.88			
Self-esteem					
T1	33.56	34.84	ns	ns	ns
T2	33.60	33.75			

Note. Site 1 = Intervention, Site 2 = Control. Residence refers to the main effect for Residence; Time X Residence refers to the interaction effect.
*p-value = <.05; ns = non-significant value. Analyses adjusted for educational level, number of days that poor health interfered with everyday activities, income, and years of residence.

Table 5. Independent Samples ANCOVAs of Participant Health and Socio-Emotional Outcomes.

Variable	Site 1	Site 2	Time	Residence	Time X Residence
CES-depression					
T1	4.58	6.98	<.09	<.01	ns
T2	4.95	11.01			
Perceived global physical health					
T1	2.42	3.03	ns	ns	$F_{1,48} = 3.71$, $p < .06$
T2	2.73	2.49			
Perceived mental health					
T1	2.93	3.07	ns	<.04	ns
T2	3.30	2.91			
Perceived stress/anxiety					
T1	2.95	4.35	ns	<.01	ns
T2	2.26	5.87			
Positive affect					
T1	45.71	42.21	ns	<.01	$F_{1, 46} = 3.67$, $p < .06$
T2	48.13	37.23			
Effective coping					
T1	33.15	32.89	ns	<.00	$F_{1,46} = 3.16$, $p < .08$
T2	36.59	32.89			
Isolation/loneliness					
T1	4.86	5.26	ns	<.01	ns
T2	4.70	6.80			
Satisfaction living in the community					
T1	14.03	13.80	<.06	<.06	ns
T2	15.52	15.42			
Self-esteem					
T1	37.26	35.00	ns	<.02	ns
T2	37.55	33.47			

Note. Site 1 = Intervention, Site 2 =Control. Residence refers to the main effect for Residence; Time X Residence refers to the interaction effect.
*p-value = <.05; ns = non-significant value. Analyses adjusted for educational level, number of days that poor health interfered with everyday activities, income, and years of residence.

$p > .05$). For self-rated global physical health however, the univariate group by time interaction approached statistical significance ($F_{1, 48} = 3.71$, $p < .06$), with global physical health ratings increasing over time for Site 1 residents, while for Site 2 residents, they declined (see Table 5).

Univariate Independent Samples Findings

Given the above independent samples multivariate findings, post hoc univariate analyses, based upon the participants with pretest only versus posttest only data, yielded no statistically significant group by occasion effects (see Table 5). However, the *post hoc* group by occasion interaction approached statistical significance for *Positive Affect* ($p < .06$) and for *Effective Coping* ($p < .08$). Accordingly, *a strictly post hoc inspection* of these data indicated that for Positive Affect, scores tended to be higher across time for residents at Site 1, while for residents at control (Site 2), they declined (see Table 5). For Effective Coping, *post hoc* inspection of scores indicated increases across time for Site 1 residents, while they remained essentially stable for Site 2 residents. *Post hoc*

inspection of data indicated that while statistically non-significant, data for global physical health, self-rated mental health, and perceived anxiety/stress nevertheless fit the pattern of more adaptive/stability in functioning for the intervention Site 1 over time and less adaptive functioning for the control Site 2 across occasions (see Table 4). These observations are post hoc in nature and should be interpreted *with caution.*

Discussion

The goal of the EWA pilot intervention study was to examine the role of a theoretically based activities program in buffering the adverse effects of life stressors associated with poor health, lack of interaction, and engagement in everyday activities among low-income older adults in urban congregate housing in North Carolina. The EWA behavioral activities program aims to improve the well-being and quality of life of older adult residents in congregate living environments by delivering a range of activities to address mental health needs, for example, psychosocial functioning, loneliness and social

isolation among low-income older persons living in congregate public housing. Based upon our longitudinal analyses, our findings are for the most part consistent with the PCP model of successful aging (Figure 1), wherein behavioral activities, such as those used in the EWA program, may promote health, reduce loneliness and isolation, and improve well-being and quality of life outcomes (Kahana et al., 2014). In participating in structured activities addressing physical, cognitive, and social needs, residents may learn to adjust to stressors associated with their living situation and the larger context of COVID-19.

The PCP model of successful aging also recognizes the influence of contextual factors as reflected in demographic characteristics such as age, race, educational attainment, and spatial and temporal context. These determinants of health are relevant for persons living in affordable public housing, since as previous research shows older persons in congregate living have characteristics that may put them at risk for mental health ailments, such as limited educational attainment, low income, and health conditions (Gonyea et al., 2018). The repeated measures findings from our sample of primarily African Americans support the literature examining the role of pro-active adaptations among racially and ethnically diverse older adults. Key strategies such as health education, effective coping, and available support may contribute to better health management and life satisfaction. Proactive strategies may also help adults with chronic conditions and disability to cope with health challenges (Ermoshkina et al., 2019). Behavioral adaptations such as health promotion or helping others are efficient tools to address aging-related stressors in health. For example, engaging in healthy lifestyles requires other preventive actions such as exercising, which may help reduce the progression of chronic health troubles (Kahana et al., 2014), and social isolation (Gonyea et al., 2018).

Our findings based upon the longitudinal data ($N = 29$) strongly indicate that, in comparison to the control community and having controlled for numerous sociodemographic variables, the EWA activities program was successful in lessening residents' depressive symptoms, enhancing positive affect, lessening loneliness and social isolation, and increasing satisfaction with their community. To a lesser extent, longitudinal analyses also indicated residents at Site 1 to report increases in improving effective coping strategies to achieve personal goals and in improving self-rated physical and mental health relative to Site 2 residents.

Our findings based upon cross-sectional/independent samples analysis ($N = 60$) are considerably less strong. They, in *only* a post hoc sense, *to an extent* paralleled the longitudinal EWA program effects for residents at Site 1 in terms of improved self-rated physical health, greater positive affect, and improved effective coping over time, all versus Site 2 residents. We note that, though statistically non-significant, cross-sectional findings for perceived stress/anxiety, self-rated mental health, CES-Depression and isolation/loneliness do mirror the positive impact of the EWA

program based upon the longitudinal analyses. As noted above, trends based upon these cross-sectional findings are post hoc in nature and they should be interpreted with *caution.*

The discrepancy in findings between the repeated measures and cross-sectional/independent samples in terms of temporal interactions with residence can be in part explained by the greater statistical power needed in the latter analyses to achieve statistical significance. Within-person (longitudinal) effects are likely to be a priori less error-prone than between person (independent/cross-sectional) effects, that is, persons are more similar to themselves over time (repeated measures) than they are to different persons across time (cross-sectional/independent samples) (Cohen, 1987).

Our longitudinal results are similar to reported findings from prior intervention studies with older persons in congregate housing. Treichler et al. (2020) reported that senior residents who attended a psychological intervention to increase resilience by engaging them in positive psychology-oriented topics, increasing positive emotions and engaging in value-driven activities, improving responses to stress. Likewise, our longitudinal findings support the positive influence that congregate aging may exert on the well-being ("thriving") of older adults, as reported for older persons with health limitations in congregate living (Corneliusson et al., 2020), attenuating the negative effect of life-course disadvantage for senior adults living alone (Park et al., 2018). The EWA program longitudinal findings align also with research suggesting that collaborative approaches to improve physical and social environments for older adults are relevant to overcome contextual challenges, in particular when increasing communication and coordination of services, and offering on-site activities (Canham et al., 2018). These findings suggest that important enhancements to congregate living communities can lead to a decrease in isolation among residents (Taylor et al., 2018).

Activities Programing in the Context of COVID-19

The EWA program was associated with improving many aspects of well-being among their residents. In the absence of the program, residents in the control group declined over time with regard to several socio-emotional outcomes. The emergence of the COVID-19 pandemic during 2020 may have exacerbated the negative outcomes observed for the control community since follow-up interviews (posttest data for residents at the control community was collected during the full impact of COVID-19 (spring, 2020). Publications have noted the observed negative psychosocial health associated with the COVID-19 pandemic.

Our analyses yielding positive findings based upon longitudinal samples suggest that the EWA program had a beneficial effect across several socio-emotional health outcomes for older adults in that community (Site 1). Cross-sectional findings, though considerably less strong, do mirror

the longitudinal findings. Overall, our findings strengthen the importance of the EWA program in promoting participants' well-being despite the potential negative influence of COVID-19. The EWA program may have served to minimize declines in well-being otherwise in part associated with COVID-19.

We recognize the need for studies to assess the efficacy of programs for adults at congregate housing. Furthermore, because COVID-19 poses an increased risk to the well-being of older persons we encourage researchers to develop proactive strategies to help residents to overcome the proliferation of stressors associated with mental health ailments. Our pilot study highlights the need to deliver theory-driven behavioral and psychiatric interventions for adults at congregate communities (Treichler et al., 2020).

We acknowledge several limitations: (a) it is not possible to draw causal inferences since we used a non-experimental design, (b) the smallness of our sample limits the generalizability of our findings and the statistical power of our analyses, (c) the role of COVID-19 as a confounding factor across sites, and (d) the weaker cross-sectional findings in supporting the impact of the program. Despite these limitations, our exploratory findings, primarily those based on longitudinal data underscores the urgency to assess the health needs of residents at congregate housing communities using a model of successful aging emphasizing proactive behavioral adaptations (Kahana et al., 2014).

Declaration of Conflicting Interests

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IRB Approval

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