



Quality of life in older adults: Benefits from the productive engagement in physical activity

Hsin-Yen Yen ^a, Li-Jung Lin ^{b, *}

^a School of Gerontology Health Management, College of Nursing, Taipei Medical University, Taiwan

^b Graduate Institute of Sport, Leisure, and Hospitality Management, National Taiwan Normal University, Taiwan

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ABSTRACT

Background/objective: Productive engagement can be a strategy to reduce stress and chaos. Physical activity, a basic type of productive activity, could benefit older adults. Therefore, the purpose of this study was to explore how productive engagement in physical activity may influence older adults in maintaining their health-related quality of life when they live in a long-term care facility.

Methods: We used purposive sampling to recruit 163 participants from 14 long-term care facilities in Taiwan. Data were collected through individual interviews with a structured questionnaire. Descriptive statistics and independent *t*-test were used.

Results: The result demonstrated that the preferred type of physical activities for the older adults was similar after the relocation. Older adults with increasing productive engagement in physical activity reported better scores of Mental Component Summary, social and emotional role functioning than those with decreasing productive engagement in physical activity.

Conclusion: Older adults can have a positive perceived health-related quality of life by consistently or increasingly engaging in productive physical activity, especially when encountering a life event.

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Introduction

The older population has been growing in recent years. The proportion of older adults aged 65 years and above was 8% in 2010, and it will double worldwide in 2050.¹ Population aging has become an important issue around the world, and maintaining a good health-related quality of life (HRQOL) is the first priority for the aging society. HRQOL is a prevailing indicator used to evaluate the wellness or sense of well-being of older adults.²

Typically, people hope to avoid big life changes that may threaten their life quality, and this is particularly true for older adults.³ However, some life events might occur suddenly and force them to change, such as losing their partner or moving from their house. Many older adults move to the long-term care (LTC) facilities. Relocation becomes a major crisis impacting their HRQOL, and they feel worried and stressed.⁴ The consequences of unexpected

adverse experiences in older adults' life could cause depressive symptoms, loneliness, alcohol and drug abuse, loss of leisure activities, and poor well-being. Productive engagement could be a solution to maintain a good HRQOL when big life changes occur and ongoing difficulties are faced.⁵

Generally, productive activities encompass physical and leisure activities, self-care and daily activities, capacity-building activities, social participation, interpersonal relationships, and activities with economic value.^{6,7} Physical activity (PA) is a basic level of productive engagement that satisfies the goal of accomplishment of older adults for their own sake. PA could produce concrete products and invisible values.⁸ PA include diverse activities, such as occupational, household, leisure-time physical activity, transportation, sports, and exercise.^{1,9} PA is a key factor to achieve successful and healthy aging by engagement with life.^{6,10}

Productive engagement, especially engaging in PA, has a positive impact on personal physical, psychological, and spiritual well-being in later life. One of the major effects of productive engagement in PA is to create a qualified life. Productive engagement helps people lead a healthy lifestyle, positive emotion, fulfillment, satisfaction, gain happiness, increase social activities, and adjust to psychosocial changes.^{11–13} PA is beneficial for the quality of life because of the

* Corresponding author. Graduate Institute of Sport, Leisure, and Hospitality Management, National Taiwan Normal University, 6F, No.129-1, Sec. 1, Heping E. Rd., Da'an Dist., Taipei City, 10644, Taiwan.

E-mail addresses: yenken520@gmail.com (H.-Y. Yen), maru641220@ntnu.edu.tw (L.-J. Lin).

improvement of muscle strength and balance which is an indicator of daily living. Older adults maintain a good physical function could avoid the risk of injury and the fear of falling.¹⁴ Consistently engaging in PA also plays an important role in active aging and active leisure, which correlates to a positive health-related outcome, especially in HRQOL. Older adults' level of productive engagement positively affected their quality of life, mental, and physical health.¹⁵ Herens, Bakker, van Ophem, Wagemakers, & Koelen' study has proved older adult consistently participated in PA programs reported a higher HRQOL than those who dropped out.¹⁶ Engaging in PA had a positive association with older adults' HRQOL.¹⁷ Productive engagement in PA is not only good for the short-term benefits it provides a, but also for the long-term benefits of HRQOL.¹⁸ However, the setting in previous studies was mainly community-based. Therefore, this study focuses on institution-based older adults.

Productive aging emphasizes being actively involved.¹⁹ Productive engagement should also be fun, enjoyable, and acceptable to older adults.¹⁰ In order to age productively, older adults can find new goals and tasks that they are capable of achieving. Productive aging is impacted by where older adults live and spend time, such as public and private sectors, church, social clubs, and LTC facilities. These facilities provide a support system, opportunities, and surroundings for the productive engagement of older adults to satisfy the goal of productive aging.¹⁵

Furthermore, PA is a self-determinate process and independent living influence older adults' physical and psychological well-being.^{20,21} Older adults need work, religion/spirituality activities, physical activities, sports, and recreation in their daily life.¹² Promoting individual regular PA is important to improve HRQOL, and it will be a necessary behavior for older adults confronting unexpected life changes while still maintaining their life quality.

Therefore, the purposes of this study were to understand preferences and the duration of PA before and after relocating to an LTC facility, and to explore the effect of productive engagement in PA for older adults' HRQOL after the relocation. The hypothesis of this study is older adults with an increased productive engagement in PA had higher HRQOL than those with a decreased productive engagement in PA.

Methods

Participants and sampling

Purposive sampling was used to recruit qualified participants. Participants were recruited from 14 LTC facilities in Taiwan, according to the roster of the Social and Family Affairs Administration in Taiwan.²² Older adults with independent living abilities were chosen, excluding nursing home, dementia care facilities, respiratory care centers, and other critical care LTC facilities. They just took in older adults with a normal physical and mental function who were capable of daily self-care activities. If the residents need further living assistances during the period of residence, they would be asked to leave the LTC institution.

There were several criteria for the participants. The participants lived in LTC facilities for a maximum of 5 years. According to Chiu, Chen, & Li's study, 5 years was a precaution against the loss of memory to measure the admitted transition.²³ The subjects with a diagnosis of psychological diseases were excluded. The participants had an appropriate cognitive function. The participants should have an independent living function. Based on the list of names provided by the director of each LTC facility, the eligible subjects were recruited for this study. All participants signed a consent form before data collection. This study was approved by the Research Ethics Committee of the National Taiwan University (NTU-REC No. 201210HS029).

Data collection

The data were collected by individual interviews with a structured questionnaire. This study applied retrospective memory-based examination of changes in PA. Personal structured interviews were conducted from March to June 2013. During the period of the interview, the participants were seated in safe, familiar, and quiet surroundings. The interviewer spoke the language most familiar to each participant. Through one-on-one interviews, the participants answered questions from the structured questionnaire. The interviewers were six graduate students who took a 2-day training course to reduce the differences between interviewers.

Instruments

Structured questionnaires contained both closed and open-ended questions. The questions were composed of four parts, including residents' PA before and after relocating to the LTC facility, HRQOL (SF-36), and background characteristics.

Participants were asked to report their present PA, which they had participated in during the past 1 week. The participants were also asked about the frequency, the duration, and the location (e.g., room, home, garden, inner or outer community) of their major PA. In order to confirm that participants reported a complete list of PAs, the interviewer repeated the questions, "What are your major leisure activities? Are there other activities you do in your daily life?" until the participants had no further responses. The same process was applied in collecting the information about participants' PA before relocating to the LTC facility. The Cronbach's alpha value of the PA questionnaire was 0.628.

Short Form (36) Health Survey (SF-36) Taiwan version was applied in this study. SF-36 is usually conducted in clinical practice and health policy evaluations as a multipurpose survey tool. SF-36 was designed with 36 items for self-reporting. SF-36 consists of eight sections in two dimensions. Physical functioning (PF), physical role functioning (RP), bodily pain (BP), and general health perceptions (GH) are aggregated into the dimension of Physical Component Summary (PCS). Vitality (VT), social role functioning (SF), emotional role functioning (RE), and mental health (MH) are aggregated into the dimension of Mental Component Summary (MCS). Each subscale is an algebraic sum and transforms into a 0–100 scale by a formula.²⁴ A higher score represents a better health status and HRQOL. SF-36 was translated and developed into a Taiwan version. SF-36 Taiwan version was tested validly and reliably. The item-scale correlation coefficients were between 0.40 and 0.83. The internal consistency of subscales reached an acceptable level ($\alpha > 0.7$) in Taiwan version.²⁵ Therefore, in this study, the item-scale correlation coefficients were from 0.64 to 0.99, and the internal consistency of the PCS and MCS was 0.68 and 0.71, respectively (using Cronbach's α).

Data analysis

Descriptive statistics were used to demonstrate demographic characteristics and the preferences and duration of PA before and after relocation. Furthermore, according to the 2011 Compendium Tracking Guide²⁶ each participant's type of PA was coded and transferred to metabolic equivalent (MET). For example, if the subject reported "tai chi" as a PA, the code would be 3.0 (15670 tai chi, qi gong, general). The MET-hours were calculated from the duration (hr/d) of different physical activities. Total MET-hours per week were the sum of the MET-minutes of all physical activities per week. For example, if the subject reported "tai chi" 1 h a day for 5 days a week, this activity was calculated as 15 MET-hours per week (=3.0 MET \times 1 h \times 5 days). Based on the difference of total MET-hours/week before and after relocation, the participants were

divided into two different groups. Chi-square was used to test the interaction of characteristics between two groups. The independent *t*-test was also applied to analyze the differences in HRQOL between groups.

Results

PA before and after the relocation

A total of 163 participants were recruited for this study. The results of the preferences of participants' PA types before and after relocation are shown in Table 1. Compared with PA preferences before relocation, inactivity quiet/light activity, miscellaneous, walking, and religious activities were still favorite PAs. With regard to the differences in PAs before and after relocation, the proportion of conditioning exercise and music playing increased comparatively. However, the proportion of sports, lawn and garden, dancing, and water activities decreased comparatively.

Table 2 shows the frequency of PA before and after relocation. Most of the PAs that were done with higher frequency before relocation were also done with a higher frequency after relocation, including watching TV, walking, listening to music or radio, reading, talking, and singing. As mentioned, after relocation, residents had more opportunities for interaction with other residents. The frequency of indoor group activity increased, such as mahjong playing and card playing. Moreover, residents had less outdoor

activity and more indoor exercise after relocation.

Segmentation by the productive engagement in PA

The participants were divided into two groups based on the mean difference of total MET values before and after relocating to LTC facilities. If the mean difference was negative, the participant was assigned to group 1, the decreasing productive engagement group (DPE). Further, if the mean difference was positive, the participant was assigned to group 2, the increasing productive engagement group (IPE) (Table 3). The DPE group had 97 participants and the IPE group had 66 participants. The effect size for two groups (*d* = 1.67) was found to exceed Cohen's convention for a large effect.

Demographic characteristics

The demographic characteristics of the participants are provided in Table 4. Our questionnaire found that 132 (81.48%) participants had relocated voluntarily. With regard to reasons for relocation, 15 (9.20%) seniors responded that nobody could take care of them because their children did not live nearby; 69 (42.33%) seniors responded that they need professional care because of a physical disability or the weakness of a physiological function; 19 (11.66%) seniors responded that they need company to decrease the feeling of loneliness; 10 (6.14%) seniors responded that their children did not have enough living space for them; 15 (9.20%) seniors responded that they had no place to live; and 35 (21.47%) seniors responded "other" reasons, such as they did not want to prepare meals anymore; they felt freer living in the LTC facility over their children's house; the LTC facility was inexpensive or free; and the services, atmosphere, and environment of the LTC facility were better than their own house.

Furthermore, the percentage of participants' characteristics was not significantly different between DPE and IPE groups, including gender ($\chi^2 = 0.058, p = .810$), educational level ($\chi^2 = 5.985, p = .112$), marriage status ($\chi^2 = 2.608, p = .625$), religious ($\chi^2 = 0.349, p = .840$), age ($\chi^2 = 6.052, p = .109$), length of residence ($\chi^2 = 3.793, p = .580$), voluntary relocation ($\chi^2 = 1.759, p = .185$), and reason of relocation ($\chi^2 = 2.986, p = .702$).

Table 1
Top 10 preferences of PA categories (before and after relocation).

Before relocation			After relocation		
Type	N	%	Type	N	%
Inactivity Quiet/Light	149	29.273	Inactivity Quiet/Light	160	31.658
Miscellaneous	122	23.969	Miscellaneous	149	24.958
Walking	88	17.289	Walking	97	16.248
Religious Activities	38	7.466	Religious Activities	57	9.548
Sports	28	5.501	Conditioning Exercise	42	7.035
Lawn and Garden	16	3.143	Sports	14	2.345
Dancing	9	1.768	Lawn and Garden	8	1.340
Home Activities	9	1.768	Dancing	6	1.005
Water Activities	9	1.768	Home Activities	4	0.670
Running	7	1.375	Music Playing	3	0.503

Table 2
The duration of PA per week before and after relocation.

Before relocation		After relocation	
Physical activity	hr/week	Physical activity	hr/week
watching TV	7.896	watching TV	7.945
walking	3.249	walking	3.269
listening to music, radio	2.524	listening to music, radio	2.540
reading	1.675	talking	1.686
talking	1.589	reading	1.599
singing	1.226	singing	1.233
classroom activities	1.023	stretching	1.029
mountain climbing	0.628	mahjong playing	0.632
tai chi	0.598	card playing	0.601
mahjong playing	0.581	reading religious materials	0.584
tea art	0.456	writing	0.459
reading religious materials	0.404	handicraft	0.406
gardening	0.403	tai chi	0.406
retreat/family reunion activities	0.376	home exercise	0.378
touring/traveling	0.372	gardening	0.368
volunteer activities	0.366	religious activities	0.328
ball sports	0.326	chess game	0.252
fishing	0.250	computer	0.227
handicraft	0.226	table tennis	0.225
running	0.224	volunteer activities	0.225

Table 3
The Paired *t*-test Result of PA in DPE and IPE groups.

Group	N	Before		After		Difference		t	p
		Mean	SD	Mean	SD	Mean	SD		
DPE	97	167.829	35.246	143.572	13.229	-24.257	30.149	-7.913***	.000
IPE	66	137.220	12.823	151.366	19.689	14.147	16.493	-6.968***	.000

The Unit: MET-hr/week; PA: Physical activity.

Table 4
Demographic characteristics.

Variables		Group DPE		Group IPE		Total		Chi-square	p
		N	%	N	%	N	%		
Gender	male	54	55.670	38	57.576	92	56.442	0.058	.810
	female	43	44.330	28	42.424	71	43.558		
Education	none	23	23.711	16	24.242	39	23.926	5.985	.112
	elementary	25	25.773	26	39.394	51	31.288		
	high school	33	34.021	20	32.515	53	30.303		
Marriage	college	16	16.495	4	6.061	20	12.270	2.608	.625
	married	3	3.093	5	7.576	8	4.908		
	separated	45	46.392	28	42.424	73	44.785		
	widowed	10	10.309	7	10.606	17	10.429		
Religious	single	21	21.649	17	25.758	38	23.313	0.349	.840
	other	18	18.557	9	13.636	27	16.564		
	Buddhism & Taoism	50	51.546	33	50.000	83	50.920		
Age	Catholic & Christian	20	20.619	12	18.182	32	19.632	6.052	.109
	none	27	27.835	21	31.818	48	29.448		
	<65	8	8.247	4	6.061	12	7.362		
Length of residence	66–74	27	27.835	30	45.455	57	34.969	3.793	.580
	76–84	33	34.021	20	30.303	53	32.515		
	>85	29	29.897	12	18.182	41	25.153		
	<1	9	9.278	8	12.121	17	10.429		
	1	40	41.237	19	28.788	59	36.196		
Voluntary relocation	2	15	15.464	16	24.242	31	19.018	1.759	.185
	3	17	17.526	11	16.667	28	17.178		
Reason for relocation	4	11	11.340	9	13.636	20	12.270	2.986	.702
	5	5	5.155	3	4.545	8	4.908		
	yes	75	78.125	57	86.364	132	81.481		
	no	21	21.875	9	13.636	30	18.519		
	far from children	9	9.278	6	9.091	15	9.202		
	physical inconveniences	37	38.144	32	48.485	69	42.331		
	lonely, need a company	12	12.371	7	10.606	19	11.656		
not enough living spaces	7	7.216	3	4.545	10	6.135			
no home	8	8.247	7	10.606	15	9.202			
others	24	24.742	11	16.667	35	21.472			

HRQOL between the DPE and IPE groups

Table 5 illustrates the result of an independent *t*-test. An independent-samples *t*-test was conducted to compare SF36 to the DPE group and the IPE group conditions. There was an insignificant difference in the PCS score for the DPE group ($M = 66.78$, $SD = 21.21$) and the IPE group ($M = 70.52$, $SD = 18.90$) conditions; $t(161) = -1.15$, $p = .25$. Although all four sections of PCS were insignificant. The scores of PF, RP, BP, and GH in the IPE group were higher than those in the DPE group.

On the other hand, there was a significant difference in the MCS score for the DPE group ($M = 72.670$, $SD = 19.046$) and the IPE group ($M = 78.273$, $SD = 14.982$) conditions; $t(161) = -2.004$, $p < .05$. Furthermore, there was a significant difference in the SF and RE scores for the DPE group and the IPE group. However, there was no significant difference in the VT and MH scores between the DPE group and the IPE group. Furthermore, Cohen's effect size value is between 0.071 and 0.369 and suggests a low to moderate practical significance.

Discussion

When comparing the type of PAs enjoyed by older adults before and after the relocation, we found that the older adults did not change their preferences very much, because the top three activities are passive activities, such as watching television and movies, listening to music, and singing. These results are similar to former research that found that older adults prefer to spend their free time doing nothing, lying, and sitting.²⁷ However, we found that the older adults have fewer outdoor activities after their relocation, including walking, religious activities, sports, gardening, shopping, water activities, and running. Instead of going out, they prefer indoor activities and social activities, such as dancing, playing music, and home activities. Sometimes outdoor or natural activities are replaced due to the restriction of the physical and social environment.²⁸ After relocating to LTC facilities, residents had more opportunities for interaction with others, but fewer opportunities for outdoor activities.

The results illustrate that the people who increasingly engaged

Table 5
Result of independent t-test in HRQOL for DPE and IPE group.

Variable Group		Mean	SD	t	p	MD	Cohens' d
Physical Component Summary	1	66.784	21.205	-1.152	.251	-3.732	0.184
	2	70.515	18.899				
Physical functioning	1	69.175	25.276	-1.306	.194	-9.431	0.208
	2	68.106	26.815				
Physical role functioning	1	64.433	47.713	-1.283	.201	-9.431	0.205
	2	73.864	43.508				
Bodily pain	1	72.423	26.538	-1.388	.167	-5.502	0.221
	2	77.924	22.101				
General health perceptions	1	62.433	21.696	-0.970	.333	-3.264	0.222
	2	65.697	20.149				
Mental Component Summary	1	72.670	19.046	-2.004*	.047	-5.603	0.320
	2	78.273	14.982				
Vitality	1	66.289	20.211	-0.443	.658	-1.439	0.071
	2	67.727	20.516				
Social role functioning	1	83.892	20.960	-2.310*	.022	-6.449	0.369
	2	90.341	14.675				
Emotional role functioning	1	75.258	42.568	-2.163*	.032	-12.621	0.345
	2	87.879	31.831				
Mental health	1	75.464	18.997	-1.422	.157	-4.233	0.223
	2	79.697	18.139				

Group 1: DPE group; Group 2: IPE group; MD: Mean difference.

in PA reported better mental health perception than the people who decreasingly engaged, especially in the social functioning and the role of emotional functioning. Previous studies also demonstrated that the higher level of PA had benefits for social and emotional functioning in older adults.¹⁸ Through PA alternatives in daily life, older adults feel more freedom and sense of autonomy, which are important elements in later life,^{15,20} and it might be helpful in reducing the stress in their life that results from not living independently. Consistent engagement in PA helps residents to adjust their mood, emotions, social interaction, and purposeful living during the transition of life events.¹⁵

There was an insignificant difference in the score of perceived physical health between the two groups; however, the results still showed the potential trend that the people who increasingly engaged in PA reported better physical health perception. One of the possible explanations could be that the participants in this study preferred quiet and mild PAs. Previous studies showed moderate-to-vigorous PAs positively associated with perceived physical health.¹⁸ Although PA alternatives would be influenced by aging and physical conditioning, it is important to encourage the older adult to engage in moderate-to-vigorous PAs for maintaining their physical functions, increasing their physical role of functioning, and decreasing body pain.¹⁸

Overall, the results demonstrated that individuals who increasingly engaged in PA had better HRQOL than those who did not, especially in mental health. Previous studies demonstrated similar results about the positive correlation between PA and HRQOL. Older adults' level of leisure-time PA and number of PA programs participation were positively influenced HRQOL.¹⁶ Older adults engaged in the counseling and practices of PA promotion intervention had a significant improvement in HRQOL.²⁹ Older adults who had more PA and less sedentary behavior had better long-term HRQOL.¹⁸ The consequences of productive engagement in PA are positive influences in personal psychological and spiritual well-being and perceived HRQOL.^{8,12}

There were several limitations in this study. First, data were collected retrospectively by memory-based investigation after relocation. In addition, self-reporting could cause bias. Second, the MET estimated was based on the guideline, but the details of PA were not investigated. For example, the information about the speed of walking, running, and swimming was not asked. In these cases, the lowest MET of the same category was used. Furthermore,

the same body weight of older seniors before and after relocation was assumed. Third, participants' perceived HRQOL before the admission is unable to measure. It could be a covariable.

Conclusion

Consistent productive engagement in physical activity showed a positive influence on the perceived mental health among the older adults after their relocation. Although the types of PA might be replaced due to aging itself or a change in circumstance, productive engagement in physical activities maintains their sense of independence, personal learning and growth, and social well-being.³⁰ Indeed, the older adults who continually and increasingly engaged in PA presented an active and healthy lifestyle.¹⁷ Therefore, it is important to create an activity-friendly environment in LTC facilities to encourage productive engagement in PA for the older adult throughout the aging process, in order to help them overcome the negative impact of life events.²⁸

Conflicts of interest

Dr. Hsin-Yen Yen declares that he has no conflict of interest. Dr. Li-Jung Lin declares that she has no conflict of interest.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jesf.2018.06.001>.

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