

The effects of physical activity based intervention program focusing on elderly people living in a twilight home

Abstract of PhD Thesis

István Barthalos

Doctoral School of Sport Sciences
University of Physical Education



Supervisor: Dr. József Bognár professor, PhD
Official reviewers: Dr. Csaba Nyakas professor emeritus, DSc
Dr. István Vingender college professor, PhD

Budapest
2019

Introduction

According to the data of the Hungarian Office of Statistics, people over sixty years of age make up about one-fifth of the Hungarian population and their current number is more than two million (KSH, 2018). At present, eighty thousands of the old people currently live in various homes/institutions providing temporary or permanent accommodation for them. Due to major economical and societal changes in the last decades, it is the society's increasing duty to support and facilitate elderly people. For that particular reason and because of the consequences of the aging society, the role of the institutional care for the elderly has become more significant than ever before.

As years are passing in the individual's life, generally the metabolic processes and the adaptability of human body decreases, the cognitive and mental capabilities decline (Róbert, 2006) as well as quality of life, self-supporting abilities and of social and physical independence (Semsei, 2014). Elderly people's everyday tasks slow down, it becomes more difficult to carry out and they gradually feel isolated and unwanted (Vagetti et. al., 2014). Also, the fear from illnesses and from the proximity of death appears in their life (Tróznai & Kullmann, 2007).

The primary reason for the distinctive poor health of Hungarian old people lies in the areas of unhealthy lifestyle and deficient health culture (Lelovics, 2009). Furthermore, the effects of various negative social processes, environmental damages and inherited qualities cannot be neglected (Iván, 2002). How much impact aging has on elderly's quality of life mostly depends on the individual's lifestyle, the level of harmful addictions, food consumption, regular physical activity and social relationships (Róbert, 2006; Valliant and Mukamal, 2001).

Participating at regular physical activities (PA) improves the level of motor abilities, the oxygen supply of the brain and therefore having a positive effect on the mental abilities, thinking, concentration and general dispositions of elderly people (Marton, 2010). On the other hand, regular PA decrease achiness, physical restrictions and the number of falls (Messier et. al., 2000). Leading an active and healthy lifestyle can considerably decrease the risk factors of certain illnesses (Carta et. al., 2008), and it can contribute to the improvement of older people's social relationships emotional condition and mood (Palo-Bengtsson & Ekman, 2002; Penninx, 2002).

Our research group contributed to the existing knowledge and the impact of PA intervention programs on the areas of fitness, body composition, quality of life and attitude to aging (Barthalos et. al., 2009a, 2012, 2016; Kopkáné et. al., 2009, 2011a, 2011b, 2014, 2015,

2016; Kopkáné, Vécseyné, Bognár, 2012; Olvasztóné et. al., 2007, 2010, 2011, 2012; Vécseyné et al., 2007, 2008, 2009, 2010, 2011). However, the number of empirical studies focusing on the complexity of lifestyle, quality of life, fitness level, and self-evaluation about own health is rather low (Kovács, 2006; Majercsik, 2004). Hence, there is a need for further studies on how PA can impact old people's lives in various areas (Vagetti et. al., 2014).

On the basis of the above, the aim of our research was to demonstrate the changes in the quality of life, attitude to aging, motor fitness, body composition, ability to concentrate, assertiveness, social and cognitive skills of inactive pensioners living in an old people's home after a 15-week organised program. Based on previous literature and also on our experiences in the field, we stated the hypotheses as follows:

1. The components of quality of life and attitude to aging of the two experimental groups will significantly improve as a result of the program.
2. The components of motor fitness and body composition of the two experimental groups will significantly improve as a result of the program.
3. The components assertiveness, social and cognitive skills of the two experimental groups will significantly improve as a result of the program.
4. It is expected that there will be significant differences between the two experimental groups for the favour of "PE & Mental" group regarding all measures

Methods

The Unified Institution of Medical and Social Care (EESZI) of the County City of Győr was chosen for this study. EESZI is responsible for social and core services, and also the specialist care of the city's old population.

During the course of the study there were 135 older people living in the institution. Most of them can be characterized with high blood pressure, musculoskeletal diseases, diabetes and vasoconstriction. Most old people in the institution need 24-hour care, they need support for activities such as walking, having a bath, dressing and eating.

The frame and quality of the accommodation of EESZI is similar to other old people's homes of this category in the country. The elderly live in rooms with two or three beds. EESZI frequently organizes recreational activities, however, the physical activity played no role in these programs in the past.

An important principle of choosing the actual methods was that they should meet not only the ethical standards and specifications but also the criteria of validity and reliability.

Sample

The most important factor in choosing the sample was the following:

- minimum 65 years of age,
- inactive lifestyle,
- have general practitioner and staff permit for the planned motor activities,
- be able to securely perform the physical tasks.

Altogether 45 people met these criteria and everybody agreed to participate in the study. Participants were requested to take part every PA session. Those missing more than 5 sessions altogether, were taken out of the analyses (n=15). There were 30 old people completing the program with less than 5 missed session ($M_{age}=79,35\pm 8,00$). Three groups were randomly created from those participating in the program:

- primarily gym activities directed and conducted by a specialist (a qualified physiotherapist and P.E. teacher) twice a week for 45 minutes (Group T) (n=11).
- primarily gym activities directed and conducted by a specialist (a qualified physiotherapist and P.E. teacher) twice a week for 45 minutes and lectures and discussions on lifestyle, health and physical activity (held by a mental health professional) once a week (Group M) (n=10)
- control group (no physical activity and no lectures on lifestyle and health) (Group C) (n=9)

The highest level of education was less than 8 years of primary education (n=16), primary school leaving exam (n=12) and higher education certificate (n=2).

Each participant signed an ethical consent and all permission was obtain in the appropriate ethical process.

Intervention

The physical activity for the two experimental groups was designed and carried out according to the age and conditions of the participants. Due to the inactive status, the program started with an easy load. Strength training, coordination, articular and stamina development played the key role throughout in the program. It was our aim to provide success and fun oriented

experiences using different apparatus and tools, focusing mostly on those abilities and skills that needed for everyday activities.

Data collection

Each participant was tested before and after the 15-week physical activity-based intervention program with the following methods:

1. A valid test of WHOQOL-OLD (Tróznai & Kullmann, 1999, 2007) examining what older people think and how they feel about certain aspects of their life quality. The test consists of 24 items with a five-stage scale (1-5, number 5 refers to the best and most agreed value while number 1 refers to the worst and least agreed one) the subscales of which are the following: Sensing abilities, Autonomy, Planned activities of past, present and future, Community participation, Issues of death and agony and Perceptions of intimacy.
2. A valid 24-item test of WHO-AAQ focusing on aging attitudes from an aspect that believes in life-long development. (Laidlaw et al, 2003). On the 1-5 scale of answers number 5 refers to the best value while number 1 refers to the least one (Tróznai & Kullmann, 2007). The subscales divided the questions into three sub-scales: Psycho-social Loss, Physical Changes and Psychological Development and Wisdom.
3. Fullerton Motor Fitness Test that has good validity scores (Jones and Rikli, 2000; 2001; 2002). This test is suitable for the survey of the physical condition of older people. It consists of the following exercises:
 - a. assessment of leg strength: a 30-second chair test consisting of stand-ups and sit-downs. The activity is assessed on the basis of the number of exercises (number).
 - b. assessment of arm strength: bending and stretching arms for 30 seconds (women with a 2-kg weight, men with a 3.5-kg weight). The activity is assessed on the basis of the number of exercises (number).
 - c. assessment of fitness: a 6-minute walk. The activity is assessed on the basis of the distance performed (meter).
 - d. assessment of the mobility of shoulder joints: putting fingers together behind the back by one hand nearing downward from above the shoulders and the other hand moving upward from below. The activity is assessed on the basis of the distance performed (+ or - cm).
 - e. assessment of the mobility of legs: bending forward from a chair to the stretched legs. The activity is evaluated on the basis of the distance performed (+ or - cm).

- f. assessment of dynamic balance and mobility: standing up from a chair and sitting down after getting around a buoy placed 2.5 meters from the chair. The activity is assessed on the basis of the speed (sec).
4. In order to be able to determine the anthropometric features of the participants, height (cm) and weight (kg) was measured and the data was used for calculating Body Mass Index (BMI), (kg/m^2).
5. The valid Rathus test was applied to measure the participants' assertiveness and social abilities in interpersonal situations (Rathus, 1973; Perczel and Tringer, 1995; Perczel, Kiss and Ajtay, 2005). In the 30-item Rathus test the achievable scores are between -90 and +90. Higher scores mean higher assertiveness. The five subscales of the test are the following: Uncertainty and Self-esteem Problems, Expression of Emotions, Self-assertion in Consumer Situation, Saying No, and Personal Participation in a Relationship.
6. The Folstein Mini Mental Status Survey is a test consisting of 30 questions (Folstein et al, 1975) which is suitable for filtering cognitive damages, for diagnosing dementia and for determining the degree for that. It assesses the mental arrhythmia, memory and orientation of the respondents. Furthermore, data on time and space orientations, counting, reading and writing abilities, the status of the short-term memory, the recognition of basic objects and about the ability to revoke memories were all analysed. The answers are assessed on the basis of a pre-established system of scores which helps to diagnose the degree of dementia: Normal (scores 24-30), Low Dementia (scores 15-23), Moderate Dementia (scores 10-14), Serious Dementia (scores <10)

Data analysis

The data were first analysed for tests of normality (Kolmogorov-Smirnov test Z) and homogeneity in order to confirm the similarity of the groups. Afterwards, descriptive statistical analyses were applied to all 24 scales both together and in the three groups. Then, paired t-test, Univariate and Repeated measures tests were applied to compare and contrast pre- and post tests and also for the effects individually and in combination of the measures. Group Variable contains the variables assessed (number of levels = 24) while Group Time consists of the two time periods of assessment (number of levels = 2). For the statistical analyses Statistica for Windows 13.2 statistical program was applied with $p < 0,05$ in the case of each statistical test.

Results

Highest level of education as an influential variable

The impact of highest level of education was assessed in all 24 variables and we found only one significant difference. Participants with a primary school leaving exam think significantly more about death and dying than the other participants.

There were no further analyses in the results section focusing on higher level of education.

Pre- and post tests

On the basis of the analysis of **Quality of life**, we can state that older people in our sample show very low values (1-5 scale). The values of Sensing Ability ($M=2,85\pm0,98$) and Intimacy ($M=2,37\pm0,56$) are both exceptionally low but the lowest values are shown in the case of Death ($M=1,93\pm0,78$). The standard deviation is quite big in all of these categories (0,27-1,61). The Autonomy ($M=3,36\pm0,92$), Past, Present, Future ($M=4,08\pm0,91$) and Society ($M=3,40\pm0,73$) subscales show average values. The post-test measures have a tendency of higher values in most subscales than the pre-test.

As regards to **Attitude to aging**, we can find average values regardless of group or time of assessment ($M=3,02-3,59$) with acceptable standard deviation values (0,30-0,73). The post-test measures have a tendency of higher values in most subscales than the pre-test.

The **Anthropometric measures** including height ($M=153,24\pm7,96$) and weight ($M=65,62\pm12,68$) and, subsequently, the BMI ($M=27,86\pm5,75$) values of the sample are appropriate to the general values of the inactive members of this age group. There were no difference between pre- and post-tests results.

As regards the tests of **Motor fitness**, the values of Standing up from a Chair and Upper Arm Strength show that the members of our sample are to be considered physically weak ($M=9,33\pm3,56$; $M=13,67\pm4,39$). Taking into consideration the general characteristic features of the sample members, the results of the 6-minute walk measuring stamina ($M=221,97\pm87,59$), the mobility of shoulder joints and legs ($-1,98\pm10,59$; $M=-0,92\pm21,82$), and also the Dynamic balance ($M=13,46\pm7,26$) can be regarded as normal and acceptable in this age group. The test results related to the Flexibility of Legs and Dynamic Balance are

similarly typical of the age group. The post-test measures have a tendency of higher values in most subscales than the pre-test and there is a great difference among the three groups.

The **Rathus** total value ($M=11,79\pm 12,92$) is considered as standard and the values of the following sub-scales are also regarded as average. There were no difference between pre- and post-test results, neither and among the groups.

After analysing the scores of Minimental test, we can state that our sample belongs to the normal range of the dementia category system. ($M=25,03\pm 4,26$). There were no difference between pre- and post-test results, neither and among the groups.

There were no difference in Attitude to aging, Anthropometric measures, Rathus and Minimental tests. However, there were meaningful difference in the following variables: Sensing abilities, Planned activities of past, present and future, Community participation (WHOQOL OLD), a 6-minute walk and dynamic balance (Fullerton motor fitness). Both experimental groups (T & M) improved significantly more than the control group in all 3 WHOQOL OLD variables and the 6-minute walk ($p<0,05$). Group M on the other hand developed significantly more in dynamic balance than groups T and C ($p<0,05$).

Multivariate analyses

It cannot be statistically proven that the PA based intervention made a significant improvement in the 3 groups and pre- and post-test. The intercept, the variables, the variables-time, and variables-group showed significant results, however the overall impact cannot be stated in the Quality of life variables. The intercept and the variables showed significant results, however the overall impact cannot be stated in the Attitude to aging variables. In this measure group M demonstrated a clear tendency of improvement. All three groups improved in the Attitude to aging variables but the difference is not significant. The intercept and the variables showed significant results, however the overall impact cannot be stated in the Fullerton motor fitness variables. The intercept, the variables and variables-group showed significant results, however the overall impact cannot be stated in the Rathus variable. There were no difference in Minimental test measures.

Discussion

The primary purpose of this study was to find out what changes a 15-week long PA based intervention can cause on different measures on minimum 65 year-old inactive population. It was not our intention to measure long-term effects.

The impact of PA on elderly is proven on various physical, social, mental and psychological aspects (Brown et. al., 2004). The success of such longitudinal interventions primarily lie on the length, content and form of such program, and also qualities of participants play an important role. According to previous research, more positive changes can be detected in old people with better health and financial status, if they are younger, living in the capital, and have a better mood in general, however, sickness, gender and medicine consumption did not have an influential differentiating factor (Tróznai & Kullmann, 2007).

Our findings clearly demonstrate that the 15-week PA based intervention proved foremost tendencies of positive changes in most of the 24 measured variables. Probably the length of the program was not sufficient to make significant changes in quality of life, attitude to aging, motor fitness, anthropometric measures, assertiveness, social and cognitive aspects as resulted by the multivariate statistics. Nevertheless, it is considered a major positive outcome that the steepness of mean values is clear in positive direction and the values of standard deviations are narrowed for the post-test. In our opinion it reflects an improvement, even though the results of multivariate statistics did not support it.

Testing hypotheses

According to the literature, longer intervention programs bring about more positive changes in old people's quality of life (Cartaet al, 2008), mental and psychological aspects (White et. al., 2009), and also autonomy, attitude and social relationships (Brach et. al., 2004; McAuley et. al., 2008). Our 15-week long intervention could not support these previous research findings. Yet, we can state that the elderly has improved in sensing abilities, past-present-future tasks, and community participation as a result of a short program. In the aspects of attitude to aging, there are clear trends in improvements. It is believed that in this study the presence of outside personnel made a significant contribution to the whole institution, including the members of the control group. That is why **first hypothesis** "The components of quality of life and attitude to aging of the two experimental groups will significantly improve as a result of the program" can be partly accepted.

Physical activity plays an important role in the maintenance of the quality of everyday activities and routines (Eggermont et. al., 2006). One of the major reasons for the decline in old people's life functions is the lack of physical activity (Rolland et. al., 2007). Regular PA has a distinct positive effect on old people's condition and coordination abilities and along with that, it supports the decline of pain, limitation of movement and fall (Koltyn, 2001; Miskó, et. al., 2003; Stengel et. al., 2005). In our intervention-based study it was found that

6-minute walk and dynamic balance improved for the post-test. Besides, there were promising results in the other Fullerton motors fitness variables. There were also some variables developing in the control group. We believe that once we went into the institution, we made an impact on all people towards the importance of physical activity and health. Besides inactivity, even small changes in body composition can be a ground for major functional problems and the loss of muscle content can significantly influence old people's way of life. We could not prove major changes in body composition in our 15-week long study. It seems this length was not long enough for making improvement in BMI. It must be stated that the training sessions had a low intensity load due to the age and health status of participants. Hence, the **second hypothesis** "The components of motor fitness and body composition of the two experimental groups will significantly improve as a result of the program" can be partly accepted.

Assertiveness and life-quality are in strong correlation with the individual's good general disposition, mental status and satisfaction (Srivastava et. al., 2003; Stobble et. al., 2010). Old people living in cities tend to express emotions easier and there is a positive correlation among health conscious behavior, health status and social relationships (Olvasztóné et. al., 2011, 2012). It is no surprise that there is a decline in cognitive skills and status with the aging process (Horváth et al., 2010). Regular physical activity is proven to decrease the possibility to develop dementia (Larson et. al., 2006) and also to increase the level of cognitive and functional abilities (Arcoverd et. al., 2008). Most of the studies based on longer intervention programs and so the length might be the reason our study could not make significant contribution to the increase of assertiveness, social relationships and cognitive skills. An especially positive change took place in the feelings of uncertainty among the members of group M. It means that the discussion of physical, mental and social problems comforted the group members. Considering the results of our research, we can conclude that the participants demonstrated normal values in the Minimental test in the course of the pre-assessments and no significant changes occurred for the post-test. The improvement detected in the control group is likely due to the fact that the group members welcomed even the minimal care shown towards them by outside personnel. The **third hypothesis** "The components assertiveness, social and cognitive skills of the two experimental groups will significantly improve as a result of the program" is then rejected.

Experience proves that in order to have a successful program, a good protocol, selection, optimalization and compensation is needed (Kaszás & Tiringner, 2010). In our study, the purpose, the appropriate methods were emphasized as well as the aspiration to make

improvement. Our research was not as successful as we planned in proving the meaningful and statistical development of our experiment groups. The two experiment groups showed improvements but this result was not distinct and straightforward. The fourth hypothesis “It is expected that there will be significant differences between the two experimental groups for the favour of “PE & Mental” group regarding all measures” is then rejected.

The value of our study, conclusions

Summarizing our results in total, it can be sad that regarding the three groups and the two assessments, we achieved remarkable results regarding time and groups. However, when we assess the groups and time separately, we cannot observe major significant differences. It is probably the result of the fact that participants form a close community and the simple presence of the session leaders brought about changes in the life of the community.

Actually, the results can be demonstrated as a success because the program positively impacted all the institution members. Our aim was to make significant changes in the members of the experimental group and in some cases it did happen so. The members of the three groups shared experiences and probably influenced one another, and from the aspects of the our research it was not a useful thing.

It is apparent from our results, that there were no major changes altogether in quality of life, attitude to aging, motor fitness, body composition, assertiveness and cognitive abilities as related to the three groups. However, important implications can be drawn from this experience. Among the most important results, we underline the quality of life and motor fitness areas because they seem to be the easiest and fastest to develop in the elderly population. There were no statistical difference between pre- and post-test in attitude to aging, body composition, assertiveness, social and cognitive relationships. It might be due to the similar lifestyle and means of life in the institution.

It is evident that regular conversations are important and strengthen old people’s feel of community, security and mood and so the PA based programs with well-planned discussions can have impact not only the motor conditions, but also on other skills and abilities. The motor, cognitive, affective and social aspects of old people can ad should be purposefully developed because it is needed for their everyday activities and self-sufficiency.

There are few studies focusing on the complexity of institutionalized elderly’s PA based interventions and its effect on motor fitness, body composition, cognitive, affective and social skills. Hence, our study show a direction for further studies. Further longitudinal studies are necessary to determine the optimal length and type of a training program that

would generate changes in the fields of older people's skills and abilities other than motor and physical related ones. Also, there is a need to find out how socio-cultural and highest level of education and other background factors influence the success of PA.

List of publications by the author

Publications on related to the topic of the thesis

1. Barthalos I, Dorgo S, Kopkáné PJ, Szakaly Zs, Ihász F, Ráczné NT, Bognár J. (2016): Randomized controlled resistance training based physical activity trial for central European nursing home residing older adults. *Journal of Sports Medicine and Physical Fitness*, 56:(10) 1249-1257.
2. Kopkáné PJ, Bognár J, Barthalos I, Vécseyné KM. (2014): Életminőségi összetevők, testösszetétel és fittségi állapot vizsgálata Észak- és Nyugat Magyarországon - keresztmetszet elemzés a 60 év feletti lakosság körében. *Népegészségügy*, 92:(1) 44-50.
3. Vécseyné KM, Kopkáné PJ, Bognár J, Olvasztóné BZs, Barthalos I. (2013): Effects of Pilates and aqua fitness training on older adults' physical functioning and quality of life. *Biomedical Human Kinetics*, 5:22-27.
4. Barthalos I, Bognár J, Fügedi B, Kopkáné PJ, Ihász F. (2012): Physical performance, body composition, and quality of life in elderly women from clubs for the retired and living in twilight homes, *Biomedical Human Kinetics* 4:(1) pp. 45-48.
5. Ország M, Kopkáné PJ, Barthalos I, Olvasztóné BZs, Benczenleitner O, Bognár J. (2012): Effects of 12 Weeks Intervention Program on Old Women' Physical and Motivational Status, *Educatio Artis Gymnasticae*, 57:(2) pp. 77-86.
6. Olvasztóné BZs, Bognár J, Barthalos I, Kopkáné PJ, Németh TR. (2012): Quality of life, assertiveness, and personality dimensions in elderly men, *Biomedical Human Kinetics*, 4:(1) 88-92.
7. Kopkáné PJ, Vécseyné KM, Ihász F, Barthalos I, Ráczné NT, Bognár J. (2011a): Fizikai teljesítményszint és testösszetétel összehasonlítása öregotthonban lakó és nyugdíjas klubba járó 60 év feletti nők körében, *Népegészségügy*, 89:(1) 27-31.

8. Kopkáné PJ, Vécseyné KM, Olvasztóné BZs, Barthalos I, Bognár J. (2011b): A rendszeres testmozgás hatása a csontritkulás megelőzésére, kezelésére, valamint az elesési- és csonttörési kockázat csökkentésére idős korban. Magyar Sporttudományi Szemle, 12:(46) p. 49.
9. Kopkáné PJ, Vécseyné KM, Barthalos I, Bognár J. (2009): A rendszeres testmozgás jelentősége a fizikai és mentális öregedési folyamatok lassításában, Kalokagathia, 47-48:(4-1.) 12-25.
10. Barthalos I, Bognár J, Ihász F, Kányai R, Ráczné NT. (2009a): Idős nők antropometriai és motoros jellemzőinek változása 15 hetes mozgásprogram hatására, Magyar Sporttudományi Szemle, 10:(37) 35-37.
11. Barthalos I, Ihász F, Szakály Zs, Konczos Cs, Nagyvárad K, Bognár J, Nagy N. (2009b): Aged people and the physical activity: motion intervention in Social Care Center in Győr, In: Hughes, Mike, Dancs, Nagyvaradi (szerk.) Research in Sport Science Cardiff: Data2Win, 2009. pp. 222-255. (ISBN:1-901288-00-13).
12. Barthalos I, Konczos Cs, Szakály Zs. (2008): A fizikai aktivitás növelése újszerű módszerek alkalmazásával az egészségtudatosság kialakítása érdekében, Kalokagathia, 46:(1) pp. 114-121.

Publications on not related to the topic of the thesis

1. Konczos Cs, Bognár J, Szakály Zs, Barthalos I, Simon I, Oláh Z. (2012): Health awareness, motor performance and physical activity of female university students, Biomedical Human Kinetics, 4:(1) pp. 12-17.
2. Szakály Zs, Lehmann T, Barthalos I, Konczos Cs, Liszkai Zs. (2007): Experience of bike training with ergometer in young triathlets, Kalokagathia, 47:(3-4) pp. 149-154.