

Review Article

## Occupational Therapy Role in Improving Health and Slowing down age-related declines: A systematic review

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### Abstract

#### Background

From a global perspective, aging people from 60 years and over were 962 million in 2017 and it is expected to reach 2.1 billion by 2050. When elderly people are not engaged in daily life, they become physically, socially and mentally impaired. The occupation-based interventions in elderly people improve their health and self-satisfaction in daily activities.

#### Objective

The aim was to analyse the role of Occupational Therapy in improving health and slowing down age-related declines.

#### Methods

The study was a systematic review of literature. Information on Occupational Therapy interventions was systematically searched from Cochrane library, MEDLINE and EMBASE database publications. The selection process of the studies was documented using PRISMA guidelines for intervention protocols.

#### Results

Literature search yielded 68 titles of relevant records. Of these five studies met inclusion criteria. One study explored the difference between group intervention and individual intervention; the results favoured group intervention. Comparison of Inter-professional approach with Occupational Therapy, the results favoured inter-professional practice in this population.

#### Conclusions

Occupational Therapy interventions seem to be effective in slowing down age related declines. However due to the heterogeneity in the intervention procedures, and duration of intervention, we suggest rigorous RCTS be undertaken to confirm that OT interventions delay age related declines.

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**Keywords:** Age-related decline, Health and Occupational therapy

## Background

Aging is one of the trajectories of life throughout the lifetime. It is a biological reality which has its natural variables, mostly not under human influence.[1] However, old age definition is also subject to the meanings embraced by each society. In the developed world, chronological time plays a pivotal role. The age range of 60-65 years, approximately the retirement ages in most developed countries, is said to be the beginning of old age.[1] In contrast in the developing world, chronological time has little or no importance in the meaning of old age. Other socially constructed meanings of age are more significant, such as the roles assigned to older people. Most of the time it is the decline in function accompanying physical decline which is pivotal in defining old age.[1] World health organisation in its working paper on the definition of old age suggests the threshold as 60 years.[1] For statistical and public administrative purposes, old age is frequently defined as 65 years of age or older, however for public health purposes, a 60-year starting point is an important reference age.[2] And for the purposes of this study the elderly was considered to be aged 60 years and above.

Globally, aging people from 60 years and over, were 962 million in 2017 and will reach 2.1 billion by 2050.[3] While as of 2017, more than two thirds of this category of old people lived in developing countries, it is envisaged that their numbers will increase much more and faster in these countries. With the projection between 2017 and 2050, the number of persons aged 60 and above in developing countries is expected to increase from 652 million to 1.7 billion, whereas in developed countries it will rise from 310 million to 427 million in 2050. [3] Thus the projection estimation indicates that in 2050, 79% of the total world population aged 60 years and above will be dwelling in the developing regions.[3] However, there will be the slowest increase of persons of corresponding age in Europe where it will increase from 183 million to 247 million between 2017 and 2050. [3] Contrastingly, in Africa, between 2017 and 2050 the population of 60 years and above will rise from 69 million to 226 million.[3]

The majority of low-income countries are located in Sub-Saharan Africa where the projection of those aged 60 years and above is expected to increase twofold and more than between 2017 and 2050.[3] In Rwanda, Malawi, Uganda and Zimbabwe it is expected to quadruple over the same period.[3]

During the aging process there are physical and physiological changes which result into activity limitation and participation.[4,5] These changes are accompanied by increase in acute and chronic diseases. There is also the weakening in functional and structural organs, wasting of tissues and cells, thus losing the ability to cope with different environmental factors.[6] Consequently, the quality of life diminishes, as these conditions tend to cause disability [3,7,8] while perceived quality of life demands financial means, physical, psychological, mental and social environment.[9]

Increase in lifespan is associated with possibility of disability,[5] especially when the elderly people are not involved in home or community activities; as a result of which they become physically, socially and mentally impaired.[10] Participation in activities of daily living and instrumental activities reduce the risk of chronic diseases.[11,12] Well designed environmental structures favour activity engagement.[13] The use of cognitive stimulation activities which are intrinsic motivation, change the sedentary lifestyle in daily living of old persons and improves mental health.[14] It is important that elderly people have the maximal possible independence through the use of assistive devices or maintenance of the available skills and prevention of further damages.[15] The integrated interventions in elderly people improves health condition, self-satisfaction and improvement in daily activities.[7] It is therefore imperative to determine the role of occupational therapy in improving health and slowing down age related declines among elderly people.

## Methodology

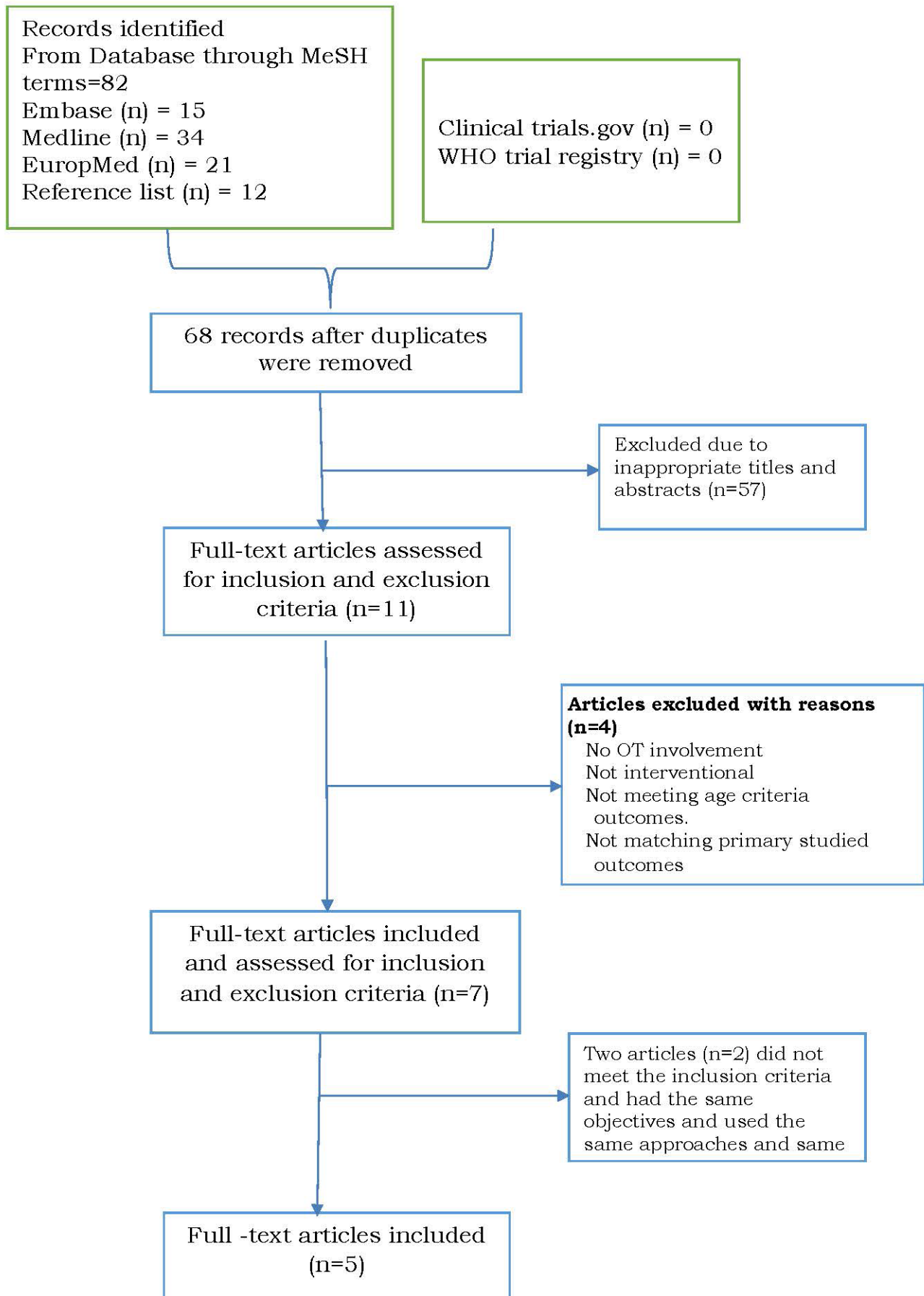
### Study types and participants

We systematically selected randomised controlled trial (RCTs) studies that were published and of which the outcome measure was either improved health or/and slowing down age-related declines. We included studies of which intervention comprised occupational intervention compared with no intervention or standard of care aimed at slowing down age related declines among elderly population. Among the selected studies, methods of assessment of outcomes varied from one study to another, from standardised measures like Autonomy measure [The Measure of Actualization of Potential (MAP)], the Rosenberg self-esteem scale (RSES), and the Korean version of the Beck Depression Inventory (K-BDI) Canadian Occupational Performance Measure (COPM) to interviews on Deterioration in Daily activities.

### Search strategy, identification and selection of studies

The study team first established PICO tool (P=elderly population, I=Occupational Therapy intervention, C=NA and O=autonomy/independence). The team established a search strategy by combining PICO component and using MeSH terms like Occupational Therapy and elderly, Occupational Therapy interventions, Occupational Therapy interventions and Health, Occupational Therapy and age related declines, Quality of Life, Age, Autonomy, independence, functional independence/performance published from 01 January 2008 to 01 May 2019 because we intended to review the most current evidence (10 years to the time of the review). Using MeSH terms, phrases and Boolean operators, we searched different databases and a library and these are; Cochrane library, MEDLINE and EMBASE publications for the period from 01st January 2008 to 01<sup>st</sup> May 2019. We searched again clinical studies (Clinicaltrial.gov and WHO International Clinical Studies Registry) for those with results but pending publication. All selected studies were published in English language.

We further checked the reference lists for principal eligible studies. We removed studies where intervention and or control involved pharmacological agents as a primary intervention, same intervention applied differently (same intervention applied at different intensity). We excluded studies that included participants below the age of 60 years and those of which the primary outcome measure decline was not age related. We also excluded studies where our primary outcome was not apparent in the published studies. The Mendeley citation software was used for management of citations. Duplicates were removed and those remaining were evaluated by three reviewers using a predetermined template (Table 1). The titles and abstracts of all identified studies from searches were independently examined by the reviewers, and removed the studies that were clearly unimportant and not meeting the eligibility criteria. Once full articles of possibly important studies had been recovered, the same three independent reviewers evaluated them for possibility of inclusion. Where differences occurred they were settled through discussion and mediation of an expert in Occupational Therapy. The selection process of studies was documented by using PRISMA flow chart (Figure 1), the list of removed studies with their reason are explained in a separate file (see additional file).



**Figure1. Flowchart showing selection process of the articles**

**Assessment of risk of bias**

**Table 1. Assessment of risk bias**

	Random sequential generation	Allocation concealment	Blinding of Participants & personnel	Blinding of outcome assessment	Incomplete outcome data		Other bias
Dehlin et al	low risk	low risk	low risk	high risk	? unclear	? unclear	baseline
Jung et al	High risk	high risk	high risk	high risk	low risk	low risk	low risk
Andresen et al	? unclear	? unclear	low risk	low risk	? unclear	? unclear	baseline
Toledano et al	? high risk	? low risk	high risk	high risk	low risk	low risk	low risk
Voight-radloff et al	high risk	low risk	high risk	high risk	? unclear	? unclear	baseline

Three reviewers evaluated the risks of bias of each selected study separately. Disagreements were settled through discussion. To assess risk of bias we utilized the Cochrane Handbook for systematic reviews.[16] We classified each risk as low, high or unclear risk of bias and, our judgement across various articles for each class is as shown in Table 1.

**Risk of bias across the studies**

Selective reporting and incomplete data due to failure to report results of the intervention was graded as unclear because this would neither influence the recommendations positively nor negatively. The studies which did not publish results of actual intervention was because the intervention was either ongoing or published separately. We found three studies.[9,13,17] in this category and out of these, two [13,17] were bias free and one,[9] had issues of randomisation and group allocation that were unclear. For example, the authors report stratification based on gender and participants divided in lots (control and intervention) without specifying the methodology.

*Randomisation and allocation:* Participant group allocation were clearly described in two studies.[17,18] The random sequence was done by either registry and simple random chart or computer generated. We therefore assigned them a low risk. The trial,[19] did not give the details of the methodology of randomisation and participant allocation to

groups and there were other potential confounders at baseline such as age which could affect the primary outcome, and it was downgraded as high risk. Two studies,[9,18] did not describe clearly the method of randomisation of participants and allocation to groups.

*Blinding:* Generally, it was quite difficult to achieve double blinding in the studies because outcome measurements were what constituted the participants perceived response (i.e. feedback), only three studies,[9,17,19] reported participant, personnel and outcome blinding. We considered studies low risk if participant and/or personnel knowledge of outcome of intervention would not constitute a bias.

*Incomplete outcomes data:* We assigned the study a low risk grade only when there were complete data or data that were missing were unimportant with respect to the primary outcome of interest or missing data balanced on both intervention group(s) and the control. Two studies,[13,18] were free of bias while the rest were graded as unclear. [9,13,17]

*Selective reporting:* We considered studies low risk if all baseline and intervention results were clearly reported. Two studies,[18,19] were ranked low risk in this domain and the rest three,[9,13,17] unclear risk of bias because they reported only baseline data.

Data extraction, presentation and analysis  
Data extraction was done after three reviewers agreed on prior determined selection criteria, then data extraction form was prepared. We utilized Microsoft office Excel to obtain the study features of interest. Two reviewers autonomously selected data from the studies. We settled down all arguments through discussion. The characteristics that were extracted included country in which the study was conducted, year, study design, age of the sample, intervention duration and Occupational Therapy role in the intervention (Table 2). Given the small number of eligible studies and the diversities in the result measures meta-analysis was not performed. Instead, a descriptive analysis of results as observations per group was done.[20]

## Results

### Results, category of interventions

The selected studies were either individual or group treatment programs without pharmacological therapy aimed at improving health and slowing down age-related declines. Individual or group interventions were defined as a single or a group clients/patients living in a long-term care facility, patients in a rehabilitation facility or general hospital. The comparison was defined as no intervention or standard care for non-interventional group. The essential results were improved autonomy. The auxiliary results were satisfaction, self-esteem, Well-Being, Self-Efficacy and any other measure of independency that is age related.

The Denmark study,[9] assessed autonomy among elderly population in residential homes. The conception of independence is frequently utilized alternatively by having the choices and being in control. Perceived short of control was detrimental to physical health, mental health and, when aged people had sentiments of control of their own daily living activities, their quality of life improved. The Korean study compared self-esteem, depression, and leisure activity among intervention and control groups. [19] The interventional group's self-esteem remarkably increased by the end of the study ( $p < 0.05$ ).

Likewise, the interventional group's depression remarkably decreased by the end of the study, ( $p < 0.05$ ). The non-interventional group's self-esteem and depression, however, did not remarkably change after the study. The interventional group's upper limb muscle strengths and flexibility remarkably improved ( $p < 0.05$ ). However, these results need to be discussed in light of the small sample size of the study with experimental group ( $n=7$ ) and control group ( $n=5$ ).

The Spain study,[18] in which they assessed, psychological well-being, general self-efficacy, independence and depression, the intervention group had group occupational therapy activities and the control had individual occupational therapy. At pre-test both groups primary variables measurements were the similar; but at post-test comparison, there was significant increase in autonomous activities of daily living (Barthel Index) in the occupational therapy group compared to individual therapy group ( $p < 0.001$ ) in which the autonomous activities reduced after the intervention. At post-test, individuals in the group therapy demonstrated improved psychological wellbeing. On the other hand, in the individual therapy, the outcomes were better in self-acceptance ( $p < 0.001$ ) and positive association with other variables. Nevertheless, there was significant improvements in both group and individual treatments in psychological variables of general self-efficacy ( $p < 0.001$ ). However, it is worth noting that total self-efficacy was lesser in individualized occupational therapy than in group occupational therapy.

The German multi-centre single-blind randomised controlled trial design study was carried out in seven health care centres.[17] The study had two arms; the intervention arm and the control arm. In the intervention, participants received Community Occupational Therapy Program for five weeks, 10 sessions, and sixty minutes each session. For the control group, patients and caregivers together received a Community Occupational Therapist Consultation for one-hour by the same study therapists who conducted the therapeutic intervention.

The purpose of the interventions was to improve the functional ability of patients and principal caregivers. The patient therapeutic interventions emphasise on enabling the performance ability of highly purposeful daily activities. The principal results were patients' daily functioning ability which was assessed by the performance scale of the Interview for Deteriorate in Activities of daily living in Dementia and video tapes of daily activities. The auxiliary results were the quality of life, mood and satisfaction with interventions for both patient and caregiver; the carer's sense of ability, carer's daybook (medications, resources utilisation and time of informal cares), and the occurrence of long-term institutionalisation. However, there were no findings presented possibly this was a longitudinal study that is ongoing pending results publication.

The Gothenburg, Sweden study had three groups; two intervention groups (A & B) and one control group.[13] It was a health-promoting program for the pre-frail population, therefore for the Occupational Therapy interventions the *essential outcome measures were the indicators of Frailty* (weakness, fatigue, weight loss, low physical activity and poor balance, slow gait speed and impaired cognition), performance of daily activities and morbidity.

While auxiliary outcomes were quality of life, life satisfaction, assistive devices technology, accessibility, feeling of loneliness, social interaction, social support, participatory activities, falls, fear of falling, health care consumption and mortality.

In this study, the baseline features indicated that most (80%) of the participants, experienced good/very good or excellent health. However, the indicators of frailty demonstrated that the participants experienced distinct degrees of frailty. Around 40% of the participants experienced fatigue, 60% had visual impairments, and 22-36% reported a low level of physical activity. This can be seen as cardinal characteristics of target group.

However, proper randomisation should guarantee that the groups are identical at baseline in terms of characteristics such that at the end of intervention the difference is attributed to trial effects. There were no final study findings to show the intervention effect; possibly results will be published in the future.

In most African countries, life expectancy is gradually increasing and consequently there will be a large number of people in the old age bracket.[21] Nevertheless, there were no similar studies conducted in the African region to inform public health policies in terms of health insurance schemes, health spending, and prevention programs.

### **Results of search, included and excluded studies**

Databases and different resources searched yielded 68 titles of possibly important records. Of these, five studies met the eligible criteria and the PRISMA flow diagram shown in Figure 1 summarizes the selection process of study. Table 1 shows more of the included study features. We considered four randomised controlled trials,[9,17,18,19] and one pre-test post-test study,[13] totalling five studies. These were published between 1st January 2008 and 1st May 2019, of which three were conducted in Europe (Germany, Spain and Sweden), one each in Korea and Denmark. All trials recruited participants and collected primary data. The study interventions varied from two months to one year and the interventions were varied including planned physical exercise, cognitive-enhancement group training program, education materials for the elderly and psychosocial skills training, all aimed at improving independence, autonomy, wellbeing, and self-efficacy.

**Table 2. Data charting**

<b>Author, (Year)</b>	<b>Country/ Setting</b>	<b>Sample</b>	<b>Design and Age of the sample</b>	<b>Duration of intervention</b>	<b>OT Role</b>
Andresen & Puggaard, 2008 <sup>9</sup>	Denmark	50	RCT Aged 65 and above	24 weeks' program Receiving daily treatment	OT as part of multidisciplinary team
Voigt-radloff et al, 2009 <sup>17</sup>	Germany	85	RCT, aged 65 and above	5 weeks; 1h/ week, 10 sessions, Follow up; Week 16 Week 26 and Week 52	OT involvement only
Dahlin-Ivan of et al 2010 <sup>16</sup>	Sweden	491	Experimental design, age 80 years	11 months, 1 year follow up; Four weekly education	Multidisciplinary OT lead the groups and provide the information during home visits and group meeting
Toledano-González et al 2018 <sup>15</sup>	Spain	70	RCT-pre-post design	Three 45 sessions per week 4 months Follow up; 3 months	OT involvement only
Jung et al., 2018 <sup>22</sup>	Korea	30	Pre and post-test design, 65 years and above	2 months; 60 minutes each week, 3 times per week, 30 minutes per session	OT and nursing facilities

**Effects of intervention and outcome***Primary outcome*

The review intended to systematically gather research evidence on the role of Occupational Therapy in improving health and slowing down age-related declines. Improved health and wellbeing in elderly age can be measured by different parameters that affect daily life of the elderly. These parameters range from autonomy, psychological well-being, performance of daily activities, depressive conditions, as well as self-efficacy frailty indicators like fatigue, weakness, and falls.

Included studies assessed primarily outcomes ranging from psychological well-being, performance of daily activities, morbidity, depression and autonomy. One study,[17] explored the effect of individual and group therapy on self-efficacy and well-being and the results showed a positive correlation between well-being and self-efficacy, being greater at a group level than at an individual level. Three studies,[13,17,18] reported only baseline data, which did not allow for interpretation to be made.



However, for one the primary indicators to be assessed included frailty, performance of daily activities and morbidity; while another one,[9] autonomy. The Asia study,[19] evaluated combined effect of exercise and cognitive enhancement on cognition and depression showed significant improvement some of the components of cognition, as well as Andresen et al alleviating depression.

## Discussion

The reviewers summarised the five evidence based randomised clinical studies covering a period May 2008 to 2019 with 726 participants. The aim was to analyse the role of Occupational Therapy in improving health and slowing down age-related declines. Generally, the outcomes are optimistic that Occupational Therapy interventions can change so many risk factors related to old age.

Our findings showed that depressive conditions, self-efficacy frailty indicators like fatigue, weakness, and falls were less frequent in the intervention groups than control groups while autonomy, psychological well-being, performance of daily activities and self-efficacy, were more frequently reported in intervention groups than in control groups. However, our results need to be interpreted in light of two studies reporting baseline results without end line results of the intervention. One study [15] explored the difference between group intervention and individual intervention, the results favoured group intervention.

For inter-professional approach, we also compared one profession managing elderly patients and three studies in which the intervention was inter-professional and showed favourable results.[9,17,19] The heterogeneity might be attributed to a number reasons like different outcome measures, dissimilar methods and intervention durations. Selected studies utilized varied methods of intervention ranging from physical activities/exercise to educational materials and reminders.

The duration lasted from two months to one year; due to the small number of studies we did not do meta-analysis and therefore no sub-group analysis was done to determine the effect of intervention duration. Given that our review did not find any study carried out in Africa or low and middle income country, the primary outcomes of our reviews are less likely to be influenced by income of elderly people or their communities. Therefore, it might be desirable to design similar studies with different delivery approaches due to contextual differences.

Daily functioning, cognition and depression in our review show that they improved significantly in intervention groups compared to control groups,[17,19] despite that we did not evaluate pooled effect due to insufficient studies with intervention results. Nevertheless, the effect would most likely show heterogeneity in the participants' lifestyle due to difference in the degrees of strength of the therapeutic interventions. The intervention periods ranged between 2 months and one year. Because of limited number of studies (five), we were not able to undertake the analysis of subgroups to compare effects of short term and long-term interventions.

Although our review was limited in number of studies having final intervention results the two studies with final results,[17,19] show a similar trend to other studies in similar population.[22] Our review of which the end line results were available, were in conformity with results of individual intervention studies,[23,24,25] in which it was found out that the occupational therapy interventions are oriented to lifestyle and have advantageous effects for ethnically diverse older people. The earlier results also suggest that though our review was conducted on studies in developed countries, it can be extrapolated to Low and Middle Income Countries (LMICs).

## Conclusion

Based on the present review it can be concluded that Occupational Therapy interventions are likely to delay and slow down age related declines. However, due to the heterogeneity in the interventions, we suggest that more well designed RCTs in LMICs with longer follow up period be undertaken to confirm that Occupational Therapy intervention can lead to delayed and/or reduced age related declines among at risk groups. These results need to be interpreted in light of limited number of studies and unavailability of results of some of the included studies.

## Conflict of interest

The authors declare that they have no competing interests.

## Author's contribution

MK searched data bases, reviewed journals, quality control and manuscript writing

JN searched data bases, reviewed journals, prepared manuscript

and JCM searched data bases and reviewed journals

Kowal P, Dowd JE. Definition of an older person. Proposed working definition of an older person in Africa for the MDS Project. Geneva: World Health Organization; 2001.

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