Iran J Public Health, Vol. 51, No.4, Apr 2022, pp.733-745

Review Article

Effect of Home Visits by Nurses on the Physical and Psychosocial Health of Older Adults: A Systematic Review and Meta-Analysis

Emine Ergin [1], Belgin Akin [2], Deniz Kocoglu-Tanyer [3]

1. *Department of Public Health Nursing, Faculty of Health Sciences, İstanbul Aydın University, İstanbul, Turkey*
2. *Department of Public Health Nursing, Faculty of Health Sciences, Lokman Hekim University, Ankara, Turkey*
3. *Department of Public Health Nursing, Faculty of Nursing, Selcuk University, Konya, Turkey*

***Corresponding Author:** Email: emineergin@aydin.edu.tr

(Received 15 May 2021; accepted 19 Jul 2021)

Abstract

Background: One of the best ways to maintain and develop physical and psychosocial health is to make regular home visits. This meta-analysis aimed to determine (by subgroups) the effects of interventions based on nurses' home visits on physical and psychological health outcomes of older people.

Methods: This search was carried out using the The CINAHL, Cochrane, MEDLINE, PubMed, Science Direct, Web of Science, and Turkish databases. Experimental and observational studies were included.

Results: The meta-analysis included 26 (with subgroups 50) out of 13110 studies. The minimum and maximum values of the effect size (Hedges g) were g = -0.708 and g = 0.525, respectively. The average effect size was g = 0.084 (SD = 0.21).

Conclusion: Home visit interventions are effective in reducing the frequency of hospitalization in the older adults, and improving physical and psychosocial health. They are negatively effective on falls and have no significant effect on the quality of life.

Keywords: Older adults; Home visit; Systematic review; Meta-analysis; Health

Introduction

Rapid aging of the world's population is one of the major global demographic trends (1). Population aging is soon a candidate to emerge as a global public health problem. By 2050, one in six people in the world will be > 65 years old (2,3). As fertility decreases and life expectancy increases, the population rate of certain age groups rises. This phenomenon, known as population aging, is progressing rapidly worldwide (4). Although old age is not a problem in developed countries, it can be an issue in developing countries that have not yet completed demographic transition (5).

Recent health policies encourage older people to receive home care, and methods such as home visits are needed in addressing older people health problems (6,7). Home visits done by nurses reduce hospitalization and mortality, as nurses can provide precautions for risky situations. Home visits have a positive effect in the older adults by improving the quality of life (8,9).

In a meta-analysis, investigated the influence of physical activity on physical health through home visits in community-dwelling elderly people and found that studies focusing on the elderly population yielded better results (d = 1.09) (10). A different systematic review (11) and meta-analysis (9) revealed that home visits in the elderly have a weak effect on physical functionality and daily life activities [(SMD = -0.10 (-0.17-0.03)].

This meta-analysis was carried out for the following reasons: a) The recent studies have contradictory results regarding the effectiveness of home visits in the elderly; b) Previous meta-analysis evaluated outcomes such as hospitalization, mortality, quality of life and fall, but the effect sizes were not studied according to subgroup variables (age, intervention, income or duration, and frequency of home visits); c) in this context, there are studies conducted not only with nurses, but also with other health professionals. Therefore, this study was conducted to fill the information deficiency found in other meta-analysis in the relevant literature.

We aimed to determine (by subgroups) the effects of interventions based on nurses' home visits on physical and psychological health outcomes of older adults.

Methods

This systematic review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and registered in PROSPERO (CRD42017054228) (12). The protocol of this systematic review was published already (13).

Search strategy

This search was carried out using the The CINAHL, Cochrane, MEDLINE, PubMed, Science Direct, Web of Science, and Turkish databases by using Medical Subject Heading (MeSH) terms ["home visits" or "home based" and ["elderly health"] and ["community health nursing" or "visiting nurses"] and ["physical health"] and ["psychosocial health"] and ["old people" or "elders" or "seniors"] and ["intervention"] and ["effect"]. The timeframe chosen for searching the articles was from 2004 to 2017 (13).

Eligibility Criteria

Population: Older adults at age ≥ 60, with or without any form of chronic illness.

Intervention: Studies exploring the effects of home visits practices by nurses in older adults were included. To improve the physical (self-efficacy, activities of daily living, nutrition, physical activity, etc.) or psychosocial (mental health, self-confidence, cognitive function, etc.) health of the older adults.

Comparison: Pre–post test single group or comparison group only observational study or control group (an inactive control intervention) (e.g., placebo); (no treatment); (standard care) or (a waiting list control) or (an active control intervention).

Outcomes: Outcome measures included :(a) physical health outcomes; (b) hospitalization outcomes; (c) fall outcomes; (d) quality of life outcomes; and (e) psychosocial health outcomes.

Study design: Randomized controlled trial (RCT) or non-randomized trials or observational design original peer-review study or research reports; English or Turkish language.

Selection of studies and data extraction

One reviewer identified duplicate literatures Endnote X8. Sorted them according to inclusion and exclusion criteria. Two reviewers (BA, DKT) independently assessed the full text of studies and entered the data abstraction table.

Quality assessment of included studies

The Quality Assessment Tool for Quantitative Studies (QATQS) was used for quality assessment of the articles (14-16). The methodological quality of the studies can be categorized as "weak," "medium," and "strong" using this tool. The quality assessments of the studies were conducted independently by two researchers (BA & DKT).

Data analysis

The Comprehensive Meta-Analysis Software v3 (Code is CMA3264) was used in the data analysis,

and the Hedge's g was used to calculate the effect size (17). The effect size classification was used (18). The Cochran's Q test, I^2 statics, a non-parametric statistical test was used to verify the presence of heterogeneity between the studies and meta-regression analysis examined (19).

Publication Bias

Publication bias of the study was tested using Funnel Plot diagram, Orwin's failsafe number test, Egger's regression analysis, and Begg and Mazumdar Rank Correlation analysis (20,21).

Reporting

PRISMA guidelines were used in the reporting of this meta-analysis (12). The quality assessment of this meta-analysis was conducted in line with the A Measurement Tool to Assess Systematic Reviews (AMSTAR) (22).

Results

Study identification and selection

Overall, 13110 articles were recorded to EndNote X8 (2016; Researchsoftware, X8, DISC, NL) and 130 duplicates article were removed. Abstracts were checked and evaluated independently by the researchers. Then, two reviewers read the full text of potentially eligible studies (n = 69). A total of 26 articles were assigned as suitable (Fig.1).

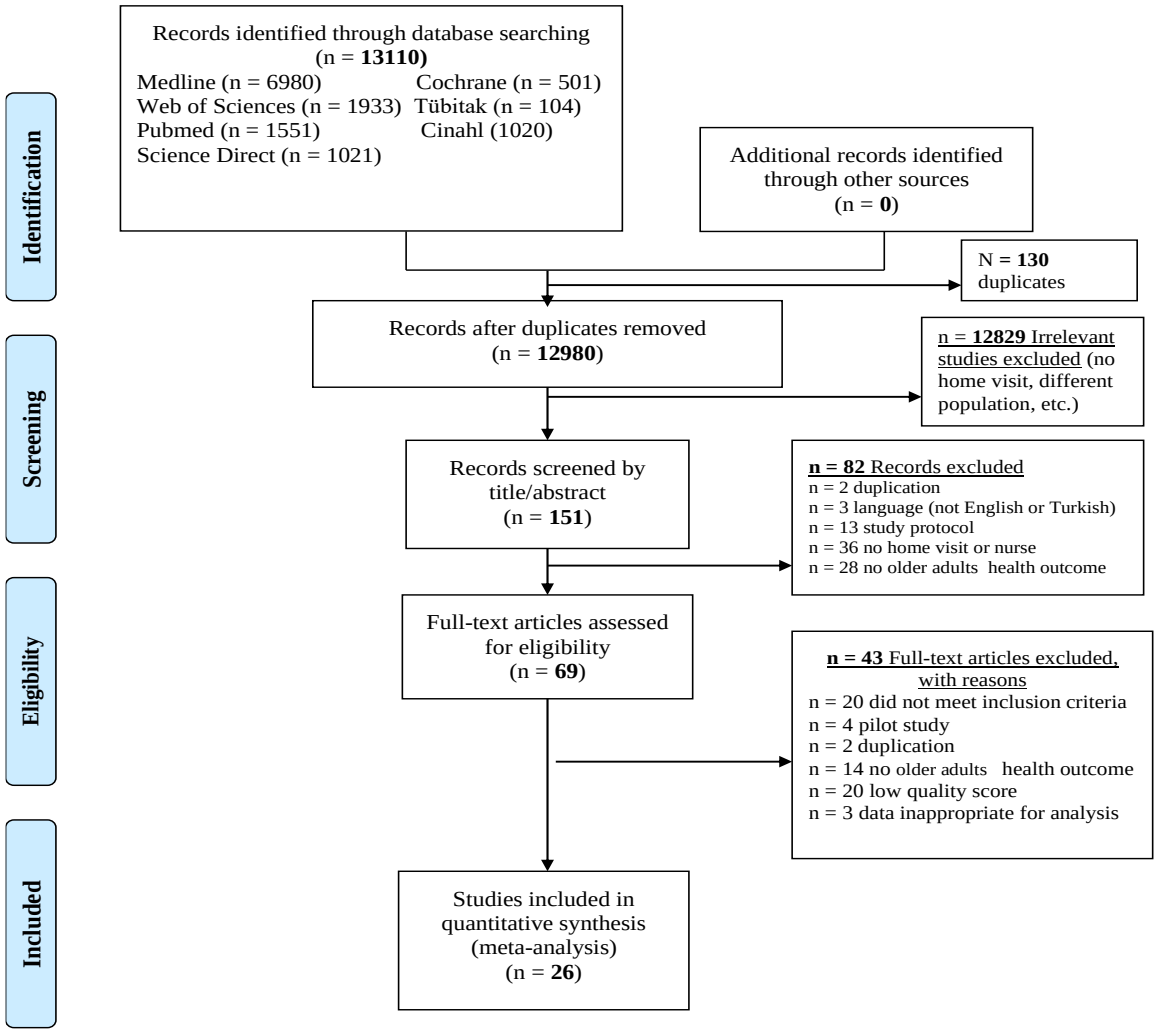

Fig. 1: Flow chart of the screening and study selection process

Study characteristics

According to the PICOS elements, we finally reached 26 studies (23-48) with subgroups 50. Ten of studies contributed to the effect size. Involving those of physical health (n = 2), psychosocial health (n = 4), hospital admission (n = 2), and falling (n = 2). Characteristics of the included studies were presented in Table 1. The characteristics of the 26 studies from the Turkey (n=1), Germany (n=4), Canada (n=4), Netherlands (n=4), New Zealand (n=2), Mexico (n=1), Sweden (n=3), America (n=3), Switzerland (n=1), Japan (n=2), and England (n = 1). Sample size ranged from 59 to 766 and all studies were 7709. Fig. 2 presents the meta-analysis diagram (forest plot) showing these studies and their effect sizes. Effect of home visit in older adults the minimum and maximum values of the effect size (Hedges's *g*) were g = -0.708 and g = 0.525, respectively.

Table 1: Summary of the characteristics of studies

	Author, year	*Study design*	*Sample size*	*Study outcomes*	*Intervention*	*Health status*	*Visitor*
1	(Carroll et al., 2007)	CCT	247	Hospital referral	Counseling	Chronic diseases	Nurse
2	(Chow and Wong 2014)	RCT	312	Physical Health	Counseling	Chronic diseases	Nurse
3		RCT	312	Hospital referral	Counseling	Chronic diseases	Nurse
4		RCT	312	Psychosocial health	Counseling	Chronic diseases	Nurse
5		RCT	312	Quality of life	Counseling	Chronic diseases	Nurse
6	(Elley et al., 2008)	RCT	312	Fall	Counseling	Fall risk	Nurse
7		RCT	312	Psychosocial health	Counseling	Fall risk	Nurse
8	(Favela et al., 2013)	RCT	133	Physical Health	Counseling	Fall risk	Nurse
9		RCT	133	Psychosocial health	Counseling	Fall risk	Nurse
10		RCT	133	Quality of life	Counseling	Fall risk	Nurse
11	(Friedman et al., 2014)	RCT	766	Physical Health	Education	Disabilities	Nurse
12	(Godwin et al., 2015)	RCT	236	Physical Health	Education	Healthy	Team
13		RCT	236	Quality of life	Education	Healthy	Team
14	(Gustafsson et al., 2012)	RCT	459	Physical Health	Health promotion	Disabilities	Team
15	(Hunger et al., 2015)	RCT	340	Physical Health	Case management	Chronic diseases	Nurse
16		RCT	340	Psychosocial health	Case management	Chronic diseases	Nurse
17	(Imhof et al., 2012)	RCT	461	Fall	Counseling	Healthy	Team

18		RCT	461	Hospital referral	Counseling	Healthy	Team
19		RCT	461	Quality of life	Counseling	Healthy	Team
20	(Jonkers et al., 2012)	RCT	361	Physical Health	Health promotion	Chronic diseases	Nurse
21		RCT	361	Psychosocial health	Health promotion	Chronic diseases	Nurse
22	(Karatay and Akkuş 2012)	CCT	100	Psychosocial health	Counseling	Healthy	Nurse
23	(Kerse et al., 2010)	RCT	193	Physical Health	Counseling	Chronic diseases	Nurse
24	(Kirchberger et al., 2015)	RCT	340	Physical Health	Education	Chronic diseases	Nurse
25		RCT	340	Hospital referral	Education	Chronic diseases	Nurse
26		RCT	340	Psychosocial health	Education	Chronic diseases	Nurse
27	(Kono et al., 2011)	RCT	323	Physical Health	Education	Disabilities	Team
28		RCT	323	Psychosocial health	Education	Disabilities	Team
29	(Luck et al., 2013)	RCT	305	Fall	Education	Disabilities	Team
30	(Markle-Reid et al., 2006)	RCT	288	Psychosocial health	Health promotion	Healthy	Nurse
31		RCT	288	Quality of life	Health promotion	Healthy	Nurse
32	(Markle-Reid et al., 2011)	RCT	101	Physical Health	Education	Chronic diseases	Team
33		RCT	101	Psychosocial health	Education	Chronic diseases	Team
34		RCT	101	Quality of life	Education	Chronic diseases	Team
35	(Markle-Reid et al., 2010)	RCT	109	Fall	Health promotion	Fall risk	Team
36		RCT	109	Psychosocial health	Health promotion	Fall risk	Team
37		RCT	109	Quality of life	Health promotion	Fall risk	Team
38	(Melis et al., 2008)	RCT	155	Physical Health	Counseling	Disabilities	Team
39		RCT	155	Quality of life	Counseling	Disabilities	Team
40	(Sandberg et al., 2015)	RCT	153	Hospital referral	Case management	Disabilities	Team
41	(Seidl et al., 2015)	CCT	340	Physical Health	Health promotion	Chronic diseases	Nurse

42		CCT	340	Quality of life	Health promotion	Chronic diseases	Nurse
43	(Shearer et al., 2010)	CCT	59	Psychosocial health	Counseling	Healthy	Nurse
44	(Sinclair et al., 2005)	RCT	324	Physical Health	Health promotion	Chronic diseases	Nurse
45		RCT	324	Quality of life	Health promotion	Chronic diseases	Nurse
46	(Dorresteijn et al., 2016)	RCT	389	Fall	Health promotion	Fall risk	Nurse
47	(Ukawa et al., 2012)	RCT	252	Psychosocial health	Counseling	Healthy	Team
48	(Van Hout et al., 2010)	RCT	651	Physical Health	Counseling	Disabilities	Nurse
49		RCT	651	Hospital referral	Counseling	Disabilities	Nurse
50		RCT	651	Psychosocial health	Counseling	Disabilities	Nurse

RCT: Randomized controlled trial, CCT: Controlled clinical trial

Quality Assessment

Among 26 included studies, some studies (29, 31, 34, 40, 41, 46, 48) were considered as a strong methodologically quality, other studies assessed as a medium methodological quality. In reliability analysis, Kappa coefficient (κ) is in the range of 0.86 and 95% confidence interval [(CI :0.742-0.977)]. In this study, the value of kappa 0.86 was very good agreement between assessors (49).

Outcome Analysis

The remaining 26 studies (23-48) included 50 outcomes. The mean effect size Hedge's g in this study is 0.090, and this level indicates a weak and positive effect. In this study, there was a heterogeneous distribution (I^2 = 41.972%, Q = 84,443, df = 49, $P < 0.001$) and heterogeneity was low.

Physical health outcomes

The effect sizes for physical health were g = 0.31 (95% CI: 0.07 to 0.56) (30) and g = 0.31 (95% CI: 0.11-0.52) (32). The effect size for physical health outcomes is medium and positive.

Hospitalization outcomes

The effect sizes of referral to the hospital were g = 0.53 (95% CI: 0.09-0.96) (24) and g = -0.28 (95% CI: 0.50 to -0.05) (31). The effect size for hospitalization outcomes is medium and positive in one study, while medium and negative in another study.

Fall outcomes

The effect sizes of falls were g = -0.32 (95% CI: 0.53-0.12) (31) and g = -0.71 (95% CI :-1.19 to -0.23) (37). The effect size for fall outcomes is medium and negative.

Quality of life outcomes

In the studies quality of life outcomes (the total score) was not given by the researcher. For these reason this study found no significant effects of home visit interventions on the quality of life of older adults.

Mortality outcomes

The effect size of this output could not be calculated because there was no study with sufficient data regarding mortality.

Psychosocial health outcomes

The effect sizes for psychosocial health outcomes were g = 0.32 (95% CI: 0.06 to 0.57) (38); g = 0.30 (95% CI: 0.09-0.50) (32); g = 0.29 (95% CI: 0.01-0.57) (47); g = 0.42 (95% CI: 0.13-0.71) (24). The effect size for psychosocial health outcomes is medium and positive.

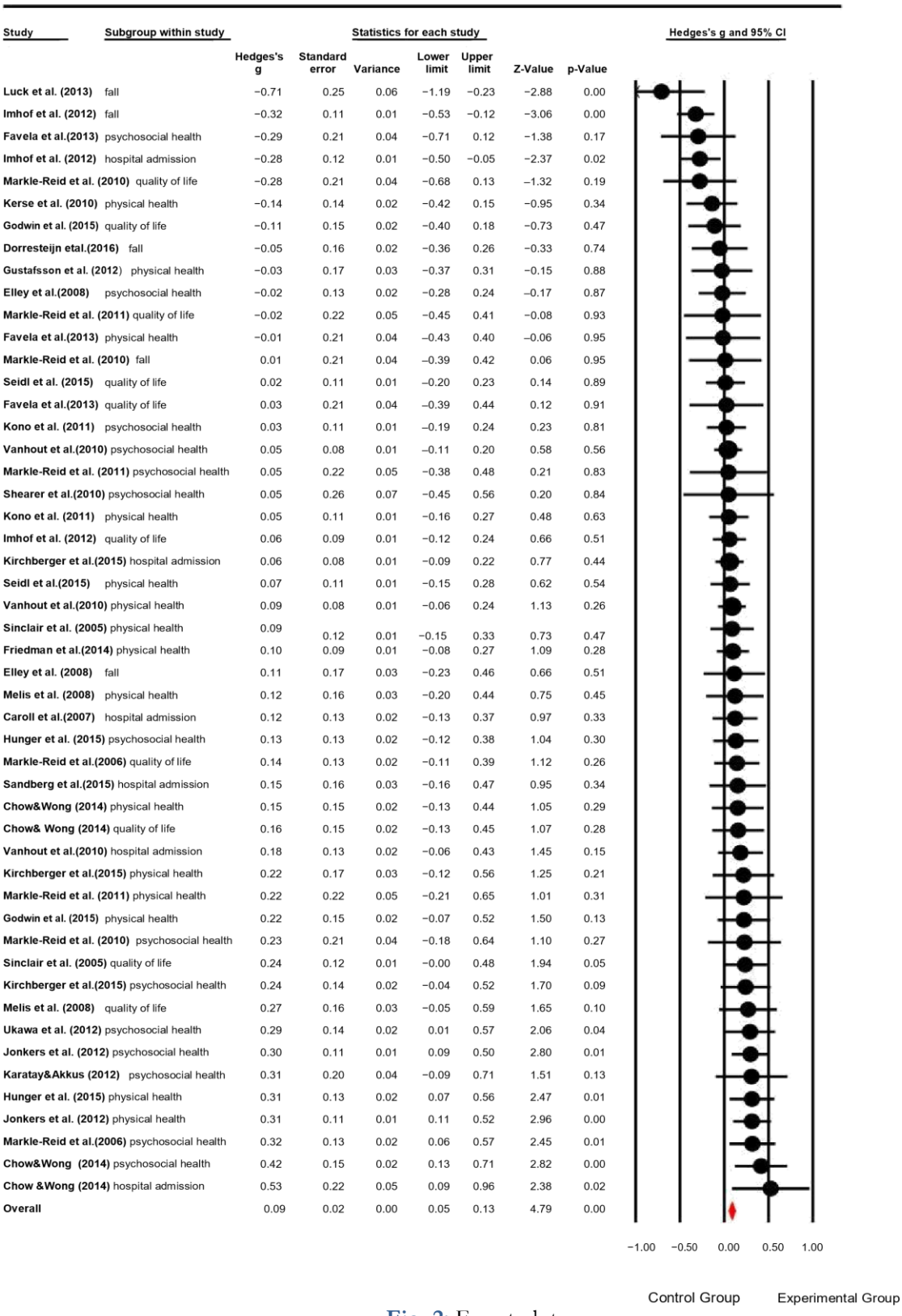

Fig. 2: Forest plot

Subgroup analysis

Age group (Q_B = 23.660, P < 0.001), health status (Q_B = 12.450, P = 0.006), using a model (Q_B = 4.968, P = 0.026), and type of visits (only by a nurse or by a nurse within a team) (Q_B = 11.200, P = 0.001) were significant moderators. The type of applied intervention (Q_B = 6.346, P = 0.096), geographical region where the study was conducted (Q_B=6.269, P =0.180), human development indexes (Q_B=1.332, P=0.248), income levels (Q_B=0.000, P =0.992) of countries, and study design (Q_B = 0.005, P = 0.943) were not moderators.

Moderating effect of home visits in older adults health

A meta-regression analysis was performed to determine the effect of continuous moderator variables on studies' effect sizes (50). Sample size did not affect effect size, in contrast, there was a significant positive linear correlation between the frequency of visits and effect size (B = 0.0012, t = 1.94, P =0.05).

Publication bias assessment

No publication bias was observed in the funnel plot diagram (Fig. 3).

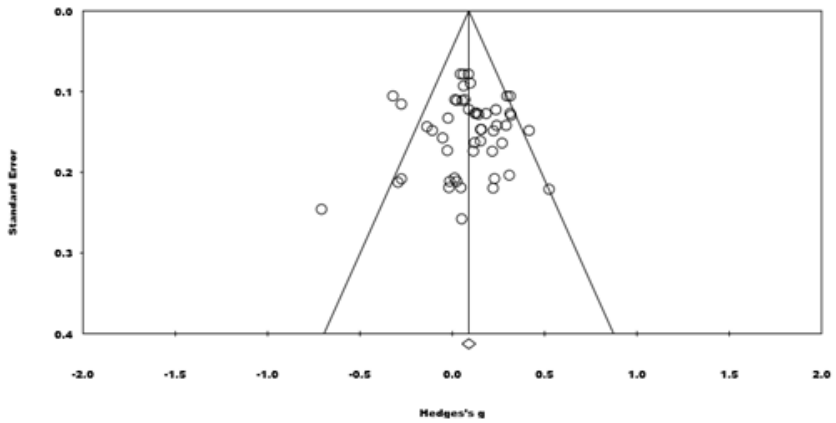

Fig. 3: Funnel plot diagram

Discussion

In the last 20 years, many studies have investigated the effects of home visits on older people (11, 51-54). The aim of conducting this meta-analysis is to produce outcomes with high level of evidence based on contradictory situations. Home visits performed by nurses have a weak and medium effect on physical health, referral to the hospital, fall and psychosocial health, which are some of the older adults' health outcomes. The positive and highest effect was determined on the referral to the hospital outcome (g=0.525, P=0.018). Then again, the highest positive and medium effects were on psychosocial and physical health outcomes (g = 0.417 and g = 0.314). An interesting result is the presence of studies with a negative medium effect on the fall outcome (g = -0.321 and g = -0.708).

In this meta-analysis, two studies reported that home visit interventions have a medium and positive effect on the physical health outcome of the older adults (g = 0.314, P = 0.014; and g = 0.314, P= 0.003) (30, 32). According to a meta-analysis conducted in recent years, it was found that home visits have a weak impact on daily life activities and instrumental life activities (9). In a different meta-analysis, physical health outcomes in intervention groups were found to be better compared to other groups (55). This is believed to be caused by differences in the study population and design, as well as different tools and measurements used to diagnose physical health

In this study, a medium and positive effect (g = 0.522, *P*= 0.018) was observed in one of two studies where the effect of home visit interventions on the hospital outcome were evaluated (24), while there was a moderate and negative effect on the other study (g = -0.275, *P*= 0.017) (31) and the reason for the different results might be lack of using a model or the characteristics of the populations of the visitors and those who were visited. The study, where a positive effect was observed on the referral to the hospital outcome, is a randomized controlled study which was conducted in Japan using the Omaha model. This study was conducted in the older people > 65 years old with a chronic disease, in which only nurses performed home visit interventions and the total duration covered 3 months (24).

Two studies reported that home visit interventions for the older people had a negative and medium size effect on the fall outcome (g = -0.321, *P* = 0.002, and g = -0.708, and *P* = 0.004) (31,37). The ineffectiveness of home visits in preventing falls can be associated with insignificant moderators. Both studies were conducted in Switzerland and Germany, enrolled older people aged >80 years, and did not use models, and the nurse made the visits by participating in team. Thus, home visits alone are insufficient to prevent the older people from falling, and multifaceted interventions involving environmental arrangements are needed. Through home visits, falls in older people can be addressed more systematically and specifically, the risk of falls can be reduced, and age-specific interventions can be planned.

It was observed that the studies included in the metadata analysis for the "fall" outcome involved the older people (over 80 years) and old people with high risk of falling; the interventions made were in the context of counseling, education, and health enhancing activities; and involved applications aimed at developing the elderly without making structural arrangements in the environment of the elderly.

Home visit initiatives did not have a significant effect on the quality of life of the elderly (*P* ≥ 0.05) in this study. It is believed that one reason might be measurement tools used in the studies, and the other reason might be the fact that when calculating the effect sizes in the studies related to quality of life. In this study, the effect size of the mortality outcome could not be calculated. The studies included did not contain sufficient mortality data to calculate the mortality outcome.

In this study, the effect of home visit initiative on psychosocial health outcome of the elderly was positive and at medium level (g=0.417, g=0.318, g=0.297, g=0.292) (24, 32, 38, 47). In a meta-analysis, similar to the results of this study, it was reported that effect sizes on the psychosocial health outcome were at small and medium levels (53). It is seen that home visits have a consistent and positive effect on psychosocial health due to the effects such as social support, communication, and strengthening self-sufficiency.

Summary of Subgroups

The group with the highest positive effect is the of 60–75-year age group (g = 0.48). In the planning of home visits to the elderly, preferring the young elderly group especially may increase the effectiveness of the initiative. The necessity of applying home visit interventions to risky groups such as the elderly with chronic diseases, especially the elderly with disabilities. In this way, the level of independence is increased by providing qualified and continuous care to the elderly in their environment.

The reason why the type of initiative implemented is not a moderator is that the activities are intertwined. For example, "health-improving" activities also include "counseling" and "education." A study found that education carried out through home visits increases healthy lifestyle behaviors and compliance with treatment (27). Using a model ensures the systematic execution and implementation of home visits, while promoting evidence-based practices. There is a need for cross-country comparisons. If a number of studies from each country were included in the meta-analysis, it could be concluded how effective it is in any country.

Conclusion

This meta-analysis found that home visit interventions are effective in reducing the frequency of hospitalization in the older adults, and improving physical and psychosocial health; they are negatively effective on falls and have no significant effect on the quality of life. The effect size on mortality could not be calculated due to insufficient data. Considering nurse home visits or a nurse-centered case management as a primary service delivery model may be a cost-reducing health policy. Moreover, research results should be evaluated by meta-analyses.

Journalism Ethics considerations

Ethical issues (including plagiarism, data generation, etc.) were observed by the authors.

Acknowledgment

I like to thank Doğan, H. a statistical expert who has supported and assisted us in the data analysis. This study is supported by Selcuk University Scientific Research Projects Coordinator (Project No: 15102040).

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Ageing 2019: Highlights (ST/ESA/SER.A/430). https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf. Accessed 30 Sep 2019.
2. Kruschke C (2018). The role of the LPN as a leader and manager in the health-care setting. In: *Leadership skills for licensed practical nurses working with the aging population.* Ed, C Kruschke. Springer, Cham, pp.47-59.
3. United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423). https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf. Accessed 30 Sep 2019.
4. Mathers CD, Stevens GA, Boerma T, et al (2015). Causes of international increases in older age life expectancy. *The Lancet*, 385 (9967):540-48.
5. Tezcan S, Seçkiner P (2012). Demographic change in Turkey; age perspective. In: *Elderly health: Issues and solutions*. Dilek A, Melikşah E. (Eds.), Australia, Turkish Society of Public Health Specialists Press, pp.1-8.
6. Chiao C, Lin Y, Hsiao C (2017). Comparison of the quality of informal care of community-dwelling Taiwanese older people. *J Nurs Res*, 25(5):375—82.
7. Grady PA (2011). Advancing the health of our aging population: a lead role for nursing science. *Nurs Outlook,* 59 (4) :207—9.
8. Marcus-Varwijk AE, Peters L, Visscher TLS et al, (2020). Impact of a nurse-led health promotion in an aging population: Results from a quasi-experimental study on the "community health consultation offices for seniors." *J Aging Health,* 32 (1): 83—94.
9. Mayo-Wilson E, Grant S, Burton J, et al (2014). Preventive home visits for mortality, morbidity, and institutionalization in older adults: a systematic review and meta-analysis. *PloS One,* 9(3): e89257.
10. Chase JAD, Phillips LJ, Brown M (2017). Physical activity intervention effects on physical function among community-dwelling older adults: A systematic review and meta-analysis. *J Aging Phys Act*, 25 (1) :149-70.
11. Renz J, Meinck M (2018). Wirksamkeit präventiver Hausbesuche bei älteren menschen:Systematische bewertung der aktuellen literatur. *Z Gerontol Geriatr*, 51 (8)**:** 924—30.
12. Moher D, Shamseer L, Clarke M, et al (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev,* 4 (1): 1.

13. Ergin E, Akın B, Tanyer D (2018). The effect of home visits by nurses on the physical and psychosocial health of the elderly: Study protocol for a systematic review and meta-analysis. *JSP*, 2(3): 97—104.
14. Thomas B, Ciliska D, Dobbins M, et al (2004). A process for systematically reviewing the literature: providing the research evidence for public health nursing interventions. *Worldviews Evid Based Nurs*, 1 (3) :176-84.
15. Armijo-Olivo S, Stiles CR, Hagen NA, et al (2012). Assessment of study quality for systematic reviews: a comparison of the cochrane collaboration risk of bias tool and the effective public health practice project quality assessment tool: methodological research. *J Eval Clin Pract,* 18 (1) :12-8.
16. Ergin E, Akın B (2018). The English adaptation of a quality assessment tool for quantitative studies: validity and reliability analyses. *Turkiye Klinikleri J Nurs Sci*, 10 (4) :292-308.
17. Cooper HM (1989). *Integrating research: A guide for literature reviews* (2nd ed.) Newbury Park, Calif.; London: Sage Publications.
18. Cohen J (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.) Hillsdale, NJ: Lawrence Earlbaum Associates.
19. Higgins JP, Green S (Eds.) 2011. *Cochrane handbook for systematic reviews of interventions, Chichester*: John Wiley & Sons, Ltd.
20. Egger M, Smith GD, Schneide M, et al (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, 315: 629-34.
21. Long J (2001). *An introduction to and generalization of The Fail-Safe N*. Washington, D.C.
22. Shea BJ, Reeves BC, Wells G, et al. (2017). AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ,* 358: j4008.
23. Carroll DL, Rankin SH, Cooper BA (2007). The effects of a collaborative peer advisor/advanced practice nurse intervention: cardiac rehabilitation participation and rehospitalization in older adults after a cardiac event. *J Cardiovasc Nurs*, 22 (4) :313—19.
24. Chow SK, Wong FK (2014). A randomized controlled trial of a nurse-led case management programme for hospital-discharged older adults with co-morbidities. *J Adv Nurs,* 70 (10): 2257—71.
25. Elley C, Robertson M, Garrett S, et al (2008). Effectiveness of a falls-and-fracture nurse coordinator to reduce falls: A randomized, controlled trial of at-risk older adults. *J Am Geriatr Soc*, 56 (8): 1383—89.
26. Favela J, Castro LA, Franco-Marina F, et al. (2013). Nurse home visits with or without alert buttons versus usual care in the frail elderly: a randomized controlled trial.*Clin Interv Aging,* 8: 85—95.
27. Friedman B, Li Y, Liebel DV, et al (2014). Effects of a home visiting nurse intervention versus care as usual on individual activities of daily living: a secondary analysis of a randomized controlled trial. *BMC Geriatr,* 14: 24.
28. Godwin M, Gadag V, Pike A, et al. (2015). A randomized controlled trial of the effect of an intensive 1-year care management program on measures of health status in independent, community-living old elderly: the Eldercare project. *Fam Pract,* 33 (1): 37—41.
29. Gustafsson S, Wilhelmson K, Eklund K, et al (2012). Health-promoting interventions for persons aged 80 and older are successful in the short term—results from the randomized and three-armed Elderly Persons in the Risk Zone study. *J Am Geriatr Soc,* 60 (3): 447—54.
30. Hunger M, Kirchberger I, Holle R, et al. (2015). Does nurse-based case management for aged myocardial infarction patients improve risk factors, physical functioning and mental health? The KORINNA trial. *Eur J Prev Cardiol,* 22 (4): 442—50.
31. Imhof L, Naef R, Wallhagen MI, et al (2012). Effects of an advanced practice nurse in-home health consultation program for community-dwelling persons aged 80 and older *J Am Geriatr Soc*, 60 (12): 2223—31.
32. Jonkers CC, Lamers F, Bosma H, et al (2012). The effectiveness of a minimal psychological intervention on self-management beliefs and behaviors in depressed chronically ill elderly persons: A randomized trial. *Int Psychogeriatr,* 24 (2): 288—97.
33. Karatay G, Akkuş Y (2012). Effectiveness of a multistimulant home-based program on cognitive function of older adults. *West J Nurs Res,* 34 (7): 883—901.
34. Kerse N, Hayman KJ, Moyes SA, et al (2010). Home-based activity program for older

people with depressive symptoms: DeLLITE—a randomized controlled trial. *Ann Fam Med*, 8 (3): 214—23.

35. Kirchberger I, Hunger M, Stollenwerk B, et al (2015). Effects of a 3-year nurse-based case management in aged patients with acute myocardial infarction on rehospitalisation, mortality, risk factors, physical functioning and mental health. A secondary analysis of the randomized controlled KORINNA study. *PloS One,* 10 (3):e0116693.
36. Kono A, Kanaya Y, Fujita T, et al (2011). Effects of a preventive home visit program in ambulatory frail older people: a randomized controlled trial. *J Gerontol A Biol Sci Med Sci*, 67 (3): 302—9.
37. Luck T, Motzek T, Luppa M, et al (2013). Effectiveness of preventive home visits in reducing the risk of falls in old age: a randomized controlled trial. *Clin Interv Aging,* 8: 697—702.
38. Markle-Reid M, Weir R, Browne G, et al (2006). Health promotion for frail older home care clients. *J Adv Nurs*, 54 (3) :381—95.
39. Markle-Reid M, Orridge C, Weir R, et al. (2011). Interprofessional stroke rehabilitation for stroke survivors using home care. *Can J Neurol Sci,* 38 (2): 317- 34.
40. Markle-Reid M, Browne G, Gafni A et al. (2010). The effects and costs of a multifactorial and interdisciplinary team approach to falls prevention for older home care clients 'at risk' for falling: a randomized controlled trial. *Can J Aging,* 29 (1): 139—61.
41. Melis RJ, van Eijken MI, Teerenstra S, et al (2008). A randomized study of a multidisciplinary program to intervene on geriatric syndromes in vulnerable older people who live at home (Dutch EASYcare Study). *J Gerontol A Biol Sci Med Sci,* 63 (3): 283—90.
42. Sandberg M, Kristensson J, Midlöv P, et al (2015). Effects on healthcare utilization of case management for frail older people: a randomized controlled trial (RCT). *Arch Gerontol Geriatr,* 60 (1): 71—81.
43. Seidl H, Hunger M, Leidl R, et al (2015). Cost-effectiveness of nurse-based case management versus usual care for elderly patients with myocardial infarction: results from the KORINNA study. *Eur J Health Econ,* 16. 671—81.
44. Crawford Shearer NB, Fleury JD, Belyea M (2010). Randomized control trial of the Health Empowerment Intervention: feasibility and impact. *Nurs Res*, 59 (3): 203—11.
45. Sinclair AJ, Conroy SP, Davies M, et al (2005). Post-discharge home-based support for older cardiac patients: a randomised controlled trial. *Age Ageing,* 34 (4): 338—43.
46. Dorresteijn TA, Zijlstra GA, Ambergen AW, et al (2016). Effectiveness of a home-based cognitive behavioral program to manage concerns about falls in community-dwelling, frail older people: results of a randomized controlled trial. *BMC Geriatr,* 16: 2.
47. Ukawa S, Satoh H, Yuasa M, et al (2012). A randomized controlled trial of a functioning improvement tool home-visit program and its effect on cognitive function in older persons *Int J Geriatr Psychiatry,* 27(6): 557—64.
48. van Hout HP, Jansen AP, van Marwijk HW, et al. (2010). Prevention of adverse health trajectories in a vulnerable elderly population through nurse home visits: a randomized controlled trial [ISRCTN05358495]. *J Gerontol A Biol Sci Med Sci,* 65 (7): 734—42.
49. Landis J, Koch G (1977). An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics,* 33 (2), 363-74.
50. Borenstein M, Hedges LV, Higgins JPT, et al (2009). *Introduction to meta-analysis. Chichester*: John Wiley & Sons, Ltd.
51. Stuck AE, Egger M, Hammer A, et al (2002). Home visits to prevent nursing home admission and functional decline in elderly people: systematic review and meta-regression analysis *JAMA,* 287 (8) :1022—28.
52. Kuo HK, Scandrett KG, Dave J, et al (2004). The influence of outpatient comprehensive geriatric assessment on survival: a meta-analysis. *Arch Gerontol Geriatr,* 39(3): 245-54.
53. Huss A, Stuck AE, Rubenstein LZ, et al (2008). Multidimensional preventive home visit programs for community-dwelling older adults: A systematic review and meta-analysis of randomized controlled trials. *J Gerontol A Biol Sci Med Sci*, 63 (3):298-307.
54. Bachmann S, Finger C, Huss A, et al (2010).

Inpatient rehabilitation specifically designed for geriatric patients: systematic review and meta-analysis of randomised controlled trials. *BMJ,* 340: c1718.

55. Beswick AD, Rees K, Dieppe P, et al (2008). Complex interventions to improve physical function and maintain independent living in elderly people: a systematic review and meta-analysis. *Lancet,* 371 (9614): 725—35.