

CRITICALLY APPRAISED TOPIC

FOCUSED CLINICAL QUESTION

In a 75-year-old female with a high risk of falls, is a group-based balance exercise class more effective than individual based balance exercise routine for decreasing falls?

AUTHOR

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CLINICAL SCENARIO

The patient is a 75-year-old female who has just attended a fall risk assessment. She has been deemed a "high falls risk."

When older adults attend a falls screening and are determined to be a falls risk, what is the appropriate course of action to take? Up to 30% of older adults fall each year, with one of every five falls requiring medical attention⁸. Falls in the elderly can be detrimental leading to fractures, increased frailty, decreased mobility, and even death. The older the person is the more likely that person is to be hospitalized from a fall². So, decreasing falls can decrease health care spending as well³.

A systematic review by Arnold et al. recognized the importance of having multi-factorial fall risk assessments and management programs with exercise. They found that including exercise and increased activity levels in fall prevention programs have been shown to decrease risk of falls and improve balance and strength⁴. However, no distinction was made about the most effective mode for this exercise to be delivered.

It is clear preventing falls in older adults is important and necessary, however research is uncertain about the "best" way to do it. However, there have been several methods that have been proven to be successful. As long as the therapists makes an evidence-based decision to increase adherence and physical activity, there is no wrong answer.

SUMMARY OF SEARCH

[Best evidence appraised and key findings]

-Overall, there is no evidence looking at specifically which is better for elderly high fall risk patients, treatment with group exercise versus individual exercise. So, I included studies that did not only include high fall risk patients. The highest-quality data is in the form of a Cochrane review. While it did not compare group vs. individual, it did independently evaluate the effects of many types of interventions to decrease falls. A reader could use this to come to some conclusions when comparing individual or home versus group exercise.

-There is a high quality RCT that supports group exercise as a way to reduce falls in older adults, including those at high risk for falls, but did not included an individual exercise comparison group.

-There are 2 low-quality RCT's that look at older adults comparing group exercise, versus home individual exercise versus a control group. These studies were both had less than 80% follow up, but are very relevant to the PICO question.

-2 quasi-experimental studies were found, which were moderate quality.

CLINICAL BOTTOM LINE

Overall, it seems that both individual and group-based exercise are successful in reducing the falls in older adults at risk. The more important variable seems to be type of exercise included in the program, as well as time spent exercising. Because of this, clinicians should consider each patient individually and recommend a community-based or individual program based on the preferences of the individual. Whichever they are more likely to adhere to should be recommended.

This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor

SEARCH STRATEGY

Terms used to guide the search strategy			
<u>P</u> atient/Client Group	<u>I</u> ntervention (or Assessment)	<u>C</u> omparison	<u>O</u> utcome(s)
Elderly Older Adults Aging	Balance Exercise	Group Exercise	Falls Fall risk Fall rate Fall incidence

Final search strategy (history):

Show your final search strategy (full history) from PubMed.

#1 elderly OR aging OR older adults

#2 balance AND exercise

#3 falls AND (risk or rate or incidence)

#4 group exercise [title/abstract]

#5 (#1 AND #2 AND #3 AND #4)

In the table below, show how many results you got from your search from each database you searched.

Databases and Sites Searched	Number of results	Limits applied, revised number of results (if applicable)
PubMed	31	N/A
CINAHL	42	N/A
Embase	14	N/A

INCLUSION and EXCLUSION CRITERIA

Inclusion Criteria
Studied community-dwelling older adults 60+ Measured fall risk in terms of incidence, rate, or risk
Exclusion Criteria
Not published in English Studies not involving older adults Older adults that are not able to ambulate independently with or without assistive device

RESULTS OF SEARCH

Summary of articles retrieved that met inclusion and exclusion criteria

For each article being considered for inclusion in the CAT, score for methodological quality on an appropriate scale, categorize the level of evidence, indicate whether the relevance of the study PICO to your PICO is high/mod/low, and note the study design (e.g., RCT, systematic review, case study).

Author (Year)	Risk of bias (quality score)*	Level of Evidence**	Relevance	Study design
Albert, King 2017	18/27: Downs and Black	2b	Mod	Quasi-Experimental: Non-equivalent groups pre-test-post-test control group design
Villafane et al. 2015	24/27: Downs and Black	2b	Mod	Quasi-Experimental: Non-equivalent groups pre-test-post-test control group design
Iliffe et al. 2014	6/10: Pedro	2b	High	Randomized Control Trial
Arnold et al. 2008	6/11: AMSTAR	1a	Mod	Systematic Review of randomized controlled trials
Donat and Ozcan, 2006	6/10: Pedro	2b	High	Randomized Control Trial
Sherrington et al. 2011	8/11: AMSTAR	1a	Mod-High	Meta-Analysis of Randomized Controlled Trials
Lord et al. 2003	6/10: Pedro	1b	Low-Mod	Randomized Control Trial
Gillespie et al. 2009	11/11: AMSTAR	1a	Mod-High	COCHRANE Systematic Review of RCTs and quasi-randomized trials.

*Indicate tool name and score

**Use Portney & Watkins Table 16.1 (2009); if downgraded, indicate reason why

BEST EVIDENCE

The following 2 studies were identified as the 'best' evidence and selected for critical appraisal. Reasons for selecting these studies were because the one is a Cochrane review, which is the highest level of evidence. While the Cochrane review did not search my specific PICO question, it did independently evaluate the effects of many types of interventions to decrease falls, which then a reader could come to some conclusions when comparing individual or home versus group exercise. They used risk and rate of falling as the outcome measures. I also chose a lower-quality RCT because it had the highest relevance to my PICO question. This study included only patient 65+ that were community dwelling, recommended to a balance program by their doctor and used incidence of falls as well as fall risk as secondary outcome measures.

- Iliffe S, Kendrick D, Morris R, et al. Multicentre cluster randomised trial comparing a community group exercise programme and home-based exercise with usual care for people aged 65 years and over in primary care. *Health Technol Assess* 2014;18(49):vii-xxvii, 1. doi:10.3310/hta18490.
- Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. *Cochrane Database Syst Rev* 2003;(4):CD000340. doi:10.1002/14651858.CD000340

SUMMARY OF BEST EVIDENCE

(1) Description and appraisal of Multicentre cluster randomised trial comparing a community group exercise programme and home-based exercise with usual care for people aged 65 years and over in primary care by Iliffe S, Kendrick D, Morris R, et al. 201

Aim/Objective of the Study/Systematic Review:

The aim of this study was to examine what the most effective mode of delivery for exercise to community-dwelling older adults. The researchers aimed to see which delivery mode between a class exercise or individual exercise at home would get older adults to achieve 150 minutes of exercise/week, therefore reducing risk of falls compared to usual care.

Study Design

[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

This study was a 3 group Randomized Control Trial. Investigators and Subjects were not blinded.

Eligibility:

Inclusion: Participants 65 or older who could walk independently both indoors and outdoors, with or without an assistive device, and who would be physically able to take part in a group exercise class.

Exclusion: Significant exclusion criteria included if participant had three or more self-reported falls in the previous year or they were not living independently.

If they had 3 or more falls in the past year they would be at a very high risk for a future fall. This means that there was already a lower-level of risk for falls in the patients. Not living independently was good to be excluded because my patient was a community dwelling older adult.

Allocation:

Allocation was randomized and concealed. Practices were allocated to a treatment arm once all participants within that practice were recruited. The practices were informed by the London coordinating center.

Intervention: One group was a control group that was allowed to exercise or not exercise as they normally would. Intervention Group One was the Otago Home Exercise intervention. Group 2 was the FaME Intervention that included group exercise.

Outcome Measures:

The primary outcome measure was the minutes of exercise completed a week and the percentage of participants that reaches the recommended amount of 150 minutes/week. There were many secondary outcome measures, however significant secondary outcomes included rate of falls and number of falls.

Outcomes were measured at baseline, at the end of the program (24 weeks), then at 6, 12, 18 and 24 months after the program.

Statistical Methods:

Baseline characteristics were compared with population norms for balance and self-report measures. Odds ratio was used to calculate the odds of an older adult reaching the recommended 150 minutes of exercise a week. Incidence Rate Ratios were used to calculate the rate of falls and reduction in falls.

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

43 General Practice of Primary Care centers in London and Nottingham (metropolitan areas).

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

43 practices General Practices were recruited through the Primary Care Research Networks in London and Nottingham.

Chosen practices established a list of patients 65 and older. The researchers then gave the practices a random number list of which patients to select. The number of patients depended on practice size. If practices had less than 450 patients over 65, all patients were invited to participate. Selected patients were sent letters from their general practitioner about participating. 1,256 adults 65 or older were selected and agreed to participate.

Older adults who could not ambulate independently, with or without an assistive device or adults that had more than 3 falls in the year were not eligible for the study.

Type of sample: Random

The average age of participants was 73 years old. The participants were 62% female, 14% non-white and 44% had some form of further education. There was no comparison of demographic or key variables at baseline between the groups. The only comparison that was performed was all participants baseline scores on outcome measures for balance and self-report measures, compared to population age-related norms. Participants had slightly below normal levels for 30-second chair rise, SF-12, recreational physical activity, and caloric expenditure per week.

426 participants did not reach 12 months follow up after the end of the intervention period. A total of 830 were reached 12-month follow up. 572 participants completed the full intervention plus 24 total months of follow up.

Intervention Investigated

[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]

Control

Participants in the control group were free to participate in any exercise or not, just as they would if they were not part of the study.

Experimental

Group 1: Home Based Otago Program

Trained staff made an initial visit to determine the appropriate exercises within the Otago program to create a 30-minute strengthening and balance program. It was to be performed 3 times a week, along with two 30-minute walking sessions a week, for 24 weeks. Exercises were progressed as time went on. Three follow up in person visits were made, and telephone calls were made every 2 weeks. Participants were to document the days they performed the program. The program was supported by trained peer-mentors.

Group 2: FaME Program

This community based falls management program consisted of 1 hour long group exercise class a week, along with two 30-minute home exercise sessions per week. They were advised to walk at least 2 times a week for 30 minutes. This lasted for 24 weeks. The group exercise classes featured progressive resistance exercise, cardiovascular exercise, tai chi, flexibility training, and functional floor skills. The class instructor kept attendance and feedback from participants. Phone calls were used to follow up with those who did not attend. Each participant was given an individualized home exercise plan as well. Classes were led by trained postural stability instructors.

Outcome Measures

[Give details of each measure, maximum possible score and range for each measure, administered by whom, where]

There were many outcome measures evaluated. Included below are the main outcome measure and the measure related to this PICO question:

Primary Outcome Measure: Proportion of Older Adults participating in 150 minutes of Moderately Vigorous Physical Activity

-Measured using the Community Health Activities Model Program for Seniors (CHAMPS): This is a 40-item scale measuring self-reported physical activity duration and frequency in older people.

-Taken at baseline, post intervention, 6 months post intervention, 12 months post intervention, 18 months post intervention, 24 months post intervention

-To quantify this outcome, the minutes of physical activity values were transformed to an Odds Ratio.

Relevant Secondary Outcome Measure: Risk of Falling compared to Usual Care and Reduction of Falls: Incidence Rate Ratio

-Participants reported number of falls during intervention period. Calculated for during intervention period and at 12 months post intervention

Researchers were not blinded when collecting data.

Main Findings

[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.]

The relative odds of reaching 150 minutes or greater of MVPA a week were:

FaME group: 1.782 95% CI (1.106 to 2.872) $p=.018$

Otago group: 1.173 95% CI (.718 to 1.918) $p=.524$

Only the FaME group reached statistical significance for odds of reaching 150 of MVPA a week. With a OR of 1.78, the FaME group was 1.78 times more likely to reach this goal of 150 minutes than the control group. With a 1.78 odds ratio, this seems to be a moderate effect. While 1.78 is not close to 1, it also doesn't reach the level of "doubles" the odds of reaching 150 minutes of activity. The further away from 1.0 the odds ratio is, is better.

Rate of Falls during Intervention period (24 weeks):

The Incidence Rate Ratio of falls was not statistically significant between the FaME, or Otago group when compared to usual care during the intervention period.

FaME: IRR: .91 (95% CI .54 to 1.52) $p=.072$

Otago: IRR: .93 (95% CI .64 to 1.37) $p=.072$

Rate of Falls 12 months post Intervention:

There was a significant reduction in falls in the FaME group compared with usual care at 12 months post intervention. There was a reduction, but it was not statistically significant for the Otago group at 12 months.

FaME: IRR: .74 (95% CI .55 to .99) $p=.009$

Otago: IRR: .76 (95% CI .53 to 1.09) $p=.014$

The only statistically significant falls reduction was seen in the FaME group at 12 months post intervention. This is the only p-value that is less than .05. The confidence interval for this data is not very narrow and comes very close to 1.0. Therefore, there is more variability in the data than desired. When looking at the data, the Risk Ratio is .74. This is saying the participants in the FaME group were .74 times as likely to fall than the control group. This is saying they have less of a chance to fall than the control. However, the further away from 1, the less of a chance they would have. .74 is only .26 away from 1.0, therefore saying the "effect size" is not very large in decreasing the rate of falls.

Original Authors' Conclusions

[Paraphrase as required. If providing a direct quote, add page number]

Only the group-based program had statistically significant results in increased physical activity minutes per week after the intervention. This amount of activity performed was still reported after 12 months of cessation of the programs. At 12 months follow up, the FaME group also had a statistically significant lower rate of falling. The Otago group has less falls as well compared to the control, but they were not statistically significant. The authors reported "Participants in the exercise class arm were more likely to be positive about exercise at follow-up. There were no other changes in health and well-being." (p. xxi)

Critical Appraisal

Validity

Pedro: 6/10

Eligibility: yes /subjects randomly allotted: yes/allocation: yes/ groups at baseline: no/ blinding of all subjects: no/ Blinding of therapists: no/ Blinding of assessors: no/ 85% obtained: no/intention to treat: yes/ between group statistical comparison: yes/ measures of variability: yes

This study had several pros and cons in considering validity. It did use multiple sites in multiple locations to give it a good generalizability. The sites were also randomly assigned to which intervention they would deliver and patients were randomly selected from a list made by providers. However, there was never 85% follow up in any group, so confidence intervals were not narrow. One negative to the study is that they did not compare the groups at baseline for different variables. All they did was compare the groups to age related norms. Also, none of the study was blinded. Although they did not do more than one intervention at a site, so it is unclear if the participants knew what the other intervention was. However, even if the participants were blinded, the assessors were not. The researchers credit this to lack of funding for more researchers that would allow for this. Not blinded assessors could introduce bias into the results. Also, the researchers measured a lot of outcomes. I am not sure it was necessary to measure so many different things and possibility convoluted the research. One limitation the authors noted was participants were burdened by frequent collection data. Almost all of these outcome measures were self-reported, as well as the exercise log falls diary the participants were supposed to keep. Because self-reporting is already questionable for validity, it is not wise to overload the participants with self-report measures. The overall quality of the study was moderate. It was a very involved study and continued follow up over two years, however they lost a lot of patients over that course.

Interpretation of Results

The results of this study relay that group-based exercise class combined with home exercise is more effective in increasing physical activity minutes per week, when compared to all individual home exercise and a control group. The group based exercise was also less likely to fall than the individual exercise group when compared to the control group at 12 months post intervention. Overall, both groups had a decrease in falls compared to the control group, however only the group-based exercise group was significant.

The only significant P-value was for the group-exercise class when considering falls at 12 months. However, the confidence interval for this data was not very narrow, meaning that there is some variability in the sample. The confidence interval is also extremely close to 1.0, possibly stating that there is very close to no significant effect. The IRR was .74. This value is not very far away from 1.0, which would denote "no change." So, while there was a slight decrease in rate of falls in the effect wasn't very large. It is basically saying a person in the FaME group reduced their risk of falling by 26%. When compared to the standard effect sizes, .2 indicates a small effect size. So, this was likely a small to moderate effect size of decreasing the rate of falls.

Not knowing if the baseline was similar for each group, it is very difficult to know if these results are valid. While the study did compare the entirety of the participants to population norms and there were no significant differences, it is impossible to know if once the groups were created differences in baseline characteristic emerged between groups. I do believe the results from this study show that group exercise can reduce fall rates, however it shows overall the home-exercise group benefited too, just not to a statistically significant effect, which could be because of the other issues such as baseline characteristics.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

This study is relevant to my clinical question. Both interventions are interventions used to keep older adult's active and reduce risk for falls. The one thing that is worth considering is that there was no requirement for the adults to be a fall-risk to participate. They were recommended by their general practitioner, however there was no threshold or recommendations of who was recommended. Because of this, some of the participants may have been already less likely to fall, but we cannot know because there were no between group comparisons. However, if the group exercise class is available in the community already, I think it would be reasonable to recommend the patients attend that while also staying active at home. Because the group exercisers were more likely to be positive about exercise than the independent exercisers, this may say something to the effect of socialization of the group exercise class. Because people are more likely to exercise if they are enjoying themselves and have a positive attitude, I think this would be a sufficient reason to accept the group exercise over independent. However, this study also shows that if a person did not have access to a group exercise class, exercising at home will still be slightly effective in lower risk and increasing minutes of activity. Starting up a group exercise class is probably not reasonable. So, if one is available, based on this study I would recommend it. However, if one is not, I would still recommend a patient do a home exercise program as opposed to not exercising at all.

(2) Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. 2003

Aim/Objective of the Study/Systematic Review:

The aim of this systematic review was the evaluate the most effective interventions to prevent falls in community dwelling older adults.

Study Design

[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]

Note: For systematic review, use headings 'search strategy', 'selection criteria', 'methods' etc. For qualitative studies, identify data collection/analyses methods.

This was a Systematic Review of randomized control trials and quasi-randomised trials.

Search Strategy: A literature search was done in the Cochrane Bone, Joint and Muscle Trauma Group specialized register, the Cochrane central register of control trials, Medline, Embase, CINAHL, PsychInfo, and AMED, through 2008. Ongoing studies were found in searching the UK National Research Register Archive, Current Controlled Trials, and the Australian New Zealand Clinical Trials Registry.

Selection Criteria: One review author selected initial articles based on the title and abstract. Two other authors then read the full texts independently to determine eligibility. Any differences in choices were solved through discussion. Studies had to include an intervention to prevent falls, participants that were 60 years or older and majority of participants were living in the community.

Methods: Data extraction was done by pairs of review authors using a pre-tested data extraction form. Trials were pooled with similar participant characteristics, including pools for specific conditions (i.e.: Parkinson's). Interventions were grouped by number of interventions (single/multiple), and then by type of intervention (exercises, medication, surgery, management of urinary incontinence, fluid or nutrition therapy, psychological interventions, environment/assistive technology, social environment, intervention to increase knowledge, and "other" interventions).

Statistical Analysis: Falls rate was calculated by risk ratio and the 95% confidence interval. Number of fallers was calculated by risk ratio and a 95% confidence interval.

Risk of Bias: Risk of Bias was assessed using the recommendation in the Cochrane Handbook using sequence generation, allocation concealment, and blinding of participants, personnel, and assessors.

Test for Heterogeneity: Test for heterogeneity between pooled trials was assessed with a Chi-Squared Test and the I^2 statistic.

Setting

[e.g., locations such as hospital, community; rural; metropolitan; country]

Communities or retirement villages in 15 countries. Exercises were performed in outpatient groups or at home with a home exercise program.

Participants

[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]

Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article.

There was a total of 55,303 men and women participants in the studies. They were 60 years or older, living in communities or retirement villages.

111 studies were included. The majority of studies were individually randomized, however some were randomized by cluster and some were also randomized by household if more than one person in the household was participating. Sample size ranged from 10 to 9,940 and the median was 239. 52 studies had participants with a history of falling or contained a risk factor of falling, 66 studies excluded patients with cognitive deficits, and 7 trials were focused on a specific condition, such as Parkinson's or post-stroke.

Studies were excluded if they were not randomized controls, participants were too young, participants were not community-dwelling, did not report falls outcomes, falls were artificially induced, or if the intervention was not designed to reduce falls.

Risk of bias was determined to be "low" for 55% of studies, high for 2% of studies, and unclear for the remaining studies. Based on the nature of most of the study interventions, 85% of studies did not have blinding of participants. Recall of falls was another source of bias in some studies, which about 30% of them were determined to have a high risk of bias for recall and 50% were determined to have a low risk of bias for recall of falls.

Intervention Investigated [Provide details of methods, who provided treatment, when and where, how many hours of treatment provided]
<i>Control</i> <p>The control groups consisted of usual care (no change in daily activities) or a Placebo control (an intervention not thought to reduce falls: general health education/social visits).</p>
<i>Experimental</i> <p>Experimental Groups included exercises, medication, surgery, management of urinary incontinence, fluid or nutrition therapy, psychological interventions, environment/assistive technology, social environment, intervention to increase knowledge, and "other" intervention. Experimental groups were also sub grouped into studies that had one intervention or multifaceted interventions.</p> <p>Groups of significance for this CAT included: Home-based/Individualized exercises including more than one exercise category, and Group exercise classes including more than one exercise category.</p>
Outcome Measures [Give details of each measure, maximum possible score and range for each measure, administered by whom, where]
Primary Outcomes: The relevant outcomes to my clinical questions were: - Rate of falls: The number of falls per person, per year. Measured by Rate Ratio with 95% CI. - Number of fallers: The reported rate of falls in each group (falls per person per year) divided by the total number of falls for all participants. Measured by Risk Ratio with 95% CI. Falls data in the studies were gathered both prospectively and retrospectively. Results reported at one year were used, if available in the study.
Main Findings [Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.]
Data: Multiple subgroups data were collected. Below are the main findings of the relevant subgroups. Rate of Falls: <ol style="list-style-type: none"> Group exercise: multiple components vs. control: Pooled Rate Ratio Effect Size=.78 95% CI (.71 to .86) Individual Exercise at home: multiple components vs. control: Pooled Rate Ratio Effect Size= .66 95% CI (.53 to .82) Fallers: <ol style="list-style-type: none"> Group exercise: multiple components vs. control: Pooled Risk Ratio Effect Size=.83 95% CI (.72 to .97) Individual Exercise at home: multiple components vs. control: Pooled Risk Ratio Effect Size= .77 95% CI (.61 to .97) Heterogeneity: <ol style="list-style-type: none"> Intervention of Exercise: $P=.006$ $I^2=52\%$ <p>Overall, both the group exercise group and individual exercises, when containing multiple components of exercises included in the program, had statistically significant results. The effect sizes for both groups for decreasing rate of falls were moderate, with group exercise being slightly greater. For number of fallers, both groups decreased number of fallers as well. Group exercise has a large effect size, and individual exercise has a moderate effect size, but pretty close to large, however the confidence interval was slightly bigger. This means both interventions are likely to be clinically meaningful, both for reducing the rate of falls and the number of fallers. Heterogeneity with a $P=.006$ means that heterogeneity was present in the review. One could conclude that this is because some studies that were included were aimed for a specific disease or condition.</p>

Authors Conclusions

"Overall, multiple-component exercise interventions are effective in reducing rate and risk of falling." (p. 25)
The exercise interventions that included 2 types of exercise or more, reduced rate of falls and the number of people falling. Exercising in groups as well as individually prescribed home exercise programs were both effective.

Critical Appraisal

Validity

[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.]

I used the evaluation tool, AMSTAR, designed to assess the methodological quality in systematic reviews. The score for this study was an 11/11. One strength was the search was very comprehensive, including all languages and unpublished studies. A weakness may have been the quality of the studies, because exercise intervention studies are difficult in general to blind. Also, a problem in fall studies, is relying on patient recall of falls for data. This is a potential source of bias. Some older adults may not report falls that they have had because they don't consider them to be a "fall." A strength is that funnel plots were created for each of the main subgroups. Exercise had the least amount of asymmetry, it was only slightly asymmetrical, conveying a low publication bias for the exercise studies. The asymmetry in the other subgroups, was slightly larger, suggesting a possible negative publication bias. So, for the exercise studies and data, the publication bias is likely low, while for the overall meta-analysis the other interventions examined may have a higher publication bias. Heterogeneity for the exercise subgroup was a moderate 52%, which can probably be explained by some studies targeting a specific group or condition (Parkinson's, poor vision, etc). Overall, the evidence quality provided by this meta-analysis is very good. They used a rigorous search method and measured the risk of bias in every study. I think especially for the exercise subgroup of studies, the quality of the evidence is good. I think any potential sources of bias come from the nature of these types of studies as opposed to the actual methods.

Interpretation of Results

[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.]

My interpretation of the results for this systematic review is that they are reliable. Especially as it concerns the results from the exercise subgroup, which is the subgroup relevant to this CAT. As long as the exercise intervention contained more than one "type" of exercise (strengthening, balance, aerobic, etc.) it was successful in group classes, as well as in individualized home exercise programs. In regards to rate of falls, group-exercise classes seemed to have a bigger effect size than the home-exercise group, however they were both significant. For reducing fall rate, the group exercise was very close to a large effect size, .78 and home exercise's effect size was moderate at .66. The confidence interval for group exercise was relatively narrow, .71 to .86, indicating a small amount of variability, increasing one's confidence of that effect size. The confidence interval for home exercise is slightly larger, .53 to .82, but still would leave the effect size in the moderate range no matter where it ended up in that interval. For decreasing number of fallers, both interventions had large or close to large effect sizes. The group intervention was .83 and home intervention was .77. Confidence interval for the group intervention was (.72 to .97), which is not very narrow, however it does stay in the moderate to large effect size range. The confidence interval for decreasing the number of fallers in the home-group was (.61 to .97), which is the largest confidence interval of the bunch, indicating more variability and less precision in this group of data. Overall, both interventions seem to have good results in decreasing the fall rate and decreasing the number of falls in a population. The group intervention has higher effect sizes in both outcomes, possibly meaning that a group-exercise routine has a greater benefit and produces slightly better outcomes than a home-exercise plan. However, that being said, this review showed that a home exercise plan could produce statistically significant results as well. Both group-exercise and home-exercise are effective in reducing falls in older adults.

Applicability of Study Results

[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.]

This is a very applicable meta-analysis of information relevant to my clinical question. While this meta-analysis on the whole includes many more variables in reducing fall rate than my clinical question presents, it includes both of the variables that my question tries to decide between. The good thing about using systematic review data is that it compares a variety of different types of interventions, but that are all group-exercise or all individualized-home exercises. This is good because it is applicable to a variety of settings and locations, to answer the general question of group vs. home exercise. The downside is that we do not have details of what makes the group or home exercise programs successful in reducing falls. We just know that if the intervention includes more than one-type of exercise, it has a high chance of being successful in reducing falls rates and number of fallers in a population. With this information, it is hard to comment on the feasibility of the exact intervention, but the feasibility of using this data to make a decision is high, especially in this type of clinical situation. Some places may not have group-exercise classes available, so it is helpful to have data that says doing a home-based program is still effective. Some places may have both, but the group-exercise class may not involve more than one type of exercise. In that case, a home-based exercise that included a variety of types of exercises would be more effective. Overall, the moderate amount of heterogeneity of the exercise studies relays that this data is able to be applied to a variety of locations that are facing this clinical question. In addition, while my original clinical question did propose the question of what is best for "high fall risk" patient, no studies analyzed this in my CAT. However, this systematic review included about 50% of studies where the patient needed to have some "risk factor" for falls. This further substantiates my confidence in these results. It tells me that at least half of these studies looked at people who did not have great balance already and still were able to make a significant difference. The results relay the answer that either type of intervention mode would be beneficial for the patient, with the possibility of a multiple-exercise, group-exercise class being the best option to create the biggest effect in decreasing the rate of falls and number of people who fall.

SYNTHESIS AND CLINICAL IMPLICATIONS

Evidence Synthesis

Overall, there are many studies that look at the effectiveness of one intervention for reducing falls in the elderly. However, there are not many that compare one intervention to another to try and discover which is best. The reviewed evidence suggests that home-exercise programs and group-exercise classes are both effective when it comes to reducing fall rates in community dwelling older adults. When considering the RCT, there was only statistically significant data for the group-based intervention, however improvements of decreasing falls were seen in the home-exercise group as well³. In the systematic review, this found that both home-based exercise programs and group-exercise classes were effective in reducing rate of falls and number of fallers in a population⁸. The data was slightly more convincing in the systematic review for group-exercise classes, as both outcomes had a larger effect size for this intervention. The one component of the exercises for both home and group-based were that there needed to be more than one type of exercise involved. There is no evidence on what intervention is best for older adults who are at a high-risk of falling.

The quality of the systematic review⁸ was very high, the highest quality data available in regards to this clinical question. Most of their articles had low levels of bias, especially when considering the articles that focused on exercise interventions. The RCT³ was of moderate quality. The inability to blind the assessors' due to funding, as well as not comparing the intervention groups at baseline were the biggest sources of potential bias. In both articles, the potential bias of self-reporting patients was very present and unfortunately due to the nature of these kinds of studies. It would be impossible to follow a person around for a year to watch if they fell. Both the RCT and systematic review depend on patients being truthful in their fall habits.

Clinical Applicability

The feasibility of the group based intervention from the RCT isn't out of the realm of possibility. The only consideration would be the group class would have to exist. Many communities do have group based classes, however this specific intervention incorporated a one-hour a week class along with home exercises. Either intervention had the patient doing a high volume of exercise, however the group class may have provided more encouragement and motivation to adhere to it. The resources needed for this would be a space to hold class and an instructor to lead it. It would be feasible for a therapist to lead a class like this and assign home exercises to the participants. It may have to be patients that "graduate" from PT or a system like that.

The systematic review examined many different interventions to reduce falls. The results are very applicable to this clinical question and the feasibility of using the information is high. This review shows that both types of interventions, home-based and group-based, can reduce fall rates. However, the systematic review emphasizes that the exercise interventions need to include multiple components of exercise in order to be effective. That said, that information may help to make a clinical decision. If there is a single-component group class or a multiple-component home-exercise program, the therapist may want to choose the multi-component home exercise, because it has been shown to statistically lower fall rates. If both were available, the group exercise classes did have high effect size, indicating a greater magnitude of their effect on decreasing falling rates.

These studies both included patients similar to the patient in the clinical question. The randomized control trial had a mean age of 73, and this patient was 75. The systematic review did not indicate the mean age of all participants, but they had to be over 60 years old. The downside to both articles is that they did not require a previous fall or another fall risk assessment or indication of severity of balance. 52 of the 111 articles in the review did require the participant have some factor of risk of falling. Both the patients in the Review and the RCT were community dwelling patients that had to be able to ambulate independently, with or without an assistive device. The patient in the clinical question would be at a risk for falls indicated by a previous fall or another balance/falls outcome measure that is frequently used in community fall screens. Overall, it is likely that this patient would be helped by a group exercise or home intervention as long as they were multicomponent and it was adhered to.

The topic of adherence matters. In studies patients are usually required to adhere to the program, especially in a group-based setting. Adherence to the program, whether group or home matters. And this should influence the decision when recommending an intervention for the patient. What are the patient preferences? Since both interventions seem to be feasible as well as significant, the patient preference should take priority. If the patient prefers it, they will be more likely to adhere to it, resulting in a higher chance they will achieve the same results and be helped by the intervention. If the patient does not seem to care, possibly using a group – based intervention, if available, would more likely result in better outcomes. If the patient does not have transportation, a multicomponent home-exercise intervention, when adhered to, could still be effective in reducing falls. Luckily, there is low risk to either intervention and one does not have a greater risk over the other. Overall, clinicians should use their best judgement in accordance with patient preferences to determine what the best referral or suggestion should be.

Future Implications for Research:

There were no RCTs comparing the two interventions of home versus group based exercise when the patients had been classified as a "high falls risk" or just any "falls risk." This would be a good area to research- to see which interventions are most effective for those who are at a high risk of falling specifically, as these patients are at the highest risk and would be most beneficial to treat and prevent. The RCTs that compared home vs. group could also be improved in size to increase power and follow up, to create more reliable and valid data.

REFERENCES

[List all references cited in the CAT]

1. Albert SM, King J. Effectiveness of statewide falls prevention efforts with and without group exercise. *Prev Med* 2017;105:5-9. doi:10.1016/j.ypmed.2017.08.010.
2. Villafañe JH, Pirali C, Buraschi R, Arienti C, Corbellini C, Negrini S. Moving forward in fall prevention: an intervention to improve balance among patients in a quasi-experimental study of hospitalized patients. *Int J Rehabil Res* 2015;38(4):313-319. doi:10.1097/MRR.000000000000128.
3. Iliffe S, Kendrick D, Morris R, et al. Multicentre cluster randomised trial comparing a community group exercise programme and home-based exercise with usual care for people aged 65 years and over in primary care. *Health Technol Assess* 2014;18(49):vii-xxvii, 1. doi:10.3310/hta18490.
4. Arnold CM, Sran MM, Harrison EL. Exercise for fall risk reduction in community-dwelling older adults: a systematic review. *Physiother Can* 2008;60(4):358-372. doi:10.3138/physio.60.4.358.
5. Donat H, Ozcan A. Comparison of the effectiveness of two programmes on older adults at risk of falling: unsupervised home exercise and supervised group exercise. *Clin Rehabil* 2007;21(3):273-283. doi:10.1177/0269215506069486.
6. Sherrington C, Tiedemann A, Fairhall N, Close JCT, Lord SR. Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *N S W Public Health Bull* 2011;22(3-4):78-83. doi:10.1071/NB10056.
7. Lord SR, Castell S, Corcoran J, et al. The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: a randomized, controlled trial. *J Am Geriatr Soc* 2003;51(12):1685-1692. doi:10.1046/j.1532-5415.2003.51551.x.
8. Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. *Cochrane Database Syst Rev* 2003;(4):CD000340. doi:10.1002/14651858.CD000340.