

## **Group exercise for adults and elderly: Determinants of participation in group exercise and its associations with health outcome**

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**Abstract** Physical activity may be carried out alone or in a group. No comprehensive studies have been conducted on the associations between group exercise and health outcomes, the mechanisms underlying the associations with health outcomes, and determinants of participation in group exercise. The aim of this article is to review the associations and mechanisms between group exercise and health outcomes, and the determinants of participation in group exercise among healthy adults and the elderly without specific illnesses. Group exercise may reduce the risk of physical and mental illness by improving adherence to physical activity, psychological factors, and social relationships. While there may potentially be various determinants of group exercise, previous research has only examined specific demographic and environmental factors. Among the studies discussed in this review, few studies examined the differences between individual exercise and group exercise. Thus, the unique effects and determinants of group exercise remain unclear. Further studies examining these points are needed to develop a more complete knowledge base on group exercise.

**Keywords** : group exercise, health, adult, aged

### **Introduction**

Studies have suggested that physical activity has many health benefits, such as low cardiovascular and all-cause mortality<sup>1)</sup> and low risk of non-communicable diseases<sup>2)</sup>. The focus in most of those studies was the volume, intensity, and type of physical activity; and physical activity recommendations or guidelines have been developed based on the results<sup>3)</sup>.

When it comes to exercise, there is also the factor of whether it is performed alone or in a group. The health effects of group exercise may be the result of not only physiological mechanisms of physical activity, but also the social network and social support mechanisms of participating in a group activity<sup>4)</sup>. One systematic review revealed that club-based and team-based sports may improve psychosocial health outcomes better than individual exercise<sup>5)</sup>. However, no comprehensive studies including physical aspects, mechanisms of the associations with health outcome, and determinants of participation in group exercise have been conducted on associations with health outcomes.

Accordingly, the aim of this article is to review the following three points:

- 1) The associations between group exercise and health outcomes;
- 2) Suspected mechanisms between group exercise and health outcomes; and
- 3) The determinants of participation in group exercise.

To this aim, we set out to create a conceptual model for health outcome through group exercise based on the results of this review. The subjects of this review were not individuals with specific illnesses, but rather healthy adults and elderly.

### **Group exercise**

**Definition.** To our knowledge, there is no clear definition for the term, “group exercise”. According to the “Health through sport conceptual model” presented by Eime, et al.<sup>5,6)</sup>, “the sport element incorporates two dimensions of context: individual - team, and informal - organized, each of which is almost dichotomous, but also has some intermediate variants.” However, this model does not include definitions of each dimension of context, and there may be cases in which various dimensions coexist. In the present study, we clearly differentiated exercise performed alone (“individual exercise”) and exercise performed with at least one other person (“group exercise”).

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**How to measure and analyze group exercise.** The health effects of group exercise which cannot be obtained through individual exercise may potentially be the result of the difference in the type of exercise. It is likely that the type of exercise would differ between individuals and groups. For example, for team sports such as football, individuals can practice alone, but cannot play games by themselves. As the intensity<sup>7)</sup> and health effects<sup>8)</sup> have been shown to vary with the type of exercise, it is necessary to use indicators and methods of analysis that take the type of exercise into account when considering the differences between groups and individuals. In addition, those who participate in group exercise may be healthier than those who participate in individual exercise, simply because group exercisers may have higher sociability. It is therefore beneficial to perform an analysis in consideration of this point.

In the Japan Gerontological Evaluation Study (JAGES), which examined community dwelling older adults in Japan who are not eligible for long-term care<sup>9)</sup>, the questions, “Do you ever exercise with family, friends, or acquaintances?” and “Do you ever exercise by yourself?” were used to determine the frequency of participation in group exercise and individual exercise. In addition to this method, another possible method would be to ask: “Who do you usually exercise with?”, for which the responses are “No exercise”, “Alone”, “As a part of a group”, or “Both alone and as a part of a group”.

### Associations between group exercise and health outcomes

**Effects on physical health.** Physical activity has been shown to have a protective effect against non-communicable diseases<sup>10)</sup>. Among types of physical activity, leisure time physical activity has been shown in systematic reviews and meta-analysis to reduce the risk of cardiovascular disease<sup>11)</sup>, colon cancer<sup>12)</sup>, pancreatic cancer<sup>13)</sup> and lung cancer<sup>14)</sup>. Similarly, participation in sports, including group exercise, has been shown to reduce the risk of stroke<sup>15)</sup>. Nevertheless, these types of group exercise may have similar effects as exercise performed alone, and do not necessarily manifest any distinctive effects of group exercise.

One systematic and meta-analytic study clarifying the association between group exercise and physical health showed the health benefits of participating in a walking group<sup>16)</sup>. Walking in groups may have health benefits at least equal to walking itself. One randomized controlled trial on older adults showed improved balance and a reduced rate of falling with participation in community-based group exercise<sup>17)</sup>. According to cross-sectional studies, participation in sports organizations was associated with a lower risk of falling<sup>18)</sup> and with having 20 or more teeth<sup>19)</sup>.

According to a cluster randomized controlled trial, group exercise at the workplace was more effective than

individual exercise at home in reducing musculoskeletal pain and the use of analgesics, and in increasing muscle strength<sup>20)</sup>. One cohort study examined the association between participation in sports organizations and incident functional disability<sup>21)</sup>. According to that study, not only did non-participation increase the risk of incident functional disability, but among those who exercised weekly or more, those that did not participate in a sports organization had a higher risk than those that did. However, more studies comparing group and individual exercise are needed.

Other studies have examined the relationship between physical health and the ratio of people involved in a social network, including participation in a sports organization at the community level. Older adults living in regions with high horizontal social capital, for example, high participation in sports organizations and leisure activity groups, had a higher tendency to have 20 or more remaining teeth<sup>22)</sup>. Women living in regions where fewer people are involved in social groups, such as participation in sports organizations, had a higher risk of incident functional disability<sup>23)</sup>. Further research is needed to examine the relationships between health outcome and the ratio of people participating in group exercise at the community level.

**Effects on mental health.** Systematic reviews have shown physical activity to have preventive effects on depression; and promoting physical activity may reduce the risk of developing depression<sup>24)</sup>. A review on organized physical recreation and mental health revealed that participation in group exercise may reduce depression and symptoms of Alzheimer’s disease<sup>4)</sup>. Also, participation in sports, including group exercise, has been shown to lower dementia risk<sup>25)</sup>.

Similarly, social participation, including participation in sports organizations, has been shown to reduce the risk of depression by about 50 to 60% in older men and women<sup>26)</sup>. Moreover, among older adults involved in social participation activities, men with a particular role had one-seventh the incidence of depression compared to those without such a role. This suggests that simply participating in a sports organization can help prevent depression and, further, that it is important to take on a special role within a sports organization.

### Mechanisms between group exercise and health outcome

The mechanisms for health benefits from group exercise that cannot be obtained through individual exercise may involve physical activity, psychological factors, and social factors.

**Effects on physical activity.** Some potential effects on physical activity are adherence and duration. According to multiple meta-analyses<sup>27-29)</sup>, performing exercise with

another person rather than alone results in a tendency to a more preferable level of adherence. Adherence is particularly high in people in cohesive groups<sup>27</sup>). Similarly, in walking groups, social cohesion may be a predictor of adherence to the walking group<sup>30</sup>). Among the various aspects of social support, material support and positive social interaction had the largest potential to promote adherence to group exercise<sup>31</sup>).

Regarding duration of physical activity, among physically active adults in New York City, those who exercised as a part of a group spent an hour or longer participating in leisure time physical activities than those who exercised alone<sup>32</sup>). The authors state that “this finding may be driven by participation in structured activities, such as team sports or exercise classes.” However, one limitation of that study was that the duration of team sports included break time and may have been overestimated. More detailed studies are needed.

**Effects on psychological factors.** According to a systematic review with a focus on sports participation, one psychological benefit may be that participation in club sports may enhance self-esteem<sup>5</sup>). A review on organized physical recreational activities indicated that participation in recreational groups and socially supported physical activity may reduce stress and anxiety<sup>4</sup>). In an intervention study that compared psychological effects from group and individual exercise programs for middle-aged and older adults, those who participated in a program consisting of both individual and group exercise had higher self-assessment of activities, enjoyment, achievement, satisfaction and self-recognition scores than those who only participated in an individual exercise program<sup>33</sup>). In a review of qualitative literature concerning mental health and physical activity interventions, it was found that group exercise may increase feelings of safety, sense of meaning, purpose and achievement, and positive feelings toward identity and the role of the facilitating personnel<sup>34</sup>).

**Effects on social factors.** According to a systematic review of the social benefits of participation in sports, enhanced social connectedness, social support and peer bonding may be provided by club sports<sup>5</sup>). A study that focused on walking groups revealed that walking together with someone has value as a form of companionship<sup>35</sup>). Furthermore, participation in Japanese senior citizen clubs that conduct wide-ranging activities, including group exercise, has been shown to increase emotional social support<sup>36</sup>). Few studies of social benefit have been conducted that compare the differences of individual exercise and group exercise. In a cluster randomized controlled trial, group exercise at the workplace contributed to building more social capital within teams (bonding social capital) than exercise at home<sup>37</sup>). A cohort study of older Japanese adults who were not eligible for long-term care showed that, among those who exercised once a week or more,

those who did not participate in a sports organization had a significantly higher hazard ratio for an incident functional disability of 1.29 (1.02-1.64) than participants in a sports organization<sup>21</sup>). Moreover, 6.9% of that difference may have been attributable to having a social network.

It has been postulated that these forms of individual-level social support and social network and community-level social capital may improve lifestyle routines through social influence and informal control, and improve health outcomes by creating a stress buffer<sup>38,39</sup>). The path for the effects of group exercise on health outcomes may therefore be the improvement of lifestyle routines and reduction of stress through social relationships.

### Determinants of participation in group exercise

There are five categories of determinants of physical activity: demographic and biological, psychosocial, behavioral, social and cultural, and environmental factors<sup>40</sup>). However, there is no clear distinction between individual exercise and group exercise in such physical activity, and the determinants of participation in group exercise are unclear. A review on interventions implemented through sporting organizations to increase participation in sports showed that there is no high quality evidence of effective methods for increasing sports participation<sup>41</sup>).

Among the very few studies conducted to clarify the determinants of participation in group exercise, one cross-sectional study looked at adults in New York City<sup>32</sup>). In that study, among respondents who reported any (>0 min/week) leisure time physical activity, the characteristics of those who tended to participate as a part of a group were as follows: (1) a lower ratio among those who were 45 or older compared to those who were between 18-24 years old, (2) a higher ratio among those with an educational attainment of only high school, compared to those with college education or higher, and (3) a higher ratio among those with a low income than those with a high income. A cross-sectional study of Australians aged 15 and older showed that participation in many team sports increased as socio-economic status decreased and geographical remoteness increased<sup>42</sup>).

Regarding environmental factors, those who live in communities with between 10,000 and 100,000 residents were more likely to participate in team sports than those who live in communities with more than 100,000 residents<sup>43</sup>). As for neighborhood safety, those who perceived neighborhood social safety participated in sports at indoor sports clubs more often than those who did not<sup>44</sup>). In addition, a positive attitude among those who perceived their neighborhood as safe and a higher self-efficacy among those who perceived their neighborhood as unsafe were both strongly associated with sports participation<sup>45</sup>). Only a few demographic and environmental factors have been examined, and further research is needed.

### Conceptual model of health outcomes through group exercise for adults and elderly

In addition to the above review, we additionally created a conceptual model of health outcomes through group exercise for adults and the elderly (Fig. 1) based on “The health through sport conceptual model” by Eime et al.<sup>5,6</sup> and “Conceptual model of the relationships between organized sport and recreation, and physical and mental health” by Street et al.<sup>4</sup>. The model includes four major elements: (a) determinants of group exercise, (b) group exercise itself, (c) mechanism in the relationship between group exercise and health outcome, and (d) health outcomes of group exercise. A point that differs from Eime’s model<sup>5,6</sup> is that we focused on group exercise and were able to pinpoint the factors that have currently been shown to be related. It also differs from Street’s model<sup>4</sup> in that it includes details about determinants of group exercise, and physical and mental health. We were therefore able to create a comprehensive conceptual model related to group exercise.

### Conclusion

In this review, we provided an overview of four aspects of group exercise: group exercise itself, health outcomes

of group exercise, mechanisms underlying the associations between group exercise and health outcome, and determinants of participation in group exercise. Based on those aspects, we created a conceptual model of health outcome through group exercise for adults and elderly. Performing group exercise, as opposed to individual exercise, may have many health benefits. However, among the studies discussed in our review, there were few that examined the differences between individual exercise and group exercise, and there were many unknown points regarding the unique effects of group exercise and determinants of participation in group exercise. In addition, it is necessary to clarify whether it would be beneficial to recommend group exercise to those who prefer individual exercise. Further studies examining these points as well are needed to develop a more complete knowledge base on group exercise.

### Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this article.

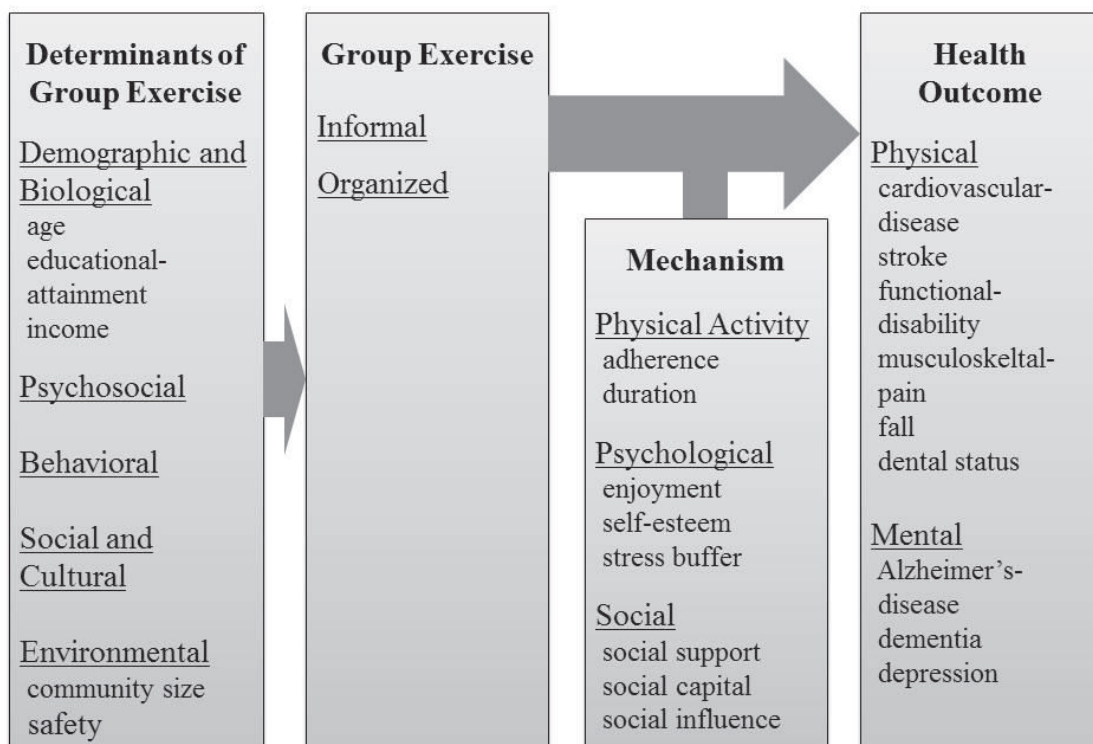


Fig. 1 Conceptual model of health outcomes through group exercise for adults and the elderly



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