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## Peer coaching as a population approach to increase physical activity in older adults

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# CHAPTER 7

## General discussion

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Van gezonde individuen naar gezonde populaties.

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## GENERAL DISCUSSION

In this thesis, we explore a new approach to increase health at the population level. We tested the hypothesis that physical activity interventions can be successful to increase physical activity in a sustainable way by using peer coaches without professional interference. In several consecutive studies we explore the timing of physical fitness, a proof-of-principle of peer coaching, the replicability of peer coaching and its integration in formal care and the Cuban case as an example of a nationwide physical activity intervention.

**Chapter one** lays the foundation for our studies. Many age-related diseases like cardiovascular disease and diabetes are largely influenced by lifestyle. Physical activity is a lifestyle factor that prevents and delays many of the common age-related diseases worldwide. However, our physical activity frequency has diminished over the past 150 years due to a changing environment. Industrialization, change in labour and household machinery changed physical activity from an unconscious part of everyday life to a conscious action. Some people need continuous external support to reach the recommended level of physical activity for healthy ageing. Therefore, interventions aiming to increase physical activity need to be able to exert their effects for a sustainable time by durably changing someone's health behaviour for a longer period of time or the intervention itself needs to exist for a long period.

In **chapter two** we study the effect of physical exercise during the life course on ageing. More specifically, we study how the timing and magnitude of peak physical performance relates to life expectancy in Olympic athletes. A higher age at peak physical performance is associated with a higher age at death. This is in line with life history theory. There is growing evidence between life history trade-offs between species. A longer period of development, measured as time from birth to sexual maturation, is associated with a higher lifespan. Within humans, this association has been found in females where age at menarche was negatively associated with risk of all-cause mortality. However, this only shows the relation of germline development with longevity in human females. We studied if there was such a sign of a life-history trade-off in both sexes using the development of the whole soma by using a unique historical cohort of 1055 Olympic track and field athletes from 41 different nationalities from the Olympic Games from 1896 through 1936. Professional athletes push their physical performance to the maximum and keep accurate track of these achievements. Consequently, their personal record is an accurate representation of the age of their peak performance. Under the assumption that professional athletes train

at maximum intensity, this peak performance is an accurate read-out of the maximal physiological capacity of the individual. Comparing the performance with contemporaries in the same discipline we also get an estimate of the magnitude of this performance as z-scores. Here, we show a life history trade-off between early and above average physical performance and longevity in male Olympic athletes. Athletes who peaked at an earlier age showed 17-percent increased mortality rates (95% CI 8-26% per SD,  $p < 0.001$ ) and athletes who ranked higher showed 11-percent increased mortality rates (95% CI 1-22% per SD,  $p = 0.025$ ). Male athletes who had both an early and extraordinary peak performance suffered a 4.7-year longevity cost. (95% CI 2.1-7.5 years,  $p = 0.001$ ). This is the first time a life history trade-off between physical performance and longevity has been found in humans. This study, sometimes misinterpreted as proof that being a young Olympian is unhealthy, shows that a biological life history trade-off is not only seen between species, but also within a species. Moderate and longer period of maturation comes with a longevity gain.

Early high physical peaks were not beneficial for longevity. We propose here that moderate and long-term physical activity during life is essential for healthy ageing. In line with this, the recommended level of physical activity for older adults is not to exercise like an Olympic athlete but only 150 minutes of moderate intense exercises per week. Moderate intense exercises are safe and without the use of professionals maybe possible to achieve over a longer period of time.

**Chapter three** shows the description and proof-of-principle of a peer coached physical activity intervention for community dwelling adults spawned in the community by older adults themselves. This first peer coached physical activity group was set up by an older adult himself and his peers. The group used the local soccer and track and field association for the exercises and storage of sport attributes. The group grew by word-of-mouth and was completely self-sustainable thanks to a small fee participants paid to participate. At the time of writing, this group exists for over 10 years and reports over 200 weekly participants. The peer coach group gathered every weekday to exercise coached by an older adult. Members attend on average 2.5 days per week and retention rate is 77.5% after 6 years. The members perceived improvements in several health measures. In line with this, the six-minute walk test results of members of this peer coach physical activity group improved with 21.7 meters per year, compared with the decline of 2-7 meters per year in the general population. Because of the self-sustainable and self-organizing character of the intervention, peer coaching has the potential to be scaled up at low cost and increase physical activity in the increasing number of older adults.

In **chapter four** we answer the succeeding question whether this self-sustainable and self-organizing peer coach intervention is replicable. The group described in the previous chapter was created by community dwelling older adults themselves, but as far as we know there was only one. To use this successful group as an intervention it needs to be replicable in different locations by professionals. Therefore, we created three new groups in Leiden, the Netherlands. Facilitators were a motivated initiator and a non-professional atmosphere for participants to take ownership. Barriers were the absence of motivated participants to take ownership and insufficient participants to ensure the presence of participants at every exercise session. The groups were similar to the previous described group and were self-organizing after 114, 216 and 263 days. The initial investments were low. The groups reached 118 members and a retention of 86.4% in two years. The groups are still active at the time of writing. During the study quality of life increased with 0.4 points on a ten-point scale (95% CI 0.1-0.7,  $p=0.02$ ) and six-minute walk test results improved with 33 meters (95% CI 18-48,  $p<0.01$ ) annually. This study showed that the proof-of-principle of a peer coached physical activity intervention is replicable. The groups can be set up by professionals to later transfer the execution and organization to the participants themselves.

**Chapter five** explores the role of formal care to aid these self-sustainable and self-organizing interventions by identifying specific high-risk individuals who could benefit the most from daily physical activity. In an exercise referral scheme study we tested if an exercise referral scheme to an unsupervised peer coached intervention was effective in primary care. Results show that a total of 106 patients were referred to the peer coach exercise groups. 5.7% of patients showed up at the peer coach exercise groups and 66.7% remained participating during follow up. The success of the exercise referral scheme was limited. There were two moments of attrition identified. First, general practitioners and nurses rarely referred a patient to the peer coached intervention, or any specific physical activity intervention. Second, not many of the referred patients actually went to the intervention. The current healthcare system in the Netherlands does not promote preventive care sufficiently. However, this minimal effort referral scheme showed similar result as quit smoking programs in primary care.

In **Chapter six** we studied an example of the healthcare system in Cuba. In Cuba there is a successful population physical activity intervention for community dwelling older adults named the *Círculos de Abuelos* (Grandparent Circles). In these grandparent circles, older adults exercise together three days a week under the guidance of a professional sport coach and engage in self-organized social activities. The Cuban Ministry of Public Health (MINSAP) founded *Círculos de Abuelos* in 1985 and during

the last count in 2011, the program promoted physical activity in 908,412 participants, 39% of Cuba's older population. Appointed by National Institute for Sports, Physical Education and Recreation, the professional sports coach initiates new *Círculos de Abuelos* in cooperation with the general practitioner and forms a lasting link between the *Círculos de Abuelos* and the local community. The *Círculos de Abuelos* is a proof-of-principle of a longstanding population-wide program to promote physical activity in older adults. To explain the success, we identified four key factors. The intervention combines physical activity in a social group with other social activities, it charges no participation fee, has a direct link with their equivalent of general practitioners and exercises three times a week which give participants a weekly routine.



## CONSIDERATIONS

The timing and magnitude of physical peak performance was measured by an athlete's personal record. This was used as a read out for biological peak and we assumed that the timing and magnitude was only influenced by genes and not environment. However, the timing of peak performance is not only influenced by genes, but also by type of sport, duration of sport event and start of sport career.<sup>1</sup> Moreover, it remains unclear if this relation is set from birth or causal in a sense that it can be influenced during life by delaying one's maturation. Future research should focus on the possibility to influence the biological predisposition of the timing of maturation and if changing this timing also influences longevity.

The difference in life expectancy between above average performers and below average performers is also influenced by their relative success in sports and no inferences should be made towards the benefits of different intensity levels of exercise. However, several studies show that moderate as well as vigorous intensity exercise is associated with lower mortality.<sup>2-4</sup> Some studies stress the difference between recreational versus professional, leisure-time versus non-leisure-time or exercise versus non-exercise physical activity.<sup>4-6</sup> In general, physical activity in all forms is healthy and we should not strive towards intense exercises or highly developed models to exercise.<sup>7,8</sup> The challenge is to increase all forms of daily physical activity in large numbers of older adults for a long period of time.

The mental well-being effects of the peer coach physical activity intervention are inferred by self-reported measures. These measures are subjective and could have been collected in a more objective way. However, self-reported well-being was just as valuable in our study and there is ample evidence that daily physical activity (with or without peer coaching) is beneficial for mental well-being in older adults.<sup>9-13</sup>

Similar consideration are in place for physical effects of the peer coach physical activity intervention. Even though the objective six-minute walk test was used to assess physical fitness, no mortality data was obtained. The goal of this thesis was not to study an effect between physical activity and health benefits, as this is well established in the scientific literature. Therefore, we measured attendance and inferred that attending a session meant engaging in moderate-intense physical activity. A better measure for physical activity would be energy expenditure or metabolic equivalent of task (METC) measured by an accelerometer. However,

lengthy observation for over a year showed that the participants did engage in physical activity at the intervention and there is reasonable agreement between self-reported physical activity and accelerometer data in older adults.<sup>14</sup> Additionally, the six-minute walk indicated that participants did engage in physical activity during participation.

In line with the past two paragraphs, effect of the peer coach physical activity intervention was not established in a Randomized Control Trial (RCT) with a control group. Inferences regarding the effect of the intervention should be made cautiously. Yet the real world setting of these studies add strength to this thesis' main message. Additionally, an RCT would not add much useful knowledge for the cost of the study. In a more practical sense, the results show us that in the Netherlands it is feasible to create self-organizing and self-supporting peer coach physical activity interventions.

Moreover, we suggested scalability on the grounds that no scarce resources are needed. Little financial investments are needed and public parks are widely available. Nevertheless, large scale implementation has not been formally tested in this thesis. Maybe even more important than large scale implementation, is to study the implementation in the harder to reach subgroups who benefit the most from daily physical activity. Not more of the same, but contextual diversity would give more insights in different implementation strategies.

Another consideration is that participants are in general younger and higher educated than the community dwelling older adults that would benefit most from daily physical activity. However, the group of participants in the peer groups that exist for a longer period shift more towards older and lower educated.

The sustainable nature of peer coaching is a strong characteristic of the intervention. There is therefore no rush to quickly recruit many participants. However, primary care could aid to reach older adults with comorbidities. The referral scheme we used had limited effect. There were two major moments of attrition. First, only a small portion of the patients were referred. Second, only a small portion of the patients responded to the referral. The implementation of the referral scheme in the primary care practice was done in a single interview with the general practitioner. More extensive implementation would probably benefit the first moment of attrition.<sup>15</sup> Also feedback from referred patients could increase adoption by primary care physician. Motivational interviewing and follow-up after referral could increase the responds to the referrals.<sup>16</sup> Future studies should focus under what circumstances this referral scheme works.

The current COVID-19 pandemic showed the resilience of the peer coach groups. In the Netherlands the regulation regarding the pandemic changed on a weekly basis. There are periods in which the peer coach groups could not gather and exercise together. The longest period in which the peer coach groups stopped was four weeks during the first lockdown. However, after this period all the peer coach groups regrouped and started exercising together again. At the time of writing, there is a second lockdown regarding sports and most peer coach groups have ceased activities. The groups stay in touch with each other which is a strong sign activities will resume when allowed by the Dutch government.

## IMPLICATIONS

What are the implications of these results for peer coaching in physical activity promotion and peer coaching in general? Physical inactivity is almost omnipresent. Especially in developed and developing countries where the burden of lifestyle diseases is high, physical activity promotion has priority. First, we discuss the implications of the intervention in this study. Second, we discuss possible applications of peer coaching in general.

### *Peer coaching for physical activity promotion*

Several benefits of the use of peer coaching to promote physical activity have been mentioned in this thesis. The strength of peer-coaching lies in empathy and using the experiential knowledge of the peer coach, to understand the other peers wishes, motivations, possibilities and limitations. Having the same age and background and likely coming from the same neighbourhood increases the level of connectedness with the participants compared to a professional. This works two ways. Helping participants from his or her own neighbourhood also increases the involvement of the peer coach. This higher level of group cohesion increases the attendance and lowers attrition making peer coaching physical activity interventions successful in major challenges of promoting physical activity.<sup>17-19</sup> Additionally, the use of peer coaches is not inferior or unsafe compared to professionals.<sup>9,20-22</sup>

Peer coaches are participants from the target population that act as coach and motivator. Tasks normally performed in interventions by professionals. Professionals are scarce, there are less professionals than older adults, and are needed for more complicated tasks. Daily physical activity can be performed by older adults themselves safely. Removing the scarce professional in this intervention removes a barrier for implementing this intervention in large numbers for longer period of time.

In our study peer coaches were unpaid volunteers. This makes it more challenging to recruit peer coaches, but greatly diminishes structural costs. Without these structural costs the groups are self-sufficient and sustainable, two barriers faced by other physical activity interventions. In two groups, the funds collected by the groups were used to compensate the peer coaches for their efforts. Other groups gave an end-of-year present to thank their peer coaches. However, in principle the peer coaches coach the groups on a voluntary basis and do not receive any payment.

Finally, older adults prefer to exercise in groups when the group consists of similar aged individuals.<sup>23</sup> This makes peer coaching with its strong social component a suitable intervention. This could be the reason that eHealth interventions using apps or websites, where participants exercise alone at home, are more suitable for adolescents than older adults.

#### *Peer coaching in interventions*

All of the previous benefits of peer coaching also apply to non-physical activity interventions. There are already fields where peers are widely applied. In medical sciences peer support for mental health in patient groups is a known phenomenon. Peer support is used in patient groups for diabetes, several forms of cancer, cardiovascular disease, dementia, depression, addiction, pregnancy and early adulthood.<sup>24-31</sup> In some of these areas the beneficial effects of peer coaching on physical or mental health is still unclear.<sup>25,26,30</sup> However, for most areas there is a clear benefit to peer support.<sup>24,27-29</sup>

There are other areas where peer coaching could be applied. In primary care peer coaching could be used to monitor patient populations. The first check in the primary care practice could be done by peers. Neighbourhoods could create local peer networks for specific purposes, for example small domestic maintenance jobs, taxes or other chores. It is also possible to change the method of deploying peer volunteers. The self-organization is seen an attractive feature of peer support. The peer coach physical activity intervention in this study requires total self-organization from the peer coaches and participants. The organizational structure of the Alcoholics Anonymous has a high degree of decentralized organization of the A.A. Group with several regional and national boards to aid the local groups.<sup>32</sup> Thanks to the Alcoholics Anonymous, a total of 2 million people in over 150 countries receive health benefits without the use of professionals and healthcare budget.

## RECOMMENDATIONS

There are several questions unanswered and recommendations for future research. In the following paragraphs we will discuss some of these. First, scalability will be discussed. Second, we will note the possibilities to further assess effectiveness. Third, we recommend a more peer centric explanatory framework in future studies. Finally, a semantic recommendation about definitions and uniformity will be discussed.

### *Scalability*

To utilize the maximum potential of peer coach physical activity interventions the scalability should be studied. In line with previous studies a real-world study can conduct large scale implementation of different peer coach groups. There would be enough data to compare empirically internal factors of success and failure. If put in diverse contexts, external factors of success and failure can be studied extensively. Also, different forms of organizational structure can be tested. This would require collaboration of several different organizations in several countries.

### *Effectivity*

First proof-of-principle has been given in this study. However, as mentioned before, ultimate effectivity measures like mortality or healthcare expenditure have not been tested yet. For reliable mortality data, a longer follow-up period is needed or more study participants. Both longer follow-up as well as more study participants are also needed for a health care expenditure measure. Healthcare expenditure and mortality are influenced by many determinants in a real world setting and experimental settings very badly reflect the real world. We therefore propose to not focus on mortality or healthcare expenditure.

### *Peer centric framework*

The study in this thesis did not find how the effect of peer coaching is mediated. As Hulteen and colleagues rightly mention, this is still an understudied area of peer-led interventions.<sup>33</sup> There is lack of a peer centric framework that explains the mechanisms through which peer coaches influence the behaviour of participants. Such a theoretical framework would also help uniform future peer-led interventions.

### *Definition*

There is a lack of uniformity across research regarding peer-led interventions.<sup>31</sup> Even though this is a frequent mentioned downside of research in this area, it could also be seen as a strength. A strong aspect of the peer coach physical activity intervention was its adaptability. However, there is still much progress to be made in this emerging

field of research. A clear definition of different matters would help communication. In the scientific literature the terms peer mentor, peer leader and peer coach are often interchangeable. The same goes for peer-led, peer-delivered and peer-coached. Terms like peer mentoring, peer support and peer coaching seemed interchangeable, but Matz-Costa and colleagues distinguished the nuances.<sup>34</sup> This is the single most important point for the future of peer support research. Although we did add a new word to the peer research lingo, we hope there will be a clear definition of all aspects in the near future.

## CONCLUSION

Many of today's prevalent diseases with a high burden are at least partly caused by unhealthy lifestyle and improve with a healthy lifestyle. Physical activity is consistently identified as a strong factor to prevent, improve and treat many of these diseases. For some people, increasing daily physical activity requires an active and sustainable intervention with a strong social component. Peer coaching is an emerging method with inherent advantages that make it suitable for a sustainable and social intervention. Here we showed that peer coaching is proven effective in a real-world setting to increase physical activity in large numbers of older adults for a long period of time.



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