



# Health economic aspects on physical activity interventions in community and primary care

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## Introduction

The importance of physical activity was recognized already by the Greek physician Hippocrates, who wrote around 400 BC: “walking is men’s best medicine”. Nowadays, 31.3% of the world population is physically inactive, ranging from 34.8% in Europe, 17% in South-East Asia to about 43% in North/South America and the eastern Mediterranean (1). The negative effects for an inactive lifestyle are well documented. It was estimated that physical inactivity causes 6-10% of the burden of disease from coronary heart disease, type 2 diabetes, breast and colon cancer. If physical inactivity would be eliminated, life expectancy is expected to increase worldwide with 0.68 years (range 0.41-0.95 years) (2). In a study of actual medical expenditure of 3500 adults from the United States, it was shown that physically active adults used 1000 dollar ( $\pm$ €780) less on yearly medical care services compared to inactive adults (3). In studies from Canada, Switzerland, the United Kingdom and the United States, of the total direct health care costs 1.5% to 3% could be inferred to physical inactivity (4). In an Australian study, simulation models were developed and it was demonstrated that a 10% reduction in physical inactivity can lead to potential cost savings of approximately €180 million, with 37% of savings for the health care sector (5).

The World Health Organization (WHO) has centered physical inactivity prevention as one of its main targets. Overall, current evidence showed that encouraging PA lead to improved PA levels (6-9). A review on the effectiveness of PA in-

terventions has shown that to increase levels of physical activity over 12 to 24 months, this was slightly more effective for older (60+ years) compared to middle aged individuals (8). Further, it was shown that twelve patients (95% CI 7 to 33) were ‘needed to treat’ with a PA intervention, in order for one additional sedentary adult to meet global recommended PA levels (i.e., being physically active at moderate-intensity for at least 150 minutes per week). Another finding was that at 12 months brief advice interventions led to higher self-reported PA compared to intensive interventions (9).

For optimal decision-making, economic evaluations of PA interventions are needed. Economic evaluations are increasingly used to inform decision makers not only on the effectiveness of these interventions, but also in their resource implications in terms of time, effort and money. Within an economic evaluation, the main aim is to calculate the costs and effects of an intervention and to compare this to the costs/effects of one or more alternatives (10;11). The section below provides a brief overview of economic analyses in PA interventions for community and primary health care. The intervention effects are mainly presented in terms of Quality Adjusted Life Years (QALYs) as the primary outcome. A QALY represents the additional life expectancy resulting from the intervention when corrected for the quality of that life expectancy. Further, section below will reflect on some gaps in the evidence and will provide implications for current primary health care practice.



**Cost-effectiveness of PA in community and primary health care**

The study of Roux et al., (12) investigated the cost-effectiveness of seven community-based initiatives in PA (i.e., community wide campaigns, social support interventions, individually adapted behavior change and creation for enhanced access to PA places). With means of a lifetime cost-effectiveness analysis on a simulated cohort, it was shown that the community based PA interventions were cost-effective. Cost-effectiveness ratios ranged between €11,000 and €55,000 per QALY (quality-adjusted-life-year gained), relative to no intervention. The relative risk of five diseases (coronary heart disease, ischemic stroke, type 2 diabetes, breast cancer and colorectal cancer) was assessed across a range of PA intensity levels. All interventions appeared to reduce disease incidence (e.g., reduction of 15-85 cases per 100 000 for breast cancer). Interventions with a shorter time frame were associated with lower cost-effectiveness.

A systematic review (13) on community-based PA promotion (behavioral and environmental strategies) showed that the estimated cost was around €800 over 12 months per participant to increase PA to recommended levels. Environmental strategies and interventions targeted at general practitioners had the most potential.

Another systematic review (14) on both community and primary health care PA interventions (walking, exercise groups, brief advice, gym-based exercise classes or instructor-led programs), overall showed that most interventions were cost-effective. Exercise on prescription delivered by nurses/primary care doctors by means of mail or telephone counseling and some group interventions were more cost-effective than intensive instructor-led PA interventions. Based on the higher quality studies, it was found that PA interventi-

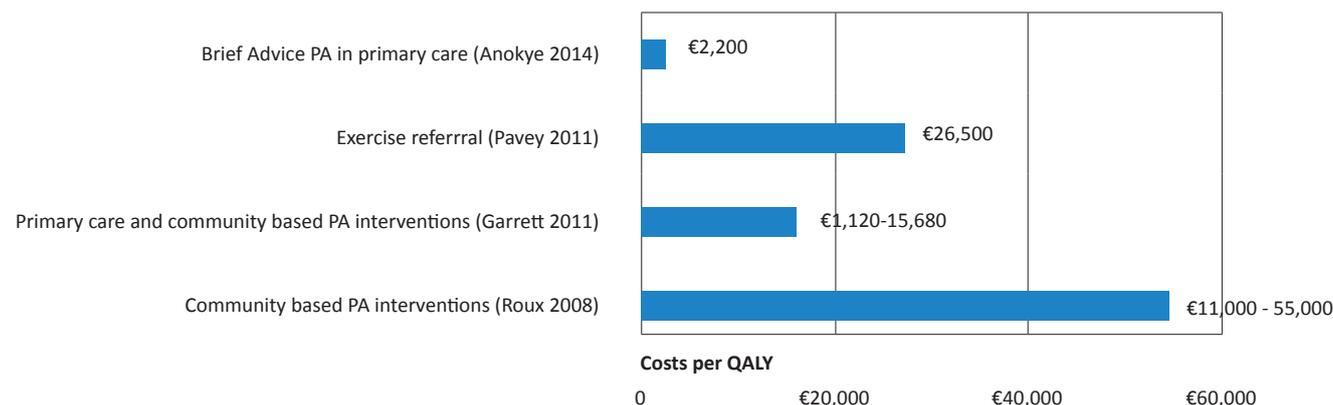
ons could be delivered for between €1,120 and €15,680 per QALY.

Pavey et al., (15) conducted a systematic review and economic evaluation on exercise referral (i.e., a person is referred by a health care professional to a third party, such as leisure centers or gyms for supervised exercise programs). Exercise referral was less effective to target PA. Moreover, it was shown that for sedentary individuals, aged between 40-60 years without a diagnosed medical condition, the cost per person in improving PA was €26,500/QALY. The cost-effectiveness was improved in groups with a medical condition; obesity €18,600/QALY, hypertension €16,300/QALY and depression €10,700/QALY.

A recent study with the use of time-based modeling investigated brief advice in PA. Brief advice consisted of verbal advice, discussion, negotiation or encouragement with or without follow-up. Incremental costs per QALY of a brief advice intervention were estimated around €2,200. Cost-effectiveness of brief advice interventions in PA versus usual care seemed to vary by age; higher effectiveness was found in individuals over 50 years. Also, higher cost-effectiveness was found when recruitment was focused on individuals with a medical condition (16).

Overall, most physical activities initiatives in community and primary health care were found to be cost-effective (12-16). Figure 1 shows that the costs are varying between €1,120 and €55,000 (original values were converted to euros) per QALY. Due to a great diversity in the chosen type of economic evaluation, intervention mode, outcomes and costs components (17;18) large differences in QALYs were observed. Even so, a large amount of the reviewed studies were under the willingness to pay threshold reported by the National Institute for Health and Clinical Excellence (NICE),

**Figure 1** Overview studies showing the costs of a PA intervention/ per QALY (quality-adjusted-life-year)





namely GBP20,000 to GBP30,000 (i.e., ±€25,000 to ±€38,000) (19).

The abovementioned information is based on literature extracted until September 2014.

### **Gaps in the evidence**

Despite the growing evidence that PA interventions are cost-effective, there are several gaps in the evidence. Overall, there is a great variety in the study design, type of PA (e.g., supervised versus unsupervised), time horizon implemented, study outcomes for cost-effectiveness analyses such as activity changes or falls, quality adjusted life years (QALY's) or disability adjusted life years (DALY's) and the use of self-report measures instead of objective measures (e.g., accelerometers) for measuring PA. Also, there is little standardization of what constitutes costs and the manner in which costs are collected (alongside the trial or estimated costs are used through assessing those costs retrospectively or by modeling). Moreover, there is a great variety among countries (i.e., healthcare-systems, infrastructure, funding and cost structures). With these issues in mind, it is difficult to draw firm conclusions about which type of PA intervention is most cost-effective in community and primary health care.

### **Implications for practice**

To plan implementation of PA interventions in primary care, the following recommendations can be considered. For now, it seems that PA delivered by nurses/primary care doctors is more cost-effective than intensive instructor-led PA interventions. Environmental interventions, group interventions and interventions targeted at general practitioners had the most potential. Another recommendation is to target brief advice interventions at older individuals (>50 years) and to focus on individuals with a medical condition, as this provides more value for money. Interventions with a longer time frame were associated with a higher cost-effectiveness. Exercise referral is recommended for subgroups with a diagnosed medical condition. Moreover, based on previous evidence, a multi component intervention is likely to result in larger health gains than individuals interventions and hence have a higher likelihood for cost-effectiveness (20). What still has to be established is whether new information technologies (website or applications on smart phones) can improve cost-effectiveness. Internet has potentially lower costs and therefore the cost-effectiveness could be increased. However, it has to be kept in mind that until now research on internet-based strategies have revealed limited effectiveness (21).

Most research has been done in developed countries; research among low-income countries is recommended. Further, it is known that socio-economic factors are determinants of physical activity. Generally, primary prevention in PA will help individuals who are already stimulated to reach PA recommendations. Since people in PA interventions are more likely to be highly educated and in good health, PA interventions in the general population may increase inequity. The benefits of PA interventions are higher if interventions are designated to groups that are the least active and could benefit the most. The WHO's STEPwise approach which was initiated (chronic disease risk factor surveillance) in 2000 and assists countries of low and middle income to obtain information about physical activity (22). By now, physical activity data is available for over 35 African countries.

Given that overall PA interventions in community and primary health care are cost-effective, it is important for decision makers to look at the affordability of the PA interventions. Much of the interventions differ in costs due to differences in intensity, mode, duration and frequency.

### **Conclusion**

PA promotion is needed in the health care setting. PA interventions can be delivered in a cost-effective way, suggesting that wide spread implementation is justified. Though, there are still several flaws to be covered since the previously conducted studies show a great variety in (i) costs measured, (ii) design of studies, (iii) outcomes measures, (iv) the use of self-report vs. objective measures, (v) PA intervention modes, (vi) time horizon interventions and (vii) a country's (healthcare) system. For now it seems that PA interventions are cost-effective when direct supervision is not required, targeted at older individuals and/or individuals with a medical condition, group intervention is preferred, a longer time frame is recommended, a multi-component intervention is a preferred choice, and nurses/primary care doctors could be best in delivering the interventions.

### **Key messages**

- High need to improve standardization and comparability of economic evaluations.
- Most reviewed studies were cost-effective, especially with less resource intensive PA interventions (e.g., no direct supervision).
- Brief Advice interventions in PA compared to usual care are cost-effective, with increasing cost-effecti-



veness at a higher age and with focus on individuals with a medical condition.

- Decision makers should pay attention to differences in PA interventions; i.e., intensity, mode, duration and frequency.
- Most reviewed studies (studies were extracted until September 2014) were cost-effective, especially with less resource intensive PA interventions (e.g., no direct supervision).

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