

# Physical activity on prescription with access to counsellor support implemented in routine care

Healthcare and  
patient perspectives

Pia Andersen





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'Sharing is caring'

This thesis is dedicated to future work of developing physical activity in prevention and treatment of diseases in healthcare practises.

*When obstacles arise, you change  
your direction to reach your goal:  
you do not change your decision to  
get there.*

Zig Ziglar



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# ABSTRACT

**Background:** The Swedish PAP (physical activity on prescription) programme FaR®, introduced in 2001, has been adopted by all Swedish regions, which are responsible for provision of healthcare in Sweden. Several studies have shown positive outcomes of the Swedish PAP on patients' physical activity and other health-related outcomes. There are no guidelines for best practises of the Swedish PAP, which has led to the development of different organizational structures for its delivery. This thesis project was developed with the ambition of providing knowledge for further development of PAP in clinical practise.

**Aim:** The overall aim was to investigate and generate improved understanding of a structure for physical activity on prescription with access to physical activity counsellors, implemented in routine healthcare.

**Methods:** To address the overall aim, four real-world studies with different design and analysis methods were carried out. The study population consisted of patients 18 years or older prescribed PAP in primary and secondary care in Region Kronoberg's healthcare organization. Study I investigated characteristics of healthcare delivery of PAP over a four-year period, including all patients prescribed PAP in these years. Study II explored factors that influenced patient's long-term engagement in physical activity after prescription. Study III investigated differences in physical activity and health-related quality of life (HRQoL) at one-year follow-up between patients who used versus patients who did not use counsellor support after prescription. Study IV investigated factors associated with patients increase in physical activity at one-year follow-up. Data sources for the studies were electronic medical records (Studies I, II, III and IV), individual interviews (Study II) and a baseline and a follow-up questionnaire (Studies III and IV). Different statistical analyses were performed in Studies I, III and IV. Study II used qualitative content analysis based on an approach including both inductive and deductive analysis. The final study samples of PAP recipients were N = 4,879 (Study I), n = 13 (Study II), n = 400 (Study = III) and n = 355 (Study IV).

**Results:** Study I: 4,879 PAP recipients were identified, one-third had used the offer of counsellor support. PAP recipients had a high frequency of diagnosis and healthcare consumption prior to PAP. Counsellor users had higher frequency of multiple diagnoses and healthcare visits than non-counsellor users. The main prescriber of PAP was physicians and the main prescribing setting was primary care. Study II: PAP recipients' long-term engagement with physical activity was influenced by the determinants of capability, opportunity, and motivation. Receiving a prescription of physical activity, and professional counselling and follow up from a physical activity counsellor, and adaption of PAP to the

individual's capacity were important for patients change of physical activity. Study III: Counsellor users had better outcomes in both physical activity and HRQoL than non-users of this support. Study IV: Nearly half of the PAP recipients had increased physical activity one year after prescription. Increased physical activity was positively associated with lower baseline activity, counsellor use, and positive perception of given support after PAP.

**Conclusions:** Patients who were prescribed PAP had a high frequency of diagnoses and high healthcare consumption in the year prior to the prescription. Due to the positive findings regarding patient outcomes on physical activity, and patient experiences of counsellor support, it could be suggested that individualized counselling and follow up by a physical activity counsellor is of importance for patients' engagement in physical activity, especially for patients with lower baseline activity. Since increased activity was also seen among non-users of counsellor support, a general recommendation for physical activity counsellor support for all PAP recipients could not be suggested.

# SVENSK SAMMANFATTNING

**Bakgrund:** Den svenska modellen för fysisk aktivitet på recept (FaR®) som används i svenska hälso-och sjukvårds regioner, introducerades år 2001. Det finns inga riktlinjer för hur arbetet med FaR® bäst kan organiseras inom hälso-och sjukvården, vilket har lett till att olika strukturer för arbetet utvecklats. Skillnaderna berör främst hur man ger stöd till patienter efter förskrivningen. Flera studier har visat på positiva effekter av FaR® på patienters fysisk aktivitet och andra hälsorelaterade utfallsmått, men det saknas forskning med fokus på vad olika arbetssätt tillför för patienterna och för hälso- och sjukvården. Denna avhandling har utvecklats med ambitionen att bidra med kunskap till nytta för fortsatt utveckling av PAP i rutinsjukvård.

**Syfte:** Det övergripande syftet var att undersöka och bidra med kunskap om en struktur för fysisk aktivitet på recept med erbjudande om kvalificerad rådgivning som implementerats i rutinsjukvård.

**Metoder:** För att besvara det övergripande syftet genomfördes fyra studier med olika design och analysmetoder. Studiepopulationen var patienter 18 år eller äldre som förskrivits fysisk aktivitet på recept inom Region Kronobergs hälso-och sjukvårdsorganisation. Studie I undersökte karakteristik i förskrivning under en period på fyra år, och inkluderade alla patienter som förskrivits fysisk aktivitet under dessa år. Studie II undersökte faktorer som påverkat patienters långsiktiga engagemang i fysisk aktivitet efter förskrivningen. Studie III undersökte skillnader i fysisk aktivitet och hälsorelaterad livskvalitet (HRQoL) mellan patienter som tog del av det kvalificerade rådgivningsstöd som erbjöds efter förskrivningen och patienter som inte tog del av detta stöd. Studie IV undersökte faktorer associerade med ökad fysisk aktivitet hos patienterna ett år efter förskrivning. Datakällor för studierna var elektroniska journalsystemet (Studie I, II, III och IV), individuella intervjuer (Studie II) samt en baslinje och en uppföljningsenkät (Studierna III och IV). Olika statistiska analyser utfördes i Studierna I, III och IV. Studie II använde kvalitativ innehållsanalys baserad på en mix av induktiv och deduktiv analys. Antal patienter som ingick var N = 4879 (Studie I), n = 13 (Studie II), n = 400 (Studie = III) and n = 355 (Studie IV).

**Resultat:** Studie I: Av de 4879 patienterna som identifierades, hade en tredjedel tagit del av det kvalificerade rådgivningsstödet. Patienterna hade en hög frekvens av diagnoser och vårdkonsumtion året innan förskrivningen. Patienter som tog del av det kvalificerade rådgivningsstödet hade högre frekvens av multipla diagnoser och öppenvårdsbesök än patienter som inte tog del av detta stöd. Läkare stod för den högsta förskrivningsfrekvensen och flest patienter var förskrivna inom primärvården. Studie II: Patienters fysiska och psykologiska kapacitet, externa faktorer och motivation påverkade deras engagemang i fysisk

aktivitet över tid. Att få recept på fysisk aktivitet, att få professionell rådgivning och uppföljning, samt att få individuell anpassad behandling med fysisk aktivitet inom hälso- och sjukvården var viktiga faktorer för patienters förändring av fysisk aktivitet. Studie III: Patienter som tog del av kvalificerad rådgivning efter förskrivningen hade bättre utfall både på fysisk aktivitet och HRQoL. Studie IV: Ett år efter förskrivningen hade nästan hälften av patienterna ökad fysisk aktivitet. Ökad fysisk aktivitet var associerad med låg aktivitetsnivå vid baslinjen, kvalificerat rådgivningsstöd och positivt upplevt stöd efter förskrivningen.

**Slutsatser:** Fysisk aktivitet på recept förskrevs till patienter med hög frekvens av diagnoser och vårdkonsumtion året innan förskrivningen. De positiva resultaten på patienternas fysiska aktivitet, samt patienternas positiva erfarenheter av det kvalificerade rådgivningsstödet, indikerar att individualiserad rådgivning och uppföljning av en kvalificerad rådgivningsfunktion för fysisk aktivitet på recept är av betydelse för patienters engagemang i fysisk aktivitet, särskilt hos patienter med lägre baslinjeaktivitet. Eftersom ökad aktivitet även sågs hos patienter som inte tog del av detta stöd, kan en generell rekommendation för kvalificerat rådgivningsstöd inte ges.

# LIST OF PAPERS

- I. Andersen P, Holmberg S, Lendahls L, Nilsen P, Kristenson M (2018). Physical Activity on Prescription with Counsellor Support; A 4-year Registry-Based Study in Routine Health Care in Sweden. *Healthcare* 6, 2;34.
- II. Andersen P, Lendahls L, Holmberg S, Nilsen P (2019). Patients' experiences of physical activity on prescription with access to counsellors in routine care ; a qualitative study in Sweden. *BMC Public Health* 19;210.
- III. Andersen P, Holmberg S, Årestedt K, Lendahls L, Nilsen P (2020). Physical Activity on Prescription in Routine Health Care: 1-Year Follow-Up of Patients with and without Counsellor Support. *Int. J. Environ. Res. Public Health* 17, 16 ;5679.
- IV. Andersen P, Holmberg S, Årestedt K, Lendahls L, Nilsen P (2022). Factors associated with increased physical activity among patients prescribed physical activity in Swedish routine health care including an offer of counselor support: 1-year follow-up. *BMC Public Health* 22;509.

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# ABBREVIATIONS

FYSS	<i>Fysisk aktivitet i Sjukdomsprevention och Sjukdomsbehandling</i> (Physical activity in prevention and treatment of diseases)
HRQoL	Health-related quality of life
ICD 10	International Classification of Diseases version 10
IQR	Interquartile range
MI	Motivational interviewing
PAP	Physical activity on prescription
PAP+C	Physical activity on prescription and use of counsellor support
PAP-only	Physical activity on prescription and no use of counsellor support
RCT	Randomized control trials
SD	Standard deviation
WHO	World Health Organization



# BACKGROUND

## Physical activity in prevention and treatment of diseases

This first chapter introduces the field of physical activity in prevention and treatment of diseases by first providing a description of physical activity and other concepts of importance. This is followed by a section concerning health benefits from physical activity and population-based recommendations for physical activity for health in adults. Finally, the prevalence of physical inactivity in the global and Swedish populations are addressed.

### **Physical activity and related concepts**

Research on physical activity requires a common understanding of the meaning of the term physical activity and concepts related to it (1-4). Some terms used seem to be difficult to distinguish between. This applies especially to physical activity and exercise (1, 2), and to physical inactivity and sedentary/sedentary behaviour (3, 4).

*Physical activity* is defined as ‘any bodily movement produced by skeletal muscles that results in energy expenditure’ (1). This definition has been frequently cited by researchers and policymakers (5), and has informed both national and global physical activity guidelines (6-9). Although some modified versions of this definition exist, they are all consistent with the original version by including the keywords: bodily movement, skeletal muscles, and energy expenditure (5). Physical activity can be undertaken during leisure time, at work, during household chores, and by active transportation.

*Exercise* is seen as a part of physical activity comprising activities that are ‘planned, structured and repetitive’ with the objective to improve or maintain one or more components of physical fitness (1, 7), performance, or health (7). Caspersen et al. explained physical fitness as ‘a set of attributes that people have or achieve that relates to their ability to conduct physical activity’ (1). Exercise or exercise training are mainly activities performed during leisure time (7).

*Physical inactivity* or insufficient physical activity refers to a level of physical activity that does not meet the current recommendations for physical activity (3, 7). In contrast, sedentary or sedentary behaviour refers to waking time that is spent in a sitting, reclining, or lying posture (7).

*Aerobic physical activity* comprises an activity in which ‘the body’s large muscles move in a rhythmic manner for a sustained period of time’ (7). This type of activity influences heart rate and breathing. Components that influence how strenuous the activity becomes are intensity, frequency, and duration. Intensity is often divided into light-intensity, moderate-intensity, and vigorous-intensity. Light-intensity activity, e.g., slow walking, does not cause a significant increase in heart rate or breathing. Moderate-intensity activity, e.g., brisk walking, and high-intensity activity, e.g., running, require higher effort, resulting in faster heartbeat and strenuous breathing. Frequency describes how often the activity is performed, and duration is the length of one activity session.

## **Physical activity for health**

People who are regularly physically active have a reduced risk of premature mortality and development of diseases (10, 11) such as coronary heart disease, stroke, several forms of cancer, diabetes type 2, hypertension, dementia, and depression. (11). Physical activity is also positively associated with other health-related factors such as sleep quality, cognitive function, health-related quality of life, and functional capacity (11). Even single bouts of moderate to vigorous physical activity could result in immediate benefits in sleep quality, and reductions in blood pressure, blood glucose, and anxiety (11).

In 2010, the World Health Organization (WHO) presented global recommendations for physical activity for health (6). These recommendations applied when the studies in this thesis project were designed and planned. In 2020, WHO published an updated version of these recommendations, which, for the first time, also includes recommendations for sedentary behaviour (7).

The threshold value for reaching the recommended level of physical activity for adults in the 2010 recommendations still applies in the updated recommendations. Adults, 18 years or older, are recommended to do ‘at least 150 minutes of moderate-intensity aerobic physical activity; or at least 75 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate and vigorous-intensity activity per week’ (6, 7). The 2020 recommendations include a recommended range of activity, reaching from the threshold value of 150 minutes and up to 300 minutes of moderate to vigorous activity. Provided that no individual contraindications exist, this recommendation also applies to people with chronic diseases or disability, to pregnant and postpartum women, and to older people.

There is a dose-response relationship between weekly physical activity minutes and health benefits (Figure 1). A key message is that all activity counts, thus some activity is better than none (7). Regarding sedentary time, the key message is ‘sit

less and move more'. Moving from a sedentary lifestyle to some activity is associated with health benefits, even if the achieved level of activity does not reach the threshold of 150 physical activity minutes.

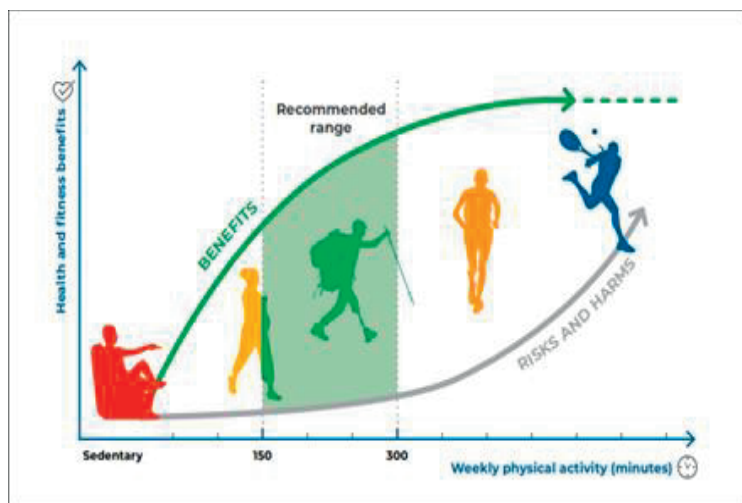


Figure 1 The dose-response relationship between weekly physical activity minutes and health benefits. From the World Health Organization, 2020 (7).

The 2020 physical activity guidelines released by WHO (7) formed the basis for Swedish recommendations for physical activity and sedentary behaviours published by the Swedish Public Health Agency (8) and by the Swedish Professional Associations for Physical Activity (<https://www.yfa.se/for-vuxna/>).

### Prevalence of physical inactivity

In 2010, the prevalence of physical inactivity in the global adult population was estimated to be 23.3% (12). The prevalence has increased to 27.5% according to more recently published data (7, 13). There is a difference between countries in prevalence, related to national country-income, with the highest prevalence of inactivity seen in high-income countries (12, 13). In 2016, the prevalence of physical inactivity was twice as high in high-income countries compared to low-income countries (36.8% versus 16.2%) (13). A European study including data from 2017 found that more than one in three adults under the age of 65 years was classified as physically inactive (36,2%) (14).

Factors such as sex (13, 15), education level (16-19), age (12, 15, 17, 20), and health status (15, 18, 20) influence the prevalence of physical inactivity.

One-third of the Swedish adult population was categorized in 2021 as physically inactive (data from the Swedish Public Health Agency, 2021). The overall prevalence was similar for females and males (33%), but differed somewhat when categorized by age groups (Figure 2) and by education level (Figure 3).

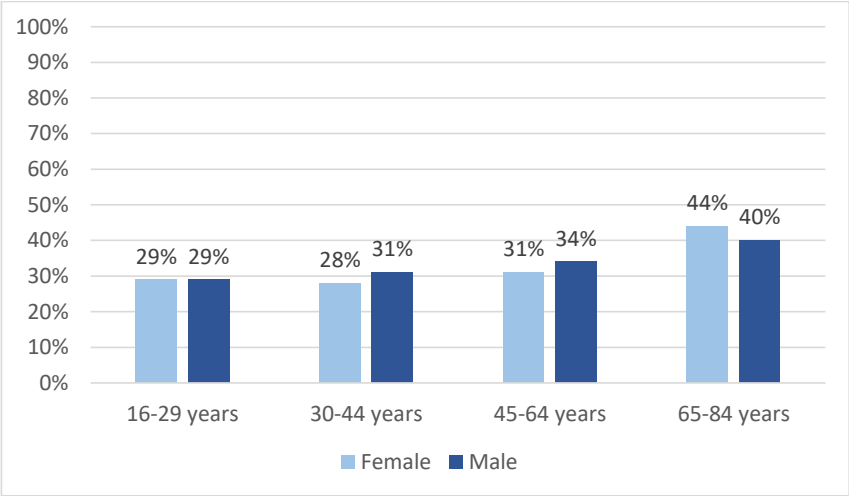


Figure 2 Prevalence of physical inactivity in Sweden by sex and age groups.  
Data source: the Swedish Public Health Agency, 2021.

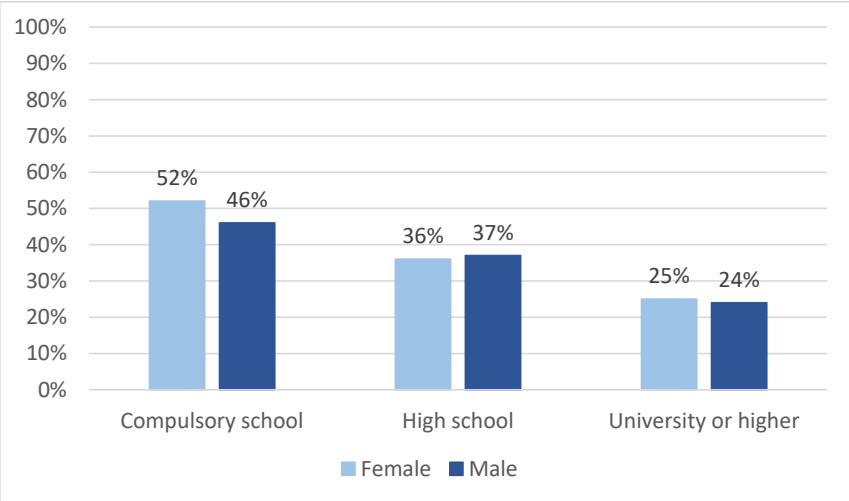


Figure 3 Prevalence of physical inactivity in Sweden by sex and education level.  
Data source: the Swedish Public Health Agency, 2021.

# Physical activity on prescription in health care

*‘The health care setting is crucial for health promotion, including prescribing physical activity in both primary and secondary prevention of noncommunicable diseases.’*

World Health Organization 2018, s. 4 (21).

This chapter provides a description of physical activity prescription in healthcare from an international and Swedish perspective, with the main focus on the Swedish physical activity on prescription (PAP) programme FaR®. The chapter addresses the development of prescription for physical activity in healthcare from a historical view and an international perspective. This is followed by a section concerning similarities and differences between country-specific PAP programmes, and outcomes of such programmes. Finally, the development of, description of, and research about the Swedish PAP programme are addressed.

## International perspective

Already in 600 (BC), Susruta, a physician in India, noted that exercise prescription could be used by physicians in prevention and treatment of diseases (22). In the 1960s, PubMed began publishing articles about prescription for physical activity or exercise (23-25). Since then, publications regarding this topic have been proliferating throughout each decade.

In the 1990s, physical activity prescription programmes began to be implemented in routine healthcare (26). Programmes that were forerunners were the Exercise Referral System in the United Kingdom (27) and the Green Prescription in New Zealand (28). In the first decade of the 21<sup>st</sup> century, PAP programmes were introduced in the Nordic countries, where *FaR®-Fysisk aktivitet på recept* was introduced in Sweden, *Liikkumisresepti* in Finland, *Grønn Resept* in Norway, and *Motion på Recept* in Denmark (29). In addition to the countries mentioned above, research supporting PAP programmes was introduced in several other countries e.g., the Netherlands (30), Spain (31), Canada (32), and Australia (33).

In 2007, the Exercise is Medicine® global initiative was launched by the American College of Sports Medicine, with the goal ‘to advance the implementation of evidence-based strategies to elevate the status of physical activity in healthcare’ (34). The first five years of this initiative included activities such as building networks, dissemination of information, developing courses for healthcare professionals, and establishing guidelines for Exercise is Medicine® in practise (35). Today, the American College of Sports Medicine manages a network including Exercise is Medicine National Centers in 37 countries located in North America, South America, Asia, Europe, Africa, Canada, and Australia (35).

Studies show that healthcare programmes based on the Exercise is Medicine® concept have been introduced in countries such as the United States (35) and Canada (36).

PAP programmes are typically used in primary care, usually being based on some form of prescribed physical activity i.e., prescription or referral. They commonly include components such as physical activity counselling and advice (27, 34, 37, 38), and they include some form of activities outside healthcare. The delivery of PAP programmes is commonly multi-professional, involving various healthcare professionals and other professionals who provide support, and/or supervised exercise lessons.

Differences in design between PAP programmes can be illustrated by a description of the national programme used in the United Kingdom and the national programme used in Sweden. The programme in the United Kingdom is based on a referral structure in which patients are referred by health care professionals to an external exercise provider who prescribes an exercise programme to the patient (27, 39). A recently published review showed that patients were typically prescribed a 12-week exercise programme, with typically two exercise sessions in a fitness gym or studio each week (40). The programme in Sweden is based on individualized written prescription for physical activity, counselling, and follow up (11). Prescribed activities could be either home-based or facility-based. Home-based activities, such as walking, are commonly prescribed (41). In Sweden, PAP is not associated with a pre-determined time of activities. Primary healthcare studies in the United Kingdom and in Sweden have reported similar prescription rates of PAP, and similar characteristics of patients (41, 42).

The main ambition of PAP programmes is to support patients who would receive health benefits from increased physical activity, with the main focus being on patients with insufficient physical activity. Numerous studies have shown that primary healthcare PAP programmes positively influence patients' physical activity (27, 37, 39, 43-52). Regarding patients' outcomes of physical activity, most PAP studies are based on self-reported measures. Some studies include self-reports of patient's physical activity, self-reports of adherence to the written PAP, or number of sessions in a prescribed exercise programme. Objective measures, such as pedometer or accelerometer, are less used.

When comparing results between PAP studies, it is important to consider that differences in design and delivery of a PAP programme can influence study outcomes (26). This could be related to differences in length of support for the patients, offered activities, patients fees, or for other reasons.



## The Swedish PAP

The Swedish National Institute of Public Health was commissioned by the Swedish government, to collaborate with other Swedish authorities and organizations, to make 2001 into ‘a physical activity year’. This resulted in the national campaign Sweden on the Move which comprised physical activity promotion activities in four society arenas i.e., workplace, school, leisure time, and healthcare. As a part of Sweden on the Move, FaR® was introduced in healthcare. The programme was tested in a pilot project conducted in nine healthcare centres and four occupational healthcare centres over a three-year period (2001 to 2003) (53). An evaluation of PAP in Swedish healthcare published in 2010 showed that a majority of the 21 Swedish healthcare regions had adopted FaR® (54).

FaR® was developed to be used in the prevention and treatment of diseases for adults age 18 years or older who could receive health benefits from changes in physical activity. The idea of FaR® was created by the Swedish Professional Associations for Physical Activity, which also developed the evidence-based handbook FYSS - *Fysisk aktivitet i Sjukdomsprevention och Sjukdomsbehandling* (Physical activity in prevention and treatment of diseases)(11). FYSS provides evidence-based knowledge for prescribing physical activity for a wide range of diagnoses and conditions. FYSS is one of the five core components included in FaR® (Figure 4). A description of the five core components in FaR® can be seen in Table 1 .

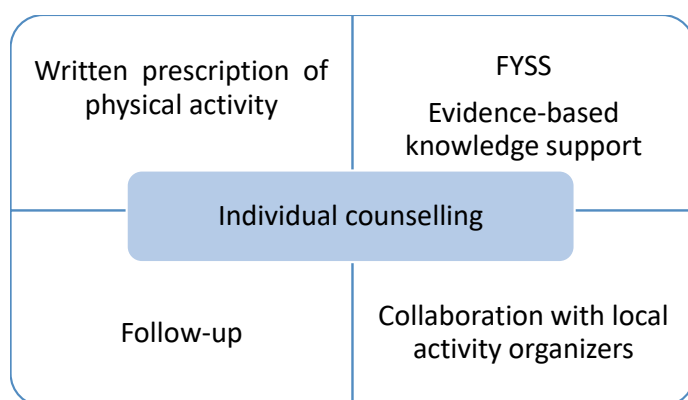


Figure 4 Components of the Swedish PAP programme - FaR®.

Table 1 Description of the five core components in FaR®.

Core component	Contents
Written prescription of PAP	Individual prescription for physical activity supported by FYSS
Individual counselling	Individual counselling based on a dialogue with the patients is the basis of FaR®. Competence in behavioural support techniques e.g., motivational interviewing (MI), are suggested to be used for counselling support.  There is no pre-determined structure for counselling.
Follow-up	There is no pre-determined structure for follow-up.
FYSS- <i>Fysisk aktivitet i sjukdomsprevention och behandling</i>	FYSS includes evidence-based physical activity recommendations for more than 30 diagnoses and conditions (the first edition of FYSS was released in 2003, and updated in 2008, 2017, and 2021). Some chapters of the FYSS textbook are available free online <a href="https://www.fyss.se/">https://www.fyss.se/</a>  An English version of FYSS was released in 2010 (55).  Based on FYSS 2017, YFA in collaboration with the Department of eHealth and Strategic IT at Stockholm County Council launched eFYSS, a free online tool to facilitate healthcare professionals in writing physical activity prescriptions. The eFYSS project was financed by the National Board of Health and Welfare. <a href="http://fyssweb.azurewebsites.net/">http://fyssweb.azurewebsites.net/</a>
Collaborations with local activity organizers	Include collaboration between the healthcare system and local activity organizers such sports associations, activities offered by pensioners' or patients' associations, municipal facilities (e.g., swimming facilities) and private businesses (e.g., gyms).  Becoming a cooperating PAP organizer can require some form of certification.  Commonly, the participating activity organizers are registered in some form of list available to healthcare professionals.

There has been a shift in the description of the Swedish PAP from a patient-centred (38, 56), to a person-centred approach (11). Eklund et al. identified 'empathy, respect, relationship, communication, shared decision-making, a holistic focus, a customised focus, and coordinated care' as 'themes present' in both patient-centered and person-centered care (57). The same authors', showed that a main difference between these approaches is related the goal. Patient-centred is based on a 'functional life', whereas for person-centred the goal is based on a 'meaningful life' (57). The difference in goal, contribute to that the meaning

of the themes could differ between these approaches. No study has so far provided information about how this shift in approach influences work with PAP in clinical practices.

In Sweden, PAP can be prescribed in routine care by licensed health professionals. Adequate knowledge about patient's health status, and how to use FaR®, are important issues when prescribing PAP. Different organizational structures for healthcare delivery of FaR® exist in Sweden, with the main difference related to how counselling and follow-up are delivered (38). Kallings presented three organizational structures for counselling and follow-up: 1) the healthcare professionals who prescribe PAP also provide counselling and follow-up, 2) a PAP coach within healthcare provides counselling and follow-up, and 3) a PAP coach outside healthcare (in e.g., a sports organization) provides counselling and follow-up (38). Another name used for a PAP coach is a PAP counsellor (58). However, there are no recommendations for how PAP can best be organized in Swedish healthcare regions.

## **Research of the Swedish PAP**

This section focuses on research into healthcare outputs and patient outcomes with use of the Swedish PAP. Early studies of the Swedish PAP providing information on healthcare output and patient outcomes included patients prescribed PAP in primary care between 2001 and 2002 (45, 59), and 2004 and 2005 (41, 46). These studies showed that:

- Prescribers of PAP were physicians, nurses, physiotherapists, occupational therapists, dieticians, behavioural scientists, and other professionals (41). The main prescribers were physicians, nurses, and physiotherapists (41, 45).
- PAP was used for approximately 1% of the general primary healthcare population (41).
- Prescribed patients varied in age: 12 and 96 years (mean age = 54 years) (41) versus 12 and 81 years (mean age = 51 years) (45).
- A majority of the patients were females: 67% females (41) versus 75% females (45).
- Higher education level was seen in about one-third of the patients (45).
- Patients' physical activity levels varied at baseline, from insufficient to sufficient (41, 45).
- Common causes for PAP were obesity, pain, musculoskeletal disorders, high blood pressure, diabetes, mental health disorders, and other conditions or diagnoses (41, 45).
- Patients' self-reported adherence to the written PAP was found to be 65% at six-month follow-up (59) and 50% at one-year follow-up (46).

- According to a patient's readiness to change at baseline, the most common stages were contemplation (24%) and preparation (41%) (45).
- Higher adherence to the written PAP at 12-month follow-up was found to be influenced by higher activity level at baseline and prescription of home-based activities (46).

Outcomes of PAP on patients' physical activity and health in Sweden have been studied in randomized controlled trials (RCT) (48, 60-64) and observational studies (45-47, 59, 65, 66).

RCT provides information on PAP interventions targeting adults in selected groups. Studies have been performed on e.g., patients with hip and knee osteoarthritis (60), obesity (61, 63), transient ischemic attack (62), and metabolic risk factors (48). Patients ages have differed e.g., 68 years (61), 40-74 years (60), and 20-80 years (64). Follow-up time varied from four (64) to six months (60, 61, 63) and up to two-year follow-up (48). Overall, RCT studies do not support that pre-determined and more extensive PAP interventions, e.g., a pre-determined number of supervised exercise sessions at local sport clubs (64), or a pre-determined number of scheduled follow-up sessions (48, 60), provide better outcomes of patients' physical activity than briefer interventions. Briefer interventions can, e.g., include advice on physical activity (60), advice and written information (62), or PAP with individualized counselling and follow-up (48).

Observational studies of PAP in Swedish healthcare have reported positive outcomes of PAP for patients' physical activity at six-month follow-up (45, 47, 66), and at one-year and two-year follow-up (66). Lundqvist and colleagues found increased physical activity in 73% of the prescribed patients at six-month follow-up (47). Lower baseline activity was found to be a predictor for an increase in PAP recipients' physical activity at six-month follow-up (48). A positive but non-significant trend for increased physical activity has been found at two-year follow-up (66). Positive outcomes of PAP for patients' HRQoL has been reported at six-month follow-up (45, 47, 63), and at 12- and 24-month follow-up (66). Findings in qualitative research of PAP indicate that patients with reduced physical capacity related to disease need information and support from healthcare to overcome barriers for physical activity (67).

One review of interventions delivered in accordance with the Swedish PAP programme has been published (49). The conclusion in this review was that the Swedish PAP probably 'increases the level of physical activity in adult patients who are insufficiently active (moderate evidence)' (49). The evidence for achieving positive effects on health parameters, such as HRQoL, glucose metabolism, blood pressure and blood lipids, was rated as low or very low. This

review included seven randomized controlled studies, one cohort study, and one case study published between 2006 and 2016. The studies included differences in patient characteristics, prescribed activities, and follow-up time (12 weeks up to 36 months). Six of these studies were conducted in Sweden (45, 61-63, 68-71) and one in Finland (72).

Outcome measure for patient's physical activity is often based on patients self-reported data. Commonly used self-reported instrument in Swedish PAP studies is the Saltin Grimby Physical Activity Level Scale (47, 66) and the International Physical Activity Questionnaire (47, 48, 63, 73). Objective measures of physical activity, such as pedometer (61), and accelerometer (60, 62), have been used in some RCT studies.

### **Swedish clinical guidelines**

In 2011, the Swedish National Board of Health and Welfare released the first Swedish clinical guidelines for prevention and treatment of unhealthy life styles, including insufficient physical activity, unhealthy eating habits, risky use of alcohol, and tobacco use (74). An updated version was published in 2018 (75). The main method recommended for adults with an unhealthy lifestyle is advice, counselling, and qualified counselling (in Swedish: *enkla råd, rådgivning och kvalificerad rådgivning*). Advice includes brief information based on general, standardized advice that might be added with written information. It is a suitable first step that could be followed by counselling or qualified counselling. Advice could be seen as a minimal standard for healthcare professionals' support for healthy lifestyle habits in all healthcare settings. The content of counselling compared to qualified counselling is described in Table 2.

Table 2 Counselling and qualified counselling according to Swedish clinical guidelines for prevention and treatment of unhealthy lifestyle habits.

	Counselling	Qualified counselling
Similarities	<p>Based on a person-centered dialogue.</p> <p>Could include motivational strategies e.g., motivational interviewing (MI).</p> <p>Could be complemented with different applications.</p>	
Differences	<p>Commonly takes 5 -15 minutes, but can be up to 30 minutes.</p> <p>Can include repeated contacts (face-to-face, phone, letter, or e-mail) on several occasions.</p>	<p>More time-consuming than counselling (no time determined) and includes repeated sessions or contacts (face-to-face, phone, letter or e-mail).</p> <p>Individual or group-based.</p> <p>Assumes that the counsellors have in-depth subject knowledge and are trained in the method used for the conversation.</p> <p>Theory-based and structured, it is based on certain clear assumptions about how and why it works and contains certain pre-defined components. There are no recommendations for a particular theory to be used.</p>

The recommendations for adult patients with insufficient physical activity are presented in Table 3. The main difference between adults at special risk or adults without this risk is priority rank: patients with special risk have a higher priority rank.

Table 3 Recommended support for clinical practises for adults age 18 years or older with insufficient physical activity

	Recommendation [priority rank] <sup>a</sup>
Groups at special risk	Counselling as a single method [2]
E.g., adults with diseases, functional disability, overweight/obesity, high blood pressure, socially vulnerable, several unhealthy lifestyle habits.	Counselling with added written prescription [2]
	Counselling with added activity tracker [2]
	Web-based intervention [3]
	Qualified counselling [5]
Adults	Counselling as a single method [3]
	Counselling with added written prescription [3]
	Counselling with added activity tracker [3]
	Qualified counselling [6]

<sup>a</sup> The evidence-based recommendations in the Swedish national guidelines are ranked on a scale between 1-10, where scale level 1 indicates highest priority (75).

The Swedish National Board of Health and Welfare recommends two categorical questions for assessment of patients' physical activity (Table 4) (76, 77).

Table 4 The Swedish National Board of Health and Welfare's recommended questions for assessment of patients' physical activity in clinical practise.

Everyday activity	Exercise training
During a regular week, how much time do you spend exercising at a level that makes you short winded; for example, running, fitness class, or ball games?	During a regular week, how much time are you physically active in ways that are not exercise; for example, walks, bicycling, or gardening? Add together all activities lasting at least 10 min
<input type="checkbox"/> 0 minutes/no time <input type="checkbox"/> less than 30 minutes <input type="checkbox"/> 0.5 - 1 hour <input type="checkbox"/> 1-1.5 hour <input type="checkbox"/> 1.5-2 hours <input type="checkbox"/> More than 2 hours	<input type="checkbox"/> 0 minutes/no time <input type="checkbox"/> less than 30 minutes <input type="checkbox"/> 0.5 - 1 hour <input type="checkbox"/> 1-1.5 hour <input type="checkbox"/> 1.5-2.5 hours <input type="checkbox"/> 2.5-5 hours <input type="checkbox"/> more than 5 hours

These questions have been validated and can be used to calculate if the recommended level of at least 150 minutes of weekly physical activity at a moderate or vigorous level is reached or not (76, 77). The questions could be used as tool for assessment of physical activity at a population level or as a tool for determining patents' appropriateness for treatment (77).

## Rationale of the thesis

Several countries have introduced the PAP programme in healthcare. The Swedish national programme FaR®, launched in 2001, was a major public health investment. FaR® is still ongoing in clinical practices in Swedish healthcare regions, and is mainly used in primary care. Numerous healthcare professionals have a great ambition and desire to work preventively but feel that there are many obstacles to implementing this work in clinical practice. FaR® is no exception. There is a large variation in prescriptions for physical activity between Swedish healthcare regions. In light of the prevalence of physical inactivity in the population, PAP could probably be more frequently used.

Several studies have reported positive outcomes of PAP on patient's physical activity. Some healthcare professionals have reservations about the effectiveness of PAP. Clear routines for PAP in clinical practice and multi-professional structures are suggested as a method to support healthcare professionals' work with PAP. Since there are no best practices guidelines for delivery of the Swedish PAP in clinical practices, different organizational structures for healthcare delivery of PAP exist (38). The main difference is related to the delivery of counselling and follow-up. Some healthcare regions have implemented multi-professional structures for delivery of FaR®. In these, counselling and follow-up are provided by professionals other than the prescriber of PAP, e.g., in healthcare

or local sports organizations. It is not clarified which organizational structure programme could be seen as best practice, or which component of the Swedish PAP programme contributes to the positive effects on patient's physical activity (49).

Based on available evidence, counselling for physical activity is the major method recommended for clinical practices by the Swedish National Board of Health and Welfare so as to support adults identified with insufficient physical activity. In addition to counselling, written prescription of physical activity or an activity tracker could be used as a complement. In these guidelines, qualified counselling has lower priority. However, qualified counselling as defined in the guidelines might be of higher importance than regular counselling for patients receiving PAP; especially for patients with higher morbidity rates.

This thesis project was developed with the ambition to provide knowledge for further development of PAP. The studies were conducted in a Swedish healthcare region which has implemented an organizational structure for PAP in which all patients are offered qualified counselling support by physical activity counsellors. If patients want this support, they contact a physical activity counsellor.



# AIM

The overall aim was to investigate, and generate improved understanding of, a structure for physical activity on prescription with access to physical activity counsellors implemented in routine healthcare.

## Specific aims

### **Study I.**

To investigate characteristics in healthcare delivery of PAP over four years with regard to differences in characteristics between PAP recipients and the total healthcare population, differences between PAP recipients who used counsellor support versus those who did not, differences between healthcare professionals who prescribed PAP, and differences between prescribing healthcare settings.

### **Study II.**

To explore influences on PAP recipients' long-term engagement in physical activity.

### **Study III.**

To investigate differences in physical activity levels and HRQoL one year after prescription for physical activity among patients who used physical counsellor support in addition to PAP, and patients who did not accept this offer of support and only received PAP.

### **Study IV.**

To investigate patient and healthcare characteristics associated with increased physical activity one year after prescription of physical activity among patients prescribed PAP in routine care with access to counsellor support.

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# THEORIES AND FRAMEWORK

This chapter addresses a number of theories and frameworks of relevance for this thesis and explains how they were applied in the studies of the thesis project.

## Behaviour change theories

### **Social cognitive theories**

Social cognitive theories contribute to insight into how behaviour can be changed. They are widely used both to understand the behaviour of individuals in clinical and public health research and of healthcare professionals in implementation science research. These theories have been used in studies of physical activity (78-82). In this thesis, social cognitive theories have been used to explain some of the findings in the study of patients' experiences (Study II) and in the two studies of patients' outcomes (Studies III and IV). This section includes a brief description of all social cognitive theories that have been referred to in the studies in the thesis.

**The social cognitive theory** by Bandura (83) states individuals learn in a social context (environment) from their own experiences and by observing others' behaviour. Information based on observations on another individual's behaviour, and consequences of the observed behaviour, act as guidance for subsequent behaviour. Learning is more likely to occur if an individual can identify themselves with the observed model and has a great deal of self-efficacy. In addition, past experiences of the behaviour of interest could also influence a behavioural change.

In social cognitive theory, behaviour change is caused by an interplay between personal (cognitive), and behavioural (83). An individual's motivation could be supported by personal, behavioural, and behavioural influences (84). This theory has been used in the discussion of study findings in Studies II, III and IV.

**The self-determination theory** views motivation as a main factor that initiates behaviour, but it differs from other social cognitive theories by distinguishing between different types of motivation (85). The theory proposes that quality and sustainability of a behaviour depend on the type of motivation that underlies it. There are three overarching types of motivation, including amotivation, extrinsic, and intrinsic motivation.

Self-determination theory states that there are three psychological needs that affect motivation:

- Autonomy i.e., the feeling of having a choice and willingly endorsing the behaviour
- Competence i.e., the experiences of mastery and being effective in performance of the behaviour
- Relatedness i.e., the need to feel connection and belongingness with others.

Cognitive evaluation theory is a sub-theory of self-determination theory focusing on environmental factors that could be positively or negatively associated with intrinsic motivation (86, 87) . Competence, autonomy, and relatedness foster self-motivation.

Self-determination theory applied to discussion of findings regarding motivational support (Studies II, III and IV). Motivational support was a part of the studied PAP counsellor structure. The physical activity counsellors were trained in motivational interviewing (MI).

**The theory of planned behaviour** states that behavioural intention is the main predictor of behaviour, e.g., physical activity (88). Intention, in turn, is predicted by an individual's attitudes toward the behaviour, by subjective norms, and perceived behavioural control. Subjective norms concern other people's thoughts about the behaviour, and perceived behavioural control comprises an individual's beliefs about their own ability to carry out the behaviour.

Social influence is considered as important in shaping attitudes and thoughts towards behavioural intentions. Theory of planned behaviour has previously been used in studies of exercise, but was sparsely referred to in this thesis (Study IV).

**Social comparison theory** proposes that individuals compare themselves to one another in order to determine how they are doing in relation to others (89). Comparisons could be either upward or downward. Upward is based on comparison with more successful individuals and downward with individuals performing worse off than themselves. Individuals with low self-esteem and negative feelings tend to prefer downward comparison (90). This is assumed to facilitate self-enhancement of their own subjective well-being and self-esteem.

This theory applied to the discussion of regarding influences of family and friends who exercised (Study IV).

## Habit theory

Social cognitive theories focus on conscious cognitive processes. In contrast, habit theory considers more or less non-conscious processes. Habits are created by a shift from a deliberate to an automatic cognitive process. Habit has been described as automatic responses to contextual cues, formed by repeating a behaviour in a stable context. Habits are important for two reasons: it may be necessary to break ingrained unfavourable habits (e.g., being physically inactive) and sustained behaviour change may depend on creating favourable habits (e.g., being regularly physically active) (91). The automaticity of habits can be measured by the Self Report Behavioural Automaticity Index (SRBAI) (92). This validated instrument was used in Study III to measure PAP recipients' physical activity habit strength at baseline and follow-up.

## The COM-B model

The COM-B model for behaviour change synthesizes many social cognitive theories concerning behaviour change and it accounts for habit theory (93). The model was developed for use in implementation science to study healthcare professionals' behaviours but it is also applicable for the behaviours of patients and other individuals. It is based on the three interacting determinants of capability (C), opportunity (O), and motivation (M), that enact change behaviour (B) (Table 5). Motivation consists of two components: reflective motivation is the deliberate, conscious process involved in decision-making, and automatic motivation is the automatic and less conscious processes, such as emotions and habits.

Table 5 Description of the three interacting determinants in the COM-B model according to Michie et al, 2011 (93).

COM-B determinates	Definition	Meaning	Type of determinant
Capability	The 'individual's psychological and physical capacity to engage in the activity concerned'.	Having necessary knowledge and skills.	Individual
Opportunity	'All the factors that lie outside the individual that make the behaviour possible or prompt it'.	Environment and social support.	Context
Motivation	'All those brain processes that energize and direct behaviour, not just goals and conscious decision-making'.	Habitual processes, emotional responses, as well as analytical decision-making.	Individual

The COM-B model was used to inform the interview guide for the individual patient interviews and served as an overall framework to structure the interview responses (Study II).

## Implementation framework

This thesis project was developed by drawing on knowledge from implementation science (also referred to as implementation research; the two terms seem to be used interchangeably in the field). This field appeared in the wake of the evidence-based movement and the ambition to contribute to a more evidence-based practice in healthcare and other areas of professional practice by closing the gap between research and practice (or between knowing and doing). Early research in implementation science was empirically driven, but there is an increasing interest in the use of theories, models, and frameworks to gain insights into the mechanisms that facilitate implementation.

There are numerous theoretical frameworks in implementation science that are used to identify and categorize various types of determinants (also referred to as barriers and facilitators, influences or factors) for implementation outcomes. They essentially describe the same types of determinants. The theoretical framework used in the development of this thesis project includes five types of determinants that influence various implementation outcomes. Figure 5 describes the determinants of the theoretical framework used and how they apply to this thesis (94).

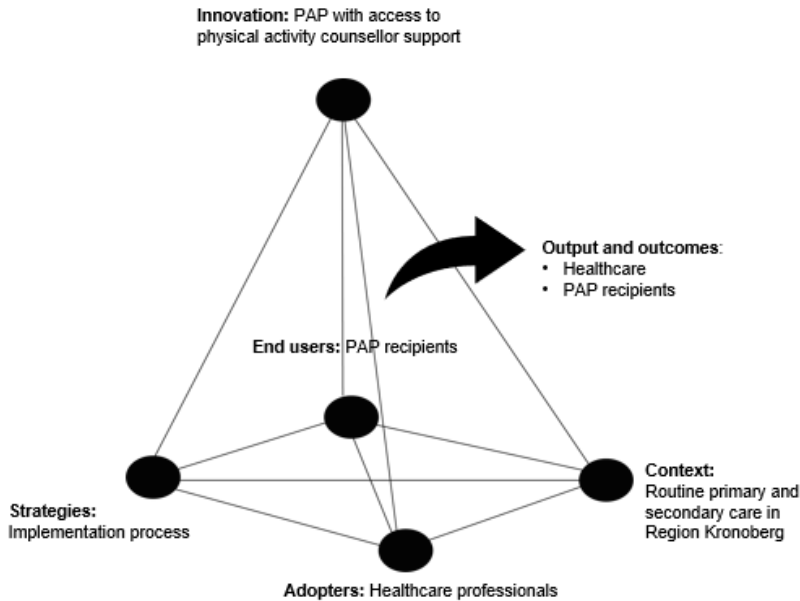


Figure 5 Theoretical framework that formed the basis for this thesis project. Adapted version from Nilsen (94).

Determinants considered in the four studies:

- Study I: characteristics in PAP recipients (end-users), prescription by healthcare professionals (adopters), and healthcare settings (context), and characteristics in counsellor users versus non-users (innovation).
- Study II: PAP recipients' (end-users) experiences of influences on their engagement in physical activity after PAP. The study provides with information of health care professionals delivery of PAP (adopters), and counsellor support (innovation).
- Study III: differences in outcomes on physical activity and HRQoL between PAP recipients (end users) who used versus did not use counsellor support (innovation).
- Study IV: characteristics of PAP recipients (end users) who increased their physical activity. The study also provides information about healthcare professionals (adopters), prescribing setting (context), and counsellor support (innovation).





# METHODS

This chapter starts with a summary of design and methods used in the four studies. The healthcare context of study and the studied organizational structure for PAP will be described under study setting. Thereafter follows a description of the overall study population and study samples, of how data was collected, and the data analysis methods used in the studies.

## Overview of study design and methods

Study design and methods used in the four studies are summarized in Table 6.

Table 6 Summary of study design and methods in the four studies.

	Study I	Study II	Study III	Study IV
<b>Study design</b>	Register-based study	Qualitative explorative	Prospective one-year follow-up	
<b>Main outcomes</b>	Characteristics of healthcare delivery of PAP	Patients' experience of PAP and long-term engagement in physical activity after prescription	Differences in physical activity and HRQoL between users and non-users of counsellor support	Factors associated with patients' increased physical activity
<b>Recruitment of patients</b>	All PAP registered in the medical records system between 2009 and 2012 were identified. Thereafter the first PAP of all individual patients was identified and selected for inclusion in the study.	Invitations by post/phone to a purposively selected sample of 75 patients prescribed PAP between June 2013 and June 2014	Postal invitation to all N = 1,503 patients prescribed PAP between June 2013 and June 2014  The 604 patients who participated at baseline received a follow-up questionnaire by post after one year.	
<b>Study sample</b>	N = 4879  Includes all individual patients prescribed PAP in the period 2009 and 2012.	n = 13  Includes patients who accepted to participate in an individual interview.	n = 400  Includes patients who responded at both baseline and follow-up	n = 355  Includes patients with complete answers to questions about physical activity at baseline and at follow-up
<b>Data sources</b>	Medical records	Individual interviews	Two questionnaires: baseline and follow-up; Medical records.	
<b>Data analysis</b>	Statistical analysis	Qualitative analysis	Statistical analysis	

# Study setting

## The healthcare organization

The studies in thesis project were conducted in primary and secondary care in Region Kronoberg's healthcare organization. This organization, located in the southern part of Sweden, provides care to the people living in Kronoberg County, which has a population of 203,340 (at the end of 2021). This population represents two per cent of the Swedish population. The county consists of eight municipalities (Växjö, Alvesta, Ljungby, Markaryd, Älmhult, Tingsryd, Lessebo, Uppvidinge). Nearly half of the population lives in Växjö Municipality (47%).

Primary healthcare encompasses 33 healthcare centres and secondary care consists of two publicly operated hospitals for somatic care and a publicly operated psychiatric clinic. Through the system Vårdval Kronoberg, the population in Kronoberg can register themselves at the healthcare centre in which they want to receive care. This system was introduced in 2009 and covers both publicly- and privately-operated healthcare centres. The centres are linked to the same governing document regarding the content of the care to be delivered (*Vårdval specifikation*).

All health care units in Region Kronoberg use the same electronic medical record system (Cambio Cosmic) for documentation of patients' care, including registrations of PAP. In the system there is support for registrations of patients' level of physical activity, but this measurement is not frequently used. Hence, it is difficult to assess how many adults in the patient population are physically inactive. In the adult population in Kronoberg, the proportion of adults who are physically inactive is 36% (Data from 2018-2021, the Swedish Public Health Agency). Physical inactivity is more common among females than males (38% vs. 34%).

## PAP with access to counsellor support in Kronoberg

PAP with access to counsellor support is about a mode of delivery of the core components, where all patients prescribed PAP are offered counsellor support. This organizational structure was developed by healthcare professionals, employees of the Department of Research and Development, and employees of the Department of Public Health. The decision to implement this healthcare delivery structure of PAP was enacted in 2008 by the regional County Council Board in Kronoberg. The intention of including physical activity counsellors in the PAP process was to facilitate the prescription process for healthcare professionals and contribute to approachable and qualified counselling for patients prescribed PAP. There was confidence that implementation of counsellors would facilitate uptake of PAP in clinical practices, with increased

numbers of PAP prescriptions as a positive consequence. There were no economic incentives for the healthcare units to prescribe PAP.

PAP with access to counsellor support was introduced in 2009 in primary and secondary care. The first two years (2009 and 2010) included implementation activities for healthcare professionals, such as educational activities and information about the new structure. Thereafter, this model of healthcare delivery of PAP has been seen as a routine practice model.

The overall structure of PAP with access to counsellor support can be summarized as follows:

- PAP can be prescribed in routine care by licensed healthcare professionals in dialogue with the patient.
- The PAP form is written electronically in the medical record system.
- The written PAP is printed out by the prescriber, and given to the patient together with information about counsellor support that was printed out along with the written PAP.
- The PAP recipients who want counsellor support contact a counsellor, and schedule time and place for a first consultation.
- Patients who not want support start with activities based on the written prescription.
- The healthcare professional's obligation is to follow up on patients' medical conditions.
- Counselling and follow-up of physical activity after PAP is further provided by the counsellors.
- There is no referral system between the prescriber and the counsellor; information is shared through medical records registrations.

The physical activity counsellors are licensed healthcare professionals with competence in MI and the PAP method. Patients and counsellors decide together where the consultation should take place, e.g., in the PAP unit, or in the healthcare centres where the patients receive their care. The place should be easily accessible for the patient. The counsellor provides qualified physical activity counselling and a wider health dialogue on the basis of a health questionnaire. There is no patient fee for counsellor visits, and the patient is offered support in the year after PAP. The number of visits needed varies between individual patients.

The patients complete their activities in the local community, either as home-based or facility-based activities. An important issue is to find an activity that fits

the individual patients. Some local sport organizers joined a PAP register that was available online for patients, prescribers of PAP, and counsellors. The sport organizers in this register had completed a short education to be certified PAP leaders. This education was arranged by RF-SISU Småland (an organization connected to the Swedish Sport Federation) in collaboration with Region Kronoberg. This register and the PAP-leader education ceased on 30 Dec 2021. All costs associated with the activities were paid by the PAP recipients. Some sport organizers offered a reduced fee at the start.

## Study population and sample

### Study population

The overall study population in the studies in this thesis was patients 18 years or older, prescribed PAP in primary and secondary care in Region Kronoberg's healthcare organization.

### Study sample

**Study I** included the 4,879 individual patients who were prescribed PAP in the years 2009 to 2012. The patients were identified through the electronic medical record as follows:

1. All PAP in this period were identified through the medical records (total 5,864 PAP).
2. The first PAP for all individual patients identified for the study.
3. After a quality assessment of the database, 985 PAP were excluded. The reason for exclusion was wrongly captured PAP, or registration issues, e.g., more than one registered PAP at the same consultation, or repeated prescriptions within the study period.
4. The final study population included 4,879 selected, with their first PAP within the four-year period.

**Study II** included 13 patients who participated in an individual interview after 1.5 and up to 2 years after the PAP date. The patients were recruited from a purposely selected sample of 75 patients prescribed PAP between June 2013 and June 2014. They were invited by postal or phone invitation. The patients were selected to represent various ages and sex, different municipalities and reasons for prescriptions, different prescribing healthcare settings and units, and differences in use of counsellor support (users and non-users).

**Studies III and IV** included patients recruited in the period of June 2013 to June 2014. The patients were invited by a postal invitation which included

information about the study and a baseline questionnaire. Those who answered and returned the baseline questionnaire agreed to participate in the study. After one year, those who answered the baseline questionnaire were sent a follow-up questionnaire. The final study sample in Study III was the 400 patients who participated at both baseline and at follow-up. The final study sample in Study IV was the 355 patients who had complete answers to the question of everyday activity and the question of exercise training at both baseline and at follow-up.

## Data collection

An overview of data sources used in the studies is presented in Table 7.

Table 7 Overview of data sources for the studies.

	Study I	Study II	Studies III & IV
Electronic medical record system (Cambio Cosmic)	X	X	X
Questionnaire; baseline & follow-up			X
Individual interviews		X	

### Medical record data

Data from medical records was collected electronically with support from IT-specialists and data analysts employed in Region Kronoberg. Medical record data was used for identification of the patients for the studies and for collection of data for the studies. The data collected for the studies are presented in Table 8.

Table 8 Data collected from the electronic medical record system for the studies.

Patient characteristics	Study I	Study II	Studies III & IV
Year of birth	X	X	X
Sex: female/male	X	X	X
Home municipality (postal zip code)		X	
Diagnoses: all ICD 10 registered	X		X
PAP date			
All healthcare visits 12 months prior PAP date	X		X
All occasions of inpatient hospitals care 12 months prior PAP date	X		X
<b>Healthcare characteristics</b>			
Prescribing setting and unit	X	X	X
Prescribing professional	X		X
Counsellor visits; all face-to-face consultations 12 months after PAP date	X		
Counsellor visits; all face-to-face consultations 16 months after PAP date			X

## Questionnaire data

Two patient questionnaires (baseline and follow-up) were used to collect information for the one-year follow-up (studies III and IV). The questionnaires can be seen in Appendix 1 (baseline) and Appendix 2 (follow-up).

The baseline questionnaire was sent to the patients two or three weeks after PAP date and the follow-up questionnaire after one year. The questionnaires were developed by the research group and were mainly based on validated instruments and questions used in previous studies and surveys. Table 9 gives a summary of baseline and follow-up data used from the questionnaires in studies III and IV, respectively.

Table 9 Data collected from the baseline and follow-up questionnaire.

	Baseline		Follow-up	
	Study III	Study IV	Study III	Study IV
Education level	X	X		
Everyday activity during a regular week <sup>a</sup>	X	X	X	X
Exercise during a regular week <sup>a</sup>	X	X	X	X
Physical activity habit strength <sup>b</sup>	X		X	
Health-related quality of life <sup>c</sup>	X		X	
Important to change activity <sup>d</sup>		X		
Confidence to change activity <sup>d</sup>		X		
Exercise among family/friends <sup>e</sup>		X		
Perception of support given after				X

<sup>a</sup> Everyday activity and exercise training (77); <sup>b</sup> SRBAI (92); <sup>c</sup> RAND36 (95, 96); <sup>d</sup> MI questions (97); <sup>e</sup> Exercise among family and friends (98).

## Patient interviews

Study II was based on data collected from 13 individual patient interviews. The interviews were conducted from 1.5 to 2.5 years after PAP was prescribed.

A semi-structured interview guide including four main areas of questions was used. The interview questions focused on prescription and counselling; start of activity; maintenance of activity; and perceived benefits of PAP. During the interview, a picture showing the focus and the four main areas of questions was placed so as to be visible to the participant and the interviewer (Figure 6). The interview guide can be seen in Appendix 3.



Figure 6 The focus and the four areas of question for the interviews.



## Data analysis

Studies I, III, and IV were based on statistical analysis and study II was based on qualitative analyses. A summary of analysis methods used in the studies is presented in Table 10.

Table 10 Summary of analysis methods used in the studies.

	Study I	Study II	Study III	Study IV
<b>Statistical analysis</b>				
Descriptive statistics	X		X	X
Chi square test	X		X	X
Independent sample T-test			X	X
Mann Whitney U Independent sample test			X	X
R-square test for Mann Whitney U Independent sample test			X	
Multiple binary logistic regression				X
<b>Qualitative analysis</b>				
Content analysis including a mix of inductive and deductive analysis		X		

### Statistical analysis

Categorical variables are presented as number and percentage. Continuous data are presented as mean  $\pm$  standard deviation (SD) and min-max. Continuous non-normally distributed data are presented as medians and 25th and 75th percentiles or interquartile range (IQR).

Depending on data, Chi square test, independent sample T-test, and Mann Whitney U Independent sample test were used in the analysis of differences between groups.

In study III, the Mann Whitney U Independent sample test analysis was used in the analysis of patients' outcomes one year after PAP. R-square test for Mann Whitney U Independent sample test was used for calculation of effect size.

In study IV, multiple binary logistic regression analysis (forced entry) was used to determine the relationship between the 10 explanatory variables included in the model, and the outcome variable of increased physical activity. Table 11 presents variables included in the final logistic regression model.

Table 11 Variables included in the logistic regression model

Variables	Categorization	Time for measurement
Age	None	Baseline
Sex	Female = 1	
University education	Yes = 1; No = 0	Baseline
Baseline activity		
<150 minutes (score 3-9)	1	Baseline
150 minutes (score 10-12)	2	Baseline
>150 minutes (score 3-19)	Reference	Baseline
Number of diagnoses	None	Baseline
Exercising friends/family	Yes = 1; No = 0	Baseline
Prescribed by physician	Yes = 1; No = 0	Baseline
Prescribed in primary care	Yes = 1; No = 0	Baseline
Counsellor users	Yes = 1; No = 0	Follow-up
Positive perception of given support	Yes = 1; No = 0	Follow-up

All p-values reported were two tailed, and a p-value of <0.05 was accepted as statistically significant.

## **Qualitative analysis**

In Study II, an inductive and deductive approach of qualitative content analysis method was used to analyse the material from the patient interviews (99, 100).

The main steps of the analysis:

- 1) Obtained a sense of the whole and familiarization with data and read through the transcribed interviews several times
- 2) Inductive analysis
  - a. The text was divided in meaning units - paragraphs of text
  - b. Meaning units were condensed, abstracted, and labelled with a code
  - c. The codes were compared - similarities and differences between the codes were identified
  - d. The identified coding units were sorted into sub-categorises i.e., groups of related codes
- 3) Deductive analysis
  - a. Analysis of the sub-categories, where all sub-categories were mapped onto pre-defined categories i.e., the determinants Capability, Opportunity, and Motivation in the COM-B model.
- 4) Representative quotations for the sub-categories were identified.



# ETHICAL CONSIDERATIONS

The studies were developed in accordance with the ethical principles of the Declaration of Helsinki and were approved by the Regional Ethical Review Board in Linköping (Reference no. 2013/51-31 and Reference no. 2014/ 476–31) and by healthcare managers in the healthcare organization of study (Region Kronoberg). To collect information on PAP from the electronic medical record system, approval was required from the head manager for the primary healthcare organization, the head manager of somatic hospital care, the head manager of the psychiatric clinic, and all managers of privately-operated healthcare centres. Permission was given by all except two managers in privately- operated healthcare centres. Patients prescribed PAP in these two healthcare centres were therefore not identified. An overview of the studies, in regard to patients’ consent to participate and information about the study, is presented in Table 12.

Table 12 Patients’ consent to participate and study information.

Patients’ consent to participate		
Study I	Not required.	Data from nearly 5,000 PAP recipients was delivered, de-identified. Neither patients nor prescribers of PAP could be identified by the researchers.
Study II	Yes	<p>The patients for this interview study were invited by post or phone. They were informed that participation was voluntary, that participation did not affect the care given, and that they could withdraw their participation at any time during the study. They were also informed that confidentiality was assured in the analysis and publication of data.</p> <p>All participants in the interviews were given additional verbal information about the study before the interview and were encouraged to ask any questions they had. Written informed consent was given by all participating patients.</p>
Studies III and IV	Yes	<p>The patients in these research studies were invited by postal invitation. The invitation included written information about the study and a baseline questionnaire. They were informed that participation was voluntary, that participation did not affect the care given, and that they could withdraw their participation at any time during the study. They were also informed that confidentiality was assured in the analysis and publication of data.</p> <p>The patients were informed that they gave their consent to participate by responding to the baseline questionnaire.</p>

Confidentiality was considered during handling of individual data and in presentation of data.



# RESULTS

## Study participants

Study participants in the four studies were patients age 18 years or older, prescribed PAP in primary and secondary routine care.

## Main findings

### **Healthcare output (Study I)**

A total number of 4,879 individual patients were prescribed PAP over the four years of study (2009 – 2012). The PAP recipients represented 3% of all adults who had visited healthcare within the four-year study period.

Among the 4,879 PAP recipients, there were more females than males. Recipients were commonly age 45-64 years (Table 13). The mean age of the PAP recipients was 53.6 (SD = 16.1), and there was a variation in age between 18-101 years. Several of the PAP recipients had a high frequency of diagnoses and healthcare consumption in the year prior to PAP (Table 13). The five most common diagnoses were musculoskeletal diseases, endocrine diseases, circulatory diseases, mental health disorders, and respiratory diseases.

Of the 4,879 PAP recipients, 1,555 (32%) had used the offer of counsellor support. Nearly half of the users were prescribed by a physician. Analysis of characteristics between the PAP recipients who used versus did not use counsellor support showed that there was a difference between the groups in sex and age, and in morbidity-related characteristics (Table 13). Counsellor users were more frequently females, and between the age of 45-64 years. Endocrine diseases, higher frequency diagnoses, and healthcare visits were more common among the counsellor's users.

Table 13 Characteristics in all PAP recipients and differences in characteristics between counsellor users versus non-users of this support.

Counsellor users				
	All PAP recipients	Yes	No	
	N=4,879	n = 1,555	n = 3,324	
	N (%)	n (%)		p-value <sup>a</sup>
Sex				< 0.001
Female	2,964 (61)	1,024 (66)	1,940 (58)	
Male	1,915 (39)	531 (34)	1,384 (42)	
Age				< 0.001
18 - 29 year	481 (10)	125 (8)	356 (11)	
30 - 44 year	933 (19)	316 (20)	617 (19)	
45 - 64 year	2,091 (43)	712 (46)	1,379 (41)	
≥ 65 year	1,374 (28)	402 (26)	972 (29)	
<b>Diagnoses<sup>b</sup></b>				
Musculoskeletal diseases (yes)	2,290 (47)	749 (49)	1,541 (47)	0.221
Endocrine diseases (yes))	2,074 (43)	683 (44)	1,306 (39)	0.002
Circulatory diseases (yes	1,989 (41)	645 (42)	1,429 (43)	0.337
Mental health disorders (yes)	1,438 (30)	487 (31)	951 (29)	0.050
Respiratory diseases (yes)	1,226 (25)	409 (27)	817 (25)	0.187
Other diagnosis (yes)	3,813 (78)	1,218 (79)	2,595 (79)	0.773
Number of diagnostic groups				0.011
≤ 2 diagnostic groups	1,649 (34)	450 (29)	1,102 (34)	
3–4 diagnostic groups	1,756 (36)	566 (37)	1,190 (36)	
≥ 5 diagnostic groups	1,474 (30)	509 (33)	965 (30)	
<b>Healthcare consumption<sup>c</sup></b>				
Number of office visits				0.002
≤ 5 office visits	1,182 (24)	354 (23)	828 (25)	
6–10 office visits	1,034 (21)	295 (19)	739 (22)	
≥ 11 health care visits	2,663 (55)	906 (58)	1,757 (53)	
≥ 1 occasion of inpatient care	1,282 (26)	389 (25)	893 (27)	0.171

<sup>a</sup> Pearson Chi-square test; Medical record registrations 12 months prior to PAP <sup>b</sup> ICD 10 classified diagnostic groups, <sup>c</sup> health care visits and inpatient care. This table is a modified version of Table 3 in Paper I.



To see how characteristics of the PAP recipients differed from a general adult healthcare population, analysis of differences between the PAP population and the healthcare population in 2009 was carried out. There was a statistically significant difference in all characteristics of study (Table 14), showing that PAP recipients were more frequently females, between the age of 45-64 years, and they had higher frequency of diagnoses and inpatient care prior to PAP compared to the general adult healthcare population.

Table 14 Differences in characteristics between PAP recipients and the total adult healthcare population in 2009.

	PAP recipients	Total adult healthcare population	
	n = 1,148	n = 121,869	
	n (%)		p-value <sup>a</sup>
<b>Sex</b>			0.027
Female	668 (58)	66,926 (55)	
Male	480 (42)	54,943 (45)	
<b>Age</b>			<0.001
18 - 29 year	101 (9)	22,515 (18)	
30 - 44 year	209 (18)	35,392 (29)	
45 - 64 year	546 (48)	29,752 (24)	
≥ 65 year	292 (25)	34,210 (28)	
<b>Diagnoses<sup>b</sup></b>			
Musculoskeletal diseases (yes)	541 (47)	30,753 (25)	<0.001
Circulatory diseases (yes)	510 (45)	26,089 (21)	<0.001
Mental health disorders (yes)	265 (23)	13,464 (11)	<0.001
Respiratory diseases (yes)	272 (24)	22,372 (18)	<0.001
Other diagnosis (yes)	866 (76)	79,366 (65)	<0.001
<b>Inpatient care<sup>c</sup></b>			
≥ 1 occasion	310 (27)	2,399 (14)	<0.001

<sup>a</sup> Pearson Chi-square test; Medical record registrations 12 months prior to PAP <sup>b</sup> ICD 10 classified diagnostic groups. <sup>c</sup> inpatient care. This table is from Paper I (Table 2).

The uptake of PAP in healthcare varied over the four years. The number of PAP recipients per year was:

- 1,148 PAP recipients (year 2009).
- 1,341 PAP recipients (year 2010).
- 1,242 PAP recipients (year 2011).
- 1,148 PAP recipients (year 2012).

The total number of PAP recipients by individual prescribers varied (min – max = 1-135). Physicians were the main prescribers of PAP, followed by nurses, physiotherapists, and other professionals. The decrease in PAP over the last two study years was mainly due to a descending trend among physicians (Figure 7).

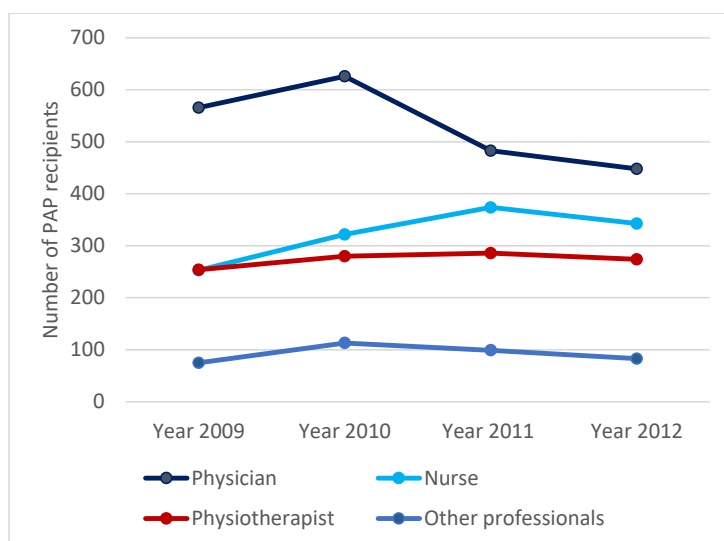


Figure 7 Frequency of prescribed patients per professional groups over time.

Primary care had the largest uptake of PAP, followed by secondary somatic care and secondary psychiatric care. There was a variation in number of PAP recipients in all settings over the four years (Figure 8). None of the settings provided an ascending trend between 2009 and 2012.

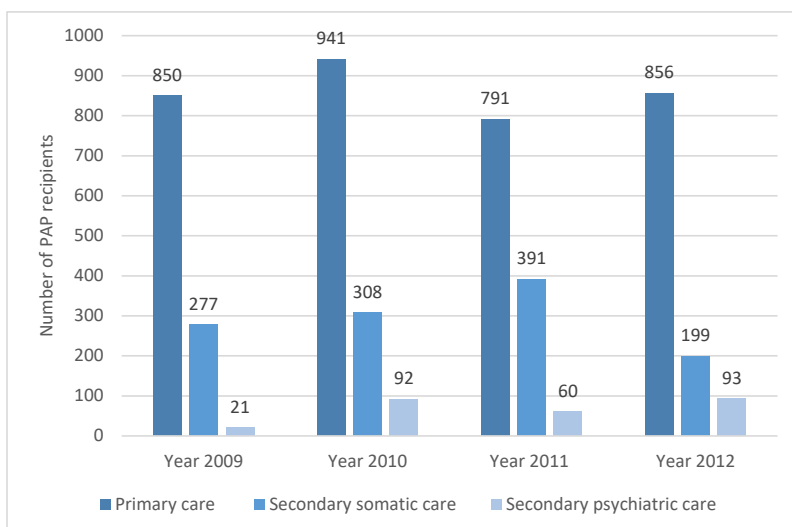


Figure 8 Frequency of prescribed patients per setting over time.

## Patients' experiences (Study II)

Ten factors (sub-categories) that influenced patients' engagement in physical activity after PAP were identified. According to the COM-B model, a major part of these factors was opportunity factor (Table 15).

Table 15 Overarching categories and sub-categories found in Study II.

Overarching category <sup>a</sup>	Sub-categories
Capability to engage in physical activity	1. Tailoring the PAP to the individual's physical capacity 2. Accounting for the individual's experiences of physical activity
Opportunity to engage in physical activity	3. Receiving a prescription 4. Receiving professional counselling and follow-up from a physical activity counsellor 5. Collaboration between prescriber and counsellor 6. Having access to appropriate activities 7. Having a balanced life situation 8. Having support and someone who can encourage continued physical activity
Motivation to engage in physical activity	9. The individual's own desire to improve his or her health condition 10. Finding activities that encourage continuation

<sup>a</sup> Categories according to the COM-model. Michie et al., 2011(93)

### **Patient outcomes (Studies III and IV)**

Studies III and IV were based on the 400 PAP recipients who answered the baseline and the follow-up questionnaire. Study III investigated differences in physical activity and HRQoL between baseline and follow-up, between the PAP recipients who used counsellor support (the PAP+C group) and the PAP recipients who did not use this support (the PAP-only group). Study IV investigated factors that were associated with patient increase in physical activity one year after PAP. Analysis was conducted of the whole study sample and separately for the counsellor users and the non-counsellor users.

### ***Characteristics of the study participants***

Compared to the PAP population in 2009-2012 (Table 13, Study I), the 400 study participants (Table 16) were more frequently females (69% female vs. 61% male), they were older (mean age 62.0 vs. 53.6), and were more frequently registered with musculoskeletal diseases (62% vs. 47%), circulatory diseases (53% vs. 41%) and respiratory diseases (27% vs. 25%) in the year prior to PAP. In addition, the study participants had more frequent healthcare visits in the year prior to PAP ( $\geq 11$  office visits: 59% vs. 55%). Of the 400 study participants, 149 (37%) of PAP recipients had used the offer of counsellor support in the year after PAP.

Table 16 Characteristics of the study participants and differences in characteristics between the patients who used versus not used counsellor support.

	All		Counsellor users		p-value
			Yes	No	
	n = 400	n = 149	n = 251		
Age (years), mean (SD)	62.0 (14.0)	59.6 (15.2)	63.5 (13.1)		0.008 <sup>a</sup>
Female sex, n (%)	276 (69)	99 (67)	177 (71)		0.394 <sup>b</sup>
University education, n (%)	103 (27)	48 (34)	55 (23)		0.019 <sup>b</sup>
Baseline activity score (3-19), median (IQR)	9.0 (5.0)	9.0 (4.0)	11.0 (5.0)		<0.001 <sup>c</sup>
Confidence to change (1-10), median (IQR)	7.0 (3.0)	7.0 (3.0)	7.0 (3.0)		0.211 <sup>c</sup>
Importance of change, median (1-10) (IQR)	7.0 (4.0)	8.0 (3.0)	8.0 (4.0)		<0.001 <sup>c</sup>
<b>Diagnoses (ICD 10 diagnostic groups)<sup>d</sup></b>					
Musculoskeletal diseases, n (%)	239 (62)	80 (55)	159 (65)		0.047 <sup>b</sup>
Endocrine diseases, n (%)	156 (40)	55 (38)	101 (42)		0.488 <sup>b</sup>
Circulatory diseases, n (%)	2017 (53)	80 (55)	127 (52)		0.571 <sup>b</sup>
Mental health disorders, n (%)	101 (26)	36 (25)	62 (25)		0.682 <sup>b</sup>
Respiratory diseases, n (%)	104 (27)	44 (30)	60 (25)		0.222 <sup>b</sup>
Number of diagnostic groups, n (%)					0.057 <sup>b</sup>
1–4	105 (27)	47 (33)	58 (24)		
≥5	283 (73)	97 (67)	186 (76)		
<b>Healthcare consumption<sup>d</sup></b>					
Frequency of healthcare visits, n (%)					0.137 <sup>b</sup>
1–10	160 (41)	67 (46)	93 (38)		
≥11	232 (59)	80 (54)	152 (62)		
≥1 occasion of inpatient care, n (%)	99 (25)	41 (28)	58 (24)		0.340 <sup>b</sup>
<b>Prescribing professional group and setting</b>					
Prescribing professional group, n (%)					0.046 <sup>b</sup>
Physician	111 (28)	50 (34)	61 (24)		
All other professional groups	289 (72)	99 (66)	190 (76)		
Prescribing setting, n (%)					0.646 <sup>b</sup>
Primary care	332 (83)	122 (82)	210 (84)		
Secondary care	68 (17)	27 (18)	41 (16)		

<sup>a</sup> Independent sample t-test; <sup>b</sup> Pearson Chi-square test; <sup>c</sup> Mann Whitney U test; <sup>d</sup> Medical record registrations 12 months prior to PAP. This table is from Paper III (Table 1).

Analysis of differences in baseline characteristics between the counsellor users and the non-users showed that counsellor users were older and had a higher education level, a lower activity level, and a higher perception of 'importance to change activity' (Table 16). Furthermore, counsellor users were less frequently diagnosed with musculoskeletal diseases, and more frequently prescribed activity by a physician.

### ***Physical activity and HRQoL outcomes (Study III)***

The primary outcome was the index value (score 3-19) of weekly physical activity calculated from answers to the question of everyday activity and to the question of exercise (77). The secondary outcomes were physical activity habit strength (92) and HRQoL (RAND 36) (95, 96).

Analysis of the primary and secondary outcomes showed statistically significant differences between baseline and follow-up between the groups for weekly physical activity ( $p = <0.001$ ), for physical role functioning ( $p = 0.026$ ), general health ( $p = 0.006$ ), vitality ( $p = 0.020$ ), and social role functioning ( $p = 0.022$ ) (Table 17). The effect size for all these variables was, according to Cohen's criteria, small ( $<0.3$ ) (101). The highest effect size was seen for weekly physical activity ( $r = 0.259$ ).

Table 17 Differences between the study groups in weekly physical activity, physical activity habit and health-related quality of life (HRQoL) at baseline and follow-up, and differences in effects one year after PAP.

	Baseline		Follow-up		Difference between baseline and follow-up	
	Median (IQR)	p-value <sup>a</sup>	Median (IQR)	p-value <sup>a</sup>	Median diff. (IQR)	p.-value <sup>b</sup>
<b>Total physical activity/week (3–19)</b>						
PAP+C	9.0 (4.0)	0.001	11.0 (7.0)	0.009	2.0 (7.0)	<0.001
PAP-only	11.0 (5.0)		9.5 (6.0)		0.0 (4.0)	
<b>Physical activity habit (1–7)</b>						
PAP+C	3.3 (2.8)	0.265	4.0 (2.3)	0.738	0.5 (2.1)	0.053
PAP-only	4.0 (3.0)		4.0 (2.5)		0.0 1.5)	
<b>Health-related quality of life (0–100)</b>						
<b>Physical functioning</b>						
PAP+C	75.0 (33.8)	0.136	80.0 (30.0)	0.016	0.0 (6.0)	0.529
PAP-only	70.0 (35.0)		70.0 (38.9)		0.0 (6.0)	
<b>Role physical</b>						
PAP+C	50.0 (100)	0.773	75.0 (75.0)	0.046	0.0 (25.0)	0.026
PAP-only	50.0 (100)		50.0 (100)		0.0 (25.0)	
<b>Bodily pain</b>						
PAP+C	56.3 (49.4)	0.264	62.5 (45.0)	0.212	0.0 (24.3)	0.789
PAP-only	45.0 (45.0)		55.0 (52.5)		0.0 (26.3)	
<b>General health</b>						
PAP+C	60.0 (30.0)	0.701	65.0 (35.0)	0.137	5.0 (25.0)	0.006
PAP-only	55.0 (30.0)		55.0 (35.0)		0.0 (20.0)	
<b>Vitality</b>						
PAP+C	55.0 (32.5)	0.253	65.0 (30.0)	0.408	5.0 (20.0)	0.020
PAP-only	60.0 (35.0)		60.0 (35.0)		0.0 (25.0)	
<b>Social functioning</b>						
PAP+C	75.0 (50.0)	0.163	75.0 (37.5)	0.726	0.0 (25.0)	0.022
PAP-only	75.0 (37.5)		75.0 (37.5)			
<b>Role emotional</b>						
PAP+C	100 (66.7)	0.711	100 (66.7)	0.714	0.0 (33.3)	0.415
PAP-only	100 (66.7)		100 (66.7)		0.0 (0.0)	
<b>Mental health</b>						
PAP+C	72.0 (32.0)	0.396	76.0 (28.0)	0.870	0.0 (18.0)	0.170
PAP-only	76.0 (32.0)		76.0 (35.5)		0.0 (16.8)	

<sup>a</sup> Mann-Whitney U test; <sup>b</sup> Average difference score between the baseline- and follow-up assessment. This table is a modified version from Paper III (Table 2).

One year after PAP, 62% in the PAP+C group had increased levels of physical activity and 55% in this group reached the recommended level of at least 150 minutes of weekly physical activity. The corresponding proportion in the PAP-only group was 38% versus 42%. The PAP+C group had better outcomes for both everyday activity and exercise training between baseline and follow-up than the PAP-only group ( $p = < 0.001$ ).

**Factors associated with increased physical activity (Study IV)**

This study investigating factors associated with increased physical activity one year after PAP included analysis of 355 out of the 400 study participants. The study sample had all completed answers to the question of everyday activity and the question of exercise training at baseline and at follow-up. Of the 355 PAP recipients, 167 (47%) had increased physical activity one year after PAP. The scope of change for the PAP recipients with increased activity varied (min – max = 1-15 score steps) (Figure 9).

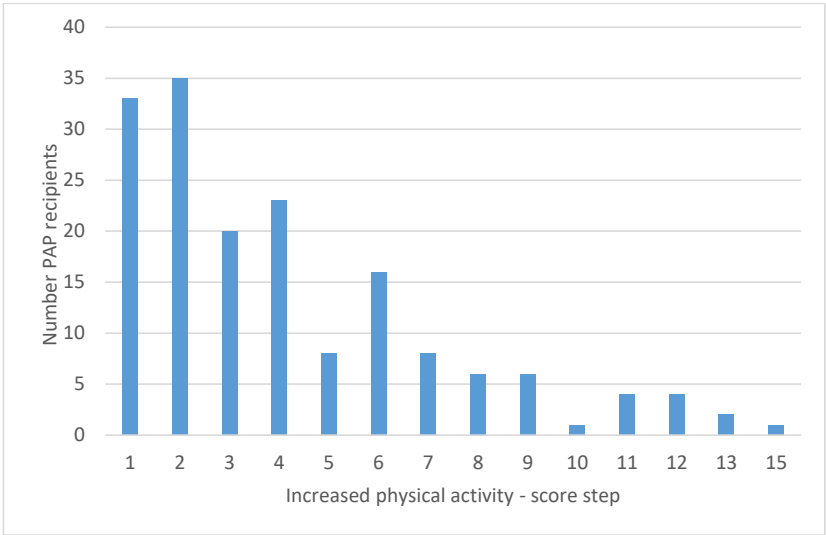


Figure 9 Differences in scope of change for the PAP recipients with increased physical activity.

The multiple binary logistic regression model included the study participants who had complete data of all variables included in the model (n =326) (Table 18).



Table 18 Multiple binary logistic regression analysis of factors associated with improved physical activity 1 year after prescription.

	Whole sample		Counsellor yes		Counsellor no	
	n = 326		n = 125		n = 201	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Age	0.99 (0.97–1.00)	0.189	0.99 (0.96–1.02)	0.450	0.99 (0.97–1.01)	0.344
Female	1.12 (0.66–1.92)	0.668	1.50 (0.59–3.81)	0.392	0.99 (0.50–1.96)	0.970
University education	1.30 (0.75–2.27)	0.346	1.35 (0.54–3.41)	0.522	1.07 (0.51–2.23)	0.865
Baseline activity						
<150 minutes (score 3–9)	4.33 (2.24–8.38)	<0.001	7.17 (2.19–23.48)	0.001	3.23 (1.40–7.47)	0.006
~150 minutes (score 10–12)	2.33 (1.14–4.78)	0.021	4.22 (1.10–16.21)	0.036	1.80 (0.74–4.34)	0.194
>150 minutes (score 13–19)	Reference		Reference		Reference	
Number of diagnoses <sup>a</sup>	0.93 (0.87–1.00)	0.064	0.89 (0.79–1.01)	0.081	0.95 (0.87–1.05)	0.301
Exercising friends/family	0.66 (0.40–1.08)	0.100	0.77 (0.40–1.89)	0.579	0.60 (0.32–1.13)	0.112
Prescribed by physician	1.15 (0.66–1.98)	0.626	0.96 (0.37–2.50)	0.937	1.27 (0.63–2.59)	0.514
Prescribed in primary care	0.78 (0.40–1.60)	0.465	1.38 (0.42–4.56)	0.594	0.65 (0.28–1.52)	0.320
Counsellor users	1.80 (1.07–3.00)	0.026	Strata		Strata	
Positive perception of support	2.08 (1.24–3.48)	0.005	7.24 (2.64–19.85)	<0.001	1.22 (0.65–2.27)	0.537
Pseudo R square:						
Cox & Snell/Nagelkerke	0.170/0.227		0.238/0.323		0.103/0.140	

<sup>a</sup> Medical record registrations 12 months before PAP of ICD 10 classified diagnostic groups. This table is from Paper IV (Table 3).

## Summary of the results

One main finding regarding healthcare output (Study I) was that PAP was prescribed to 3% of all adults in the healthcare population over the four years of study, and that one-third of the PAP recipients used the offer of counsellor support. Another main finding was that several of the PAP recipients had a high

frequency of diagnosis and healthcare consumption in the year prior to PAP. Findings regarding uptake of PAP by over the years with regard to healthcare professionals showed that there was a larger variation in the number of PAP by individual healthcare professionals, and that the main prescribers of PAP were physicians, nurses, and physiotherapists. There was a large variation in prescription over the four years, with an increase between the first and second year of study (implementation years) and a decrease the following two years. This was mainly influenced by variation in prescription rates by physicians and nurses.

One main finding regarding PAP recipients' experiences of what influenced their engagement in physical activity was that six out the ten factors were related to 'opportunity' in the COM-B model (Study II). The written prescription of PAP and social support e.g., by counsellor or spouses, were some of these factors. Another main finding was that all three determinants in the COM-B model of behaviour change influenced PAP recipients' engagement in physical activity from a long-term perspective. An individual person-centred approach to healthcare delivery of PAP is of importance.

One main finding in Study III was that PAP recipients who used counsellor support had better outcomes on weekly physical activity and HRQoL one year after PAP than the recipients who did not use this support. There were more PAP recipients among the counsellor users who had increased physical activity and who reached the recommended level of at least 150 minutes of physical activity at follow-up. Factors associated with PAP recipients' increase in physical activity (Study IV) were found to be lower levels (scale score 3-9, scale score 10-12) of physical activity at baseline, counsellor support, and having positive perception of support. There was some difference in factors between counsellor users and non-users of this support. The factors among counsellor users were lower levels (scale score 3-9, scale score 10-12) of physical activity at baseline, and having positive perception of support, while the only factors among non-users of this support were the lowest level of physical activity at baseline (scale score 3-9).

This thesis project sought to investigate healthcare output (Study I), patients' experiences (Study II) and patient outcomes (Studies III and IV) of an organizational structure for routine healthcare delivery of the Swedish PAP programme in primary and secondary care, where all patients prescribed PAP has access to counsellor support.

# DISCUSSION

This chapter starts with a general discussion to position the study findings in a broader empirical context of PAP. The basis for the general discussion is the implementation science framework which was used in the development and planning of this thesis project. The chapter ends with a methodological discussion of strengths and limitations of the studies.

## General discussion

The findings in the studies are mainly discussed in terms of the three implementation determinants, adopters, context, and end users. Since no clear strategy for implementation of the studied counsellor structure was found, this determinant was not possible to study. The general discussion wraps up with an overall discussion of the innovation, which was an organizational structure for healthcare delivery of the Swedish PAP, including access to physical activity counsellor support for all patients prescribed PAP.

### Adopters

PAP in Swedish healthcare can be prescribed by licensed healthcare professionals. The results in Study I showed that PAP was adopted differently by different professional groups. The most frequent prescribers were physicians, followed by nurses and physiotherapists. The patterns regarding the different professions' prescription was in accordance with a previous Swedish primary healthcare study of PAP (41).

A main finding regarding individual prescribers' adoption of PAP was the large variation in number of PAP between individual healthcare professionals (Study I). The study provides no answer for what contributed to this variation. In general, PAP seems to vary a lot between individual prescribers (42, 102), and between healthcare centres (41). It seems to be difficult for healthcare professionals to use PAP on a regular basis (32, 102, 103). Information from individual interviews with prescribers of PAP in the studied healthcare organization indicates that it is difficult to maintain prescriptions of physical activity over time, since PAP seems to be 'easy to forget' (unpublished data). A question for further studies is what strategies would support healthcare professionals' prescription of PAP. More strategies than implementing a facilitating organizational structure of PAP seem to be needed.

Findings in Study I regarding prescription rates in the general healthcare population showed similar rates as reported in previous primary healthcare

studies, one in Sweden (41) and one in United Kingdom (42). Seen in relation to the prevalence of physical inactivity in the adult Swedish population, the adoption rate of PAP could be seen as underutilized in Swedish healthcare. However, it is difficult to determine an optimal prescription rate for PAP in the patient population, since PAP is one of other methods that can be used by healthcare professionals to support patients' physical activity. Health care professionals seem to prefer to use advice or counselling alone. An important task for healthcare professionals is to use the most relevant method for the individual patient (104).

Another measurement that could provide better information about whether PAP is underutilized or not in a healthcare organization is adoption rate of PAP among all potential adopters. This question has rarely been investigated. A study including physicians in German private clinics showed that a majority of the physicians were non-users of PAP (102). The relevance of this result with regard to adoption of PAP in Swedish healthcare has not been studied. Measurement of adoption rates of PAP among healthcare professionals could be used to determine how PAP is implemented in routine care. PAP might be considered as implemented when more than half of all potential prescribers use PAP as intended, and could be seen as being part of routine care after an additional one to two years (105).

The uptake of PAP counsellor support was highest among patients prescribed PAP by a physician. Supporting structure has previously been reported to be of importance for physicians (103, 106), and therefore physicians might have been better than other professionals at supporting patients in contacting a counsellor. Results in Study II showed that both written and verbal information of counsellor support from the prescriber of PAP was important for whether patients used this support or not.

## **Context**

Findings in Study I showed that PAP was used in primary and secondary care. About one-quarter of all PAP recipients in the four years was prescribed in secondary care. A majority of counsellor users were prescribed in primary care, which was not surprising since a majority of the patients were prescribed in primary care (Study I).

Further analyses performed separately for the three settings, primary care, somatic secondary, and in psychiatric care, showed that the lowest use of counsellor support was for patients prescribed in psychiatric care (24%). The corresponding proportion for somatic secondary care and primary care were 33% and 32%, respectively. Based on this result, we can say that there were differences

in patients' use of counsellor support related to prescribing setting. The reasons behind these differences were not investigated. Something that emerged from the interviews in Study II was that some patients had barriers to contacting a counsellor since they were an unknown function that was not previously involved in their care. Patients treated in psychiatric care might have more barriers to contact an unknown person that is not involved in their ordinary treatment. This finding indicates that an overall structure including counsellor support might not fit all patients, and other structures of support might be considered.

Context is a broad, complex concept, typically encompassing many aspects beyond merely the type of setting, e.g., the culture and leadership in the settings where innovations are implemented (107). However, such features of the context were not investigated in any of the studies.

### **End users**

The relatively high rate of diagnosis and healthcare consumption seen among the PAP recipients was somewhat unexpected (Study I). According to the FYSS book available at the time of the studies, PAP could be interpreted as a method that was not primarily for patients with diseases (*Sjuk/hög risk*) (108). For this group, a referral to a physiotherapist or a controlled PAP group should be considered. However, the severity of diagnoses was not distinguished in the study data in this thesis. No PAP study was found that provided comparable information to verify if higher morbidity rates is a common pattern among patients receiving PAP in Swedish routine healthcare. Comparison between the PAP recipients and the general healthcare population showed that higher frequencies of diagnoses and inpatient care were found among the PAP recipients. Multi-morbidity is commonly defined as the presence of two or more morbidities (109). According to this definition, a majority of the PAP recipients could be defined as having multi-morbidity. The use of PAP for patients with higher morbidity rates increased over the four years of study. Since higher disease burden has previously been found to be significantly related to physical inactivity, the association between PAP and patients' higher morbidity rates might not be surprising (110).

Results regarding PAP recipients' sex and age (Study I) were generally similar to those in previous Swedish PAP studies (41, 45). Patients with higher rates of diagnoses were more frequently counsellor users. This result is not surprising, since diseases could provide obstacles to physical activity (67), caused by factors such as being afraid that physical activity might worsen their diseases (111-114). The competence among professionals who provide support for physical activity aims at contributing to patients feeling secure with the recommendations (67, 114). PAP recipients who had used counsellor support expressed trust in the counsellor's competence (Study II).

Due to the findings of differences in outcomes between the group who used versus did not use counsellor support, physical activity counsellor support could be suggested as an important supplement to healthcare professionals' prescription of physical activity. The counsellor group had better outcomes on both weekly physical activity and HRQoL one year after PAP (Study III). The improvement in HRQoL might be influenced by the improvement in physical activity seen in counsellor users (45, 115).

The differences in outcomes concerning physical activity between counsellor users and non-users of support were obvious (Study III). Since increased activity was also seen in the group who did not use counsellor support, the support might not be of importance for all PAP recipients. Even brief PAP interventions have been found to provide positive outcomes concerning patients' physical activity (58).

Study IV investigated the association between patient and healthcare characteristics and increased physical activity one year after prescription. The analysis was adjusted for patients' age, sex, education level, and number of diagnoses. Patients' increase in physical activity was associated with having low baseline activity, using counsellor support, and having a positive perception of support received after PAP. Low baseline activity was, in this analysis, defined as below the recommended level of at least 150 min of physical activity per week. This result can provide healthcare professionals with confidence that patients with low physical activity and in need of increased physical activity can be supported by PAP and counselling to increase their physical activity.

## **Innovation**

The innovation was an organizational structure for healthcare delivery of the Swedish PAP programme, including an offer of counsellor support in addition to healthcare professionals' prescription of physical activity. The Swedish PAP programme had been introduced in Swedish healthcare nine years before this counsellor structure was implemented. Therefore, prescription of physical activity was already used by some healthcare professionals. Differences in adoption related to previous use of PAP was not investigated in this thesis (Study I).

Due to the results in the patient studies (studies II, III, and IV), individualized support by physical activity counsellors in addition to health care professionals' prescription of physical activity could be suggested as a suitable strategy for routine healthcare delivery of PAP. The profession of the physical activity counsellors could be licenced healthcare professional, commonly registered nurses (47), and physiotherapists (66, 106). The physical activity counsellors in

the studied innovation were nurses and physiotherapists with the task of providing support for PAP recipients, and their organizational belonging was in a PAP unit within the primary care organizations.

Advantages of having a specialized PAP unit employing a physical activity counsellor could be that a counsellor develops a broad competence by supporting a large number of PAP recipients, and that they have time allocated for supporting PAP recipients. Disadvantages could be related to lack of collaboration between counsellors and prescribers of PAP, and that the counsellors were an unknown function for the PAP recipients. Counsellor users expressed great confidence in the counsellors' competence, but had barriers to make a first contact with a counsellor if they were not supported to do so by the prescriber of PAP (Study II). Only receiving written information about how to get in contact did not seem to be enough for patients to make a first contact with a counsellor. However, since the studies in this thesis do not provide any knowledge about healthcare professionals' perception and knowledge about the studied PAP counsellor, any conclusion of how they perceived the counsellor structure could not be drawn.

Some PAP structures are based on a referral system between the prescriber and the healthcare professional who provides counselling and follow-up (66, 106). Such a system might facilitate patients' use of support. One reflection is that, due to the proportion of patients with increased activity in the group who did not use counsellor support (Study III), and due to findings in a physical activity counsellor trial in Canada (58), a referral system in which all patients prescribed PAP are automatically referred to a specialized physical activity counsellor function might be an unnecessary use of healthcare resources. For some patients, advice and a written prescription for physical activity is sufficient support from healthcare (58). Social support to engage in physical activity after PAP could also be provided by peers in sport clubs, spouses and other family members, and by instructors in sport clubs (Study II).

Results in Study IV indicated that patients with an activity level below the recommended level of 150 minutes of moderate to vigorous would benefit most from qualified counselling support in addition to healthcare professionals' prescription for physical activity. Sedentary time has not been analysed within the scope of the studies in this thesis, but questions about sedentary time are now recommended as additional to questions about physical activity (11).

It is now more than two decades since the Swedish PAP programme FaR® was introduced. The research that supports the use of the Swedish PAP in Swedish healthcare has increased (47, 49, 65, 66). However, Swedish healthcare regions still have problems implementing sustainable structures for PAP in routine

healthcare (116, 117), and disparities exist between regions (117). It is difficult to say how the national guidelines for prevention and treatment of physical activity in healthcare have affected the work with PAP in Sweden (75). In these guidelines, counselling as a single action has the same priority as counselling including written prescriptions for physical activity, and counselling including pedometer.

## Methodological considerations

This section includes a general discussion of methodological considerations that should be used when interpreting the study findings.

### Real-world studies

The thesis presents a broad investigation of a real-world organizational structure for PAP with access to counsellor support and that was implemented in a Swedish healthcare organization. Four studies with different focus, study design, and analysis methods provide knowledge about effectiveness of this counsellor structure in routine care. The focus is primarily on what this mode of routine healthcare delivery of PAP has brought to the patients prescribed PAP. Hence, it is of importance that the studies reflect routine healthcare delivery of PAP, and appropriately account for the heterogeneity of the current patient population receiving treatment in the studied healthcare organization (118).

One ambition of the thesis was to investigate real-life healthcare delivery of PAP under real-life healthcare conditions. All data collection, and recruitment of patients for the studies, were handled by one of the researchers that was not involved in clinical practice work with PAP. The PAP process in healthcare was thereby not interrupted by study-related tasks. Clinical decision-making for PAP was not influenced by healthcare professionals' awareness of being studied (119) or by higher workload in clinical practices because of the studies.

The overall study population in this thesis represents the heterogeneity of the population of adult patients prescribed PAP in primary or secondary care in Kronoberg. There were no exclusion criteria related to PAP recipients' characteristics. In addition, there were no exclusion criteria set for prescribing professionals' group, or for prescribing setting. The PAP recipients were identified through their registered PAP in the electronic medical record system (Cambio Cosmic). Data were collected from a majority of the healthcare centres (99%) and from all healthcare units in secondary care. Since the same electronic medical record system and methods for registration of PAP were used by all healthcare professionals in primary and secondary care, the condition to correctly identify the patients prescribed physical activity was deemed to be high.



## **The quantitative studies**

The thesis includes three quantitative studies with different focus, design, and analytical methods (studies I, III, and IV). Data sources for the studies were electronic medical record (Studies I, III, and IV), and patient-reported data derived from one baseline and one follow-up questionnaire (Studies III and IV).

To ensure that electronic medical record data were properly captured and measured, the researchers had an ongoing dialogue with healthcare professionals familiar with clinical practice work with PAP, data analysts familiar with registration codes, and IT technician familiar with extraction of data from the system, and statisticians familiar with preparing datafiles based on medical record data (120). The data files for analyses were rigorously gone through to secure the quality of data. Transparency of how data from healthcare records has been measured and categorized has been described as much as possible with the purpose of facilitating interpretation of the study findings. We assessed that the information of diagnoses and healthcare consumption was relevant in order to broaden an overall understanding of routine health care PAP recipients' morbidity rates (Studies I, III, and IV).

Data retrieved from the baseline and the follow-up questionnaire were based on validated questions and instrument (76, 77, 92, 95, 96, 98), previously used survey question (98), and clinical questions for measurement of readiness to change (97). The question of patients' perception of support after PAP was developed by the researcher. All data from the questionnaires were first registered in SPSS, and were thereafter gone through a second time to check for subsequent registration errors.

The Swedish National Board of Health and Welfare questions of everyday activity and exercise training were used to calculate patients' weekly physical activity (Studies III and IV). These questions are validated and recommended for use in clinical practice (76, 77). The questions have also been used in the Swedish national public health survey *Hälsa på lika villkor* since 2016 (the Swedish Public Health Agency).

The questions have been described as a tool in the dialogue about physical activity with the patient, to find patients who have the greatest need to change their lifestyle, and for follow-up of changes in physical activity, at both an individual and group level (121). We perceive that the questions could be used in research to support an overall categorization according to recommendations on physical activity for adults, and to measure changes in physical activity over time. It is important to consider that self-reports of physical activity are not a precise measure, and that there is a risk that the level of physical activity is overestimated

(121). Since this measurement of physical activity seems to be relatively new in research (60), it might have been of value for interpretation of the findings if an additional, more frequently used instrument of physical activity e.g., the Saltin Grimby Physical Activity Scale (122), had been added in the analyses (Studies III and IV).

Study I, that used electronic medical record data as a single data source, allowed for analyses of all unique patients prescribed PAP in the years 2009 to 2012. The high coverage of data and four-year study period was a strength of this study. The four years of study were important to determine that uptake of PAP in clinical practices was not merely an early implementation effect of the counsellor structure. The generalizability of the study findings to other PAP populations and healthcare settings could be restricted by limited information on patient characteristics and by different strategies used for healthcare delivery of PAP and to support uptake of PAP in clinical practices. It is difficult to determine the extent to which the patients in our study differ from PAP recipients in other PAP studies with regard to morbidity; this has previously not been reported. However, we assess that the comparison of characteristics in total healthcare population and the PAP population facilitate interpretation of the study findings regarding patient characteristics.

To receive appropriate information for studies III and IV, both electronic-medical record data and patients' self-reported questionnaire data were used. A limitation of these studies is that there is a selection bias related to patients' willingness to participate at baseline and to non-responder at follow-up. However, it is difficult to determine if a participation rate at baseline including 40% of all patients prescribed PAP in a healthcare organization should be seen as low or high. A final study sample of 400 patients at one-year follow-up is relatively high in relation to other Swedish real-world studies investigating effectiveness of PAP on patients' physical activity (45, 47, 66). Both Study III and IV provide information on non-participants at baseline and drop-out at follow-up.

The generalizability of the study findings in the quantitative studies to other healthcare contexts is influenced by factors such as study participants' characteristics, the healthcare context, and the mode of delivery of PAP with access to counsellor support.

Studies III and IV have somewhat restricted generalizability to younger PAP recipients and to PAP recipients with mental health disorders. Information on characteristics of non-participants at baseline and non-responders at follow-up is given in the published version of Study III and Study IV.

## **The qualitative study**

This section includes an overall discussion of methodological considerations for the qualitative study in this thesis (Study II). Both strengths and limitations of the study will be discussed. This study focused on patients' experiences of factors that influenced their engagement in physical activity after PAP.

The combination of an inductive (conventional) and deductive (directed) approach of content analysis was found to be an applicable analysis method (99, 100). The inductive approach allowed for new insights directly generated from the information given by the interviewees, without being influenced by pre-selected categories. The deductive approach contributed to putting the study finding in the perspective of a behaviour change model reference, from existing theories of behaviour change (93). The COM-B model was found to be an applicable framework to categorize factors that influenced PAP recipients' engagement in physical activity. The credibility of the study findings was enhanced by the multidisciplinary team of researchers involved and the multiple analyst approach used in the analyses of interviews (123, 124).

We identified two potential biases for the study, i.e., recall bias and selection bias. The potential risk for recall bias is affected by the interviews being conducted at 1.5 to 2.5 years after PAP. Hence, the memory of what actually happened in the initial phase of PAP could be reduced. The selection bias occurred because we did not succeed in recruiting younger PAP recipients for the interviews.

The study findings cannot be directly transferred to other healthcare organizations. This study represents the experiences of the interviewees in the study, and what influenced their engagement in physical activity after they received PAP with access to counsellor support. However, the use of the COM model might have facilitated the comparison of the study findings with other similar healthcare studies (125).



# CONCLUSIONS

**Study I:** Patients who were prescribed PAP had a high frequency of diagnoses and high healthcare consumption in the year prior to the prescription. Just one-third of all PAP recipients used the physical activity counsellor support that was implemented and available in the healthcare system. Counsellor users had higher morbidity than non-users. The counsellor users were more frequently prescribed by a physician. The main prescribers of PAP were physicians and the main prescribing setting was primary care. A large variation in prescription rate was seen among individual healthcare professionals. However, PAP was used in both primary and secondary routine care and the findings indicate that PAP is pertinent in both levels of care.

**Study II:** Patients' engagement in physical activity from a long-term perspective was influenced by capability, opportunity, and motivation. Numerous opportunity factors influenced capability and motivation, of which receiving a PAP, professional support, and follow-up by a physical activity counsellor were important for the patients. The individual approach of counselling support and flexible follow-up adapted to each individual's need for support were found to be important for sustained activity

**Study III:** Patients using the counsellor support had higher physical activity and better HRQoL at one-year follow-up. Counsellor users' increase in physical activity was mainly due to increased exercise training rather than everyday activity.

**Study IV:** Increased physical activity at one-year follow-up was related to low baseline activity, a positive perception of support, and use of counsellor support. Qualified counselling support in addition to healthcare professionals' prescription for physical activity seems to be most important factor for achieving increased physical activity among patients with lower baseline activity.



# IMPLICATIONS

## Clinical practices

The findings of this thesis suggest that PAP is a method to be used in both primary and secondary care and that physical activity counsellors have an important role in supporting patients' physical activity. Increased physical activity was seen in both patients who used and patients who did not use counsellor support, which means that any general recommendation that all patients prescribed PAP should be referred to a physical activity counsellor cannot be given.

Identifying patients with insufficient levels of activity might increase the quality of routine healthcare delivery of PAP, and allow healthcare counselling resources to be allocated to patients with the greatest need for increased activity. This thesis suggests a feasible method for improving the future health and well-being of patients. The results could contribute to health practitioners' confidence in the outcomes of PAP.

All studies in this thesis were carried out under real, routine, healthcare conditions, demonstrating the feasibility of PAP with a physical activity counsellor. Thus, healthcare professionals should feel confident that PAP is feasible and has the potential to improve patients' physical activity and future health. The findings regarding patient outcomes of PAP suggest that an effective resource utilization of counsellor support after PAP should be to use this support for patients who do not reach 150 minutes of moderate to vigorous physical activity per week.

An implication for clinical practices is that these findings are based on outcomes of physical activity as measured by the Swedish National Board of Health and Welfare physical activity questions recommended for clinical practices (75). Our data collection process indicates that there is potential for improvement with regard to healthcare professionals' use of, and documentation of, available measures of physical activity in the electronic medical record system.

The quality of routine healthcare delivery of PAP might be raised if validated questions were used to identify patients with insufficient levels of activity and allow healthcare counselling resources to be allocated to patients with the greatest need for increased activity.

For the patients, it was of importance that the PAP process through prescription, counselling, and follow-up was seen as a whole, and that the prescriber of PAP encouraged patients to visit a physical activity counsellor. Collaboration between prescribers of PAP and physical activity counsellors was of importance for the patients.

## Research

The intention behind implementation of the counsellor structure in routine care was twofold; i.e., to give qualified support to patients prescribed PAP and to facilitate healthcare professionals' PAP process. The findings regarding physical activity counsellors suggest that patients who used the offer of counsellor support received qualified counselling and follow-up. How this counsellor structure supported uptake of PAP in clinical practices from healthcare professionals' perspective was not determined. Qualitative studies are warranted to explore healthcare professionals' view of the counsellor structure. In addition, the findings in the thesis do not provide information on whether PAP was used widely by healthcare professionals and healthcare units. Such information could provide more answers regarding whether the uptake of PAP could be seen as underutilized in routine care or not. In addition, perceptions among healthcare management might be of value for qualitative exploration, since management decisions on resource allocation depends on both perceptions and economics.

This thesis provides information on one of the existing structures for routine healthcare delivery of PAP in Sweden. Further studies of PAP in routine care, in which outcomes of different modes of healthcare delivery of PAP are compared, could provide more information about best practice models for PAP.

To our knowledge, this was the first real-world study of the Swedish PAP in which both primary and secondary care were analysed. Findings regarding prescribing setting showed that prescribing setting was not influential on patients' increase in physical activity. Since little is known about healthcare delivery of PAP by prescribing setting, further sub-group analyses of healthcare output and patients' outcomes per setting might generate new valuable information about PAP.

A priority for healthcare is to know when PAP is a more appropriate method compared to counselling alone or counselling with a pedometer. Future studies that can contribute to providing clearer guidance to healthcare, e.g., as to when PAP might be more preferable than other actions, are warranted. Such information might facilitate and strengthen the work with PAP and physical activity promotion in clinical practice. In such studies, measurements that can be used for health economic evaluation should be included.



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# APPENDICES

Appendix 1: Baseline questionnaire (Studies III and IV)

Appendix 2: Follow-up questionnaire (Studies III and IV)

Appendix 3: Interview guide (Study II)





# Appendix 1



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# Enkät till dig som fått fysisk aktivitet på recept i Kronobergs län

**Forskningsstudie om fysisk aktivitet**



## Allmänna bakgrundsfrågor

1. Vilket år är du född?  
\_\_\_\_\_
2. Är du man eller kvinna?  
☐ Man    ☐ Kvinna
3. Vilken är din huvudsakliga sysselsättning i nuläget?
- ☐ Arbetar heltid  
☐ Arbetar deltid  
☐ Studerande  
☐ Sjukskriven (i mer än 3 mån)  
☐ Föräldraledig  
☐ Pensionär (sjuk, avtals, ålders- förtids-  
☐ Annat
4. Mitt nuvarande arbete/huvudsakliga sysselsättning innebär att jag  
*Ange ett alternativ.*
- ☐ Är mest är stillasittande  
☐ Sitter halva tiden  
☐ Är mest är stående  
☐ Går mest, lyfter, bär lite  
☐ Går mest, lyfter, bär mycket  
☐ Har tungt kroppsarbete
5. Vilken är din högsta formella utbildning?
- ☐ Grundskola/folkskola                  ☐ Högskola/Universitet  
☐ Gymnasium                                 ☐ Annat

## Frågor om din nuvarande fysiska aktivitet

6. Hur mycket tid ägnar du en vanlig vecka åt vardagsmotion till exempel promenader, cykling eller trädgårdsarbete? Räkna samman all tid (minst 10 minuter åt gången).

☐ 0 minuter/Ingen tid

☐ mindre än 30 minuter

☐ 0,5-1 timme

☐ 1-1,5 timmar

☐ 1,5–2,5 timmar

☐ 2,5-5 timmar

☐ Mer än 5 timmar

7. Hur mycket tid ägnar du en vanlig vecka åt fysisk träning som får dig att bli andfädd, till exempel löpning, motionsgymnastik och bollsport?

☐ 0 minuter/Ingen tid

☐ mindre än 30 minuter

☐ 0,5-1 timme

☐ 1-1,5 timmar

☐ 1,5-2 timmar

☐ Mer än 2 timmar

**Markera det alternativ på skalan som stämmer bäst in på dig**

8. Hur viktigt är det för dig att förändra din nuvarande fysiska aktivitet?
- |                   |   |   |   |   |                |   |   |   |    |
|-------------------|---|---|---|---|----------------|---|---|---|----|
| 1                 | 2 | 3 | 4 | 5 | 6              | 7 | 8 | 9 | 10 |
| inte alls viktigt |   |   |   |   | mycket viktigt |   |   |   |    |
9. Hur säker är du på att kunna klara av att förändra din nuvarande fysiska aktivitet?
- |                 |   |   |   |   |              |   |   |   |    |
|-----------------|---|---|---|---|--------------|---|---|---|----|
| 1               | 2 | 3 | 4 | 5 | 6            | 7 | 8 | 9 | 10 |
| inte alls säker |   |   |   |   | mycket säker |   |   |   |    |

## Frågor om besöket när du fick ditt recept på fysisk aktivitet

Frågorna som följer handlar om hur du upplevde kontakten med vårdgivaren dvs. den läkare, sjuksköterska eller annan vårdpersonal som utfärdade ditt recept på fysisk aktivitet. Vi ber dig vara helt öppen och ärlig. Vårdgivaren kommer inte att ta del av dina svar.

Motion i frågorna kan omfatta både vardagsmotion (t.ex. promenader, cykling) och fysisk träning som får dig att bli andfådd (t.ex. löpning, motionsgymnastik).

Markera ett alternativ på skalan för varje påstående - det som stämmer bäst in på dig.

	Stämmer inte alls			Stämmer i viss mån			Stämmer helt och hållet	
10. Jag tyckte att vårdgivaren klargjorde olika val och möjligheter för mig när det gäller att motionera regelbundet (men också vad det innebär att inte motionera regelbundet)	1	2	3	4	5	6	7	
11. Jag tycker att vårdgivaren förstod hur jag ser på att motionera regelbundet	1	2	3	4	5	6	7	
12. Vårdgivaren uttryckte tilltro till min förmåga att göra förändringar när det gäller att motionera regelbundet	1	2	3	4	5	6	7	
13. Vårdgivaren lyssnade på mig angående på vilket sätt jag skulle vilja göra saker när det gäller att motionera regelbundet	1	2	3	4	5	6	7	
14. Vårdgivaren uppmuntrade mig att ställa frågor om mitt motionerande	1	2	3	4	5	6	7	
15. Vårdgivaren försökte ta reda på hur jag ser på att motionera regelbundet innan han/hon föreslog några förändringar	1	2	3	4	5	6	7	
16. Att få fysisk aktivitet på recept kändes relevant för min livssituation	1	2	3	4	5	6	7	

17. Vid besöket fick du råd om något av nedanstående?

Ange ett alternativ på varje fråga.

17A. Dina tobaksvanor

- ☐ Ja  
☐ Nej, men jag hade önskat det  
☐ Nej, det behövdes inte  
☐ Nej, men vid tidigare besök under senaste året

17B. Dina matvanor

- ☐ Ja  
☐ Nej, men jag hade önskat det  
☐ Nej, det behövdes inte  
☐ Nej, men vid tidigare besök under senaste året

17C. Dina alkoholvanor

- ☐ Ja  
☐ Nej, men jag hade önskat det  
☐ Nej, det behövdes inte  
☐ Nej, men vid tidigare besök under senaste året

## Frågor om dina levnadsvanor

### 18. Tobak

Markera ett alternativ på varje fråga – det du brukar göra.

#### 18A. Mina rökvanor

- ☐ Jag har aldrig varit rökare
- ☐ Jag har slutat röka för mer än 6 månader sen
- ☐ Jag har slutat röka för mindre än 6 månader sen
- ☐ Jag röker men inte dagligen
- ☐ Jag röker dagligen

#### 18B. Mina snusvanor

- ☐ Jag har aldrig varit snusare
- ☐ Jag har slutat snusa för mer än 6 månader sen
- ☐ Jag har slutat snusa för mindre än 6 månader sen
- ☐ Jag snusar men inte dagligen
- ☐ Jag snusar dagligen

### 19. Mat

Markera ett alternativ på varje fråga – det du brukar göra.

#### 19A. Hur ofta äter du grönsaker och/eller rotfrukter (färska, frysta eller tillagade)?

- ☐ Två gånger per dag eller oftare
- ☐ En gång per dag
- ☐ Några gånger i veckan
- ☐ En gång i veckan eller mer sällan

#### 19B. Hur ofta äter du frukt och/eller bär (färska, konserverade, juice etc.)?

- ☐ Två gånger per dag eller oftare
- ☐ En gång per dag
- ☐ Några gånger i veckan
- ☐ En gång i veckan eller mer sällan

#### 19C. Hur ofta äter du fisk eller skaldjur som huvudrätt, i sallad eller som pålägg?

- ☐ Tre gånger i veckan eller oftare
- ☐ Två gånger i veckan
- ☐ En gång i veckan
- ☐ Några gånger i månaden eller mer sällan

#### 19D. Hur ofta äter du kaffebröd, choklad/godis, chips eller läsk/saft?

- ☐ Två gånger per dag eller oftare
- ☐ En gång per dag
- ☐ Några gånger i veckan
- ☐ En gång i veckan eller mer sällan

#### 19E. Hur ofta äter du frukost?

- ☐ Dagligen
- ☐ Några gånger i veckan
- ☐ Nästan varje dag
- ☐ En gång i veckan eller mer sällan

### 20. Ange din längd i hela centimeter

---

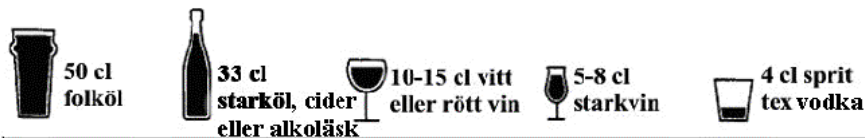
### 21. Ange din vikt i hela kg

---

Är du gravid anger du hur mycket du brukar väga.

## 22. Alkohol

Bilden visar exempel på standardglas.



Markera ett alternativ på varje fråga – det du brukar göra.

22A. Hur många standardglas dricker du en vanlig vecka?

- ☐ Dricker mindre än 1 standardglas per vecka
- ☐ 1-4 standardglas per vecka
- ☐ 5-9 standardglas per vecka
- ☐ 10-14 standardglas per vecka
- ☐ 15 eller fler standardglas per vecka

22B. Hur ofta dricker du som kvinna 4 standardglas och du som man 5 standardglas eller mer samma tillfälle?

- ☐ Aldrig
- ☐ Mer sällan än 1 gång per månad
- ☐ Varje månad
- ☐ Varje vecka

## Kompletterande frågor om fysisk aktivitet och motionsvanor

23. Hur mycket har du rört och ansträngt dig kroppsligt på fritiden under de senaste 12 månaderna? Om din aktivitet varierar mellan t.ex. sommar och vinter, så försök att ta ett genomsnitt.

*Ange ett alternativ.*

- ☐ Stillasittande fritid

Du ägnar dig mest åt läsning, TV, bio eller annan stillasittande sysselsättning på fritiden. Du promenerar, cyklar eller rör dig på annat sätt mindre än 2 timmar i veckan

- ☐ Måttlig motion på fritiden

Du promenerar, cyklar eller rör dig på annat sätt under minst 2 timmar i veckan oftast utan att svettas. I detta inräknas också promenad eller cykling till och från arbetet, övriga promenader, ordinarie trädgårdsarbete, fiske, bordtennis, bowling

- ☐ Måttlig, regelbunden motion på fritiden

Du motionerar regelbundet 1-2 gånger per vecka minst 30 minuter per gång med löpning, simning, tennis, badminton eller annan aktivitet som gör att du svettas

- ☐ Regelbunden motion och träning.

Du ägnar dig åt t.ex. löpning, simning, tennis, badminton, motionsgymnastik eller liknande vid i genomsnitt minst 3 tillfällen per vecka. Vartdera tillfället varar minst 30 minuter per gång

24. Hur mycket tid ägnar du en vanlig vecka åt att titta på tv/läsa/sitta vid datorn eller andra stillasittande aktiviteter?

- ☐ Mindre än 1 timme/dag
- ☐ 1-2 timmar/dag
- ☐ 3-4 timmar/dag
- ☐ 5-6 timmar/dag
- ☐ Mer än 6 timmar/dag

25. Hur mycket tid ägnar du en vanlig vecka åt vardagligt hem/hushållsarbete?

- ☐ Mindre än 1 timme/dag
- ☐ 1-2 timmar/dag
- ☐ 3-4 timmar/dag
- ☐ 5-6 timmar/dag
- ☐ 7-8 timmar/dag
- ☐ Mer än 8 timmar/dag



26. Hur bedömer du din nuvarande kondition?

- ☐ Mycket bra
- ☐ Bra
- ☐ Någorlunda
- ☐ Mindre bra
- ☐ Dålig

27. Hur bedömer du din nuvarande kondition i förhållande till för tolv månader sedan?

- ☐ Mycket bättre
- ☐ Något bättre
- ☐ Ungefär detsamma
- ☐ Något sämre
- ☐ Mycket sämre

28. Hur bedömer du din nuvarande kondition i förhållande till personer i samma ålder?

- ☐ Mycket bättre
- ☐ Något bättre
- ☐ Ungefär detsamma
- ☐ Något sämre
- ☐ Mycket sämre

29. Hur många av dina vänner, familj motionerar regelbundet (dvs. minst en gång per vecka, motsvarande en ansträngningsnivå av snabb promenad)?

- ☐ Ingen      ☐ Några      ☐ De flesta      ☐ Alla

Denna fråga handlar om hur du upplever att motion ingår som en vana i din vardag. Motion kan omfatta både vardagsmotion (t.ex. promenader, cykling) och fysisk träning som får dig att bli andfädd (t.ex. löpning, motionsgymnastik och bollsport).  
*Markera ett alternativ för varje påstående - det som stämmer bäst in på dig.*

30. Motionerar på fritiden en vanlig vecka är något	Stämmer inte alls			Stämmer i viss mån			Stämmer helt och hållet	
... jag gör automatiskt	1	2	3	4	5	6	7	
... jag gör utan att jag behöver påminna mig om det	1	2	3	4	5	6	7	
... jag gör utan att jag funderar på det	1	2	3	4	5	6	7	
... jag gör innan jag ens inser att jag gör det	1	2	3	4	5	6	7	

31. Hur säker är du på att kunna klara av att förändra din fysiska aktivitet?

*Markera ett alternativ för varje påstående- det som stämmer bäst in på dig.*

	Stämmer inte alls			Stämmer i viss mån			Stämmer helt och hållet	
Jag känner mig säker på min egen förmåga att motionera regelbundet.	1	2	3	4	5	6	7	
Nu känner jag mig redo att motionera regelbundet.	1	2	3	4	5	6	7	
Jag kommer att klara av att motionera regelbundet på lång sikt.	1	2	3	4	5	6	7	
Jag klarar av utmaningen att motionera regelbundet	1	2	3	4	5	6	7	

# RAND-36 Hälsa och livskvalitet

RAND-36 handlar om din hälsa och funktion i vardagen. Välj det svarsalternativ som stämmer bäst för dig på varje fråga.

	Utmärkt	Mycket god	God	Någorlunda	Dålig
1. I allmänhet, skulle du säga att din hälsa är:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Mycket bättre	Något bättre	Ungefär densamma	Något sämre	Mycket sämre
2. Jämfört med för ett år sedan, hur skulle du bedöma din hälsa <b>nu</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Följande frågor handlar om aktiviteter du kan tänkas ägna dig åt en vanlig dag. **Begränsar din nuvarande hälsa dig i dessa aktiviteter?** Om ja, hur mycket?

	Ja, mycket begränsad	Ja, lite begränsad	Nej, inte alls begränsad
3. <b>Fysiskt ansträngande aktiviteter</b> , t.ex. löpning, lyfta tunga föremål, delta i ansträngande idrotter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. <b>Måttligt ansträngande aktiviteter</b> , t.ex. flytta ett bord, dammsuga, promenera eller cykla	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lyfta eller bära matkassar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Gå upp för <b>flera</b> trappor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Gå upp för <b>en</b> trappa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Böja dig eller gå ner på knä	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Gå <b>mer än ett par kilometer</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Gå <b>flera kvarter</b> (flera hundra meter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Gå <b>ett kvarter</b> (hundra meter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Bada/duscha eller klä på dig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Under de **senaste 4 veckorna**, har du haft något av följande problem med ditt arbete eller andra vanliga dagliga aktiviteter **på grund av din fysiska hälsa**?

	Ja	Nej
13. Dragit ner på <b>tiden</b> du ägnat åt arbete eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
14. <b>Fått mindre gjort</b> än du skulle vilja	<input type="checkbox"/>	<input type="checkbox"/>
15. Begränsats i <b>vissa</b> arbetsuppgifter eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
16. Haft <b>svårt</b> att utföra arbete eller andra aktiviteter (t.ex. det krävdes mer ansträngning)	<input type="checkbox"/>	<input type="checkbox"/>

Under de **senaste 4 veckorna**, har du haft något av följande problem med ditt arbete eller andra vanliga dagliga aktiviteter **på grund av känslomässiga problem** (t.ex. att du känt dig nere eller orolig)?

	Ja	Nej
17. Dragit ner på <b>tiden</b> du ägnat åt arbete eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
18. <b>Fått mindre gjort</b> än du skulle vilja	<input type="checkbox"/>	<input type="checkbox"/>
19. Utfört arbete eller andra aktiviteter mindre <b>noggrant</b> än vanligt	<input type="checkbox"/>	<input type="checkbox"/>

20. Under de **senaste 4 veckorna**, i vilken omfattning har din fysiska hälsa eller känslomässiga problem stört dina vanliga sociala aktiviteter med familj, släkt, vänner, grannar eller föreningar etc.?

Inte alls	Lite grand	Måttligt	Ganska mycket	Extremt mycket
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. Hur mycket **fysisk** smärta har du haft under de **senaste 4 veckorna**?

Ingen	Mycket lätt	Lätt	Måttlig	Svår	Mycket svår
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. Under de **senaste 4 veckorna**, hur mycket har smärta stört ditt vanliga arbete (gäller både arbete utanför hemmet och hushållsarbete)?

Inte alls	Lite grand	Måttligt	Ganska mycket	Extremt mycket
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Följande frågor handlar om hur du känner dig och hur det har varit **under de senaste 4 veckorna**.

Ange det svar som stämmer bäst med hur du känt dig.

Hur mycket av tiden under de **senaste 4 veckorna** ...

Hela tiden	Största delen av tiden	En stor del av tiden	En viss del av tiden	En liten del av tiden	Inget av tiden
23. Har du känt dig pigg?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Har du känt dig mycket nervös?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Har du känt dig så nere att ingenting kunnat muntra upp dig?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Har du känt dig lugn och harmonisk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Har du känt dig energisk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Har du känt dig dystert och ledsen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Har du känt dig utsliten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Har du känt dig lycklig?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Har du känt dig trött?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32. Under de **senaste 4 veckorna**, hur mycket av tiden har din **fysiska hälsa eller känslomässiga problem** stört dina sociala aktiviteter (som att träffa vänner, släktingar etc.)?

Hela tiden	Största delen av tiden	En viss del av tiden	En liten del av tiden	Inget av tiden
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hur väl stämmer följande påståenden in på dig?

Stämmer helt	Stämmer ganska bra	Vet inte	Stämmer ganska dåligt	Stämmer inte alls
33. Jag verkar ha något lättare att bli sjuk än andra människor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Jag är lika frisk som andra jag känner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Jag tror att min hälsa kommer att försämrats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Min hälsa är utmärkt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Har du några kommentarer eller något du vill framföra är du välkommen att skriva det här.**

**Tack för din medverkan!**

**Skicka enkäten inom två veckor i bifogat svarskuvert.**

## Appendix 2



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# Uppföljningsenkät till dig som fått fysisk aktivitet på recept i Kronobergs län

**Forskningsstudie om fysisk aktivitet**



Linköpings universitet





## Frågor om din nuvarande fysiska aktivitet

1. Hur mycket tid ägnar du en vanlig vecka åt vardagsmotion till exempel promenader, cykling eller trädgårdsarbete? *Räkna samman all tid (minst 10 min åt gången).*

- ☐ 0 minuter/ingen tid
- ☐ mindre än 30 minuter
- ☐ 0,5-1 timme
- ☐ 1-1,5 timmar
- ☐ 1,5-2,5 timmar
- ☐ 2,5-5 timmar
- ☐ Mer än 5 timmar

2. Hur mycket tid ägnar du en vanlig vecka åt fysisk träning som får dig att bli andfådd, till exempel löpning, motionsgymnastik och bollsport?

- ☐ 0 minuter/ingen tid
- ☐ mindre än 30 minuter
- ☐ 0,5-1 timme
- ☐ 1-1,5 timmar
- ☐ 1,5-2 timmar
- ☐ Mer än 2 timmar

## Frågor om vilket stöd du fått för att öka din fysiska aktivitet

3. Upplever du att du har fått det stöd du behöver för att öka din fysiska aktivitet?

- ☐ Ja
- ☐ Nej
- ☐ Vet inte

4. I Landstinget Kronoberg finns receptmottagare för fysisk aktivitet på recept. Receptmottagarna är sjuksköterskor och sjukgymnaster som speciellt arbetar med fysisk aktivitet på recept och har sin mottagning på olika platser i hela länet. Till receptmottagarna kan man som patient vända sig för att få stöd och råd att finna lämpliga aktiviteter och nya aktivitetsvanor.

Fick du i samband med ditt recept på fysisk aktivitet information att du kunde kontakta receptmottagare?

- ☐ Ja
- ☐ Nej
- ☐ Kommer inte ihåg

5. Vilka har du haft kontakt med under senaste året med anledning av ditt recept på fysisk aktivitet? Med vårdgivare i svarsalternativen menas läkare, sjuksköterska eller annan vårdpersonal.

*Flera alternativ kan anges.*

- ☐ Vårdgivaren som skrev ut ditt recept
- ☐ Annan vårdgivare på samma vårdenhets där ditt recept skrevs ut
- ☐ Annan vårdgivare på annan vårdenhets än där ditt recept skrevs ut
- ☐ Receptmottagare
- ☐ Familj/vänner
- ☐ Idrottsledare inom föreningslivet, idrottsklinik eller liknande.
- ☐ Annan person, ange gärna \_\_\_\_\_
- ☐ Ingen

6. Vilka anser du har varit ett stöd för dig att ändra din fysiska aktivitet?

Med vårdgivare i svarsalternativen menas läkare, sjuksköterska eller annan vårdpersonal.

*Flera alternativ kan anges.*

- ☐ Vårdgivaren som skrev ut ditt recept
- ☐ Annan vårdgivare på samma vårdenhets där ditt recept skrevs ut
- ☐ Annan vårdgivare på annan vårdenhets än där ditt recept skrevs ut
- ☐ Receptmottagare
- ☐ Familj/vänner
- ☐ Idrottsledare inom föreningslivet, idrottsklinik eller liknande.
- ☐ Annan person, ange gärna \_\_\_\_\_
- ☐ Ingen

7. Har du använt dig av något hjälpmedel som stöd för att öka din fysiska aktivitet?

*Flera alternativ kan anges.*

- ☐ Stegräknare
- ☐ Dagbok för att fylla i fysisk aktivitet
- ☐ Mobil App.
- ☐ Annat, ange gärna vad \_\_\_\_\_
- ☐ Har inte använt något

### Kompletterande frågor om din fysiska aktivitet

8. Hur mycket har du rört och ansträngt dig kroppsligt på fritiden under de senaste 12 månaderna? Om din aktivitet varierar mellan t.ex. sommar och vinter, så försök att ta ett genomsnitt.

*Ange ett alternativ.*

- ☐ Stillasittande fritid

Du ägnar dig mest åt läsning, TV, bio eller annan stillasittande sysselsättning på fritiden. Du promenerar, cyklar eller rör dig på annat sätt mindre än 2 timmar i veckan.

- ☐ Måttlig motion på fritiden

Du promenerar, cyklar eller rör dig på annat sätt under minst 2 timmar i veckan oftast utan att svettas. I detta inräknas också promenad eller cykling till och från arbetet, övriga promenader, ordinarie trädgårdsarbete, fiske, bordtennis, bowling.

- ☐ Måttlig, regelbunden motion på fritiden

Du motionerar regelbundet 1-2 gånger per vecka minst 30 minuter per gång med löpning, simning, tennis, badminton eller annan aktivitet som gör att du svettas.

- ☐ Regelbunden motion och träning.

Du ägnar dig åt t.ex. löpning, simning, tennis, badminton, motionsgymnastik eller liknande vid i genomsnitt minst 3 tillfällen per vecka. Vartdera tillfället varar minst 30 minuter per gång.

9. Hur mycket tid ägnar du en vanlig vecka åt att titta på tv/läsa/sitta vid datorn eller andra stillasittande aktiviteter?

- ☐ Mindre än 1 timme/dag
- ☐ 1-2 timmar/dag
- ☐ 3-4 timmar/dag
- ☐ 5-6 timmar/dag
- ☐ Mer än 6 timmar/dag

10. Hur mycket tid ägnar du en vanlig vecka åt vardagligt hem/hushållsarbete?

- ☐ Mindre än 1 timme/dag
- ☐ 1-2 timmar/dag
- ☐ 3-4 timmar/dag
- ☐ 5-6 timmar/dag
- ☐ 7-8 timmar/dag
- ☐ Mer än 8 timmar/dag

11. Hur bedömer du din nuvarande kondition?

- ☐ Mycket bra
- ☐ Bra
- ☐ Någorlunda
- ☐ Mindre bra
- ☐ Dålig

12. Hur bedömer du din nuvarande kondition i förhållande till för tolv månader sedan?

- ☐ Mycket bättre
- ☐ Något bättre
- ☐ Ungefär detsamma
- ☐ Något sämre
- ☐ Mycket sämre

13. Hur bedömer du din nuvarande kondition i förhållande till personer i samma ålder?

- ☐ Mycket bättre
- ☐ Något bättre
- ☐ Ungefär detsamma
- ☐ Något sämre
- ☐ Mycket sämre

14. Vilken typ av aktivitet har du genomfört under senaste året?

*Flera alternativ kan anges.*

- ☐ Fysisk aktivitet på egen hand
- ☐ Fysisk aktivitet hos sjukgymnast eller någon annan inom den hälso- och sjukvården
- ☐ Fysisk aktivitet hos aktivitetsarrangör utanför sjukvården (t.ex. Friskis & Svettis, Korpen, annan idrottsförening eller privat idrottsklinik)
- ☐ Annan typ av aktivitet, ange gärna vad \_\_\_\_\_
- ☐ Ingen

15. Denna fråga handlar om hur du upplever att motion ingår som en vana i din vardag.

Motion kan omfatta både vardagsmotion (t.ex. promenader, cykling) och fysisk träning som får dig att bli andfådd (t.ex. löpning, motionsgymnastik och bollsport).

*För varje påstående markerar du det alternativ på skalan som stämmer bäst in på dig.*

Motionerar på fritiden en vanlig vecka är något	stämmer inte alls			stämmer i viss mån			stämmer helt och hållet	
... jag gör automatiskt	1	2	3	4	5	6	7	
... jag gör utan att jag behöver påminna mig om det	1	2	3	4	5	6	7	
... jag gör utan att jag funderar på det	1	2	3	4	5	6	7	
... jag gör innan jag ens inser att jag gör det	1	2	3	4	5	6	7	

# RAND-36 Hälsa och livskvalitet

RAND-36 handlar om din hälsa och funktion i vardagen. Välj det svarsalternativ som stämmer bäst för dig på varje fråga.

	Utmärkt	Mycket god	God	Någorlunda	Dålig
1. I allmänhet, skulle du säga att din hälsa är:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Mycket bättre	Något bättre	Ungefär densamma	Något sämre	Mycket sämre
2. Jämfört med för ett år sedan, hur skulle du bedöma din hälsa <b>nu</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Följande frågor handlar om aktiviteter du kan tänkas ägna dig åt en vanlig dag. **Begränsar din nuvarande hälsa dig i dessa aktiviteter?** Om ja, hur mycket?

	Ja, mycket begränsad	Ja, lite begränsad	Nej, inte alls begränsad
3. <b>Fysiskt ansträngande aktiviteter</b> , t.ex. löpning, lyfta tunga föremål, delta i ansträngande idrotter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. <b>Måttligt ansträngande aktiviteter</b> , t.ex. flytta ett bord, dammsuga, promenera eller cykla	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lyfta eller bära matkassar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Gå upp för <b>flera</b> trappor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Gå upp för <b>en</b> trappa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Böja dig eller gå ner på knä	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Gå <b>mer än ett par kilometer</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Gå <b>flera kvarter</b> (flera hundra meter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Gå <b>ett kvarter</b> (hundra meter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Bada/duscha eller klä på dig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Under de **senaste 4 veckorna**, har du haft något av följande problem med ditt arbete eller andra vanliga dagliga aktiviteter **på grund av din fysiska hälsa**?

	Ja	Nej
13. Dragit ner på <b>tiden</b> du ägnat åt arbete eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
14. <b>Fått mindre gjort</b> än du skulle vilja	<input type="checkbox"/>	<input type="checkbox"/>
15. Begränsats i <b>vissa</b> arbetsuppgifter eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
16. Haft <b>svårt</b> att utföra arbete eller andra aktiviteter (t.ex. det krävdes mer ansträngning)	<input type="checkbox"/>	<input type="checkbox"/>

Under de **senaste 4 veckorna**, har du haft något av följande problem med ditt arbete eller andra vanliga dagliga aktiviteter **på grund av känslomässiga problem** (t.ex. att du känt dig nere eller orolig)?

	Ja	Nej
17. Dragit ner på <b>tiden</b> du ägnat åt arbete eller andra aktiviteter	<input type="checkbox"/>	<input type="checkbox"/>
18. <b>Fått mindre gjort</b> än du skulle vilja	<input type="checkbox"/>	<input type="checkbox"/>
19. Utfört arbete eller andra aktiviteter mindre <b>noggrant</b> än vanligt	<input type="checkbox"/>	<input type="checkbox"/>

	Inte alls	Lite grand	Måttligt	Ganska mycket	Extremt mycket
20. Under de <b>senaste 4 veckorna</b> , i vilken omfattning har din fysiska hälsa eller känslomässiga problem stört dina vanliga sociala aktiviteter med familj, släkt, vänner, grannar eller föreningar etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Ingen	Mycket lätt	Lätt	Måttlig	Svår	Mycket svår
21. Hur mycket <b>fysisk</b> smärta har du haft under de <b>senaste 4 veckorna</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Inte alls	Lite grand	Måttligt	Ganska mycket	Extremt mycket
22. Under de <b>senaste 4 veckorna</b> , hur mycket har smärta stört ditt vanliga arbete (gäller både arbete utanför hemmet och hushållsarbete)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Följande frågor handlar om hur du känner dig och hur det har varit **under de senaste 4 veckorna**.

Ange det svar som stämmer bäst med hur du känt dig.

Hur mycket av tiden under de <b>senaste 4 veckorna</b> ...	Hela tiden	Största delen av tiden	En stor del av tiden	En viss del av tiden	En liten del av tiden	Inget av tiden
23. Har du känt dig pigg?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Har du känt dig mycket nervös?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Har du känt dig så nere att ingenting kunnat muntra upp dig?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Har du känt dig lugn och harmonisk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Har du känt dig energisk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Har du känt dig dystert och ledsen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Har du känt dig utsliten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Har du känt dig lycklig?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Har du känt dig trött?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Hela tiden	Största delen av tiden	En viss del av tiden	En liten del av tiden	Inget av tiden
32. Under de <b>senaste 4 veckorna</b> , hur mycket av tiden har din <b>fysiska hälsa eller känslomässiga problem</b> stört dina sociala aktiviteter (som att träffa vänner, släktingar etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hur väl stämmer följande påståenden in på dig?

	Stämmer helt	Stämmer ganska bra	Vet inte	Stämmer ganska dåligt	Stämmer inte alls
33. Jag verkar ha något lättare att bli sjuk än andra människor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Jag är lika frisk som andra jag känner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Jag tror att min hälsa kommer att försämrats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Min hälsa är utmärkt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Allmänna bakgrundsfrågor

16. Vilken är din huvudsakliga sysselsättning i nuläget?

- ☐ Arbetar heltid
- ☐ Arbetar deltid
- ☐ Studerande
- ☐ Sjukskriven (i mer än 3 mån)
- ☐ Föräldraledig
- ☐ Pensionär (sjuk, avtals, ålders- förtids-)
- ☐ Annat

18. Hur lång är du?

Ange din längd hela centimeter

\_\_\_\_\_ cm

17. Mitt nuvarande arbete/huvudsakliga sysselsättning innebär att jag

*Ange ett svar.*

- ☐ Mest är stillasittande
- ☐ Sitter halva tiden
- ☐ Mest är stående
- ☐ Går mest, lyfter, bär lite
- ☐ Går mest, lyfter, bär mycket
- ☐ Tungt kroppsarbete

19. Hur mycket väger du?

Ange din vikt i hela kg

\_\_\_\_\_ kg  
Är du gravid anger du hur mycket du brukar väga.

Datum när Du fyllt i formuläret:

\_\_\_\_\_

**Har du några kommentarer eller något du vill framföra är du välkommen att skriva det här.**

**Tack för din medverkan!**

**Skicka enkäten inom 2 veckor i bifogat svarskuvert.**

## Appendix 3





## Intervjuguide enskilda intervjuer med patienter

(Inledningen och intervjubild med övergripande teman är samma för patienter och förskrivare. Intervjustöd med följdfrågor är olika för patienter och förskrivare)

### Inledning

*Intervjun börjar med att inleda kontakt och att hälsa välkommen*

Välkommen... i samband med inbjudan information... något du funderar på innan vi går in på intervjun? ... jag kommer att be dig berätta om ... (bilden med intervjuns tema läggs på bordet som ett stöd för intervjun)



... utgå helt från dina erfarenheter ... här finns inget som är rätt eller fel.

... som du vet bandas intervjun... du kan när du vill be mig stoppa bandet... intervjun kommer att skrivas ut i kodad form... något du undrar innan?

### Intervjustöd med följdfrågor till patienter

Kan du utveckla lite mer ... Vad menar du ... har jag uppfattat dig rätt?

Frågeområden	Stödfrågor om det behövs
Berätta om hur det var när du fick ditt recept på fysisk aktivitet	Hur var det när du fick det recept ... det har gått långt tid sedan ... vad du kommer ihåg ... varför ... vad ordinerades du... hur kom frågan upp ... innehåll i samtalet ... tidsåtgång ... fick du recept i handen, information om var du kunde få stöd... uppföljning ... information om aktiviteter... annat?
Berätta om vad som underlättat respektive försvårat för dig att komma igång med fysisk aktivitet	Kan du utveckla lite mer vad som inverkat... receptet... stöd förskrivaren, receptmottagare eller andra inom hälso-och sjukvården ... stöd från familj, vänner andra utanför hälso- och sjukvården ... befintliga möjligheter till aktiviteter ... eget intresse ... hälsa/sjukdom ... vad började du med för typ av aktivitet ... något annat du tänker på...
Berätta vad som underlättat respektive försvårat för dig att vidmakthålla din aktivitet	Kan du utveckla lite mer vad som inverkat... receptet... stöd förskrivaren, receptmottagare eller andra inom hälso-och sjukvården ... stöd från familj, vänner andra utanför hälso- och sjukvården ... befintliga möjligheter till aktiviteter ... eget intresse ... hälsa/sjukdom ... vad gör du för typ av aktivitet idag... något annat du tänker på...
Hur ser du på nyttan med FaR ...	... för dig själv? ... för hälso- och sjukvårdens verksamhet?
Är det något annat du vill framföra som inte kommit fram ... några tankar som du har om arbetet med FaR och vad som behöver förbättras?	
Avslutar ... tack för din medverkan	

# PAPER I



## Article

# Physical Activity on Prescription with Counsellor Support: A 4-Year Registry-Based Study in Routine Health Care in Sweden

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**Abstract:** *Background:* Public health gains from physical activity on prescription (PAP) depend on uptake in routine care. We performed an evaluation of the implementation, in a Swedish county council, of counsellors who give personalized support to PAP recipients aimed at facilitating PAP delivery. The aim was to compare characteristics between PAP recipients and the health care population as well as between PAP recipients who used and did not use counsellor support. We also investigated professional belonging and health care setting of health care professionals who prescribed PAP. *Methods:* All patients'  $\geq 18$  years who received PAP during 2009–2012 in primary and secondary care in the County Council of Kronoberg were included ( $n = 4879$ ). Data were retrieved from electronic medical records. Main outcome measures were patient and professional characteristics. *Results:* A third of the PAP recipients had diseases in  $\geq 5$  diagnostic groups and more than half had  $\geq 11$  office visits the year before receiving PAP. Counsellor support was used by one-third and PAP recipients who used counsellor support had more multiple diagnoses and office visits compared with non-users. Physicians issued 44% of prescriptions and primary care was the predominant setting. The amount of PAP did not change over time, but the proportion of physicians' prescriptions decreased while the proportion of nurses' prescriptions increased. *Conclusions:* PAP recipients had high morbidity and were frequent health care attenders, indicating that PAP was predominantly used for secondary or tertiary prevention. PAP rates did not increase as intended after the implementation of counsellor support.

**Keywords:** physical activity prescription; implementation; counselling; primary care; secondary care

## 1. Background

Insufficient physical activity contributes considerably to premature mortality and is a risk factor for a broad range of non-communicable diseases, including cardiovascular diseases, cancer, diabetes, as well as musculoskeletal and mental health disorders [1,2]. Globally, one in four adults report physical activity below recommended levels, and the proportion is even higher in Sweden: one in three adults [3]. Hence, policies and interventions to achieve increased physical activity levels in the population are of utmost importance for public health [1,2].

The concept of physical activity on prescription (PAP) has been developed for health care services mainly to support patients in primary care who might benefit from increased physical activity [4–9]. The Swedish PAP concept (referred to as FaR in Sweden) was introduced in 2001 as a part of the national project “Sweden on the move” and is now used by all Swedish county councils (which are responsible for provision of health care in Sweden). The concept consists of patient-centred counselling, written prescription of individualized physical activity using the FYSS manual (the meaning of “FYSS” is Physical Activity in the Prevention and Treatment of Disease, English version) [10], collaboration with local organizations and follow-up assessments of the recipient’s physical activity [11]. The FYSS manual is an evidence-based handbook for health care professionals and it describes how physical activity can be used in prevention and treatment of several types of diseases and conditions. The PAP concept in Sweden is used in the prevention and treatment of diseases [10] with the aim to support the recipients to incorporate physical activity into their everyday life [11].

Several studies have demonstrated the effectiveness of PAP to achieve increased physical activity levels in adults at 6 [5,12], 12 [12,13], 16 [8] and 24 months’ follow-up [14]. However, public health gains are affected by the uptake of PAP in routine care. Study findings suggest that PAP concepts tend to reach relatively few patients, more female recipients than male and primarily patients over the age of 45 [6,15]. In a Swedish county council-based study in 2004–2005, Leijon et al. [6] found that PAP was delivered to less than 1.5% of all primary care patients in one year. In 2007–2010, the amount of PAP in Sweden doubled, although there was a large variation in prescriptions between county councils [16]. Harrison et al. [15] estimated that 4% of the sedentary adult residents in a primary care district in northwestern England received an exercise referral in 2000–2004.

Barriers for delivery of PAP in routine care include perceived time constraints [17–19], reservations about the effectiveness of PAP as a treatment or preventive intervention and the lack of clear routines concerning how to integrate PAP into regular practice [18]. A Swedish study found that simplifying routines of PAP delivery for primary care physicians prescription rates increased over two years (2006–2007) [20]. Multi-professional PAP concepts that involve physical activity counsellors who provide personalized support to PAP recipients to achieve increased physical activity have been proposed as a possible means to facilitate health care delivery of PAP [18,21]. Furthermore, the use of physical activity counsellors in primary care has been proposed as a possible means to raise the quality of physical activity counselling [21,22]. However, long-term evaluations of the reach and effectiveness of multi-professional PAP concepts in routine care are lacking and there are no studies covering both primary and secondary health care settings.

Addressing important knowledge gaps with regard to PAP delivery in routine health care, this study provides a registry-based long-term evaluation of a multi-professional PAP concept with counsellor support implemented in a Swedish county council. The aim was to investigate differences in characteristics between PAP recipients and the total health care population and between PAP recipients who used counsellor support and PAP recipients who did not use this support. The aim was also to investigate health care professionals who prescribe PAP in terms of professional belonging and health care setting. The use of medical record registry data allowed for analyses of previous morbidity in all PAP recipients, which has not been done in earlier routine health care studies of PAP delivery. Furthermore, data allowed for comparisons of characteristics between PAP recipients and the total health care population.

## 2. Methods

### 2.1. Study Design and Setting

This registry-based study involved patients who received PAP in routine primary and secondary care in the County Council of Kronoberg, a predominantly rural district in southern Sweden. Health care in Sweden is primarily publicly funded. All residents are insured by the state and have equal access to health care. Out-of-pocket fees are low and regulated by law.

Primary care in the County Council of Kronoberg consists of 22 public and 11 privately operated (publicly funded) units; secondary care is provided in two public hospitals. All primary and secondary care units have used the same electronic medical record system (Cambio Cosmic, Cambio Healthcare System AB, Linköping, Sweden) since 2005.

Since 2009, patients who receive PAP in the County Council of Kronoberg are offered counselling support by appointed physical activity counsellors. Patients who want this support can contact a counsellor; there is no formal referral system. The support is free of charge and can be utilized for one year after the PAP is issued. The counsellors are health care professionals, e.g., nurses and physiotherapists, who are trained in motivational interviewing counselling techniques [23]. An important rationale for implementing the concept was to reduce the clinical work load as a means of enabling higher numbers of prescriptions of physical activity.

## 2.2. Data Collection

All patients aged 18 years or older receiving PAP in primary or secondary care in the County Council of Kronoberg in 2009–2012 were identified via the electronic medical record system using specific registry codes. The only exception was PAP delivered in two privately operated primary care centres, which were not included because of lack of consent from the managers of the centres.

In total, 5864 prescriptions were registered. Of these, 985 prescriptions were excluded because they were repeated, duplicated or erroneously registered prescriptions, such as prescriptions in home care of the elderly. Only the first prescription of each PAP recipient during the study period was selected. This left 4879 PAP recipients to be included for analysis.

The characteristics of the PAP recipients were retrieved from the electronic medical record: sex, age and all registered diagnoses for the 12 months before PAP, the number of office visits (including visits to all professions in primary and secondary care), the number of secondary inpatient care occasions, PAP-prescribing profession and prescribing health care unit.

Several measures were used to capture morbidity: registered diagnoses, office visits (to primary and/or secondary care) and inpatient (secondary) care. Diagnostic groups have previously been used to describe morbidity among frequent health care attendees [24]. The European General Practice Research Network states that any combination of at least two diseases (acute or chronic) can be used as a definition of multi-morbidity [25].

Diagnoses were grouped according to the International Classification of Diseases (ICD) system version 10 [26]. Patients were categorized according to (a) having any diagnosis versus not having any diagnosis within each diagnostic group of diseases (yes/no), and (b) the number of diagnostic groups of diseases (0–2, 3–4,  $\geq 5$ ). The diagnostic groups pregnancy, childbirth/puerperium and factors influencing health status and contact with health services were excluded.

The total health care population in the County Council of Kronoberg in 2009 was used as a reference population for the PAP recipients in 2009. For the reference group, data on sex, age, diagnoses and inpatient care were retrieved using the same registry codes for capturing registry data as for the PAP recipients.

## 2.3. Statistical Analysis

Data are presented using numbers and proportions (%), means and standard deviation (SD), and median and 25th and 75th percentiles. Differences between groups were tested with the chi-squared test. A  $p$ -value  $\leq 0.05$  was regarded statistically significant. All statistical analyses regarding PAP recipients were performed with IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, NY, USA).

## 2.4. Ethical Considerations

The Regional Ethical Review Board in Linköping approved the project (Ref. No. 2013/51-31). The data were delivered in such a way that the patients and prescribers of PAP could not be identified by the researchers.

## 3. Results

### 3.1. Characteristics of PAP Recipients over Time

The 4879 adult patients who received a first PAP in primary or secondary care during 2009–2012 represents 3% of all primary and secondary care adult patients (186,117 patients) during these four years.

Approximately 60% of prescribed patients were female. The age group 45–64 years dominated (Table 1). The proportion of PAP recipients aged 65 years or older increased somewhat over time (from 26% to 33%). The mean age of the PAP recipients for the study period was 53.6 years (SD 16.1 years).

**Table 1.** Patients receiving PAP (Physical Activity on Prescription) in primary and secondary care and differences between years of prescription.

Patient Characteristics	Year				p-Value *
	2009	2010	2011	2012	
	n = 1148 % (n)	n = 1341 % (n)	n = 1242 % (n)	n = 1148 % (n)	
Sex					0.100
Female	58 (668)	63 (843)	60 (746)	62 (707)	
Male	42 (480)	37 (498)	40 (496)	38 (441)	
Age					≤0.001
18–29 years	9 (101)	9 (126)	11 (132)	11 (122)	
30–44 years	18 (209)	22 (296)	18 (221)	18 (207)	
45–64 years	48 (546)	43 (571)	43 (528)	39 (446)	
65+ years	25 (292)	26 (348)	29 (361)	33 (373)	
Diagnoses ** and health care consumption *** in the 12 months before PAP					
Musculoskeletal diseases (yes)	47 (541)	45 (602)	46 (573)	50 (574)	0.089
Endocrine diseases (yes)	52 (549)	41 (550)	38 (469)	37 (421)	≤0.001
Circulatory diseases (yes)	45 (510)	40 (529)	43 (538)	43 (497)	0.088
Mental health disorders (yes)	23 (265)	31 (412)	30 (370)	34 (391)	≤0.001
Respiratory diseases (yes)	24 (272)	26 (344)	24 (303)	27 (307)	0.298
Other diagnostic groups (yes)	76 (866)	77 (1027)	81 (999)	81 (921)	0.004
Number of diagnostic groups					0.034
0–2 diagnostic groups	35 (405)	34 (447)	33 (414)	31 (356)	
3–4 diagnostic groups	37 (425)	37 (493)	36 (442)	35 (396)	
≥5 diagnostic groups	28 (315)	29 (387)	29 (387)	34 (390)	
Number of office visits					0.054
0–5 office visits	22 (253)	23 (312)	25 (307)	27 (310)	
6–10 office visits	22 (250)	21 (282)	20 (247)	22 (255)	
≥11 office visits	56 (645)	56 (747)	55 (688)	51 (583)	
≥1 occasion of inpatient care (yes)	27 (310)	28 (376)	28 (352)	21 (245)	≤0.001

\* Tested by chi-squared test. \*\* 24 ICD- (International Classification of Diseases) 10 diagnostic groups of diseases assessed by the first coding character, i.e., letter, excluding O (pregnancy, childbirth and the puerperium) and Z (factors influencing health status and contact with health services). Analysis of patients with (yes) or without (no) assessed diagnostic group of diseases. \*\*\* Office visits in primary and secondary care, and inpatient somatic and/or psychiatric care. Inpatient care analysis includes patients with (yes) or without (no) inpatient care.



The most frequent diagnostic groups were musculoskeletal disease, circulatory disease, endocrine disease and mental health disorders (Table 1). The proportion with endocrine disease decreased from 52% in 2009 to 34% in 2012, whereas the proportion with mental health disorders increased from 23% in 2009 to 34% in 2012. The number of diagnostic groups per patient ranged from 0 to 16, with an average of 3.7 (SD 2.6). The proportion of patients with five or more diagnostic groups increased over the period, from 28% in 2009 to 34% in 2012.

During the year before PAP, more than half of the PAP recipients had 11 or more registered office visits to primary and/or secondary care and approximately 25% had been hospitalized (inpatient care) (Table 1).

Compared with the total health care population of the County Council of Kronoberg, a larger proportion of the PAP recipients were female and over 45 years old. The PAP recipients had almost twice the proportion of registered diagnoses for the majority of diagnostic groups. More PAP recipients had at least one occasion with inpatient (hospital) care, 27% compared with 14% for the total health care population (Table 2).

**Table 2.** Differences in characteristics between PAP recipients and the total health care population in 2009.

Patient Characteristics	PAP Recipients	Total Health Care Population	p-Value *
	n = 1148 % (n)	n = 121,869 % (n)	
Sex			0.027
Female	58 (668)	55 (66926)	
Male	42 (480)	45 (54943)	
Age			≤0.001
18–29 years	9 (101)	18 (22515)	
30–44 years	18 (209)	29 (35392)	
45–64 years	48 (546)	24 (29752)	
65+ years	25 (292)	28 (34210)	
Diagnostic groups **			
Musculoskeletal diseases (yes)	47 (541)	25 (30753)	≤0.001
Endocrine diseases (yes)	48 (549)	13 (15443)	≤0.001
Circulatory diseases (yes)	45 (510)	21 (26089)	≤0.001
Mental health disorder (yes)	23 (265)	11 (13464)	≤0.001
Respiratory diseases (yes)	24 (272)	18 (22372)	≤0.001
Other diagnostic groups (yes)	76 (866)	65 (79366)	≤0.001
Inpatient care ***			≤0.001
≥1 occasion of inpatient care	27 (310)	14 (2399)	

\* Tested by chi-squared test. \*\* 24 ICD-10 diagnostic groups of diseases assessed by the first coding character, i.e., letter, excluding O (pregnancy, childbirth and the puerperium) and Z (factors influencing health status and contact with health services). Analysis of patients with (yes) or without (no) assessed diagnostic group of diseases. PAP recipients' diagnoses were measured in the 12 months before PAP. \*\*\* Somatic and/or psychiatric inpatient care within a year before PAP. PAP recipients' inpatient care was measured in the 12 months before PAP. Analysis includes patients with (yes) or without (no) inpatient care.

### 3.2. Characteristics of PAP Recipients Using Counsellor Support

One-third of all PAP recipients (n = 1555; 32%) used support from a physical activity counsellor in the year after prescription (Table 3). PAP recipients using support compared with non-users were more often female and over 45 years of age. The support users more often had an endocrine diagnosis and a mental health disorder, and had higher frequency of multiple diagnoses (≥5 diagnostic groups

of diseases) and office visits ( $\geq 11$ ) compared with non-users. Prescriptions by physicians were more common among counsellor support users, but no difference according to health care setting was seen.

**Table 3.** Differences in characteristics between patients using versus not using counsellor support after receiving a PAP ( $n = 4879$ ).

Patient Characteristics	Counsellor Support		<i>p</i> -Value *
	Yes ( <i>n</i> = 1555) % ( <i>n</i> )	No ( <i>n</i> = 3324) % ( <i>n</i> )	
Sex			$\leq 0.001$
Female	66 (1024)	58 (1940)	
Male	34 (531)	42 (1384)	
Age			$\leq 0.001$
18–29 years	8 (125)	11 (356)	
30–44 years	20 (316)	19 (617)	
45–64 years	46 (712)	41 (1379)	
65+ years	26 (402)	29 (972)	
Diagnoses ** and health care consumption *** in the 12 months before PAP			
Musculoskeletal diseases (yes)	49 (749)	47 (1541)	0.221
Endocrine diseases (yes)	44 (683)	39 (1306)	0.002
Circulatory diseases (yes)	42 (645)	43 (1429)	0.337
Mental health disorder (yes)	31 (487)	29 (951)	0.050
Respiratory diseases (yes)	27 (409)	25 (817)	0.187
Other diagnostic groups (yes)	79 (1218)	79 (2595)	0.773
Number of diagnostic groups			0.011
0–2 diagnostic groups	29 (450)	34 (1102)	
3–4 diagnostic groups	37 (566)	36 (1190)	
$\geq 5$ diagnostic groups	33 (509)	30 (965)	
Number of office visits			0.002
1–5 office visits	23 (354)	25 (828)	
6–10 office visits	19 (295)	22 (739)	
$\geq 11$ office visits	58 (906)	53 (1757)	
$\geq 1$ occasion of inpatient care	25 (389)	27 (893)	0.171
Prescribing professional			$\leq 0.001$
Physician	49 (767)	41 (1356)	
Nurse	23 (357)	28 (935)	
Physiotherapist	19 (295)	24 (799)	
Other professionals ****	9 (136)	7 (234)	
Prescribing setting			0.082
Primary care	70 (1093)	70 (2345)	
Secondary somatic care	25 (392)	24 (783)	
Secondary psychiatric care	5 (70)	6 (196)	

\* Tested by chi-squared test. \*\* 24 ICD-10 diagnostic groups of diseases assessed by the first coding character, i.e., letter, excluding O (pregnancy, childbirth and the puerperium) and Z (factors influencing health status and contact with health services). Analysis of patients with (yes) or without (no) assessed diagnostic group of diseases. \*\*\* Office visits in primary and secondary care, and inpatient somatic and/or psychiatric care. Inpatient care analysis includes patients with (yes) or without (no) inpatient care. \*\*\*\* Psychologists, behavioural therapists, midwives, dieticians and occupational therapists.

### 3.3. PAP Delivery by Health Care Professional and Setting over Time

The total number of prescriptions increased by 20% from 2009 to 2010, but, in the fourth year, 2012, the number of prescribed patients was the same as in 2009 (Table 4). Physicians prescribed the largest

proportion of PAPs, but with a decreasing proportion over the years (from 49% to 39%). In contrast, the proportion of nurses prescribing PAP increased from 22% to 30%. Physiotherapists prescribed about one-fourth of the PAP recipients in all four years. The individual variation of prescriptions was large, ranging from 1 to 135 prescriptions per prescriber (median 19, —25th to 75th percentiles (9–37)). Primary care was the dominant setting with 64% to 75% of the prescriptions.

**Table 4.** PAP delivery by health care professional and setting over time ( $n = 4879$ ).

Professional Groups and Health Care Setting	Year of Prescription				<i>p</i> -Value *
	2009 <i>n</i> = 1148 % ( <i>n</i> )	2010 <i>n</i> = 1341 % ( <i>n</i> )	2011 <i>n</i> = 1242 % ( <i>n</i> )	2012 <i>n</i> = 1148 % ( <i>n</i> )	
Professional group					≤0.001
Physician	49 (566)	47 (626)	39 (483)	39 (448)	
Nurse	22 (253)	24 (322)	30 (374)	30 (343)	
Physiotherapist	22 (254)	21 (280)	23 (286)	24 (274)	
Other professionals **	7 (75)	8 (113)	8 (99)	7 (83)	
Health care setting					≤0.001
Primary care	74 (850)	70 (941)	64 (791)	75 (856)	
Secondary somatic care	24 (277)	23 (308)	31 (391)	17 (199)	
Secondary psychiatric care	2 (21)	7(92)	5 (60)	8 (93)	

\* Tested by chi-squared test. \*\* Psychologists, behavioural therapists, midwives, dieticians, occupational therapists.

#### 4. Discussion

This registry-based study investigated the characteristics of patients who received PAP and the health care professionals who issued these prescriptions in a multi-professional PAP concept with counselling support. The concept was implemented in primary and secondary care in a county council in Sweden and was studied over four years. We found higher prevalence of morbidity in terms of more diagnoses and more inpatient care among PAP recipients compared with a reference population of all patients visiting health care. Morbidity was even higher among PAP recipients who used support by PAP counsellors compared to non-users. Slightly more than half of prescriptions were by professionals other than physicians and about one-quarter were prescribed in secondary care.

All information in this registry-based study was based on data captured in electronic medical records from primary and secondary care. The very high coverage of data (almost 100%) and the length of the study period are strengths of the study. The four-year study period ensured that the results were not only an effect of enthusiasm about a new organisational structure for PAP. However, medical records are structured for use in clinical care, which means that there might be quality problems when using these data for research purposes [27]. To ensure completeness, validity, consistency and accuracy of the data, the researchers had an ongoing dialogue with health care professionals familiar with registration of codes, data analysts familiar with how to capture the specific data codes and with quality control of the county councils' health care data, and with statisticians with experience of using health care data.

External validity, i.e., generalizability, of the study findings to other settings is somewhat restricted. Aside from sex and age, we have limited information about the PAP recipients that could facilitate comparisons between PAP populations, e.g., socio-economic variables, reason for receiving PAP, PAP recipients' level of physical activity and motivation. Generalizability may also be restricted due to different strategies used by health care organisations to support uptake of PAP in routine care, e.g., strategies involving pay for performance of PAP, and different organisational structures for PAP delivery. On the other hand, external validity is enhanced by the fact that the study was conducted in routine care. Unlike most routine care PAP studies, the study allowed for analyses of long-term real-life health care delivery of PAP in an unselected total health care population with no selection bias.

Data were collected in a way that did not require effort or even awareness of the study by the health care professionals and PAP recipients.

Furthermore, it is difficult to determine the extent to which the patients in our study differ from PAP recipients in other PAP studies with regard to morbidity because previous studies have not investigated prevalence of morbidity in terms of medical diagnoses among PAP recipients in health care populations. The high prevalence of morbidity among the PAP recipients in this study suggests that the PAP concept was predominantly applied as a secondary or tertiary preventive strategy, i.e., aimed at reducing the impact of a diagnosed disease or softening the impact of an ongoing illness [28]. The benefit of physical activity has been demonstrated in both primary (i.e., no evidence of disease) and secondary prevention [10]. However, our findings indicate that PAP is not viewed as a primary prevention strategy by the health care professionals, who instead predominantly prescribed physical activity to patients with a broad range of diseases.

The uptake of PAP in the total health care population was found to be broadly similar to what has been reported from previous population-based primary health care studies [6,15]. One-third of the PAP recipients used counsellor support. The reasons why the PAP recipients sought or did not seek counsellor support were not investigated. It is difficult to determine whether the use by one-third was a small or large proportion since there are no comparative studies. Still, the proportion of users of counsellor support was lower than expected among the health care practitioners who were involved in implementing the concept. The patients' reasons for choosing to use, or not to use, this support will be investigated in a forthcoming study. Our findings of an association between morbidity and use of counsellor support are in line with results from a recently published study of PAP recipients with chronic musculoskeletal pain, which found that they experienced obstacles to increasing their physical activity and needed individually tailored information and support when prescribed physical activity [21].

Two-thirds of the prescriptions were issued by physicians and nurses, which is in line with a previous Swedish primary care study of PAP [6]. Persson et al. [20] found that simplified routines increased the physicians' prescription rate over two years. In our study, in line with Leijon et al. [6], we found decreasing proportion of PAP by physicians over time. This finding suggests that the physicians' interest or enthusiasm for the PAP concept declined over time. Physicians in Sweden have expressed some scepticism about the practice of issuing PAP [18]. Other studies have noted that physicians feel confident in providing advice about physical activity [29], but a Canadian study [7] observed that physicians were more likely to provide verbal counselling on physical activity than use PAP.

Despite the expressed ambition to achieve higher PAP rates by means of the multi-professional concept with counselling support, the prescription rates for 2012 were similar to those for 2009. However, the rates could have been even lower without the concept. Our study did not investigate the reasons for decreasing rates of prescription over time, but implementation research has shown that adoption or uptake of new practices in routine health care is influenced by a combination of several interdependent factors. These factors include the characteristics of the practices (e.g., perceived complexity and compatibility with existing routines), the health care professionals (e.g., their attitudes, beliefs, motivation and self-efficacy concerning the new practice), strategies used to facilitate the implementation and the context of the implementation [30]. Numerous factors associated with the wider context may have influenced our results. A trend towards increasing the amount of PAP in Sweden has been seen at the national level [16]. The studied PAP concept was new and it is possible that the strategies used to enhance implementation in 2009–2010, e.g., information and education targeting health care professionals, contributed to increased prescription in the initial years. However, no comparative data at the national level exist for 2011 and 2012. In 2011, the Swedish National Board of Health and Welfare introduced guidelines for disease prevention, which included recommendations for management of insufficient levels of physical activity. The effects of these guidelines on prescription rates have not been studied.

While the aim of the counsellor support was to reduce the clinical workload as a means of enabling higher numbers of prescriptions of physical activity, overall PAP rates did not increase as intended. However, it is not possible to determine how the rates would have developed without the implementation of the concept. Qualitative studies are warranted to explore some of the unanswered “why” questions of quantitative PAP research.

## 5. Conclusions

In this four-year registry-based study of a multi-professional PAP concept with counsellor support implemented in a Swedish county council, we found that PAP recipients had high morbidity and were frequent attenders in health care. Counsellor support was used by approximately one-third of all PAP recipients, and morbidity was even higher in this group. The PAP concept therefore seems predominantly to have been used as a secondary or tertiary prevention strategy. The overall prescription rate was similar to prescription rates found in other PAP studies.

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**Conflicts of Interest:** The authors declare no conflict of interest.

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## PAPER II




RESEARCH ARTICLE

Open Access

# Patients' experiences of physical activity on prescription with access to counsellors in routine care: a qualitative study in Sweden



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## Abstract

**Background:** Physical activity on prescription (PAP) has been implemented in several countries, including Sweden, to support patients who might benefit from increased physical activity. This study explores the experiences of recipients of PAP in routine health care in Sweden that offers the recipients support from physical activity counsellors. The aim was to explore influences on engagement in physical activity by PAP recipients' from a long-term perspective.

**Methods:** We conducted individual semi-structured interviews using a topic guide with a purposively selected sample of 13 adult PAP recipients 1.5 to 2.5 years after PAP. Interviews were recorded, transcribed verbatim and analysed through inductive and deductive content analysis. The questions were informed by Capability-Opportunity-Motivation-Behaviour (COM-B), which was also used as a framework to analyse the data by means of categorizing the factors (influences on the behaviour).

**Results:** Ten factors (i.e. sub-categories) that influenced the participants' engagement in physical activity were identified. PAP recipients' capability to engage in physical activity was associated with adapting the PAP to the individual's physical capacity and taking into account the individual's previous experiences of physical activity. PAP recipients' opportunity to engage in physical activity was related to receiving a prescription, receiving professional counselling and follow-up from a physical activity counsellor, collaboration between prescriber and counsellor, having access to appropriate activities, having a balanced life situation and having support from someone who encouraged continued physical activity. PAP recipients' motivation to engage in physical activity was associated with the desire to improve his or her health condition and finding activities that encouraged continuation.

**Conclusions:** PAP recipients' engagement in physical activity was influenced by their capability, opportunity and motivation to undertake this behaviour. Numerous extraneous factors influence capability and motivation. Physical activity counsellors were found to be important for sustained activity because they use an individual approach to counselling and flexible follow-up adapted to each individual's need of support.

**Keywords:** Qualitative research, Physical activity, Health care, Patients, Counselling

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## Background

There is convincing evidence supporting the role of physical activity in the prevention and treatment of non-communicable diseases. Globally, one in four adults report physical activity below recommended levels, and the proportion is even higher in Sweden: one in three adults [1]. Numerous barriers have been identified for adult participation in physical activity, such as lack of social support [2, 3], insufficient motivation and unfavourable health status [4–6]. Physical activity on prescription (PAP) in routine health care has been implemented in several countries, including Sweden, to support patients who might benefit from increased physical activity [7]. These programmes vary with regard to design, e.g. programme duration, reason for prescription and patient payments. Varying degrees of effectiveness in influencing patients' physical activity have been observed [7]. It is important that PAP programmes enhance recipients' self-efficacy to participate in physical activity [8] and address barriers to participation [9, 10].

The Swedish PAP concept (FaR\*) consists of motivational person-centred counselling, along with individualized written prescriptions of home-based activities (e.g. walking) and/or facility-based activities in local sports organizations and follow-up by health care professionals [11]. Some health care organizations in Sweden have implemented multi-professional programmes for delivery of PAP in routine health care involving physical activity counsellors [11]. Such programmes have been proposed as a possible means to facilitate delivery of PAP in routine health care and to improve the effectiveness of PAP to increase patients' physical activity levels [4, 12].

The Swedish PAP concept has been favourably evaluated in terms of the effect on patients' change in physical activity levels and quality of life [13–15], adherence to prescription [16, 17] and the characteristics of prescribed patients and prescribers [18]. Further, experiences of PAP among patients with chronic musculoskeletal pain have been described [4]. However, the concept has not been investigated from a patient perspective to gain an understanding of how routine health care delivery of PAP and counsellor support may influence the recipients' beliefs, attitudes and motivation to achieve increased physical activity. In general, there is a paucity of qualitative research on routine health care delivery of PAP from the patient perspective, including programmes that include access to counsellor support. Such research could potentially yield important insights into PAP recipients' paths to behaviour change, i.e. increased physical activity. This knowledge is highly relevant for the development of improved PAP programmes. To address this gap in research on PAP, this study investigates the experiences of PAP recipients in a routine health care PAP programme in Sweden that offers the recipients

support from physical activity counsellors. The aim was to explore influences on PAP recipients' engagement in physical activity from a long-term perspective.

## Methods

### Study design

A qualitative explorative design was used, operationalized through individual semi-structured interviews with a purposively selected sample of PAP recipients. A combination of conventional (inductive) and directed (deductive) approaches to qualitative content analysis was used [19, 20].

### Study setting

Interviews were conducted with PAP recipients living in the County of Kronoberg, a small rural county in the southern part of Sweden, with approximately 190,000 inhabitants. The health care organization in this county is managed by the County Council of Kronoberg and consists of 22 public and 11 privately operated primary health care centres (all publicly funded) and secondary care provided in two public hospitals.

The Swedish welfare system is largely funded by taxes and provides equal access to health care for everyone, with elderly care and social services based on each person's need for support. The system is characterized by shared welfare responsibility between 21 county councils and 290 municipalities. County councils provide primary and secondary health care, whereas municipalities are responsible for social services and providing health care for older people living at home or in nursing homes.

In 2009–2010, the County Council of Kronoberg implemented a multi-professional programme for health care delivery of PAP in both primary and secondary care. The PAP programme features the key elements of the Swedish PAP concept [11]. The prescriptions are issued by licensed health care professionals, e.g. physicians, nurses and psychologists, during routine health care visits. In conjunction with issuing the PAP, the prescriber provides written information about the physical activity counsellors. There is no formal referral system arranged between prescribers and counsellors. PAP recipients who want this support contact a counsellor by e-mail or phone. This counselling support is free of charge and can be utilized for 1 year after the PAP is issued. The counsellors are licensed health care professionals (registered nurses and physiotherapists) who are trained in motivational interviewing (MI) counselling techniques. They are familiar with local facility-based activities. Any fees associated with participation in activities are paid for by the PAP recipients.

### Participants and recruitment

The participants in this study were purposively selected from PAP recipients in routine care between June 2013

and June 2014. The sample was selected to represent various age groups (18–29, 30–44, 45–64 and 65+ years), sex and municipality, prescribing health care setting and unit, and use of counsellor support (users and non-users). Criteria for participation were Swedish-speaking, willingness to share experiences with the researcher and having received a PAP 1.5–2.5 years earlier.

In total, 75 recipients were invited, 68 by postal invitation and 7 by telephone. Telephone invitations were used with the aim of reaching a younger and more geographically diverse sample. All participants received both written and verbal information about the study. A heterogeneous sample of 13 of the 75 invited recipients agreed to participate (Table 1).

# Data collection

Data were collected from April 2015 to January 2017. A semi-structured interview guide was developed by the researchers in order to give the interviewees the opportunity and freedom to express their individual views on their engagement in physical activity. All questions were generated by the researchers informed by previous research about PAP and barriers and facilitators to physical activity behaviour.

The interview guide consisted of four main areas of questions: prescription and counselling; start of activity; maintenance of activity; and perceived benefits of PAP (see Additional file 1). A picture showing the topics was visible to the participant and the interviewer during the interviews. The interviews started with a key question

for each main area followed by supplementary questions when necessary. Descriptive questions were used [21], such as “Could you tell me about the consultation when you received PAP” followed by probing questions, e.g. “Can you explain a little further?”, and/or clarifying questions, e.g. “What advice did you receive from the prescriber?” At the end of each interview, the interviewer asked if there was anything that had not been elucidated.

The interview guide was tested in one interview to determine whether the questions were suitable for obtaining rich answers. The questions were found to be clear and informative. Consequently, no revision of the interview guide was done and the test interview was included in the analysis.

All interviews were conducted by the first author (PA), either in the participant’s home or another location selected by the interviewee. A maximum of 60 min was allocated for each interview. The interviews were recorded and transcribed verbatim, mainly by the interviewer (PA). Two were transcribed by an assistant. PA listened and read through the first version of all transcriptions and made corrections where necessary.

# Theoretical framework

The interview questions were informed by the theoretical framework Capability-Opportunity-Motivation-Behaviour (COM-B) [22]. COM-B was also used as a framework to analyse the data by means of categorizing the factors (influences on the behaviour) into the three behaviour change determinants, i.e. Capability-Opportunity-Motivation, in the deductive analysis.

The COM-B framework was developed with reference to existing theories of behaviour and a US consensus meeting of behavioural theorists, which considered the prerequisites for enacting various behaviours [22]. The framework is intended to be comprehensive, parsimonious and applicable to all behaviours. COM-B has been widely applied to many different types of behaviours, including studies of audiologists’ behavioural planning [23], adherence to swallowing exercise [24] and promoters and barriers to being vaccinated and taking antiviral drugs [25].

Capability is defined in COM-B as an individual’s psychological and physical capacity to engage in the behaviour concerned, encompassing having the necessary knowledge, ability and skills. Opportunity is defined as all the factors that lie outside the individuals that make the behaviour possible or prompt it. Motivation or willingness to enact behaviour is defined as all those brain processes that energize and direct individuals’ behaviour. Motivation includes habitual processes, emotional responding, as well as conscious, deliberate decision making [22]. Behaviour in this study was defined as

**Table 1** Characteristics of the PAP recipients who were interviewed

Characteristic	Number (N = 13)
Sex	
Female	9
Male	4
Age	
30–44 years	1
45–64 years	3
65+	9
Prescribing setting	
Primary care	11
Secondary care	2
Visits to PAP counsellor	
Yes	6
No	7
Number of inhabitants in the municipality of residence	
< 15,000	3
15,000–30,000	5
> 80,000	5

undertaking and maintaining some form of physical activity.

### Data analysis

The analysis was grounded in qualitative content analysis according to Krippendorff [20]. The interview transcripts were read through several times by PA and LL to obtain a sense of the whole. The text was then divided into meaning units (paragraphs) in relation to the aim (by PA and LL). The meaning units were condensed, with the purpose of reducing the text, but still preserving the core. The meaning units were then abstracted and labelled with a code. The codes were compared based on differences and similarities, and sorted into sub-categories, structured according to the predefined categories, i.e. the determinants in COM-B (by PA, LL and PN).

In the next step, the highlighted text was read, coded and categorized separately by PA, LL and PN. The text was analysed individually by the three authors to ensure credibility, using a structured process to code and categorize the data according to the COM-B framework. Then, the authors discussed the interpretation of the data in relation to COM-B and compared their coding. Discussions in the group continued until no inconsistencies existed and a shared understanding was reached to prevent researcher bias and strengthen the internal validity [26].

Representative quotations were identified to report the findings. Quotations were then translated from Swedish to English by PA and an assistant (native Swedish speaker and with good competence in verbal and written English), and thereafter controlled by PA and LL.

### Results

Analysis of the data yielded ten factors (i.e. sub-categories) that influenced the participants' engagement in physical activity. They were mapped onto the three overarching categories of the COM-B framework. In the following, the results are presented in accordance with COM-B.

#### Capability to engage in physical activity

PAP recipients' capability to engage in physical activity was associated with adapting the PAP to the individual's physical capacity and taking into account the individual's previous experiences of physical activity.

#### Tailoring the PAP to the individual's physical capacity

It was important that the prescribed activities were tailored to the PAP recipient's physical capacity. This capacity varied among the interviewees and was influenced by factors such as age, level of previous physical activity and health status, e.g. the type, severity and number of

diseases. Trying out different activities provided a means to find an appropriate physical activity.

I should exercise my knees and hips just to keep them smooth, so that I could avoid surgery. If they stay like this there will be no surgery. I have no pain if I do not overwork. Female  $\geq 65$  years (4).

I went on Easyline [a specific activity] once, but it was way too hard for me. But then a softer class started; that one was not so hard, so I joined that class. Female  $\geq 65$  years (3).

If a prescribed activity was found to be ineffective in achieving desired outcomes, the interviewees emphasized that a change of activity was needed even if this meant that the new activity might be less appealing to them. Switching to another activity might also be prompted by a change in the health condition.

The prescription was that I should walk four to five times a week, I think, and then two to three exercise classes a week. But then my blood pressure was too high so my counsellor didn't dare to advise me to join these classes, but I could start walking and doing water exercise as I always have. I'm glad my body responded so well to the activity, so that I did not have to go to a gym. Of course, I would have done that if I needed to. Female  $\geq 65$  years (5).

#### Accounting for the individual's experiences of physical activity

Previous negative experiences of physical activity, e.g. experiences of exclusion from school sports activities, contributed to a degree of resistance to physical activity in general and/or to participation in specific activities.

If it had been just an ordinary sports club, I probably would not have joined it, because I never liked gymnastics. I belong to the category that was always chosen last in school; no one wanted me on their team. Female  $\geq 65$  years (4).

I don't like water exercise because there are a lot of people, but then I started with Easyline, which is also a group activity. I think it's OK but I like to do my own moves. Female  $\geq 65$  years (3).

Positive experiences of the prescribed activity were important for engagement and maintenance. Interviewees talked about the importance of having fun while undertaking the physical activity, with some expressing a fondness for group activities because they allowed for

socializing. The feeling of not being comfortable in an activity or a group hindered further physical activity.

They really did not have much to offer except swimming. There were just females when I got there, it was nice, but it felt strange. I don't like water exercise and things like that. Male  $\geq 65$  years (10).

If you don't think it's fun, you postpone it. I've been involved in Friskis and Svettis [a popular Swedish training organization] but, no, I didn't like it either. I've access to a gym, where I can train as much as I want, but I don't do it either. Female  $\geq 65$  years (13).

Having previous experience of the benefits of physical activity contributed to maintaining physical activity. In contrast, having knowledge or recognizing the importance or advantages of physical activity, but lacking first-hand experience, did not seem to facilitate PAP recipients' engagement or sustainability.

You know the importance of exercise, I have the knowledge. If I didn't have the knowledge, maybe I could have been more curious. I have to admit I didn't prioritize it [physical activity], but I would need to. Female 45–64 years (12).

### Opportunity to engage in physical activity

PAP recipients' opportunity to engage in physical activity was related to receiving a prescription, receiving professional counselling and follow-up from a physical activity counsellor, collaboration between prescriber and counsellor, having access to appropriate activities, having a balanced life situation and having support from someone who can encourage continued physical activity.

### Receiving a prescription

PAP was seen as something to be taken seriously by the interviewees. Receiving a prescription for physical activity was perceived as more important for carrying out the activity than merely talking about or answering questions about one's physical activity without a PAP. On the other hand, the written prescription in itself seemed to have only a symbolic value, as few interviewees remembered whether they had actually received a prescription on paper or not. Some interviewees had changed their physical activity over time, which meant that a paper prescription received in health care no longer applied.

When I got it on prescription, it became a little more serious. Now I have this prescription. It's just like medicine, the doctor prescribes a pill a day, instead

the doctor prescribed water exercise once a week and then you have to go. Female  $\geq 65$  years (4).

I think it's good, it's important with physical activity. But I think it takes more than this prescription. I think you need to be motivated as well, but it's always good to have support. Male, 30–44 years (11).

### Receiving professional counselling and follow-up from a physical activity counsellor

All interviewees expressed that receiving counselling and follow-up were important aspects of PAP. The six interviewees who had visited a PAP counsellor expressed a great deal of confidence in the physical activity counsellors' professional competence. Several of those interviewed were eager to increase their physical activity, but few believed they could not achieve this entirely on their own. Being followed up by a counsellor was deemed important for continuing a prescribed physical activity.

Some people tell you what you should do and that's a negative thing. In this case it was never like that; if you had not done what you were expected to, we tried to find another way to do it. I think it's very important that the personal chemistry is right, and it was. Female  $\geq 65$  years (13).

The duration of support varied from a couple of months to more than a year. Not having a pre-determined schedule of support facilitated change of physical activity, and even sustained activity.

[Concerning the counsellor visits:] I was there for more than a year; it was me who wanted to see her more. Male 45–64 years (1).

Dialogue with a counsellor made it easier to find a suitable physical activity that matched the PAP recipients' interests, health condition and financial capacity. The counsellors' knowledge about local activities was appreciated by the interviewees. Interviewees who visited a PAP counsellor received information about locally organized activities, which they often did not know about themselves. Interviewees who did not visit a counsellor often lacked information about the range of available activities.

It was the counsellor who came up with some suggestions for activities and then some estimates about how much it would cost. I choose Medley [a physical activity organization] because they had swimming and other activities that you could combine. Male, 45–64 years (1).

Ordinary table tennis and that kind of stuff is fun. You meet people and there may be some competitions and stuff like that. It's fun, but I don't know if there are things like that. Male ≥65 years (10).

The counsellors also introduced the PAP recipients to tools such as mobile apps, training diaries and pedometers, which were helpful for some and were mostly used periodically.

For a while I tried to use the App that the counsellor had, and for a while I tried to write down what I ate. So I was very careful for a while, but it was too advanced and took too long. Female, 45–64 years (9).

#### **Collaboration between prescriber and counsellor**

Most of the interviewees perceived that it was difficult to make the first contact with a counsellor because this was a new function that was unknown for them. One reason for not seeking support was that the interviewees trusted in their own ability to change their activity; a high level of trust in their own ability contributed to not seeking counsellor support.

It was a bit difficult to make the first contact, because I had not recognized that there was a problem. Female ≥65 years (2).

When I accepted this offer, the nurse contacted the counsellor and then she [the counsellor] contacted me. Otherwise it's easy to pass. Female ≥65 years (13).

The way the prescriber informed or introduced the recipients to the availability of the PAP counsellors influenced whether they used this support or not. The interviewees were of the opinion that the prescriber had to actively promote the use of counsellor support. Receiving a written leaflet was not enough to seek counsellor support.

At that time I didn't have the power to get out. It would have had more effect if someone had called, I have to admit. Female 45–64 years (12).

I just received a paper and then I put it away; then we went down to the summer house and it petered out.. Nothing came of it. Male ≥65 years (7).

Interviewees argued that health care professionals who prescribe physical activity without following up with questions about how it went show a lack of interest in PAP, which could reduce the likelihood of sustained physical activity. In my case, it was me who had to take

the initiative completely. It feels like they write a prescription and then they do not bother anymore. Female ≥65 years (2).

[Concerning follow-ups by the prescriber:] It didn't work out so well, to be honest. Male ≥65 years (10).

#### **Having access to appropriate activities**

Proximity to nature allowed PAP recipients to engage in home-based activities such as cycling, walking and Nordic walking. Several of the interviewees appreciated outdoor activities, because they enjoyed seasonal fluctuations in nature, and the animal and bird life.

I can choose where I want to go for a walk and I usually go in the forest. I enjoy seeing how the seasons change. Female ≥65 years (5).

There is nothing more delightful than going for a walk and listening to the birds. Female ≥65 years (4).

Seasonal variations influenced interviewees' engagement in and choice of physical activity. For most of the interviewees, indoor activities were most common from September to April, whereas outdoor activities were more likely during the spring and summer months. Several of the interviewees did not want to be dependent on fixed times for organized activities during the spring and summer, preferring to be more active on their own during this time. Most organized group activities take a break during Christmas and New Year as well as during the summer. Some interviewees found it hard to resume the activity after a break, as the habit was interrupted.

I don't like to go the indoor swimming pool when it's spring and summer. In the summer, I do more outdoors activities. Female ≥65 years (5).

Well, in the summer, you don't get away so it drops. Female 45–64 years (9).

To go to the gym was inconceivable for some if they did not receive personalized support. Some of the interviewees who were unaccustomed to training in a gym emphasized the importance of receiving a demonstration of the machines and equipment as well as having a personal training programme put together by a gym instructor.

I got help from a personal trainer who gave me some extra exercises, if I remember correctly. It was at the gym I started. Male 30–44 years (11).



[Attending a gym without personal instruction:] No, I don't think you would know where to start, or which machines to use. Male  $\geq 65$  years (8).

Some interviewees preferred group activities that were exclusive to PAP recipients, with the prescription being the admission ticket. Prolonged participation in these activities required a new PAP.

As long it's a group for people with physical activity prescription who have the same problem. To go to activity centres where most people are fit does not feel good for someone who is very out of shape as I am. Female 45–64 years (12).

When talking to people, you realize that you are better off than some others. Female  $\geq 65$  years (4).

#### Having a balanced life situation

Having a life situation whereby work and leisure time are balanced made it easier to engage in physical activity, according to the interviewees. They perceived a heavy workload and other factors that complicated the "life puzzle" as barriers to pursuing sustained physical activity. Receiving a PAP at a time when one's leisure time was limited made it difficult to prioritize physical activity.

I slowed down and started a new job. I felt that I had more spare time. I could find the time because I have a pretty flexible job. But I changed my job, with more responsibility, so it has become more difficult. Male, 30–44 years (11).

#### Having support and someone who can encourage continued physical activity

The interviewees believed it was important to have someone who could actively "push" them to adhere to their physical activity over time, especially when it was tough. The PAP counsellor was such a person. Family members, not least the spouse, were also described as important persons for continued physical activity. Some interviewees experienced the social support given in group-based activities as important.

Socially I have gained more contacts and met equals. I can give some good advice to others and then feel pleased with myself. Female  $\geq 65$  years (4).

We push each other a bit, the wife and me, to do this. Male  $\geq 65$  years (8).

#### Motivation to engage in physical activity

PAP recipients' motivation to engage in physical activity was associated with the individual's own desire to improve his or her health condition and finding activities that encouraged continuation.

#### The individual's own desire to improve his or her health condition

Positive health outcomes from the physical activity were a motivational factor for all the interviewees. Achieving and experiencing various positive results were seen as highly rewarding, functioning as a strong motivator for continued activity. The PAP counsellor was described as a supportive function, which was motivational.

It feels like a reward when you go to the counsellor and see that your blood pressure is lower. Then I have one more thing that triggers me; it is an App called Run Keeper, which makes me compete against myself. Female  $\geq 65$  years (5).

When you have lived with pain for a year and then it starts to disappear. It was the biggest, coolest thing. Male, 30–44 years (11).

Engaging in physical activity to avoid disease and premature death was also a motivational factor for some of the interviewees.

Actually, it was my doctor who shocked me when my blood pressure was too high and she told me that we have to do something, you should not die now. It was drastic, but it made me react. This is serious, you have to do something, and therefore I have been very motivated. Female  $\geq 65$  years (5).

I have two older siblings who have diabetes, and I don't want to have diabetes. I had a brother who died unexpectedly. I think his blood pressure was high. It makes you think. Then I got high blood pressure myself. Female  $\geq 65$  years (9).

#### Finding activities that encourage continuation

Activities that were perceived to be stimulating or fun motivated the interviewees to sustain physical activity over a longer period of time. Some of the interviewees found this in activities that enabled them to socialize with others. In contrast, an activity perceived as not fun was a barrier for continued activity.

[Motivation for continued activity:] I think it's fun, and we are a group; we meet once in a while. Female  $\geq 65$  years (3).

[Motivation for continued activity:] There were two machines at the gym or something like that, and it was not fun, so I paid for three months, but I think I was not there more than three times. Female  $\geq 65$  years (6).

## Discussion

This study investigated influences on PAP recipients' engagement in physical activity. Analysis of the interview data yielded ten factors that were perceived to influence the interviewees' engagement in physical activity in the 1.5–2.5 years after receiving the prescription. The factors were mapped onto COM-B; a framework that posits that behaviour (such as engaging in physical activity) depends on the capability, opportunity and motivation to undertake this behaviour. The three determinants of COM-B interact to influence behaviour, which in turn influences these components [22]. COM-B was found to be useful to categorize factors found to influence physical activity.

Two of the factors concerned the PAP recipients' capability to engage in physical activity: tailoring the PAP to the individual's physical capacity and accounting for the individual's earlier experiences of physical activity. These factors underscore the importance of adapting the physical activity to each PAP recipient's physical and psychological capacity. An individual prescription of physical activity is considered one of the key components in the Swedish PAP concept [5], and our findings lend credence to the importance of accounting for the individual characteristics of the recipients.

The PAP recipients' previous experiences of physical activity seemed to influence their initiation of activity, whereas experiences during the activity period were important for sustained activity. We found that the existence of diseases influenced the PAP recipients' capability to engage in physical activity, which is in accordance with previous research in which diseases were associated with fear and avoidance of activity [6, 27, 28]. Diseases or bodily symptoms have been found to negatively influence the self-efficacy of PAP recipients, i.e. belief in one's capability to complete tasks and reach goals in becoming more physically active [29]. Matching the activity with the individual's capacity and experience can be expected to enhance the individual's self-efficacy with regard to physical activity [30]. Mastery of experiences, i.e. previous successful performance of physical activity, is an important factor determining a person's self-efficacy, and a higher level of self-efficacy can be achieved by means of feedback on past performance [31].

Six of the ten factors influencing the PAP recipients' physical activity were attributed to opportunity to engage in physical activity, which in COM-B refers to extraneous factors that enable or bring about behaviour.

Receiving professional counselling and follow-up from a physical activity counsellor as well as having support and someone who can "push" for continued physical activity were considered important. The importance of social influences on behaviours is highlighted in many social cognitive theories on behaviour change. For example, Social Cognitive Theory [30] assumes that an individual's behaviours are influenced by the actions that the individual has observed in others. This was evident in our study. We found that PAP recipients believed that they were influenced by being "observed" by others, most importantly the counsellors and spouses. A previous study found that spousal support for physical activity was perceived to be important for regular exercise but shared participation in physical activity was uncommon; regular exercise appeared to be largely individual and independent of others [32].

Our findings point to the importance of PAP counsellors in supporting the PAP recipients to find an appropriate physical activity and achieving sustainability of the activity over time. This is in line with previous studies of multi-professional PAP programmes, which have suggested that physical activity counsellors enhance physical activity in prescribed patients [4, 33–35]. In this study, we found that the prescribers appeared to be the deciding factor for PAP recipients to seek counsellor support because they informed the patient about the option to receive counsellor support or referred directly to a counsellor. The flexibility in the duration of counsellor support found in our study seemed to support sustained physical activity for the PAP recipients. Counsellor visits were offered based on each recipient's personal needs, and some PAP recipients seemed to require support for more than a year after the prescription. To our knowledge, this has not been described in previous studies of PAP from the patient perspective. There is no "one-size-fits-all" programme for PAP, a finding that is supported by other PAP studies from the patient perspective [9, 29, 36–38].

Two of the factors influencing the PAP recipients' physical activity were related to their motivation: the desire to improve his or her health condition and finding appropriate activities that encourage continuation. Both factors suggest the relevance of having more autonomous motivation, i.e. engaging in physical activity for personal interests and enjoyment, rather than doing it because one feels compelled by pressures, i.e. controlled motivation [39]. Self-Determination Theory posits that all behaviours lie along a continuum of relative autonomy, reflecting the extent to which a person endorses what he or she is doing. At one end of the continuum is behaviour that is intrinsically motivated and performed for its inherent satisfaction, e.g. for the fun, interest or challenge it offers. At the other end, is amotivation,

which refers to a lack of intention to perform the behaviour. A considerable body of research exists that shows that more autonomously motivated behaviours are more stable, performed with greater care and quality, and accompanied by more positive experiences [40]. Studies on physical activity have confirmed the relevance of achieving more autonomous forms of motivation [41]. For example, Fortier et al. [42] found that physical activity counsellors trained in Self-Determination Theory and MI facilitated change in recipients' physical activity behaviour by fostering both the quantity and quality of motivation.

There was a great deal of interdependency among the different factors (i.e. sub-categories) and the three COM-B determinants (i.e. categories), with many of the factors related to opportunity having an impact on PAP recipients' capability and motivation to engage in physical activity. The success of PAP programmes depends on viewing physical activity not merely as an endeavour or task for the individual PAP recipient; physical activity must be considered in the broader context of the recipient's social circumstances.

This study has a number of methodological shortcomings that must be considered when interpreting the results. The factors influencing PAP recipients' engagement in physical activity should not be considered as list of all possible factors because other studies may yield different factors or prioritize different factors. The results cannot be directly transferred to other county councils or international settings. We sought analytical generalization by comparing our findings with comparable studies.

The sample was purposively selected to account for a variety of characteristics. However, we were unsuccessful in recruiting PAP recipients in the 18–29 years age range. We lack information on why invited PAP recipients declined interviews, although some of the reasons that were reported by non-participants were "I did not receive a PAP" and "I could not participate in any activity due to spousal or their own health status," indicating that many did not want to participate because they had not (or believed they had not) undertaken sufficient physical activity to be involved in the study. The interviews were conducted 1.5–2.5 years after the PAP was received, which suggests a potential risk of recall bias, i.e. an error caused by differences in the accuracy or completeness of the participants' recollections regarding initiation of their physical activity. We believed this period was necessary to obtain information about the participants' engagement in physical activity because PAP strives to reach longer-term maintenance of physical activity in everyday life. However, because of the length of time between PAP and the interview, the study does not allow for detailed description of time-specific influences.

The study applied COM-B as a framework. When using a preconceived framework, there is a risk of neglecting ways of analysing the data that may provide important insights [43]. However, COM-B was found to provide a suitable framework for informing the data collection and analysing the data. One limitation with COM-B in this study is that the framework does not relate to a time perspective, which would have provided valuable information concerning the process of changing physical activity. In this study, the time perspective was addressed by asking the participants about factors associated with how they got started with an activity and how they maintained the activity. The selection of one specific theory, model or framework usually means that weight is placed on some aspects at the expense of others, thus offering only partial understanding. Regardless, we found COM-B to be broad enough to enable us to use an inductive approach. COM-B was not applied until the second phase of data analysis, which meant that the data had already been analysed inductively to arrive at the sub-categories, i.e. factors.

The study was conducted by a multidisciplinary team of researchers, which was strength of the study. When interpreting the data, this allowed for multiple perspectives and different pre-understandings concerning the issue of PAP, thus enhancing the rigor and credibility of the findings. The team consisted of two (female) nurses with experience in clinical patient work as well as work on miscellaneous research issues (PA, LL), a (female) primary care physician (SH) and an experienced (male) implementation researcher, who is an economist and organizational analyst (PN).

## Conclusions

In conclusion, PAP recipients' engagement in physical activity was influenced by the capability, opportunity and motivation to undertake this behaviour. Numerous extraneous factors influenced capability and motivation; receiving professional support and follow-up by a physical activity counsellor were of utmost importance. The physical activity counsellors were found to be important for sustained activity because they use an individual approach to counselling and flexible follow-up adapted to each individual's need for support.

## Additional file

**Additional file 1:** Interview guide. (DOCX 27 kb)

## Abbreviations

COM-B: Capability-Opportunity-Motivation-Behaviour; PAP: Physical activity on prescription

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## Availability of data and materials

The transcribed interviews that support the findings of this study are stored at the County Council of Kronoberg. Restrictions apply to the availability of these data, which were used under license for the current study, and so they are not publicly available. Upon reasonable and formal request to the corresponding author and with permission of the County Council of Kronoberg, data sharing can be considered via a data-sharing agreement that indicates the criteria for data access and conditions for research.

## Authors' contributions

PA, LL, PN and SH conceived the design of the study. PA carried out data collection, PA, LL and PN analysed data, PA, LL, PN and SH discussed the analysed data and drafted the manuscript. The final manuscript was read and approved by all authors.

## Ethics approval and consent to participate

The study was approved by the Regional Ethics Committee for Human Research, Faculty of Health Sciences Linköping University Sweden (Dnr 2014/476–31), and performed in accordance with the Declaration of Helsinki (World Medical Association 2013). All participants were informed that participation was voluntary and confidentiality was assured in the analysis and publication of data. Written informed consent was obtained from all participants.

## Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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## PAPER III







Article

# Physical Activity on Prescription in Routine Health Care: 1-Year Follow-Up of Patients with and without Counsellor Support

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**Abstract:** The effectiveness of counsellor support in addition to physical activity on prescription (PAP) from health care professionals has rarely been evaluated. This observational follow-up study investigated differences in physical activity levels and health-related quality of life (HRQoL) one year after PAP regarding patients' use of counsellor support in addition to PAP in routine care. The study was conducted in a Swedish health care region in which all patients receiving PAP from health care professionals were offered counsellor support. Data were collected from medical records and questionnaires (baseline and follow-up). Of the 400 study participants, 37% used counsellor support. The group of counsellor users attained a higher level of physical activity one year after receiving PAP compared to the group of non-users ( $p < 0.001$ ). The level of physical activity was measured by a validated index (score 3–19) calculated from weekly everyday activity and exercise training. Comparison of the change in scores between baseline and follow-up showed a significant difference between the two groups, ( $p < 0.001$ ). The median difference in the PAP + C group was 2.0 (interquartile range, 7.0) and 0.0. among non-users (interquartile range, 4.0). Significant differences in HRQoL were due to positive improvements among counsellor users, with the main improvement in general health. The conclusion is that patients using counsellor support after receiving PAP from health care professionals had higher physical activity and better HRQoL one year after compared with patients who did not use this support.

**Keywords:** physical activity on prescription; counsellor; counselling; health care; patients

## 1. Introduction

Physical activity on prescription (PAP) interventions including health care professionals' prescription of physical activity or a physical activity referral to an exercise provider outside the health care system have been developed for health care services to support patients who would benefit from increased physical activity [1,2]. Several studies on PAP interventions have reported positive outcomes on patients' physical activity levels and health-related quality of life (HRQoL) [3–6].

Longer duration of PAP interventions is usually associated with a higher level of physical activity [7]. However, poor patient adherence is typically a problem with long-term maintenance of behavior change interventions [8]. Research has documented that poor long-term adherence is a common problem for PAP interventions [7,9,10].

Recognizing the challenges of long-term adherence, some PAP interventions such as the Swedish PAP [11] have been developed based on individually tailored written prescriptions of activities delivered with a patient-centered approach, i.e., delivery of care that is respectful, individualized and empowering, to encourage individual participation of the patient and a patient–caregiver relationship of mutual trust, empathy and shared knowledge [12]. Such interventions show promise with regard to achieving positive effects on patients’ physical activity levels [13,14]. More tailored approaches to PAP delivery are facilitated by multi-professional organizations [15]. In such organizations, patients are allowed to receive counselling support by an exercise specialist within a sport organization [13] or from an allied health care professional in routine health care, e.g., a physiotherapist [5,16].

Despite promising findings regarding more tailored and patient-centered approaches to the delivery of PAP, there is a paucity of research investigating the outcomes on patients’ physical activity levels regarding counselling support in addition to PAP. This study addresses this knowledge gap in the PAP literature by investigating the impact on patients’ physical activity levels and HRQoL of individualized counselling support provided by health care professionals in addition to PAP. The aim of this study was to investigate differences in physical activity levels and HRQoL one year after PAP among patients who used physical counsellor support in addition to PAP and patients who did not accept this offer of support and only received PAP.

## 2. Materials and Methods

### 2.1. Study Design

This is an observational follow-up study of a routine health care PAP intervention including an offer of physical activity counsellor support for all PAP recipients in addition to health care professional’s prescription of physical activity. The study was developed in accordance with the ethical principles of the Declaration of Helsinki and was approved by the Regional Ethical Review Board in Linköping (No. 2013/51-31).

### 2.2. Setting

The study was conducted in Region Kronoberg, a health care region located in southern Sweden. This health care region includes 22 public and 11 privately operated primary health care centers (all publicly funded), two public hospitals for specialized somatic care and one for specialized psychiatric care. The health care region delivers care to the whole population in Kronoberg County, approximately 200,000 people. The PAP intervention has been in use this health care organization since 2009 and is an adapted model of the Swedish PAP program.

The Swedish PAP program includes patient-centered counselling, written prescription of individualized physical activity using the Physical Activity in the Prevention and Treatment of Disease handbook [17], collaboration with local sport organizations and follow-up assessments of patients’ physical activity levels [11]. There are no recommendations on best practice models for delivery of support after prescription of physical activity in the Swedish PAP program, and different modes of support delivery exist. Support can for instance be delivered within health care or by sports organizations, to all PAP recipients, or as an offer for those who believe they need additional support.

The PAP intervention investigated in this study includes a multi-professional organization for routine health care delivery of PAP involving health care professionals who prescribe physical activity and counsellors who delivers support after PAP. The rationale for implementation of physical activity counsellor support was to provide simplified routines for health care professionals’ delivery of PAP and to offer high-quality physical activity counselling, with the aim of reaching a larger population who

would benefit from physical activity and increasing the likelihood of successful results. The physical activity counsellors are employed and financed by the Region Kronoberg for the specific task of supporting patients who are prescribed PAP. They are licensed health care professionals (e.g., nurses or physiotherapists) and are trained in motivational interviewing techniques [18]. Motivational interviewing training available for the physical activity counsellors varies from a course lasting for several weeks at the university to a four-day short course administered by the Region Kronoberg. One-day workshops are offered every other year. Training in motivational interviewing is obligatory for physical activity counsellors but not for the health care professionals who prescribes PAP.

Patients who would benefit from increased physical activity are identified and prescribed PAP during routine health care visits and during in-patient hospital stays by licensed health care professionals, e.g., physicians, nurses, and physiotherapists. When health care professionals prescribe PAP, they are expected to have a short dialogue about physical activity with the patient (5–10 min) based on the individual's need of physical activity, prescribe a written electronic PAP, including the reason for the prescription and any contraindications for activity. There is no obligation on the health care professional who prescribes the PAP to specify type and dose of physical activity, because this can also be managed by the physical activity counsellors. Patients receive a copy of the written PAP along with written information about how to get in contact with a physical activity counsellor.

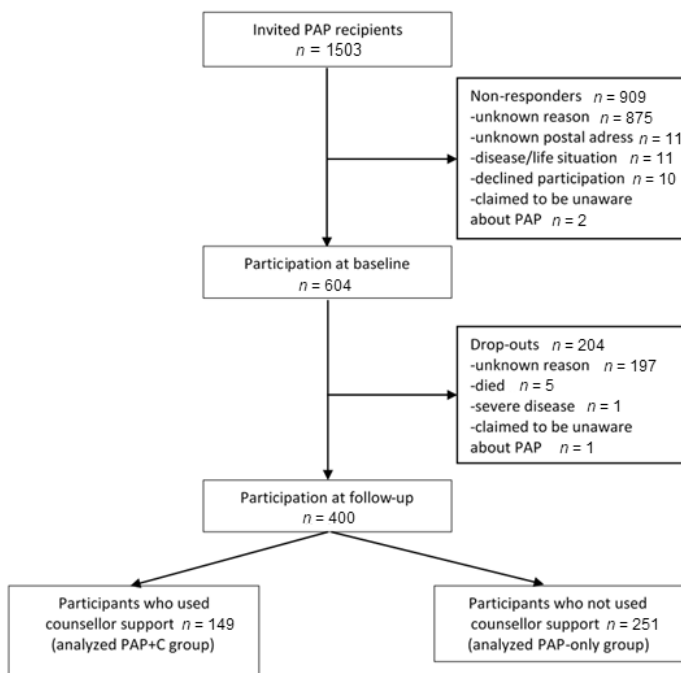
The next step for patients who want counsellor support is to phone or e-mail a counsellor to schedule a face-to-face counselling session. Time scheduled for the counselling is between 30 and 60 min, although the first visit is always 60 min. There are no patient fees for counsellor support and there is no predetermined number of counselling visits. The number of follow-up counselling sessions is based on the individual PAP recipient's need of support. In the years of 2009 to 2012 one-third of all PAP recipients used counsellor support [19], and the min-max number of visits within these years were 1 to 12 (mean = 3.5 [SD = 1.8]).

Counsellor support is to be utilized within one year after prescription. If appropriate, the physical activity counsellor encourages a wider health dialogue, e.g., dietary habits, tobacco use, and alcohol consumption.

PAP recipients can be recommended everyday activities or exercise training. The activities can be performed on one's own or in local sport clubs. There are no differences in access to activities for patients who use or do not use counsellor support. Fees for participating in local sport clubs are paid by the patient. Some sport clubs have reduced fees for a period.

### 2.3. Recruitment Process

All patients receiving PAP from June 2013 until June 2014 were identified through the electronic medical record system and recruited consecutively by postal invitations. Inclusion criteria were  $\geq 18$  years of age and prescribed PAP in primary care or specialized care (somatic or psychiatric hospital care). A few patients were excluded due to prescription from other settings such as occupational health services and elderly care. Two primary health care centers did not agree to be involved in the study and, therefore, patients receiving PAP from these centers were not invited. A postal invitation was sent to the patient 2 to 3 weeks after the PAP prescription date. One reminder was sent to non-responders after 2 to 3 weeks. A total 1503 patients were invited to participate (Figure 1). The invitation included information about the study, a baseline questionnaire, and a pre-paid return envelope. A total of 604 patients responded at baseline (40%). A follow-up questionnaire and a pre-paid return envelope were sent after one year to those who responded at baseline. One reminder was sent to non-responders after 2 to 3 weeks. Of the 604 patients who participated at baseline, 400 responded at follow-up (66%) (Figure 1). Among these responders, 149 patients had used counsellor support (the PAP + C group) and 251 patients had not used this support (the PAP-only group).



**Figure 1.** Flowchart of the recruitment process.

#### 2.4. Data Collection

Data were collected from the electronic medical record system and from the baseline and the follow-up questionnaire. The same electronic medical record system was used by all health care settings. The following patient characteristics were obtained from the medical record data: sex, age, registered diagnoses according to the International Classification of Diseases version 10 (ICD-10) [20], out-patient health care visits and in-patient hospital care, prescribing setting, prescribing profession, and the number of visits to physical activity counsellors. Data on diagnoses and health care consumption were collected for the 12 months before the PAP prescription date. The rationale for the categorization of diagnostic groups, i.e., the ICD-10 classified disease groups, and the categorization of health care consumption was to correspond to higher or lower morbidity rates, including multi-morbidity. To capture all visits to a physical activity counsellor data were obtained for the 16 months after the PAP prescription date. The questionnaire included data on socio-demographics, self-rated physical activity, physical activity habit strength, confidence to change activity, perceptions of importance to change activity and HRQoL.

#### 2.5. Primary and Secondary Outcomes

The primary outcome was the level of physical activity during a regular week, as measured using the Swedish National Board of Health and Welfare questions recommended for clinical practice: “During a regular week, how much time are you physically active in ways that are not exercise, for example walks, bicycling, or gardening? Add together all activities lasting at least 10 min”; and “During a regular week, how much time do you spend exercising on a level that makes you short winded, for example, running, fitness class, or ball games?” [21]. The response format of these questions is categorical, and the alternatives includes different levels of activity in minutes. The everyday activity item has seven numbered response alternatives (“1” implies no activity while “7” implies more than 300 activity minutes during a regular week) and the exercise training item has

six numbered alternatives (“1” implies no exercise while “6” implies more than 120 exercise minutes during a regular week) [21,22]. The total level of weekly physical activity is calculated from the response of these two questions: everyday activity + (exercise training  $\times$  2), which gives a possible score range of 3 to 19 [21,22]. The highest score 19 is equal to >300 min of everyday activity and >120 min of exercise training per week, and the lowest score 3 is equal to no activity minutes [22]. A score of 11 corresponds to at least 150 min of moderate intensity physical activity throughout a week measured by accelerometer [21,22]. This scale has been validated for identifying insufficient activity (sensitivity) and sufficient activity (specificity) [21]. The categorical answer modes of the physical activity questions correlate with accelerometer data, and validity has been found to be in line with several other extensively used self-reported physical activity measures [22].

Secondary outcomes were physical activity habit strength and HRQoL. Physical activity habit strength was measured using the validated Self-Report Behavioral Automaticity Index (SRBAI) [23]. The participants were asked “Physical activity in leisure time is something... a) I do automatically, b) I do without having to consciously remember, c) I do without thinking, d) I start doing before I realize I’m doing it.” Furthermore, the participants were informed that physical activity could include everyday activities and exercise training activities. Response options for each of the four items were given on a Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The higher the score, the stronger the habit. The SRBAI has demonstrated satisfactory measurement properties [23].

HRQoL was measured using the RAND 36-item Health Survey (RAND-36) [24]. The validated standard scoring algorithm for this instrument was used to calculate the eight health scores: physical functioning; role physical limitation; bodily pain; general health; vitality; social functioning; role emotional limitation; and mental health [25]. Calculation of the subscales in RAND-36 is performed in two steps: (1) all items are scored so that a higher level is equal to better health; (2) all items included in the subscales are averaged together. The health scores range from 0 to 100, where higher scores represent better health state [25].

## 2.6. Statistics

Descriptive statistics were used for presentation of the patients’ characteristics. Dependent on the data, chi-squared statistics, the Mann–Whitney U test or the independent sample t-test was used to compare patient characteristics between the study groups.

The Mann–Whitney U test was used to compare the outcome variables between the two groups at baseline and at follow-up. Difference scores (follow-up—baseline) were also calculated for the outcome variables and compared between the two groups using the Mann–Whitney U test. Cohen’s  $r$  ( $r = Z/\sqrt{2}$ ) for the independent sample Mann–Whitney U test was used as a measure of effect size (effect size; 0.1, small; 0.3, medium; and 0.5, large) [26].

In the analysis of physical activity, only those patients who responded to the questions of everyday activity and exercise training at baseline and at follow-up were included. For the SRBAI, only those responding to at least three of the four items were included. For RAND-36, those who completed at least 50% of the questions within a health domain were included. The scale scores represent the average for all items in the scale that the respondent answered.

A  $p$ -value  $< 0.05$  was regarded as statistically significant. All statistical analyses were performed with SPSS Statistics for Windows 23.0 (IBM Corp, Armonk, NY, USA).

## 2.7. Dropout Analysis

At baseline, non-responders were significantly younger than participants (mean age = 50.4 vs. 59.6  $p < 0.001$ ) and they were more frequent prescribed in specialized care (28% vs. 16%  $p = 0.001$ ). No sex differences were detected between the two groups ( $p = 0.300$ ).

Dropouts at follow-up were significantly younger than the study participants (mean age = 54.9 years vs. 62.0 years  $p < 0.001$ ) and used counsellor less frequently (29% vs. 37%  $p = 0.042$ ). Compared with the participants, the group of dropouts at follow-up included significantly more patients with

mental health disorders (37% vs. 26%  $p = 0.005$ ) but fewer with circulatory diseases (41% vs. 53%  $p = 0.007$ ). The dropouts did not differ from the study participants with regard to any other variables included in the drop-out analysis (sex, education level, baseline level of everyday activity and exercise training, diagnosis, number of registered diagnoses, number of health care visits and overnight hospital stays, prescribing profession and setting).

### 3. Results

#### 3.1. Study Participants

The final sample included 400 participants, 149 in the PAP + C group and 251 in the PAP group. Most of the participants were female (69%), the mean age was 62.0 years, and about one-quarter (27%) had a university education. About three-quarters (73%) of the participants had medical registrations in five or more diagnostic groups; musculoskeletal diagnoses were the most common. More than half (59%) of the participants had 11 or more visits to health care in the year before PAP and about one-quarter had at least one overnight hospital stay. About one-quarter (28%) of the participants received PAP from a physician and most (83%) were within primary health care (Table 1).

**Table 1.** Characteristics in all participants at baseline and differences in characteristics between the study groups.

Characteristics	All <i>n</i> = 400	PAP + C <i>n</i> = 149	PAP-only <i>n</i> = 251	<i>p</i> -Value
Age, mean (SD) (min-max)	62.0 (14.0) (18–90)	59.6 (15.2) (18–90)	63.5 (13.1) (21–90)	0.008 <sup>a</sup>
Female sex, <i>n</i> (%)	276 (69.0)	99 (66.6)	177 (70.5)	0.394 <sup>b</sup>
University education, <i>n</i> (%)	103 (26.7)	48 (33.6)	55 (22.6)	0.019 <sup>b</sup>
Confidence to change (scale 1–10), median (IQR)	7.0 (3.0)	7.0 (3.0)	7.0 (3.0)	0.211 <sup>c</sup>
Important to change (scale 1–10), median (IQR)	8.0 (4.0)	8.0 (3.0)	8.0 (4.0)	<0.001 <sup>c</sup>
Common occurring diagnosis, <i>n</i> (%) <sup>c</sup>				
Musculoskeletal diseases	239 (61.6)	80 (54.8)	159 (64.9)	0.047 <sup>b</sup>
Circulatory diseases	207 (52.9)	80 (54.8)	127 (51.8)	0.571 <sup>b</sup>
Endocrine diseases	156 (39.9)	55 (37.7)	101 (41.2)	0.488 <sup>b</sup>
Mental health disorders	101 (25.8)	36 (24.7)	65 (26.5)	0.682 <sup>b</sup>
Respiratory diseases	104 (26.6)	44 (30.1)	60 (24.5)	0.222 <sup>b</sup>
Number of diagnostic groups, <i>n</i> (%) <sup>d</sup>				0.057 <sup>b</sup>
1–4	105 (27.1)	47 (32.6)	58 (23.8)	
≥5	283 (72.9)	97 (67.4)	186 (76.2)	
Frequency of health care visits, <i>n</i> (%) <sup>e</sup>				0.137 <sup>b</sup>
1–10	160 (40.8)	67 (45.6)	93 (38.0)	
≥11	232 (59.2)	80 (54.4)	152 (62.0)	
≥1 overnight stays in hospital, <i>n</i> (%) <sup>e</sup>	99 (25.2)	41 (28.0)	58 (24.0)	0.340 <sup>b</sup>
Prescribing professional, <i>n</i> (%)				0.046 <sup>b</sup>
Physician	111 (27.8)	50 (33.6)	61 (24.3)	
Other e.g., nurse, physiotherapist	289 (72.3)	99 (66.4)	190 (75.7)	
Prescribing setting, <i>n</i> (%)				0.646 <sup>b</sup>
Primary care	332 (83.0)	122 (81.9)	210 (83.7)	
Specialized somatic or psychiatric care	68 (17.0)	27 (18.1)	41 (16.3)	

PAP + C; patients receiving physical activity prescription + counsellor support. PAP-only; patients receiving physical activity prescription without counsellor support. <sup>a</sup> Independent sample *t*-test; <sup>b</sup> Pearson Chi-square test; <sup>c</sup> Mann Whitney U test; <sup>d</sup> Medical record registrations 12 months prior PAP of the International Classification of Diseases version 10 (ICD 10) classified diagnostic groups excluded O (pregnancy, childbirth) and Z (factors influencing health status/health care contacts); <sup>e</sup> Medical record registrations 12 months prior PAP of health care visits in primary and/or specialized somatic and psychiatric care with no selection of professional; overnight hospital stays in somatic or psychiatric care.

Participants in the PAP + C group, were significantly younger ( $p = 0.008$ ), had a higher education level ( $p = 0.019$ ), were less frequently diagnosed with musculoskeletal diseases ( $p = 0.047$ ), and were more frequently prescribed PAP by a physician ( $p = 0.046$ ). At baseline, participants in the PAP + C

group perceived that it was more important to change physical activity ( $p \leq 0.001$ ) (Table 1). The mean number of face-to-face counselling visits for patients using counsellor support was 4.1 visits (SD = 2.1, min-max = 1–11).

### 3.2. Primary Outcomes

Using the index value (score 3–19), based on the questions of everyday activity and exercise training, the PAP + C group had significantly lower levels of total physical activity at baseline compared with the PAP-only group ( $p = 0.001$ ). The opposite finding was shown at follow-up, i.e., the PAP + C group had significantly higher levels of physical activity ( $p < 0.001$ ). Comparison of the difference scores between baseline and follow-up showed a significant difference between the two groups ( $p < 0.001$ ). The median difference between baseline and follow-up in the PAP + C group was 2.0 (interquartile range [IQR], 7.0) and 0.0 in the PAP-only group (IQR = 4.0) ( $p < 0.001$ ). The effect size was small ( $r = 0.259$ ) (Table 2). The proportion in the PAP + C group with increased total physical activity was 62% and the corresponding proportion in the PAP-only group was 38%. Participants in the PAP + C group who reached an activity score of 11 to 19, i.e., within 150 min of moderate to vigorous physical activity at follow-up was 55% and 42% in the PAP-only group.

According to everyday activity, no significant differences between the groups were shown at baseline ( $p = 0.404$ ). At follow-up, significantly higher levels were shown in the PAP + C group ( $p = 0.024$ ). The comparison of the difference scores between baseline and follow-up in everyday activity showed a significant difference between the two groups, with higher improvement in the PAP + C group ( $p = 0.014$ ). The effect size was small ( $r = 0.126$ ) (Table 3). The proportion with increased everyday activity at follow-up was 38% in the PAP + C group and 22% in the PAP-only group.

According to exercise training, there was a significant difference between the groups at baseline, with the highest level seen in the PAP-only group ( $p < 0.001$ ). In contrast, the PAP + C group had significantly higher levels of exercise training at follow-up ( $p < 0.001$ ). The comparison of the difference scores between baseline and follow-up in exercise training showed a significant difference between the two groups, with the highest improvement in the PAP + C group ( $p < 0.001$ ). The effect size was small ( $r = 0.260$ ) (Table 3). At follow-up, the proportion with increased exercise training was 52% in the PAP + C group and 30% in the PAP-only group.

### 3.3. Secondary Outcomes

No significant differences between the groups were shown for integration of physical activity as a habit at baseline ( $p = 0.265$ ), follow-up ( $p = 0.738$ ), or in the difference scores ( $p = 0.053$ ) (Table 2).

Regarding HRQoL, no significant differences were shown in none of the eight health dimensions between the two groups at baseline. At follow-up, the PAP + C reported significantly higher levels in the two dimensions “physical functioning” ( $p = 0.016$ ) and “physical role functioning” ( $p = 0.046$ ) compared with the PAP-only group. The comparison of the difference scores showed that the improvement was significantly higher in PAP + C in four out of eight HRQoL dimensions; physical role functioning ( $p = 0.026$ ), general health ( $p = 0.006$ ), vitality ( $p = 0.020$ ) and social role functioning ( $p = 0.022$ ). The effect size for the differences were small and ranged between 0.118 and 0.144 (Table 2).

**Table 2.** Differences between the study groups in weekly physical activity, physical activity habit and health-related quality of life (HRQoL) at baseline and follow-up, and differences in effects one year after PAP.

Outcomes	Baseline			Follow-up			Difference between Baseline and Follow-up				
	Median (IQR)	Meanrank	p-Value <sup>a</sup>	Median (IQR)	Meanrank	p-Value <sup>a</sup>	Median Diff. (IQR)	Meanrank Diff.	p-Value <sup>b</sup>	Effect Size <sup>c</sup>	Valid Data
Weekly physical activity (3–19)											
PAP + C	9.0 (4.0)	154.3	0.001	11.0 (7.0)	196.1	0.009	2.0 (7.0)	211.8	<0.001	0.259	n = 135
PAP-only	11.0 (5.0)	192.6		9.5 (6.0)	166.9		0.0 (4.0)	157.3			n = 220
Physical activity habit (1–7)											
PAP + C	3.3 (2.8)	124.4	0.265	4.0 (2.3)	132.3	0.738	0.5 (2.1)	141.1	0.053	0.120	n = 109
PAP-only	4.0 (3.0)	134.9		4.0 (2.5)	129.2		0.0 (1.5)	112.9			n = 151
Health Related Quality of Life (0–100)											
Physical functioning											
PAP + C	75.0 (33.8)	195.7	0.136	80.0 (30.0)	202.3	0.016	0.0 (6.0)	189.5	0.529	0.033	n = 138
PAP-only	70.0 (35.0)	178.6		70.0 (38.9)	174.7		0.0 (6.0)	182.3			n = 231
Physical role functioning											
PAP + C	50.0 (100)	172.1	0.773	75.0 (75.0)	187.1	0.046	0.0 (25.0)	188.5	0.026	0.119	n = 132
PAP-only	50.0 (100)	175.2		50.0 (100)	166.0		0.0 (25.0)	165.1			n = 215
Bodily pain											
PAP + C	56.3 (49.4)	194.0	0.264	62.5 (45.0)	195.0	0.212	0.0 (24.3)	184.1	0.789	0.014	n = 138
PAP-only	45.0 (45.0)	181.2		55.0 (52.5)	180.7		0.0 (26.3)	187.1			n = 233
General Health											
PAP + C	60.0 (30.0)	176.8	0.701	65.0 (35.0)	190.1	0.137	5.0 (25.0)	198.6	0.006	0.144	n = 135
PAP-only	55.0 (30.0)	181.1		55.0 (35.0)	173.2		0.0 (20.0)	168.0			n = 223
Vitality											
PAP + C	55.0 (32.5)	174.9	0.253	65.0 (30.0)	188.9	0.408	5.0 (20.0)	199.6	0.020	0.122	n = 137
PAP-only	60.0 (35.0)	187.9		60.0 (35.0)	179.5		0.0 (25.0)	173.1			n = 228
Social role functioning											
PAP + C	75.0 (50.0)	177.1	0.163	75.0 (37.5)	189.5	0.726	0.0 (25.0)	203.1	0.022	0.118	n = 138
PAP-only	75.0 (37.5)	192.8		75.0 (37.5)	185.6		0.0 (25.0)	177.5			n = 235
Emotional role functioning											
PAP + C	100 (66.7)	172.2	0.711	100 (66.7)	176.8	0.714	0.0 (33.3)	179.6	0.415	0.044	n = 133
PAP-only	100 (66.7)	176.0		100 (66.7)	173.1		0.0 (0.0)	171.3			n = 215
Mental Health											
PAP + C	72.0 (32.0)	175.1	0.396	76.0 (28.0)	182.2	0.870	0.0 (18.0)	190.6	0.170	0.072	n = 137
PAP-only	76.0 (32.0)	184.6		76.0 (35.5)	180.3		0.0 (16.8)	175.1			n = 224

PAP + C; patients receiving physical activity prescription + counsellor support. PAP-only; patients receiving physical activity prescription without counsellor support. <sup>a</sup> Mann-Whitney U test; <sup>b</sup> Average difference score between the baseline- and follow-up assessment; <sup>c</sup> Interpretation of Cohen (1988)  $r = Z/\sqrt{N}$ : small effect 0.10, medium effect 0.30, large effect 0.50.



Table 3. Differences between the study groups in everyday activity and exercise training at baseline and follow-up, and differences in effects one year after PAP.

Everyday Activity and Exercise Training	Baseline		Follow-up		Difference in Effects between Baseline and Follow-up	
	PAP + C	PAP-only	PAP + C	PAP-only	PAP + C	PAP-only
Everyday activity	n= 147	n= 249	n= 143	n= 242	n= 141	n= 241
Mean rank	192.4	202.1	209.4	183.3	209.2	181.1
Categorical response, n (%)						
1. 0 min	4 (2.7)	6 (2.4)	1 (0.7)	2 (0.8)		
2. <30 min	15 (10.2)	20 (8.0)	9 (6.3)	21 (8.7)		
3. 30–60 min	25 (17.0)	36 (14.5)	19 (13.3)	36 (14.9)		
4. 60–90 min	17 (11.6)	35 (14.1)	17 (11.9)	45 (18.6)		
5. 90–150 min	29 (19.7) <sup>b</sup>	53 (21.3) <sup>b</sup>	30 (21.0) <sup>b</sup>	54 (22.3) <sup>b</sup>		
6. 150–300 min	34 (23.1)	50 (20.1)	39 (27.3)	50 (20.7)		
7. >300 min	23 (15.6)	49 (19.7)	28 (19.6)	34 (14.0)		
Exercise training	n = 146	n = 238	n = 139	n = 234	n = 137	n = 222
Mean rank	167.8	207.6	203.3	177.3	213.45	159.36
Categorical response, n (%)						
1. 0 min	63 (43.2)	67 (28.2)	31 (22.3)	72 (30.8)		
2. <30 min	32 (21.9) <sup>b</sup>	40 (16.8)	23 (16.5)	44 (18.8)		
3. 30–60 min	26 (17.8)	64 (26.9) <sup>b</sup>	33 (23.7) <sup>b</sup>	50 (21.4) <sup>b</sup>		
4. 60–90 min	10 (6.8)	36 (15.1)	16 (11.5)	32 (13.7)		
5. 90–120 min	7 (4.8)	19 (8.0)	16 (11.5)	11 (4.7)		
6. >120 min	8 (5.5)	12 (5.0)	20 (14.4)	25 (10.7)		
					p-value <sup>a</sup>	p-value <sup>a</sup>
					0.021	0.024
						p-value <sup>a</sup>
						<0.001
						Effect size <sup>c</sup>
						0.260

PAP + C; patients receiving physical activity prescription + counsellor support. PAP-only; patients receiving physical activity prescription without counsellor support. <sup>a</sup> Independent Mann-Whitney U test; <sup>b</sup> Median category for each group; <sup>c</sup> Interpretation of Cohen (1988)  $r = Z/\sqrt{N}$ ; small effect 0.10, medium effect 0.30, large effect 0.50.

#### 4. Discussion

This study has investigated differences in physical activity levels and HRQoL one year after PAP in patients who received physical counsellor support in addition to PAP and patients who did not accept this offer of support and only received PAP. The main finding was that patients who used physical activity counsellor support attained a higher level of weekly physical activity one year after receiving PAP than patients who did not use counsellor support. The increase in weekly physical activity among counsellor users was mainly due to increased exercise training rather than everyday activity.

These findings suggest that physical activity counsellors can influence patients to increase and maintain their physical activity. All the physical activity counsellors in the study were trained in motivational interviewing, an approach that can foster a more self-determined behavior and help patients overcome barriers to physical activity [27]. Motivational interviewing appears to support fulfilment of three basic needs described in Cognitive Evaluation Theory: competence, autonomy and social relatedness [28]. In our study, the counsellors accounted for the patients' interests and priorities regarding physical activity, which supported competence to achieve the behavior change. The counsellors supported patients' autonomy by exploring different behavioral options (e.g., different exercise opportunities) together with the patient. They also showed a genuine interest and expressed empathy, thus supporting social relatedness [29].

The model used for counselling support in addition to PAP in this study could be seen as a person-centered approach (also described as a client-centered approach) [30]. In a person-centered counselling approach, the PAP recipients become partners in planning, developing and monitoring care, and the counsellors support them to make changes and goals that best suit their personal needs and context [31,32]. Patient-centered counselling is a key component of the Swedish PAP program [11]. However, even though there are several similarities between a patient-centered approach and a person-centered approach, a person-centered approach broadens the perspective beyond the clinical perspective [31,32]. This perspective could be an important issue when it comes to supporting change in physical activity in every-day life [33].

Nearly two-fifths of the participants in this study took up the offer of counsellor support. Some patients may feel reluctant to seek support [34] and, therefore, it is likely that a PAP model in which patients are contacted by a counsellor leads to a higher proportion of counsellor use. For some, the reason for not utilizing the support of a physical activity counsellor might be related to factors that could be facilitated by the counsellors, such as low motivation to start physical activity [35] or insufficient self-efficacy and low expectations concerning one's own ability to engage in physical activity [36]. Having more modest expectations of one's own ability at the outset has been found to be related to achieving expected changes [37]. In this study there was no significant difference between the study groups in their confidence to change physical activity at baseline. However, the findings in this study among the non-counsellor users indicate that some patients can manage to increase their physical activity without support from physical activity counsellors. Nearly two-fifths among the non-counsellor users had increased physical activity one year after PAP.

The findings in this study showed that more participants among counsellor users reached the public health recommendation for physical activity for adults of at least 150 min of moderate to vigorous physical activity per week one year after PAP [38]. Among the counsellor users, 55% reached this physical activity level; this is less than the 66% who reach this level of activity in the Swedish adult population aged 18 to 64 years but similar to the level of activity in the population 65 years or older (54%) [39]. A previous study on patients receiving PAP within the studied health care organization showed that patients receiving PAP were older and had higher frequency of diagnoses than the general health care population [19]. The frequency of diagnoses among the participants in the present study was even higher and they were older. The treatment goal of physical activity for some patients, e.g., with physical limitations related to disease and for patients in older age groups, could be a small increase in physical activity and low intensity activity [40,41], whereas for other more healthy adults, a higher increase and high-intensity activity could be a possible goal. Other studies show that PAP is

often used to support physical activity among older patients [13,42,43]. A small reduction in sedentary time [44] and low intensity activities [41] can have health benefits.

Another finding in this study was that the use of physical activity counsellor support in addition to PAP had positive effects on HRQoL. In this study, significant improvements were shown for four of eight health domains. Other studies of PAP interventions have reported significant positive effects of PAP on HRQoL in more or less [3,45,46] than the four health domains found in this study. The variation between PAP studies on effects on HRQoL outcomes may be a result of differences in study population characteristics with regard to patient morbidity [47], sex [48] and level of physical activity [5]. Furthermore, the specific PAP intervention investigated and the control group used, usual care [3,45] or written information about physical activity [46], may also influence differences in effects on HRQoL between PAP studies. The positive effects on HRQoL among counsellor users in this study could be a result of a higher increase in physical activity in this group [4,46], or as a result of improved positive health outcomes [40,46].

#### 4.1. Limitations

The present study has some shortcomings that should be considered when interpreting the findings. The response rate at baseline was 40%. The non-responders at baseline were younger and more frequently prescribed specialized care (somatic or psychiatric). Of the baseline participants, 66% completed the follow-up. The dropouts at follow-up were younger, more frequently diagnosed with mental health disorders and less frequently diagnosed with circulatory diseases. However, our response rate of 66% at follow-up was higher compared to some previous PAP studies (62% vs. 56%) [4,49] but lower compared to others (83% vs. 73%) [5,48], including 6 respectively 12 months follow-up. Collecting data through postal questionnaires often yields low response rates. Although unwillingness to perform physical activity could be a reason for non-participation, other reasons might also apply, such as lack of interest or simply forgetting to respond [50]. Another limitation of the study was that we were not able to measure the baseline level of physical activity or HRQoL on the day when PAP was prescribed. Filling in the baseline questionnaire a few weeks after prescription might influence self-reporting on baseline physical activity. However, the primary aim was to identify differences in physical activity and HRQoL one year after PAP between the two groups (counsellor use or not), and there were no differences in how baseline and follow-up data were collected for both groups. Still, the effect size might have been higher if the reported baseline activity level was overestimated. The overall results of this study must be interpreted with caution regarding generalization to other clinical populations and health care contexts. Characteristics of PAP recipients, clinical populations and prescribing health care contexts influence the generalizability of study results.

These limitations should be balanced against the study's strengths. The study concerned a real-world PAP intervention, designed to include all patients receiving PAP over a period of one year in primary care and specialized somatic and psychiatric routine health care. This type of real-world intervention is important for developing the evidence base for PAP provided in routine clinical practice, i.e., evidence based on effectiveness rather than efficacy studies. However, patient-related selection bias regarding willingness to participate is difficult to overcome in this type of study. Regardless, the study included a relatively large sample of a clinical PAP population. The fact that the recruitment process lasted for one year reduced the risk of bias associated with seasonal variation in weather, which is known to influence maintenance of physical activity [51]. Recruitment of participants and data collection were handled by one of the researchers, which meant that health care professionals and counsellors were not interrupted by study-related tasks. Hence, PAP could be provided to patients as part of a real-world routine health care delivery of PAP.

#### 4.2. Implications and Future Research

To our knowledge, this is the first study in Swedish routine care investigating a PAP model in which counsellor support was offered in addition to health care professionals' delivery of PAP. Previous

studies involving the Swedish PAP program have described models using counsellor support [5,48], but no study has evaluated the potentially added benefits of using counsellor support versus not using this support. The result concerning physical activity in the PAP-only group in this study indicates that some patients do not need to take part of the offered counsellor support. Studies of PAP commonly investigate the effectiveness of the program as a whole and patients who do not complete the program after PAP are, despite an increase in physical activity, considered non-adherers [13]. In further evaluations of PAP programs, we suggest that greater focus should be placed on investigating what different program components add to patients' physical activity after PAP. PAP programs are often adapted to fit local health care contexts, underscoring the importance of transparency to enable description and analysis of the contents of the programs. Regarding counsellor support in addition to PAP, further studies are needed to provide evidence for the effectiveness of different patient support models in addition to health care professionals PAP. It is also important to identify which patients would benefit from counsellor support.

## 5. Conclusions

Patients who used physical activity counsellor support in addition to receiving PAP from health care professionals had higher physical activity and better HRQoL one year after prescription of physical activity compared with patients who did not use this support. The increase in physical activity among counsellor users was mainly due to increased exercise training rather than everyday activity.

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## PAPER IV



RESEARCH

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# Factors associated with increased physical activity among patients prescribed physical activity in Swedish routine health care including an offer of counselor support: a 1-year follow-up

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## Abstract

**Background:** The study addresses knowledge gaps in research regarding influences of routine health care delivery of physical activity on prescription (PAP). The aim was to investigate if patient and health care characteristics are associated with increased physical activity 1 year after prescription among patients offered counselor support in addition to health care professionals' prescription. The study was conducted in primary and secondary care in a Swedish health care region.

**Methods:** All PAP recipients during 1 year were invited ( $N = 1503$ ) to participate in this observational prospective study. Data were collected from medical records and questionnaires (baseline and follow-up). Descriptive statistics and multiple logistic regression analysis were used. The outcome variable was increased physical activity after 1 year. Study variables were patient and health care characteristics.

**Results:** Three hundred and fifty-five patients with complete follow-up data were included. The mean age was 62 years ( $SD = 14$ ; range, 18–90) and 68% were females. Almost half (47%) had increased physical activity 1 year after PAP. Multiple logistic regression analysis showed that increased physical activity at follow-up was positively associated with lower baseline activity, counselor use, and positive perception of support. Counselor users with low baseline activity had higher odds ratio for increased physical activity at follow-up than non-users ( $OR = 7.2$ , 95%  $CI = 2.2–23.5$  vs.  $OR = 3.2$ , 95%  $CI = 1.4–7.5$ ). Positive perception of support was associated with increased physical activity among counselor users but not among non-users.

**Conclusions:** An increase in physical activity after PAP was related to low baseline activity, positive perception of support, and use of counselor support after PAP. Qualified counseling support linked to PAP seems to be important for achieving increased physical activity among patients with lower baseline activity.

**Keywords:** Physical activity on prescription, Counseling, Health care characteristics, Patient characteristics, Predictors

## Background

Physical inactivity is recognized as an important modifiable risk factor for premature death and noncommunicable diseases, posing a major global health threat [1]. There is evidence of the effectiveness of regular physical activity

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in the prevention and treatment of several diseases, e.g., cardiovascular disease, diabetes, cancer, hypertension, obesity, and depression [2]. However, despite convincing evidence for physical activity, more than a quarter of all adults worldwide do not reach the public health recommendations of at least 150 min of physical activity per week at a moderate to vigorous level, and thereby more than 1.4 billion adults are at risk for development of diseases due to physical inactivity [3].

Health care potentially has an important role in promoting physical activity because many individuals who visit health care for various health problems have a higher probability of being physically inactive [4, 5]. Sweden and several other countries have implemented physical activity on prescription (PAP) programs to achieve increased physical activity among patients consulting health care [6–10]. The PAP program in Sweden is promoted in the Swedish National Board of Health and Welfare's National Guidelines for Methods of Preventing Disease [11] and by the Swedish Public Health Agency [12]. The program was first implemented in 2001 as part of a national campaign "Sweden on the move" and is now used by all 21 regions responsible for providing health care in Sweden. Recently, the Swedish PAP program was chosen as a best practice program by the European Commission to be implemented in other European Union member states [13, 14].

Despite widespread implementation of PAP in Sweden, there has been some debate whether there is sufficient evidence of its effectiveness to support continued use of the program in routine practice [15–17]. Several studies have generated evidence of the Swedish PAP program in terms of patients' adherence to the written prescription of physical activity [18], and regarding patients' changes in physical activity levels [19–22] and other health-related outcomes [19, 21–24]. However, few studies have been conducted under circumstances of routine care to investigate the factors that have influenced changes in physical activity among patients receiving PAP in health care. The existing studies of PAP in Sweden have not provided any information about how the components of the program, such as counseling and support after receiving PAP, influenced changes in physical activity after prescription [18, 25, 26]. Qualitative research from a patient perspective has highlighted that patients need support to be able to change physical activity after receipt of PAP [27, 28]. Studies suggest the importance of social support for patients receiving PAP [29–31]. Previous studies by the researchers behind the present study have indicated that counselor support in association with delivery of PAP is beneficial for increased physical activity [28, 32]. However, the association between counselor support and other factors has not been elucidated.

Addressing key knowledge gaps in research on the Swedish PAP program, the aim of this study was to investigate the patient and health care characteristics associated with increased physical activity 1 year after prescription among patients prescribed physical activity in routine care with access to counselor support. This knowledge is important for improved understanding of the factors that influence patients' physical activity after PAP [33], especially regarding counselor support. Such knowledge could be important for further development of delivery of PAP in routine health care. This study also adds information on patients receiving PAP in both primary and secondary care, which is important considering that most previous PAP studies in Sweden and other countries focused only on primary care.

## Methods

### Study design

This is a prospective observational study including 1-year follow-up of adult patients prescribed physical activity in routine care, including an offer of counselor support.

### Setting

The study was conducted in one of the 21 decentralized health care regions in Sweden. This southern health care region includes 32 health care centers (primary care), two hospitals for specialized somatic care, and one clinic for specialized psychiatric care (secondary care). Of the 32 health care centers, 11 are privately operated. The Swedish regions are funded by taxes (including privately operated primary care centers); health care is universal for all citizens and patient out-of-pocket fees are low.

The health care region provides care to a total population of approximately 200,000 people. About 80% of the residents are 18 years or older, and about 27% of the population is 65 years or older. This population has somewhat higher life expectancy for both females and males (84.6 years vs. 81.7 years) compared with the rest of Sweden (84.3 years vs. 80.8 years). Furthermore, compared with the national Swedish population, this county has fewer adults with a university education (34% vs. 39%) and more adults with good self-rated health (74% vs. 72%). The proportion of adults who reach at least 150 min of moderate to vigorous physical activity is consistent with that of the general Swedish population (65%). More males than females reach this recommended level of activity (65% versus 61%) [34]. However, in Kronoberg as in the rest of the Swedish regions there are intraregional health differences in the population that need to be considered [35].

### The Swedish PAP program and health care delivery of PAP

The Swedish PAP program involves person-centered prescription of physical activity, counseling, and follow-up [6]. The prescribed activities are intended to be implemented as part the patient's ordinary life. Prescribed activities can be home-based (e.g., cycling, walking, and Nordic walking) and/or organized (e.g., in fitness centers and sport clubs). When PAP is found to be a suitable intervention for the patient, all licensed health care professionals can prescribe PAP. The FYSS textbook (Physical Activity in Prevention and Treatment of Diseases) can be used as an evidence-based guide by the health care professionals who prescribe PAP [2]. Because there are no guidelines on how the Swedish PAP program should be delivered, health care organizations develop their own mode of delivery of the program [6].

In 2009 and 2010, a structure for routine health care delivery of the Swedish PAP program was implemented in the health care region under study. This mode of delivery is still in use and includes an offer of support from a physical activity counselor to all patients in addition to the health care professional's PAP. The counselors are licensed health care professionals, typically nurses and physiotherapists, who are employed with the task of supporting patients prescribed physical activity. Their work covers the entire region and their organizational belonging is in a PAP counselor unit within the primary health care setting. Patients are able to meet with a counselor in the PAP counselor unit or at a place that the patient might find more accessible e.g. at their primary care center. The counselors are trained in motivational interviewing (MI) and are familiar with activities offered by local sport clubs and fitness centers. The purpose of including physical activity counselors was to provide patients with support to change their participation in physical activity and to support the health care professional's delivery of PAP.

All patients receiving PAP in primary and secondary care have access to physical activity counselor support in the year after prescription or longer, if needed. Written information about how to contact a counselor is given by the prescriber of PAP and is automatically printed along with the electronic prescription of physical activity. The patients who accept the offer of support contact a counselor and schedule time and location for the visit. The scheduled time for the first visit is 60 min, while follow-up visits can be up to 30 min. At the first visit the counselor initiates a broader lifestyle dialogue to provide a context for physical activity discussions. There are no patient fees associated with counselor visits, and there are no pre-determined number of visits. The mean number counselor visits by the patients in the present study who used this support was 4.2 (SD=2.1), with the

number of visits ranging from 1 to 11. Any fees associated with the activities are paid by the patient.

### Study population

Patients 18 years or older who received PAP in primary and secondary care between June 2013 and June 2014 were identified through the electronic medical record system. Postal invitations to participate in this study were sent to all identified patients 2 to 3 weeks after the PAP prescription date. One reminder was sent to non-responders after 2 to 3 weeks later. Those who responded to the baseline questionnaire enclosed in the invitation agreed to participate. The baseline responders were sent a follow-up questionnaire after 1 year. The recruitment process has been described previously by the authors of this study [32].

A total of 1503 patients were invited, and 604 participated at baseline (Fig. 1). The patients who did not participate were significantly younger (mean age, 50.4 years vs 59.6 years,  $p < 0.001$ ) and more frequently prescribed in secondary care (28% vs 16%,  $p = 0.001$ ) than the participants. No difference was found for sex ( $p = 0.300$ ). Among those invited in secondary care, patients prescribed in psychiatric care were more frequently non-participants (76%) than patients prescribed in somatic care.

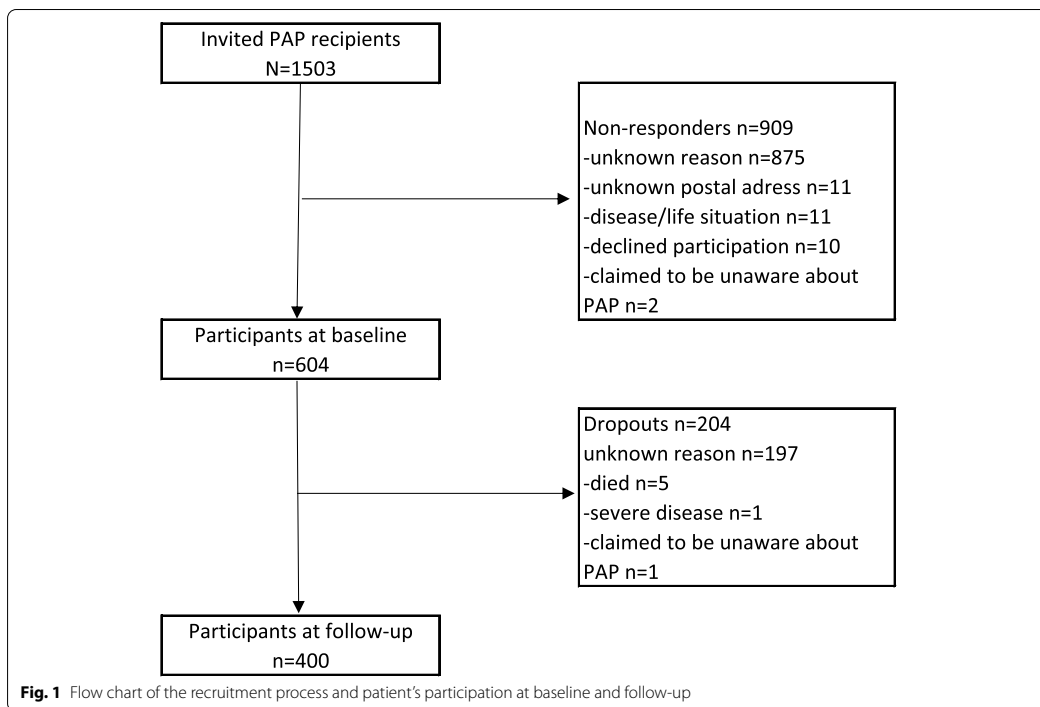
Of the 604 participants at baseline, 400 (66%) responded at follow-up (Fig. 1). The 204 dropouts at follow-up were significantly younger ( $p < 0.001$ ) than the patients who participated, they used counselors less frequently ( $p = 0.042$ ), had fewer circulatory diseases ( $p = 0.007$ ), and more mental health disorders ( $p = 0.005$ ). The dropouts did not differ in any of the other variables analyzed (Table 1). Complete data on the patients' everyday activities and exercise training at baseline and at follow-up was an obligation for analysis in this study. Of the 400 participants at follow-up, 355 (89%) patients were available for this study.

### Data collection and measurements

Data were collected from electronic medical records and a self-administrated questionnaire at baseline and at follow-up.

### Outcome of physical activity

The outcome variable was increased physical activity between baseline and follow-up. Physical activity data were collected by questionnaire and measured by one question on everyday activity and one question on exercise training at baseline and at follow-up. The patients were asked: "During a regular week, how much time are you physically active in ways that are not exercise, for example walks, bicycling, or gardening? Add together



all activities lasting at least 10 min"; and "During a regular week, how much time do you spend exercising on a level that makes you short of breath, for example, running, fitness class, or ball games?" [36]. These questions have been validated and are recommended for use in clinical practice by the Swedish National Board of Health and Welfare [36, 37]. The responses to these questions are calculated in a scale score of weekly physical activity ranging from 3 (no activity minutes) to 19 (>300 min of everyday activity and >120 min of exercise training per week). The cutoff value for reaching the recommended level of at least 150 min of physical activity per week is 11. The score of 11 ( $\pm 1$ ) was used as the cutoff for categorization of patients' physical activity at baseline into three categories: 3 to 9 was categorized as <150 activity minutes, 10 to 12 as ~150 activity minutes, and 13 to 19 as >150 activity minutes. These categories were used as explanatory variables in the multiple logistic regression model.

#### Patient characteristics

Data on the patients' age, sex, diagnoses, and health care consumption were collected electronically through the medical record system. Age was measured at PAP date.

Sex was recorded as female and male. Details of all registered diagnoses, office visits to health care, and occasions of inpatient care were collected in the 12 months before the prescription date. Diagnoses were described at a disease group level, i.e. by the first character code according to the International Classification of Diseases version 10 (ICD-10) [38]. The five most common disease groups were identified; i.e., musculoskeletal diseases, circulatory diseases, endocrine diseases, mental health disorders, and respiratory diseases. Each of these disease groups were dichotomized as "yes" or "no" according to their presence within the disease group. The number of disease groups and number of health care office visits was calculated for each patient. Inpatient care was dichotomized as "yes" or "no" according to whether one or more occasion of inpatient care occurred. Data on age, sex, and number of disease groups were used as an explanatory variable in the multiple logistic regression model.

Data on the patients' education level were collected in the baseline questionnaire and assessed in terms of the patient's highest education level attained and dichotomized into having a university degree, "yes" or "no". Patients were asked about their highest education level in a four-item question, and university education

**Table 1** Patient characteristics at baseline and differences in characteristics between dropouts and participants at follow-up

	Baseline (n = 604)	Follow-up		P value
		Dropouts (n = 204)	Participants (n = 400)	
Age (years), mean (SD) [min–max]	59.6 (15.2) [18–90]	54.9 (16.4) [18–86]	62.0 (14.0) [18–90]	< 0.001 <sup>a</sup>
Sex, female n (%)	402 (66.6)	126 (61.8)	276 (69.0)	0.075 <sup>b</sup>
Education, university education n (%)	145 (24.9)	42 (21.3)	103 (26.7)	0.156 <sup>b</sup>
Baseline activity (score 3–19), median (IQR) [min–max]	9.0 (5.0) [3–19]	8.0 (5.0) [3–19]	9.0 (5.0) [3–19]	0.004 <sup>c</sup>
Confident to change (1–10), median (IQR) [min–max]	7.0 (3.0) [1–10]	6.5 (3.0) [1–10]	7.0 (3.0) [1–10]	0.593 <sup>c</sup>
Important to change (1–10), median (IQR) [min–max]	8.0 (3.0) [1–10]	8.0 (3.0) [1–10]	7.0 (4.0) [1–10]	0.266 <sup>c</sup>
Diagnoses <sup>d</sup>				
Musculoskeletal diseases, yes n (%)	341 (58.9)	102 (54.3)	239 (61.1)	0.116 <sup>b</sup>
Circulatory diseases, yes n (%)	284 (49.1)	77 (41.0)	207 (52.9)	0.007 <sup>b</sup>
Endocrine diseases, yes n (%)	222 (38.3)	66 (35.1)	156 (39.9)	0.267 <sup>b</sup>
Mental health disorders, yes n (%)	171 (29.5)	70 (37.2)	101 (25.8)	0.005 <sup>b</sup>
Respiratory diseases, yes n (%)	168 (29.0)	64 (34.0)	104 (26.6)	0.065 <sup>b</sup>
Number of diagnoses, median (IQR) [min–max]	7.0 (5.00) [0–18]	6.00 (5.00) [0–15]	7.00 (5.00) [0–18]	0.887 <sup>c</sup>
Health care use <sup>e</sup>				
Number of office visits, median (IQR) [min–max]	13.0 (21.0) [1–119]	13.0 (22.0) [1–116]	14.0 (19.0) [1–119]	0.715 <sup>c</sup>
≥ 1 hospital stay, yes n (%)	148 (24.5)	49 (26.1)	99 (25.2)	0.821 <sup>b</sup>
Prescribing professional group, physician n (%)	169 (28.0)	58 (28.4)	111 (27.8)	0.860 <sup>b</sup>
Prescribing setting, primary care n (%)	490 (81.1)	158 (77.5)	332 (83.0)	0.099 <sup>b</sup>
Used counselor support after PAP, yes n (%)	208 (34.4)	59 (28.9)	149 (37.3)	0.042 <sup>b</sup>

<sup>a</sup> Independent sample t test<sup>b</sup> Pearson chi-squared test (binary variables)<sup>c</sup> Mann-Whitney U test<sup>d</sup> Medical record registrations 12 months before PAP of the International Classification of Diseases version 10 (ICD 10) classified diagnostic groups excluded Z<sup>e</sup> Medical record registrations 12 months before PAP of health care visits in primary and/or specialized somatic and psychiatric care with no selection of professional, overnight hospital stays, or specialized somatic and psychiatric care

was one of the options. Education level was used as an explanatory variable in the multiple logistic regression model.

Data on the patients' readiness to change was collected through the baseline questionnaire and measured by two questions derived from MI and recommended for clinical practice of PAP [2]. Patients were asked "how important is it for you to change your physical activity" and "how confident are you about succeeding in changing your physical activity". The responses options were on a Likert scale ranging from 1 to 10, where 1 was equal to "not at all ..." and 10 to "very ...". These measurements were used in the description of the patient characteristics.

Data on exercise among family and friends were collected through the baseline questionnaire and measured by the question "How many of your friends, family exercise regularly?" The four alternatives were "none", "some", "a majority" and "all". The answers were categorized as "yes" and "no", where yes included "a majority" and "all" and no the other two alternatives. This question has previously been used in a Swedish survey for adults aged 20 to 65 years [39]. Exercise among family and friends was

used as an explanatory variable in the multiple logistic regression model.

Patients' perception of received support after PAP was collected by the follow-up questionnaire and measured by the question "Do you feel that you have received the support you needed to increase your physical activity" Three alternatives for response was given: "yes", "no" and "do not remember". The answers were categorized into received needed support for increased physical activity, "yes" or "no". "No" encompassed both "no" and "do not remember". This question was developed by the researchers of the study with the purpose to complement the measurements of patients' use of counselor support. Patients' perception of support was used as an explanatory variable in the multiple logistic regression model.

### Health care characteristics

Health care characteristics included data on the prescribing professional and the setting, and the patient's counselor visits. These data were collected electronically through the medical record system. The prescribing professional was categorized as physician: "yes" or

“no”. “No” included prescription from others, i.e., physiotherapists, nurses, psychologists, behavioral therapists, midwives, dieticians, and occupational therapists. The prescribing setting was categorized “yes” or “no” for PAP in primary care. “No” included prescription in secondary care (somatic and psychiatric). All data concerning face-to-face consultation with a counselor were collected in the first 16 months after PAP and were dichotomized as “yes” or “no” for use of counselor support. “Yes” included patients with one or more face-to-face consultations with a counselor. All measurements of health care characteristics were used as explanatory variables in the multiple logistic regression model.

### Statistical analysis

Descriptive statistics were used for presentation of the patient characteristics and study variables. Continuous data are presented as means, standard deviation (SD), and min–max. Non-normally distributed continuous data and ordered categories are presented as medians, interquartile range (IQR), and min–max, while non-ordered categorical data are presented as frequencies. Depending on the data level and distribution, chi-squared statistics, Mann-Whitney U test, or independent sample t test was used to compare groups.

Multiple binary logistic regression analysis (forced entry) was used to determine the relationship between the explanatory variables and the outcome variable. The outcome variable “increased physical activity” was calculated by subtract physical activity at the follow-up from physical activity at baseline on an individual level. The difference score was then recoded so that 0 reflected no change or decreased physical activity (i.e., difference scores  $\leq 0$ ) while 1 reflected increased physical activity (i.e., difference score  $> 0$ ).

The explanatory variables included age (continuous), sex (female = 1, male = 0), university education (yes = 1, no = 0), baseline activity (score 3–9 = 1, score 10–12 = 2, score 13–19 = REF), number of diagnostic groups (continuous), exercise among family and friends (yes = 1, no = 0), prescription by physician (yes = 1, no = 0), prescription in primary care (yes = 1, no = 0), use of counselor support (yes = 1, no = 0), and positive perception of support for increased physical activity after PAP (yes = 1, no = 0).

All explanatory variables were included in a multiple binary logistic regression model, including an analysis of the whole sample and of two stratified subgroups. One subgroup included the patients who used counselor support and one group included the patients who did not use this support.

A  $p$  value  $< 0.05$  was regarded as statistically significant. All statistical analyses were performed with SPSS

Statistics for Windows 27.0 (IBM Corp, Armonk, NY, USA).

## Results

### Study sample

The mean age of the study sample ( $n = 355$ ) was 61.1 (SD = 14.2). More than half were females ( $n = 242$ , 68%) and about one quarter had a university education ( $n = 92$ , 27%) (Table 2). Low physical activity (score 3–9) at baseline was seen in half of the study sample. Several of the patients had a high number of diagnoses and a high number of health care visits before PAP. Musculoskeletal disease was the most common disease ( $n = 254$ , 59%), followed by circulatory disease ( $n = 179$ , 52%), endocrine disease ( $n = 135$ , 38%), respiratory disease ( $n = 90$ , 26%), and mental health disorders ( $n = 89$ , 26%). PAP was most often prescribed in primary care ( $n = 298$ , 84%) and by other health care professionals than physicians ( $n = 257$ , 72% vs. 98, 28%), and the offer of counselor support was used by less than two-fifths of the patients ( $n = 135$ , 38%).

### Differences in characteristics between patients with increased activity versus patients with no increase in activity

Almost half of the patients ( $n = 167$ , 47%) reported increased activity 1 year after PAP. In contrast, 59 (17%) patients reported unchanged physical activity and 129 (36%) reported decreased physical activity.

The patients with increased activity were somewhat younger ( $p = 0.013$ ), had a lower level of baseline activity ( $p < 0.001$ ), had fewer exercising family and friends ( $p = 0.005$ ), and had fewer health care visits ( $p = 0.038$ ) and diagnoses ( $p = 0.009$ ) than patients with no increase (Table 2). A higher proportion of those who used counselors ( $p < 0.001$ ) and patients with a positive perception of support after PAP ( $p < 0.001$ ) were seen among patients with increased activity.

The baseline median score for patient's confidence to change and for patient's perception of the importance of changing was high and did not differ between the patients with increased activity and the patients with no increase in activity 1 year after PAP (Table 2).

### Multiple binary logistic regression analysis

The multiple binary logistic regression model of the whole sample showed that lower levels of baseline activity, use of counselor support, and having a positive perception of support received after PAP were significantly and positively associated with increased physical activity 1 year after PAP (Table 3).

The multiple binary logistic regression model, in which patients were stratified according to whether they had used or not used counselor support after PAP



**Table 2** Characteristics of all patients in the study and in patients with increased physical activity versus patients with no increase in physical activity

	Study sample (N = 355)	Increased physical activity		P value	Valid data
		Yes (n = 167)	No (n = 188)		
Age (years), mean (SD) [min–max]	61.6 (14.2) [18–90]	59.6 (13.8) [18–85]	63.3 (14.3) [23–90]	0.013 <sup>a</sup>	355
Sex, female n (%)	242 (68.2)	117 (70.1)	125 (66.5)	0.471 <sup>b</sup>	355
Education, university education n (%)	92 (26.6)	49 (29.9)	43 (23.6)	0.189 <sup>b</sup>	346
Baseline activity (score 3–19), median (IQR) [min–max]	10.0 (5.0) [3–19]	8.0 (5.0) [3–18]	11.0 (4.8) [3–19]	< 0.001 <sup>c</sup>	355
< 150 min (score 3–9)	176 (49.6)	105 (62.9)	71 (37.8)		
~ 150 min (score 10–12)	95 (26.8)	39 (23.4)	56 (29.8)		
> 150 min (score 13–19)	84 (23.7)	23 (13.8)	61 (32.4)		
Confidence to change (1–10), median (IQR) [min–max]	7.0 (3.0) [1–10]	7.0 (3.0) [1–10]	7.0 (3.0) [1–10]	0.643 <sup>c</sup>	351
Important to change (1–10), median (IQR) [min–max]	8.0 (4.0) [1–10]	8.0 (3.0) [1–10]	8.0 (4.0) [1–10]	0.152 <sup>c</sup>	353
Exercising family/friends, yes n (%)	151 (43.3)	58 (35.4)	93 (50.3)	0.005 <sup>b</sup>	349
Diagnoses <sup>d</sup>					
Musculoskeletal diseases, yes n (%)	204 (59.0)	87 (54.0)	117 (63.2)	0.082 <sup>b</sup>	346
Circulatory diseases, yes n (%)	179 (51.7)	78 (48.4)	101 (54.6)	0.254 <sup>b</sup>	346
Endocrine diseases, yes n (%)	135 (38.4)	57 (35.4)	76 (41.1)	0.279 <sup>b</sup>	346
Mental health disorders, yes n (%)	89 (25.7)	48 (29.8)	41 (22.2)	0.104 <sup>b</sup>	346
Respiratory diseases, yes n (%)	90 (26.0)	42 (26.1)	48 (25.9)	0.976 <sup>b</sup>	346
Number of diagnoses, median (IQR) [min–max]	6.0 (5.0) [0–18]	6.0 (4.0) [0–16]	7.0 (4.5) [0–18]	0.006 <sup>c</sup>	346
Health care use <sup>e</sup>					
Number of office visits, median (IQR) [min–max]	12.0 (19.0) [1–118]	11.0 (18.0) [1–92]	15.0 (15.0) [1–118]	0.038 <sup>c</sup>	348
≥ 1 hospital stay, yes n (%)	86 (24.1)	38 (28.3)	48 (25.9)	0.570 <sup>b</sup>	348
Prescribing professional group, physician n (%)	98 (27.7)	136 (81.4)	162 (86.2)	0.225 <sup>b</sup>	355
Prescribing setting, primary care n (%)	298 (84.0)	52 (31.1)	46 (24.5)	0.161 <sup>b</sup>	355
Used counselor support after PAP, yes n (%)	135 (38.0)	82 (49.7)	52 (27.7)	< 0.001 <sup>b</sup>	355
Positive perception of received support, yes n (%)	211 (60.3)	115 (69.3)	96 (52.2)	< 0.001 <sup>b</sup>	350

<sup>a</sup> Independent sample t test<sup>b</sup> Pearson chi-squared test (binary variables)<sup>c</sup> Mann-Whitney U test<sup>d</sup> Medical record registrations 12 months before PAP of the International Classification of Diseases version 10 (ICD 10) classified diagnostic groups excluded Z<sup>e</sup> Medical record registrations 12 months before PAP of health care visits in primary and/or specialized somatic and psychiatric care with no selection of professional, overnight hospital stays, or specialized somatic and psychiatric care

showed different results for the groups. Among counselor users, increased physical activity was found to be associated with lower levels of baseline activity and having a positive perception of support given after PAP. The other factors were not associated with increased physical activity: age, gender, education, number of diagnoses, having exercising friends or family, being prescribed by a physician and being prescribed in primary care. Among non-counselor users, increased activity was only associated with low baseline activity (Table 3). Among the counselor users, 99 patients (74.4%) reported a positive perception of support, and the corresponding figure among the non-counselor users was 112 (51.6%).

## Discussion

This study sought to investigate patient and health care characteristics associated with increased physical activity 1 year after prescription among patients prescribed physical activity in routine care. We found that increased physical activity was associated with having a baseline activity below the recommended level of at least 150 min of physical activity per week, using counselor support, and having a positive perception of support received after PAP.

The positive association found in this study between lower baseline activity and increased physical activity after 1 year indicates that PAP was an appropriate intervention for patients with the greatest need for increased

**Table 3** Multiple binary logistic regression analysis of factors associated with improved physical activity 1 year after prescription

	Whole sample (n = 326) <sup>a</sup>		Counselor yes (n = 125)		Counselor no (n = 201)	
	Odds ratio (95% CI)	p value	Odds ratio (95% CI)	p value	Odds ratio (95% CI)	p value
Age	0.99 (0.97–1.00)	0.189	0.99 (0.96–1.02)	0.450	0.99 (0.97–1.01)	0.344
Female	1.12 (0.66–1.92)	0.668	1.50 (0.59–3.81)	0.392	0.99 (0.50–1.96)	0.970
University education	1.30 (0.75–2.27)	0.346	1.35 (0.54–3.41)	0.522	1.07 (0.51–2.23)	0.865
Baseline activity						
< 150 min (score 3–9)	4.33 (2.24–8.38)	< 0.001	7.17 (2.19–23.48)	0.001	3.23 (1.40–7.47)	0.006
~ 150 min (score 10–12)	2.33 (1.14–4.78)	0.021	4.22 (1.10–16.21)	0.036	1.80 (0.74–4.34)	0.194
> 150 min (score 13–19)	Reference		Reference		Reference	
Number of diagnoses <sup>b</sup>	0.93 (0.87–1.00)	0.064	0.89 (0.79–1.01)	0.081	0.95 (0.87–1.05)	0.301
Exercising friends/family	0.66 (0.40–1.08)	0.100	0.77 (0.40–1.89)	0.579	0.60 (0.32–1.13)	0.112
Prescribed by physician	1.15 (0.66–1.98)	0.626	0.96 (0.37–2.50)	0.937	1.27 (0.63–2.59)	0.514
Prescribed in primary care	0.78 (0.40–1.60)	0.465	1.38 (0.42–4.56)	0.594	0.65 (0.28–1.52)	0.320
Counselor users	1.80 (1.07–3.00)	0.026	Strata		Strata	
Positive perception of support	2.08 (1.24–3.48)	0.005	7.24 (2.64–19.85)	< 0.001	1.22 (0.65–2.27)	0.537
Pseudo R square: Cox & Snell/Nagelkerke	0.170/0.227		0.238/0.323		0.103/0.140	

<sup>a</sup> Comprise the 326 patients with complete data for all variables in this analysis

<sup>b</sup> Medical record registrations 12 months before PAP of the International Classification of Diseases version 10 (ICD 10) classified diagnostic groups excluded Z

activity. Similar results were seen in a previous Swedish PAP study including 6 months follow-up [26]. Contrary to our findings, higher baseline activity was found in others studies to be associated with higher adherence to the written prescription of physical activity [18] and patients' adherence to referred exercise programs [40]. However, these inconsistent findings might be due to differences in measuring adherence and increased activity. Compared with other studies of PAP [18, 21, 22, 41], several patients in our study had a relatively high level of activity when they received PAP.

There are a few potential explanations for the high level of baseline activity. Since the baseline measure of physical activity was included in the questionnaire, which was sent to the patients after they received PAP, some patients might already have increased their physical activity when they responded to the questionnaire. Other explanations might be that the present study reached more patients with higher activity levels or the fact that PAP was not only prescribed to patients with insufficient physical activity. The patients' physical activity might have been poorly assessed by the health care professionals at the time of the prescription [42]. Available tools for measurement have been shown to be impractical in clinical work [43]. Health care professionals may have relied on their own opinions about physical activity rather than using recommended physical activity guidelines [42, 44]. For this study, we have no information on how the patients' physical activity was assessed by individual prescribers of PAP. However, lack of registration of patients' physical activity in the medical records indicates that

assessment of physical activity was not frequently carried out. Improved attention to assessment of patients' physical activity in health care practice before initiating a PAP could yield improved results.

The patients' positive perception of support in this study is likely related to the use of counselor support although the questionnaire did not specifically ask what this support entailed. A qualitative interview study which included PAP recipients recruited from the same population as the present study showed that patients who visited a counselor expressed a great deal of confidence in the counselor's competence and in the individualized support given by the counselor [28]. The need for support when receiving PAP has been reported in several qualitative studies [27–29, 31]. Support from health care professionals seems to be particularly important among patients with disease [27, 45]. It has been documented that some patients are afraid that physical activity might worsen the disease [46].

Our finding was somewhat unexpected regarding the negative association between patients' increase in physical activity and the presence of family and friends who exercise. Social influence is a key element in shaping attitudes, beliefs, and behaviors in numerous social cognitive theories, e.g., Theory of Planned Behavior [47], Social Cognitive Theory [48] and Self-Determination Theory [49]. However, our result may be explained with reference to Social Comparison Theory [50], which posits that people have an innate drive to evaluate themselves in comparison with others. Thus, in comparison with others performing better (upward

comparisons), there is a risk of underestimation of one's own ability. In contrast, we can devote ourselves to comparison with others performing worse (downward comparison) than ourselves, because it makes us feel more satisfied with ourselves [51]. Among PAP recipients, comparisons with peers in group activities at similar or lower capability to perform activity has been reported to strengthen satisfaction with one's own capability [28, 31]. It is not clear whether a different question than asking about exercising family and friends would be more informative or if support should be measured at follow-up. The results in our study regarding patients' perception of support indicate that follow-up measures of support might better predict patients increase in physical activity. Results in a Swedish PAP study that used a validated instrument to measure support from family and friends found that neither family nor friends was a significant baseline predictor for PAP recipients' increase in physical activity [26]. However, the adjusted analysis in the present study showed no significant association with increased physical activity for friends and family who exercise. Measurement of support by family and friends seems to be complex issue that needs more attention in research.

In our study, the adjusted analysis showed no significant association with increased activity for age, sex, education level, or number of diagnoses. Studies have shown different findings regarding the influence of patients' age [18, 26, 52] and sex [18, 26, 53]. These differences might be influenced by the use of different outcome measures and variations concerning the health care delivery of PAP [54]. For example, older age has been found to be positively associated with adherence to prescribed exercise programs [52] and the written physical activity prescription [18] but not to increased physical activity after PAP [26]. It is well established that the behavior change involved in increased physical activity is complex. Thus, several factors influence the changes, including not only patients' physical and psychological capacity, attitudes and motivation, but also their inner context (e.g., family and friends) and outer context (e.g., access to local sports activities and structural and economic constraints of health care) [33].

There are some limitations that need to be considered when interpreting the results of the present study. The study was conducted over 1 year, which makes it impossible to assess how the physical activity levels developed in a longer term. We recruited 40% of all PAP recipients at baseline within primary and secondary routine care over the 1-year period. Two-thirds of the baseline participants participated at follow-up. Patient-related willingness to participate is difficult to overcome in the type of real-world studies that we

undertook. Non-participants at both baseline and follow-up were younger and had more mental health disorders diagnoses.

Due to lack of registration of patients' physical activity in the medical records, it was not possible to collect these data on the day when PAP was prescribed. Measures of patients' physical activity were based on responses from the baseline questionnaire, which were sent to the patients 2 to 3 weeks after the prescription day. The patients who did not respond were sent a reminder after an additional 3 weeks. However, if patients responded directly or after a reminder did not influence the outcome of physical activity at follow-up ( $p=0.101$ ). The use of self-reported measurement of physical activity could be seen as a limitation of the study.

From the medical records, it was not possible to retrieve any data on support from health care professionals other than the physical activity counselors. Other health care professionals might have provided support after PAP. Support might also have been given from others outside health care.

The limitations of the study should be balanced against the study's strengths. To our knowledge, this is the first routine health care study of the Swedish PAP program investigating the association between counselor support after PAP and increase in patients' physical activity. Real-world health care studies including routine health care populations are essential to document the benefits of interventions as delivered in routine clinical practice. This type of study typically has high generalizability, clinical utility and policy relevance [55]. The study reflected real-world PAP delivery, had a relatively large sample of PAP recipients recruited, had high data quality with low internal non-response, and had a 1-year recruitment period, which reduced the risk of bias related to seasonal variations of physical activity [56]. Recruitment of participants and data collection in this study were handled by one of the researchers, therefore routine health care delivery of PAP by health care professionals and counselors was not influenced by research-related tasks.

### Implications for clinical practice

Identifying patients with insufficient levels of activity might increase the quality of routine health care delivery of PAP, and allow health care counseling resources to be allocated to patients with the greatest need for increased activity. This study suggests a feasible method for improving the future health and well-being of patients and the results could contribute to health practitioners' confidence in the outcomes of PAP.

## Conclusion

Increased physical activity after PAP was related to low baseline activity, a positive perception of support, and use of counselor support after PAP. Qualified counseling support linked to PAP seems to be most important for achieving increased physical activity among patients with lower baseline activity.

## Abbreviations

ICD 10: International Classification of Diseases version 10; PAP: Physical activity on prescription; used as an overall term for prescribed physical activity in health care.

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## Authors' contributions

All authors (PA, SH, KÅ, LL, PN) conceived and designed the study. PA carried out data collection; PA, KÅ, and SH analyzed the data. PA drafted the manuscript and SH, KÅ, LL and PN participated in preparation of the manuscript. All authors have read and agreed to the published version of the manuscript.

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## Availability of data and materials

The data that support the findings of this study are available from Region Kronoberg, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. However, data are available from the corresponding author (PA) upon reasonable request and with permission of Region Kronoberg.

## Declarations

### Ethics approval and consent to participate

The research study was developed in accordance with the ethical principles of the Declaration of Helsinki and was approved by the Regional Ethical Review Board in Linköping (no. 2013/51–31). Informed consent was obtained by all the participants.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

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