Towards the effective introduction of physical activity interventions in primary health care

Huijg, J.M.

Chapter 2

Factors influencing primary health care professionals' physical activity promotion behaviors: a systematic review

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Abstract

Background

Despite the promising findings related to the efficacy of interventions aimed at promoting physical activity (PA) in primary health care (PHC), the translation of these interventions to PHC practice does not always happen as desired.

Purpose

To help understand why efficacious PHC-based PA interventions are not effectively translated to practice, this study systematically reviewed the literature on factors influencing PHC professionals' PA promotion practices.

Method

Literature searches were conducted in Web Of Science, PubMed, and PsycINFO for peer reviewed articles published in English from 1990 onwards. Studies were included that met the following criteria: 1. involving PHC-based PA interventions, and 2. reporting factors influencing PHC professionals' PA promotion behaviors. Two researchers independently screened studies and extracted data. A narrative synthesis using thematic analysis was conducted to identify factors.

Results

Of the 4469 identified articles, 59 were included in the review. Factors were identified by qualitative methods, barrier/facilitator ratings, and the examination of the relationship between factors and PA promotion, and the effectiveness of introduction strategies. Many factors related to the development, delivery, and effects of the innovation, the socio-political and organizational culture, resources, and support, patient and PHC professional characteristics, and innovation strategies were identified as potential influences on PHC professionals' PA promotion practices. However, the lack of evidence on the relationship between factors and PA promotion indicated insufficient evidence on PA promotion determinants.

Conclusion

This extensive overview of potential factors can inform intervention developers and implementers on which factors may play a role when introducing PA interventions in PHC. Future research should further investigate relationships between factors and PA promotion, which should be guided by qualitative in-depth knowledge on influencing factors.

Introduction

In the last decades many interventions have been developed aimed at promoting physical activity (PA) in primary health care (PHC) [60]. These PHC-based PA interventions, such as PA counseling, prescribing PA, and patient referral to PA programs, have been shown to be effective in research settings [61–63]. However, rates of PA promotion by PHC professionals are far from optimal [50–52] and PA interventions are not delivered as intended by the intervention developers [1,9,53,54].

This gap between research and practice reduces the impact that evidence-based PHC-based PA interventions can have on public health [1,10–13]. The gap may be at least partly due to the complexity of translating innovations to practice, which often requires changes in organizations and health care professionals' behavior [17,18,27,30]. Moreover, health care professionals' behaviors may be influenced by a multitude of factors related to the intervention, adopting person, patient, social setting, organizational context, and introduction strategies [5,7,17,24,27,30,64].

With the impact of efficacious interventions depending on their use in practice, it is critical to systematically investigate this process [1,5,7,17,21,24]. Furthermore, knowledge on which factors influence PHC professionals' PA promotion behaviors can inform intervention developers and implementers with regard to the design of appropriate strategies to introduce interventions in practice [1,7,17,34]. Possibly related to the complexity of the translation of innovations to practice, the factors that help and hinder the introduction of PA interventions in PHC are seldom studied in the PA literature [12,59]. This was also reported by Eakin et al. [58], who reviewed the PA intervention literature on the degree to which studies addressed interventions' introduction to practice. Furthermore, they reviewed eight studies on professionals' barriers to PA counseling in PHC, of which lack of time, perceived lack of patient receptiveness, lack of reimbursement, and perceived limitations in counseling skills were most reported. Recently, Hébert et al. [65] systematically reviewed the literature on PHC professionals' perceptions and attitudes towards PA counseling. They concluded that professionals perceive PA promotion as important and part of their role, but that they encounter numerous barriers to promote PA, such as lack of time, training, and reimbursement.

To date, no study has systematically reviewed the literature taking the comprehensive perspective of factors related to the intervention, adopting person, patient, social setting, organizational context, and introduction strategies influencing this subject. This might be due to the heterogeneity of theories and frameworks that guide implementation research, leading to challenges in measuring factors underlying health care professionals' behaviors [22,64]. To investigate factors influencing PHC professionals' PA promotion we used Fleuren et al.'s [17] theoretical framework describing the different categories of determinants of the introduction of innovations in health care (i.e., characteristics of the innovation, socio-political context, organization, adopting person, and innovation strategy). Moreover, we included characteristics of the patient as an additional category as proposed by Chaudoir et al. [64]. Fleuren et al.'s [17] framework has been successfully used for the identification of determinants of the introduction of innovations in health care in previous studies [40–42]. To the best of our knowledge, this study is the first to use this framework as a guide to study determinants of the introduction of PA interventions in PHC.

In short, the objective of this study was to systematically review the literature on factors influencing professionals' PA promotion. The main aim was to explore the factors described in the literature to be influencing PHC professionals' PA promotion practices. A secondary aim was to examine which methods are used to identify influencing factors and to take these methods into account when interpreting the results.

Method

Literature search

The literature search was performed between March and April 2012. Articles were retrieved via online databases and cross-checking reference lists. Three electronic databases, i.e., Web Of Science, PubMed, and PsycINFO, were systematically searched for the period of 1990 to 2012. A combination of the following keywords was used: physical activity, exercise, physician, clinician, nurse practitioner, practice nurse, professional, provider, family practice, general practice, health, primary care, primary health care, health care, promotion, and prevention. The full search strategy is described in Figure 1.

((physical activ* OR exerc*) AND (physician* OR clinician* OR nurse practi* OR professional* OR provider* OR family practi* OR general practi* OR practice nurse*) AND (health OR primary care OR primary health care OR healthcare OR health care) AND (promot* OR prevent*) NOT (child* OR school*))

Figure 1. **Search strategy**

Study selection

A study was eligible for inclusion in the review if: 1. it involved face-to-face interventions focusing on promoting PA in adults (e.g., PA counseling, prescribing PA, and patient referral to PA programs), 2. PA promotion was delivered in PHC or interventions were developed to be delivered in PHC, 3. outcomes included factors perceived to influence or associated with PHC professionals' PA promotion behaviors, 4. it was an original collection of data, and 5. it was written in English. All types of research designs were included.

Two researchers (JH and JdV) independently screened all titles to exclude clearly irrelevant articles. Consequently, they independently screened abstracts and full-texts to identify articles that were potentially relevant (Figure 2). The results of this process were discussed afterwards. Only slight disagreement occurred in this stage, which was discussed between the two researchers and resolved by consensus. A Kappa of .86 was calculated for the selection of articles based on full-texts, which reflects excellent agreement according to Orwin [66].

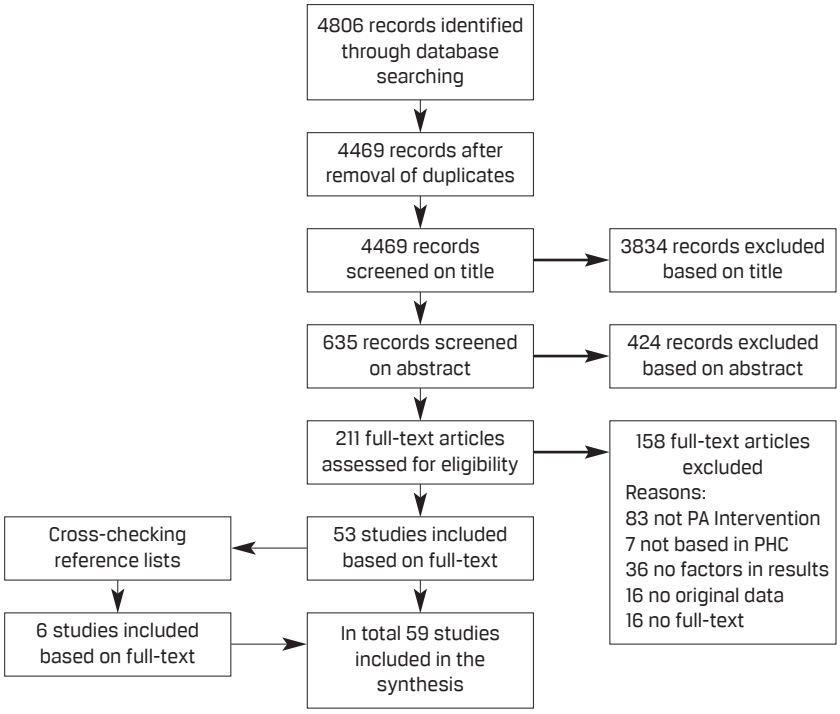

Figure 2. **Flow diagram of selection process**

Data collection and analyses

From the final set of studies that met the inclusion criteria, JH and JdV independently extracted the following study details: design, methods, objective, type of intervention, the intervention's target group, and study participants. A narrative synthesis using thematic analysis was conducted to identify influencing factors [67]. This included extracting all evidence regarding influences on PHC professionals' PA promotion from the literature. With regard to qualitative studies, a factor was created for everything that was reported to have a positive or negative influence on the introduction process. Regarding quantitative studies, all factors that were examined were included in the list of evidence. For each factor we registered the type of evidence (i.e., perceived influencing factors, relationship). Subsequently, factors were grouped into themes. This inductive approach to thematic analysis [68] was applied to detect factors and themes that were strongly linked to the data. A theoretical approach to thematic analysis [68] was used to structure the data by classifying the factors inductively derived from the data within the different categories of determinants of the introduction of innovations in health care (i.e., characteristics of the innovation, socio-political context, organization, adopting person, innovation strategy, and patient) as forwarded by Fleuren et al. [17] and Chaudoir et al. [64]. Every step of the process was done independently by the two researchers, and discussed afterwards. Cases of disagreement were resolved by consensus.

Results

The search strategy yielded 4469 potential articles after removal of duplicates (Figure 2). Following completion of screening, a total of 59 studies met the inclusion criteria and were included in the systematic review.

Characteristics of the included studies

Study characteristics are presented in Table 1. The final set of studies incorporated in the review encompassed a variety of methods to identify factors, including a. qualitative methods (e.g., interviews [69], focus groups [70]) investigating perceptions on barriers and facilitators of PA promotion, b. quantitative studies using questionnaire ratings of barriers and facilitators (e.g., indicating key factors from a list of barriers/facilitators [71]; rating barriers/facilitators on a 5-point Likert scale from very unlikely to act as a barrier to very likely to act as a barrier [72]), c. quantitative studies investigating the relationship between certain predetermined factors and PA promotion, and d. quantitative studies examining the effectiveness of introduction strategies. Some studies used a combination of these methods to identify factors (Table 2).

Factors for which qualitative evidence was found as well as factors that were rated a barrier or facilitator in questionnaire studies are considered in the present study as perceived influencing factors. Factors, including introduction strategies, for which their relationship with PA promotion has been investigated were described as either related to, unrelated to, or as having inconclusive relationships with PA promotion. For the latter factors, some studies found a relationship with PA promotion, while other studies did not or found opposite relationships with PA promotion.

Table 1. **Study characteristics**

	Study	Design	Methods	Objective	Type of intervention	Target group intervention	Study participants
1.	Abramson et al. [73]	Cross-sectional	Questionnaire	To investigate exercise habits and counseling practices	Exercise counseling	Sedentary PHC patients	298 PHC professionals
2.	Ackermann et al. [74]	RCT	Pretest and posttest questionnaires	To evaluate an intervention with the aim to promote referral of older adult patients to community exercise programs	Exercise advice	Sedentary older PHC patients	31 PHC professionals
3.	Allenspach et al. [75]	Qualitative	Interviews	To explore experiences with the 'Move for Health' project	PA counseling	PHC patients aged 16–65 years	40 physicians
4.	Almeida et al. [76]	Prospective trial	Referral rates record	To determine the effectiveness of a stimulus control strategy to increase referrals to an evidence-based PA program	Referral to PA intervention	PHC patients	11 physicians
5.	Al-Shahri and Al-Sameeh [77]	Cross-sectional	Questionnaire	To explore PA promotion practices	PA promotion	PHC patients	89 male physicians
6.	Bize et al. [78]	Qualitative	Interviews	To better understand the opinions, beliefs, and behavior regarding PA promotion	PA counseling	PHC patients	16 PHC professionals
7.	Bull et al. [72]	Cross-sectional	Questionnaire	To assess current practice, perceived desirable practice, and barriers related to PA promotion	Ask, assess, advice and PA promotion in general	PHC patients	908 GPs
8.	Bull & Milton [79]	Qualitative	Focus groups and interviews	To evaluate a systematic approach to integrating PA promotion into PHC	PA promotion	Patients aged 16-74 ranging from a low or high risk of chronic conditions	10 PHC professionals
9.	Burns et al. [80]	Cross-sectional	Questionnaire	To examine PA counseling practices and influencing factors	PA counseling (assessment and advice)	PHC patients	396 PHC NPs
10.	Croteau et al. [81]	Cross-sectional	Questionnaire	To determine the prevalence of PA advice and to identify characteristics of patients who receive such advice	PA advice and Green prescription	Sedentary PHC patients	8187 PHC patients
11.	Damush et al. [82]	Cross-sectional	Questionnaire	To describe the extent to which older adults receive recommendations to exercise	Exercise recommendations	Older adults	893 older adults
12.	Dauenhauer et al. [83]	Cross-sectional	Questionnaire	To better understand the prevalence of exercise prescriptions and related attitudes, barriers, and educational needs	Exercise prescriptions	Older adults	177 PHC professionals
13.	Douglas, Torrance et al. [84]	Cross-sectional	Questionnaire	To investigate attitudes, current practice, and knowledge related to PA advice	PA advice	PHC patients	757 PHC professionals

Table 1. **Study characteristics (continued)**

	Study	Design	Methods	Objective	Type of intervention	Target group intervention	Study participants
14.	Douglas, van Teijlingen et al. [85]	Cross-sectional	Questionnaire and interviews	To investigate attitudes, beliefs, and practice associated PA advice	PA advice	PHC patients	381 PHC professionals
15.	Eakin et al. [14]	Prospective trial	Pretest and posttest questionnaires	To evaluate efforts to increase PA promotion	PA counseling (incl. PA advice)	PHC patients	44 GPs pretest 37 GPs posttest and 2333 patients pretest and 2469 posttest
16.	Eakin et al. [86]	Cross-sectional	Questionnaire	To evaluate the prevalence of PA advice and characteristics of patients who receive it	PA advice	PHC patients	2478 PHC patients
17.	Eckstrom et al. [87]	Prospective controlled trial	Pretest and posttest questionnaires	To examine whether an educational intervention is effective in increasing PA counseling and whether this is associated with increased PA among patients	PA counseling	Elderly PHC patients with multiple chronic diseases	48 residents and 465 patients
18.	Epel and Regev [88]	Cross-sectional	Questionnaire	To investigate PA counseling and associated variable	PA counseling, PA assessment, PA advice, PA assistance	Older population	793 older adults
19.	Glasgow et al. [51]	Cross-sectional	Questionnaire	To examine relationships between PA counseling and patient characteristics	PA advice	PHC patients	1818 adults
20.	Goodman et al. [89]	Cross-sectional	Questionnaire	To investigate the feasibility of involving PHC nurses in PA promotion for older people	PA promotion	Community dwelling older people	515 PHC nurses
21.	Graham et al. [90]	Cross-sectional	Questionnaire and interviews	To investigate factors influencing referral to an exercise scheme	Exercise referral schemes	PHC patients	71 GPs (questionnaire) and 10 GPs and 2 PNs (interviews)
22.	Gribben et al. [91]	Cross-sectional	Questionnaire	To investigate Green Prescriptions practices and associated factors	Green prescription	Sedentary patients	316 GPs
23.	Harrison et al. [92]	Cross-sectional	Referral rates record	To examine the impact of exercise referral schemes at a population level and associated factors with uptake of the service	Exercise referral scheme	Sedentary patients	6610 referrals to the exercise referral scheme
24.	Hinrichs et al. [93]	Cross-sectional	Questionnaire	To evaluate the rate and characteristics of elderly patients receiving PA advice	PA advice	Older PHC patients	1,627 older PHC patients
25.	Huang et al. [94]	Prospective trial	Pretest and posttest GP questionnaires and interviews with patients '	To assess the success and cost effectiveness of the Active Script Program' in increasing PA advice	PA assessment, advice	PHC patients	338 GPs pretest, 332 GPs posttest, and 54 and 54 patients

Table 1. **Study characteristics (continued)**

	Study	Design	Methods	Objective	Type of intervention	Target group intervention	Study participants
26.	James et al. [95]	Longitudinal	Referral rates record	To examine scheme and participant characteristics in relation to access, uptake, and participation in PA referral schemes	PA referral schemes PHC patients	PHC patients	Referral data from 2958
27.	Johnson et al. [96]	Quasi experimental	Questionnaire	To examine the effectiveness of a workshop on PA promotion strategies	PA counseling and referral	RDs' patients	103 RDs
28.	Kennedy and Meeuwisse [97]	Cross-sectional	Questionnaire	To assess current and desired exercise counseling practices and related barriers	Exercise counseling	Family physicians patients	330 PHC professionals
29.	Lawlor et al. [98]	Cross-sectional	Questionnaire	To determine PA promotion practices and their impact	PA promotion (incl. PA advice)	PHC patients	174 GPs
30.	Leijon et al. [99]	Prospective trial	Referral rates record	To examine characteristics of the PA referrals' recipients and practitioners and to identify reasons for practitioners to use them	PA referrals	High-risk PHC patients.	PA referral rates: 3343 (2004) and 2955 (2005)
31.	Märki et al. [100]	Prospective trial	Patient pretest and patient and GPs posttest questionnaire and interview	To investigate how to promote daily PA of elderly patients through systematic counseling conducted by GPs	PA counseling	Elderly patients	2 GPs and 29 of their patients aged 65+
32.	McDowell et al. [101]	Cross-sectional	Questionnaire	To measure PA promotion and to identify related factors	PA promotion, PA advice, asking, assistance	PHC patients	169 PNs
33.	McKenna et al. [102]	Cross-sectional	Questionnaire	To examine PA promotion and related barriers	PA promotion	PHC patients	615 PHC professionals
34.	McKenna et al. [103]	Cross-sectional	Questionnaire	To investigate the prevalence and types of PA promotion and which patients receive it	PA promotion	RDs' patients	395 RDs
35.	McKenna and Vernon [104]	Cross-sectional	Questionnaire	To examine PA promotion practices and to identify how training has influenced delivery	PA counseling	PHC patients	234 GPs
36.	Morrato et al. [105]	Cross-sectional	Questionnaire	To evaluate the prevalence of received PA advice and to identify associated factors	PA advice	Adults with diabetes and who are at risk of developing diabetes	26.878 adults with diabetes or at risk of developing diabetes
37.	Patel et al. [69]	Qualitative	Interviews	To identify perceptions on green prescriptions use for the management of depression	Green prescription	Sedentary PHC patients	15 GPs
38.	Patel and Parchman [106]	Cross-sectional	Questionnaire, direct observation and and audio recordings	To study the relationship between exercise discussions and factors related to the organization	Exercise counseling	Diabetic patients	162 patients and 45 PHC physicians

Table 1. **Study characteristics (continued)**

Study	Design	Methods	Objective	Type of intervention	Target group intervention	Study participants
39. Petrella et al. [107]	RCT	Pretest and posttest questionnaires, telephone interview, and patient recordings	To investigate exercise counseling and acceptance and utilization of an exercise counseling instrument	Exercise counseling	Older adults	362 physicians pretest, 293 physicians posttest
40. Pinto et al. [108]	RCT	Pretest and posttest questionnaires	To examine perceptions on PA counseling, PA counseling training, and support materials, and patients' perceptions on PA counseling	PA counseling	Physicians' older adult patients	34 physicians and 355 patients
41. Podl et al. [109]	Cross-sectional	Direct observation checklist, and a patient exit questionnaire	To assess the prevalence of exercise counseling and to ascertain associated patient and visit characteristics	Exercise counseling (incl. advice	PHC patients	138 physicians, 4215 visits with direct observational data, and 3152 patients
42. Puig Ribera et al. [110]	Cross-sectional	Questionnaire, interviews, and focus groups	To investigate PA promotion practices	PA promotion	PHC patients	145 physicians and 92 nurses (questionnaire), 18 physicians and 15 nurses (interviews), and 5-12 participants (5 focus groups)
43. Puig Ribera et al. [111]	Case study	Focus groups and interviews with patients and key players	To generate explanations for the lack of integration of PA promotion in PHC	PA promotion	PHC patients	20 patients and 22 stakeholders
44. Robertson et al. [112]	Cross-sectional	Questionnaire	To investigate PA recommendations, characteristics of patientsreceiving recommendations, and patients' uptake of the recommendation	Recommending PA	PHC patients	1261 patients
45. Sassen et al. [113]	Prospective	Questionnaire	To explore the relationship between social cognitive variables and PA advice	PA advice	Cardiovascular risk patients	572 healthcare professionals (time 1) and 278 healthcare professionals (time 2)
46. Schmid et al. [114]	Cross-sectional	Focus Groups and a questionnaire	To develop a procedure and information material for PA promotion broadly applicable in the PHC setting	PA counseling	Patients older than 65 years old	12 GPs
47. Sherman et al. [115]	Cross-sectional	Questionnaire	To examine exercise counseling practices	Exercise counseling	Healthy patients	422 PHC physicians

Table 1. **Study characteristics (continued)**

Study	Design	Methods	Objective	Type of intervention	Target group intervention	Study participants
48. Shirley et al. [116]	Cross-sectional	Questionnaire	To determine knowledge, confidence, role perception, barriers, feasibility, and PA counseling practices	PA advice	Physical therapist patients	319 physical therapists and 279 physical therapist students
49. Smith et al. [117]	Qualitative	Focus groups	To identify attitudes toward exercise schemes	Prescription for exercise schemes	PHC patients	22 PHC professionals and 1 receptionist
50. Sowden et al. [118]	Cross-sectional	Referral rates record	To examine every stage of the implementation of the exercise referral scheme	Exercise referral schemes	People from disadvantaged socio-economic groups	6101 patients referred by general practices to exercise referral schemes
51. Swinburn et al. [70]	Qualitative	Focus groups	To assess attitudes and perceptions towards using green prescription and the feasibility of incorporating it into everyday practice	Green prescription	Sedentary patients	25 GPs
52. Tompkins et al. [71]	Cross-sectional	Questionnaire	To describe NP practice patterns for exercise counseling	PA counseling	Adults and older adults	398 NPs
53. van der Ploeg et al. [119]	Prospective trial	Pretest and posttest questionnaires	To examine PA promotion and associated factors	PA promotion	PHC patients	325 GPs (1997) and 397 GPs (2000)
54. van Sluijs et al. [120]	Qualitative	Interview	To conduct a process evaluation of a PA promotion program and investigate its effectiveness	PA promotion	General practice patients	17 PHC professionals and 12 practice assistants
55. Walsh et al. [121]	Cross-sectional	Questionnaire	To identify factors influencing exercise counseling and prescription	Exercise assessment, counseling and prescription	PHC patients	157 PHC professionals
56. Wee et al. [122]	Cross-sectional	Questionnaires	To examine physician counseling about exercise and to identify factors associated with counseling	PA counseling	PHC patients	9299 patients
57. Williford et al. [123]	Cross-sectional	Questionnaire	To determine physicians' attitudes and practices related to PA promotion and exercise prescriptions	PA advice and exercise prescriptions	Physicians' patients	168 physicians
58. Wilson et al. [124]	RCT	Patient exit questionnaires	To study the effect of a training on the frequency and quality of exercise prescriptions	Exercise prescription	Sedentary patients	22 physicians and 420 patients
59. Winzenberg et al. [125]	Qualitative	Interviews	To investigate GPs' perceptions of assessing PA, and to explore how GPs assess PA in their patients	Assessing PA	PHC patients	15 GPs

Note. PHC, primary health care; PA, physical activity; GPs, general practitioners; NPs, nurse practitioners; RDs, registered dieticians

Table 2. Methods to identify factors and categories and amount of factors

Type of method	Method to identify factors Source of data	Study
Qualitative	Perceptions on barriers/facilitators	Allenspach et al. [75]
	PHC professionals	Bize et al. [78]
		Bull & Milton [79]
		Patel et al. [69]
		Schmid et al. [114]
		Smith et al. [117]
		Swinburn et al. [70]
		Van Sluijs et al. [120]
		Winzenberg et al. [125]
	Multiple stakeholders	Puig Ribera et al. [111]
Quantitative	Ratings of barriers/facilitators	Bull et al. [72]
	PHC professionals	Goodman et al. [89]
		Gribben et al. [91]
		Kennedy and Meeuwisse [97]
		Lawlor et al. [98]
		Märki et al. [100]
		Tompkins et al. [71]
		Williford et al. [123]
	Analysis of relationship between factors and PA promotion	Al-Shari and Al-Almaei [77]
		McKenna et al. [103]
	PHC professionals	McKenna and Vernon [104]
		Sassen et al. [113]
	Patients	Croteau et al. [81]
		Damush et al. [82]
		Eakin et al. [86]
		Epel and Regev [88]
		Glasgow et al. [51]
		Hinrichs et al. [93]
		Morrato et al. [105]
		Robertson et al. [112]
		Wee et al. [122]
	Medical record data	Harrison et al. [92]
		James et al. [95]
		Leijon et al. [99]
		Sowden et al. [118]
	PHC professionals & medical record data	Patel and Parchman [106]
	Patients & medical record data	Podl et al. [109]

Table 2. **Methods to identify factors and categories and amount of factors (continued)**

Type of method	Method to identify factors Source of data	Study
	Ratings of barriers/facilitators + analysis of relationship between factors and PA promotion *PHC professionals*	Abramson et al. [73] Burns et al. [80] Dauenhauer et al. [83] Douglas, Torrance et al. [84] McDowell et al. [101] McKenna et al. [102] Sherman and Hershman [115] Shirley et al. [116] Walsh et al. [121]
	Effectiveness of introduction strategies *PHC professionals* *Patients* *PHC professionals & patients* *Medical record data*	Huang et al. [94] Johnson et al. [96] Ackermann et al. [74] Eakin et al. [14] Almeida et al. [76]
	Effectiveness of introduction strategies + analysis of relationship between additional factors and PA promotion *PHC professionals* *Patients* *PHC professionals & patients*	Pinto et al. [108] Van der Ploeg et al. [119] Eckstrom et al. [87] Wilson et al. [124]
Mixed	Perceptions + analysis of relationship between factors and PA promotion *PHC professionals*	Douglas, van Teijlingen et al. [85] Puig Ribera [110]
	Perceptions + ratings of given barriers/facilitators *PHC professionals*	Graham et al. [90] Petrella and Wight [107]

Note. PHC, primary health care; PA, physical activity

Factors influencing PA promotion

Factors influencing PHC professionals' PA promotion practices are shown in Table 3, 4, 5, 6, 7, and 8. The findings are presented in the different categories of determinants of the introduction of innovations in health care [17,64] and whether they were perceived influencing factors or their relationship with PA promotion was investigated.

Characteristics of the innovation

Factors related to characteristics of the innovation are shown in Table 3.

Table 3. **Factors related to characteristics of the innovation**

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Development	Lack of (fully developed) protocol (-)	78,90,110,114, 120,125]	Barrier [71,102] to 54.6% - 55% [97,110]	Y: [101]
	Flexibility intervention (+) *Possibility to adapt to professionals' needs* *Possibility to adapt patients' needs*	[114] [78,110,125]		
	Fit with daily routine (+)	[75,79,110]		
	PA part of preventive intervention (+)	[114]		
	Use of waiting room (+)	[78,114]		
	Evidence-based (+)	[79,90]	Lack of is barrier to 3.1% - 12.9% [72,91,97]	
Delivery	Little time investment (+)	[110,114]		
	High delivery costs (-)		[71]	
	Administration work (-)	[100,120]	1.2 out of 5 on barrier score [108]	
	Intervention materials *Patient materials* (+)	[79,85,114]	Facilitator to 11.3% [71] Lack of is barrier to 39.3% - 43.4% [85]	
	Professional materials (+)	[70,75,78,107,114]	Lack of is barrier [83] to 5.4% - 29.2% [71,79]	
	Limited accessibility to target group (-) [110] [89]			
	Complex intervention organization (-) [75]			
Results/ effects	Effects (+)		Lack of is barrier [102]	Y: [115]
	Research on intervention (+)		[71]	
	Observable results (+)	[90]	[101]	

Note. PA, physical activity; Y, yes; N, no

Perceived influencing factors. Intervention materials for both patients [71,79,85,114] and professionals [70,71,75,78,79,83,107,114] were most often cited perceived influencing factors on PA promotion practices. Examples of facilitating materials were a PA booklet [114] and educational materials for patients [85] and an overview of all available regional resources for PA practice [78] and exercise prescription aids for professionals [107]. A (fully developed) intervention protocol, including core components that are essential to deliver, was also found to positively influence PA promotion in many studies [71,78,90,97,102,110,114,120,125], in addition to the intervention's flexibility to be adapted to professionals' [114] and patients' needs [78,110,125]. These factors indicate that a good balance between essential intervention components and the intervention's flexibility needs to be achieved to enhance PHC professionals' PA promotion. Next, multiple studies reported that PA is more often promoted when PA interventions are evidence-based [72,79,90,91,97].

Investigated relationships. The full development of an intervention protocol [101] and interventions' positive effects on patients' PA levels [115] were found to be significantly related to PHC professionals' increased PA promotion practices. No other innovation characteristics were studied for their association with PA promotion.

Characteristics of the socio-political context

Factors related to characteristics of the socio-political context are shown in Table 4.

Perceived influencing factors. The most often cited socio-political factor perceived to negatively influence PHC professionals' PA promotion practices was lack of formal education on PA promotion [72,84,85,89,97,107,110,111,123,124]. This barrier was reported by a variety of PHC professionals, including general practitioners, practice nurses, and health visitors. Moreover, lack of resources to promote PA was cited as a perceived barrier in four studies [85,101,102,110], while existing networks between PHC and PA and sport facilities in the community were often found to be facilitating [71,78,110,111].

Investigated relationships. PHC organizations' and professionals' support for the intervention was found to be significantly associated with higher PA promotion levels [113]. In addition, Leijon et al. [99] showed that PA interventions are delivered significantly more often during spring compared to

Table 4. Factors related to characteristics of the socio-political context

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Culture/ climate	Curative medical culture (-)	[78,110]		
	Lack of formal education on PA promotion (-)	[85,107,110,111]	Barrier [83] to 21.4% - 78% [72,84,85,89,97,110,123,124]	N: [77]
Support	Political/official support for PA interventions (+)	[110,111]	Lack of is barrier [71] to 69% [110]	
	Support for PA interventions from PHC organizations and professionals (+)	[110]		Y: [113]
Resources	Lack of resources (-)	[85,110]	[101,102]	
	Lack of funding for PA research (-)	[78]		
	PA and sport facilities within community (+)	[78]	Lack of is barrier [71,80]	
Networks	Networks between PHC and PA and sport facilities in community (+)	[78,110,111]	Lack of is barrier [71]	
Time of the year	Seasonal changes (spring 〉 summer)			Y: [99]

Note. PA, physical activity; PHC, primary health care; N, no; Y, yes

summer. Lack of formal education was found to be unrelated to PA promotion in one study [77]. No other socio-political characteristics were studied for their association with PA promotion.

Characteristics of the organization
Factors related to characteristics of the organization are shown in Table 5.

Perceived influencing factors. Lack of time to promote PA was the most often cited perceived barrier [69,70,72,73,75,78–80,84,85,89–91,97,98,100–102,107,108,110,114–116,120,121,124,125]. In addition, short consultation time [71] and shortage of staff to promote PA [71,89] were perceived to negatively influence PA promotion. These factors may be related to the multitude of tasks PHC professionals' need to deliver, but also to lack of time provided by the management of the organization to promote PA. Managerial top-down decisions regarding PA promotion practices were perceived to negatively influence PHC professionals' PA promotion practices [71,89], which is linked to the perceived importance of support for the intervention from staff within the organization [110].

Table 5. Factors related to characteristics of the organization

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Culture/ climate	Requirement in organization (top-down decision management) (-)		Barrier [89] to 5.9% [71]	
	Clarity on roles with regard to PA promotion (+)	[111]		
	Use of other preventive interventions (+)		Facilitator to 55.4% [71]	Y: [88]
Support	Support for PA interventions from staff (+)	[110]		Y: [106]
Resources	Lack of time (-)	[69,70,75,78,79, 85,90,91,100,107, 110,114,120,125]	Barrier [85,90] to 26.5% - 92.5% [72,73,80,84,89,97,98,101, 102,110,115,116,121,124] 2.3 out of 5 on barrier score [108]	
	Consultation time (long › short)		Long facilitator to 69.2% [71], short barrier to 68.1% [71]	Y: [102,106,109]
	Number of discussed problems (more › less)			Y: [106]
	Shortage of staff (-)		[71,89]	
	Number of GPs or PNs			N: [101,102]
	Number of patients			N: [101,102]

Note. PA, physical activity; GP, general practitioner; PN, practice nurse; Y, yes; N, no

Investigated relationships. Corresponding with the perceived importance of time to promote PA, longer consultation time was significantly related to higher levels of PA promotion [102,106,109]. Support for the intervention from staff within the organization [106] and the use of other preventive interventions within the organization, such as weight reduction counseling [88], were significantly associated with higher PA promotion levels. Also, a significant positive relationship was found between PA promotion and the number of problems discussed during consultations [106]. Two studies did not find a relationship between PA promotion and the number of staff and patients within the organization [101,102]. No other organization characteristics were studied for their association with PA promotion.

Characteristics of the patient
Factors related to characteristics of the patient are shown in Table 6.

Perceived influencing factors. Patients' negative attitudes towards prevention and PA was the most cited perceived barrier related to patient characteristics [71,72,91,97,110,114,115,121]. This may be related to other perceived inhibiting factors, such as patients' barriers to be physically active (e.g., not having time, busy lifestyles) [71,110] and patients' and professionals' competing agendas [78]. For example, a patient may prefer medication over lifestyle changes to enhance their health [78]. On the other hand, a good relationship between patients and professionals, causing amongst others increased knowledge on patients' personal lives and patients that accept professionals' advice, was reported to enhance PA promotion practices in multiple studies [70,71,110,125]. Finally, PA was perceived to be promoted most often in patients with a bad physical health [69,78,125] and patients with a condition that is linked to PA [98,110,125].

Investigated relationships. Multiple studies indicated that patients with a bad physical health (e.g. having one or multiple chronic diseases) receive significantly more PA promotion compared to patients with a good physical health [51,72,81,82,86,88,93,105,109,112,122]. Related to this, one study found that having a condition that is linked to PA was significantly associated with higher PA promotion levels [72]. In addition, PA was shown to be most often promoted in patients with a high socioeconomic status [118], patients with a general practitioner [51], and patients first visiting a PHC professional [101,103]. Factors unrelated to PA promotion were patients' employment status [112] and marital status [51,82,122].

Many inconclusive relationships were found. For instance, multiple studies reported that PA is most often promoted in middle-aged patients [92,99,105,112,118,122] and women [51,72,88,92,99,105,106,118,122], while evidence was also found for higher PA promotion in older patients [51,82,109], younger patients [81], and men [86,93,109] and some studies did not find a relationship for age [81,86,95,106] or gender [81,82,95,112]. Furthermore, two studies found that patients' negative attitude towards prevention and PA was significantly related to lower levels of PA promotion [72,82], while another study did not find an association [112]. Other factors for which inconclusive relationships were found were: patients' education level [51,82,86,88,93,105,112,122], income level [51,81,82,105,122], ethnic background [51,81,82,88,93,105,112,122], number of visits to PHC [51,86,88,93], physical limitations [93,105], mental health [72,82,95], PA level [81,82,93,105,122], and smoking behavior [88,93,105,112] (for details see Table 6).

Table 6. **Factors related to characteristics of the patient**

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Demographic characteristics	Age			N: [86,95,106] (green prescription) [81]
	Young ‹ in between › Old	[125]		Y: [92,99,105,112, 118,122]
	Old › Young			Y: [51,82,109]
	Young › Old			Y: (PA advice) [81]
	Gender			N: [81,82,95,112]
	Women › men			Y: [51,72,88,92,99, 105,106,118,122]
	Men › women			Y: [86,93,109]
	SES (high › low)		Low is barrier [71]	Y: [118]
	Education level			N: [51,82,86,88,93]
	High › low			Y: [105,112,122]
	Income level			N: [51,81,82]
	High › low		Low is barrier [71]	Y: [105,122]
	Employment status			N: [112]
	Language barriers (-)		Barrier [71] to 16.9% [80]	
	Ethnic background			N: [82,93,112,122]
	Maori & pacific › others			Y: (PA advice) [81]
	Maori › others			Y: (green prescription) [81]
	Nonwhites › whites (US)			Y: [51]
	Black and white › Hispanic or Asian Native or Western Europe (+) (Israel)			Y: [105] Y: [88]
	Lack of family support (-)		Barrier [71]	
	Marital status			N: [51,82,122]
Health care access	Number of visits			N: [93]
	More › less	[110]		Y: [51,86,88]
	Having a GP (+)			Y: [51]
	Type of insurance			N: [51]
	Insured › uninsured			Y: [122]
	Being a new patient (+)			Y: [101,103]

Table 6. **Factors related to characteristics of the patient (continued)**

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Health	PA link with condition (+)	[110,125]	Lack of is barrier to 68.4% [98]	Y: [72]
	Physical health (bad › good)	[69,78,125]		Y: [51,72,81,82,86, 88,93,105,109,112, 122]
	Physical disability (-)	[125]	[71,89]	N: [93]
	Physical limitations (+)			Y: [105]
	Mental health			
	Good › bad		Bad mental health is barrier [71]	Y: [72,95]
	Bad › good			Y: [82]
Lifestyle	PA level			N: [93,122] (green prescription) [81]
	Low › high	[120]		Y: [82,105] (PA advice) [81]
	High › low			Y: [88,106]
	Smoking behavior			N: [93,112]
	Smoking › no smoking			Y: [88]
	No smoking › smoking			Y: [105]
Interest in prevention/ PA	Initiation of topic (+)	[125]	[71]	
	Patient barriers to be physically active (-)	[71,110]		
	Negative attitude towards prevention and PA (-)	[91,110,114]	Barrier to 21.1% - 87.3% [71,72,97,115,121] Positive attitude facilitator to 87.4% [71]	N: [112] Y: [72,82]
Patient/ professional interaction	Positive relationship between patient and professional (+)	[70,110,125]	[71]	
	Competing agendas patient and professional (-)	[78]		

Note. PA, physical activity; N, no; Y, yes

Characteristics of the adopting person
Factors related to characteristics of the adopting person are shown in Table 7.

Perceived influencing factors. PHC professionals' perception that patients lack motivation to be physically active was the most often cited perceived barrier to PA promotion [71,73,78–80,84,85, 90,97,98,107,110,120,125], followed by PHC professionals' priorities other than PA promotion [71,78, 80,85,90,97,110,111,115,121,125]. Tasks competing with PA promotion were, for example, other health promotion and preventive medicine activities [78], such as dealing with obesity and falls [125]. Moreover, one study forwarded that the extent to which the primary reason of the patient for visiting required immediate treatment was perceived to decrease the importance of discussing PA [90]. On the other hand, many studies found that PHC professionals' positive attitudes towards PA [69,71,110,115,124], the intervention [69–71,73,78,111,114,116,117,125], and the intervention's effectiveness [70,90,110,115–117,121,124] were perceived to enhance PA promotion. In addition, PHC professionals' knowledge [71,73,78,90,97,107,110,115] and skills [78,110,115,116,120,121,124] were often cited perceived facilitators.

Investigated relationships. PHC professionals' positive attitude towards the intervention's effectiveness was significantly and positively related to PA promotion practices [115,121]. Furthermore, PHC professionals' intentions [104,113] and habits regarding PA promotion were found to have a significant positive effect [113]. Studies could not find a relationship between PA promotion and PHC professionals' education level [80], smoking behavior [115], and perceived role/responsibility [83].

Many inconclusive relationships were found. For example, one study found that younger professionals and professionals with short practice experience promote PA significantly more often [73], while other studies found that this holds true for older professionals [115,121] and professionals with long practice experience [121]. Yet, two studies did not find associations between professionals' age, practice experience and PA promotion [101,102]. Likewise, multiple studies found that professionals' high PA levels are significantly related to higher levels of PA promotion [73,77,80,101, 102,110,115], whereas two studies did not find an association [91,103]. Other factors for which inconclusive relationships were found were: PHC professionals' profession [73,80,84,85,88,95,99,110, 121], physical health [115,121], received education on PA promotion [80,101,102], and self-efficacy [80,113,115,116]. Finally, inconclusive relationships were found for PHC professionals' knowledge [80,101,116,121] and positive attitudes towards PA [83,113,115] and the intervention [83,102,113,116]
(for details see Table 7).

Table 7. Factors related to characteristics of the adopting person

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Demographic characteristics	Age			N: [101,102]
	Young › old			Y: [73]
	Old › young			Y: [115,121]
	Profession			N: (prescribing) [121]
	PNs › GPs			Y: [110] [84]
	Pediatricians › geriatricians › GPs and internists			Y: [73]
	Dietician, GPs and specialists › PNs			Y: [88]
	HVs › PNs			Y: [85]
	GPs › internists			Y: (asking and counseling) [121]
	GPs › PNs › PTs			Y: [95]
	PTs and behavioral scientists › physicians and dieticians			Y: [99]
	Education level (degree)			N: [80]
	Practice experience (+)			N: [101,102]
	Short › long			Y: [73]
	Long › short			Y: [121]
Health and lifestyle	Physical health			N: (asking and prescribing) [121]
	Good › bad			Y: [115] (counseling) [121]
	PA level			N: [91,103]
	Low › high	[78]		
	High › low	[110]		Y: [73,77,80,101,102, 110,115]
	Smoking behavior			N: [115]
Capability	Received education on PA promotion (+)	[70]		N: [102] Y: [80,101]
	Knowledge on PA, recommendations, and interventions (+)	[78,90,107,110]	Lack of is barrier [71,90] to 16% - 50.6% [73,97,115]	N: [101,116] Y: [80,121]
	Counseling skills (+)	[78,110,120]	Lack of is barrier [116,124] to 12% - 33% [115,121]	
	Self-efficacy (+)	[79,110,125]	Lack of is barrier to 7.4% [121]	N: [80] Y: [113,115,116]
	PA promotion is routine/habit (+)	[70]	Facilitator to 50.1% [124]	Y: [113]

Table 7. **Factors related to characteristics of the adopting person (continued)**

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Motivation	Intention (+)	[70,110,125]		Y: [104,113]
	Perceived role/ responsibility (+)	[90,111]	Lack of is barrier to 7% [115]	N: [83]
	Beliefs about consequences			
	Positive attitude towards PA (+)	[69,110]	Negative attitude is barrier [71,124] to 11% [115]	N: [83] Y: [113,115]
	Positive attitude towards the intervention (+)	[69,70,78,111,114, 117,125]	Negative attitude is barrier [71,116] to 25% [73]	N: [83] Y: [102,113,116]
	Positive attitude towards the intervention's effectiveness (+)	[70,90,110,117]	Negative attitude is barrier [116,124] to 10.3% - 35% [115,121]	Y: [115,121]
	Perception of lack of patient motivation (-)	[78,79,85,90,107, 110,120,125]	Barrier [71,90] to 11% - 55.2% [73,80,84,85,97,98]	
	Perception of lack of patient compliance (-)	[91]	Barrier to 11% [73]	
	Competing priorities (-)	[78,85,90,110,111, 125]	Barrier to [71] 6.9% - 58.3% [80,90,97,115,121]	
	Emotions			
	Fear of undermining relationship with patients (-)	[78,91]		

Note. PN, practice nurse; GP, general practitioner; HV, health visitor; PT, physical therapist; N, no; Y, yes

Characteristics of the innovation strategy

Factors related to characteristics of the innovation strategy are shown in Table 8.

Perceived influencing factors. Most cited innovation strategies referred to PHC professionals' reinforcement. Specifically, adequate reimbursement for PA promotion practices was a frequently forwarded facilitator [71,78,80,97,107,114–116,124], in addition to other (financial) incentives [79,84,85,101,102]. Moreover, PHC professionals' PA promotion was perceived to be facilitated by providing information on PA and PA interventions [84,89,107,110], for instance during a workshop [91,103,110], and the inclusion of intervention reminders [78,114,125].

Investigated relationships. Seven studies investigated the effectiveness of combined innovation strategies, of which five were found to be effective [14,74,76,86,94,124]. The effective combined strategies involved some of the already described innovation characteristics (i.e., intervention materials, the intervention's evidence-base) and perceived influencing strategies (i.e., information, media attention, training, reminders) in combination with supervision [14], and stakeholder involvement in the development of PA interventions [94].

Inconclusive relationships with PA promotion were found for the provision of a workshop. Four studies reported a significant positive effect of the provision of a workshop [87,96,103,119], whereas two studies did not find such an effect [80,104].

Table 8. Factors related to characteristics of the innovation strategy

Theme	Factor	Perceived influencing factors		Relationship
		Qualitative evidence	Barriers/facilitators	
Information	Lack of information on PA and intervention (-)	[107,110]	Barrier to [89] 40 - 60% [84]	
	Media attention (+)	[78]	Facilitator to 30% [91]	
Training	Workshop (+)	[110]	Facilitator to 10% - 95.5% [91,103]	Y: [87,96,103,119] N:[80,104]
Reminders	Reminders (+)	[78,114,125]		
Assistance	Assistance (+)		Facilitator [71] to 5% [91]	
Reinforcement	(Financial) incentives (+)	[79]	Lack of is barrier [84,101,102] to 3.3% - 15% [79,85]	
	Adequate reimbursement (+)	[78,107,114]	Lack of is barrier [116] to 5.1% - 46.6% [71,80,97,115,124]	
Combined strategies	Media campaign, training, supervision, intervention materials professionals and patients (+)			Y: [14]
	Written information, intervention materials professionals, reminder, training (+)			Y: [74]
	Intervention material professional, reminder, instruction (+)			Y: [76]
	Training, written information, intervention materials professionals and patients (+)			Y: [124]
	Networks, stakeholder involvement in development, evidence-base, intervention materials professionals, media attention, training, audit (+)			Y: [94]
	Written information, reminder, poster, protocol, workshop			N: [108]
	Range of initiatives to increase attention to PA in PHC			N: [119]

Note. PA, physical activity; PHC, primary health care; Y, yes; N, no

Discussion

The aim of this study was to systematically review the literature on factors influencing PHC professionals' PA promotion. Based on 59 studies published in the last 20 years this review provides an overview of factors potentially influencing PHC-based PA promotion, taking into account the different methods used to identify these factors. Factors were organized following the different categories of determinants of the introduction of innovations in health care [17,64]. Prominent themes were the development, delivery, and effects of the innovation, the socio-political and organizational culture, resources, and support, patient and PHC professional characteristics, and innovation strategies.

Identified factors were foremost perceived influencing factors, as for only a minority of factors significant relationships with PA promotion were found. Most cited factors perceived to positively influence PA promotion referred to PHC professionals' knowledge [71,73,78,90,97,107,110,115], skills [78,110,115,116,120,121,124], and positive attitudes towards PA promotion [69–71,73,78,90,110,111,114–117,121,124,125], intervention materials [70,71,75,78,79,83,85,107,114], and strategies to reinforce PHC professionals' PA promotion practices [71,78–80,84,85,97,101,102,107,114–116,124]. Factors most cited to negatively influence PA promotion were lack of time [69,70,72,73,75,78–80,84,85,89–91,97,98, 100–102,107,108,110,114–116,120,121,124,125] and formal education [72,84,85,89,97,107,110,111, 123,124], PHC professionals' competing priorities [71,78,80,85,90,97,110,111,115,121,125] and their perception of patients' lack of motivation to be physically active [71,73,78–80,84,85,90,97,98,107,110,120,125]. For the majority of these factors their relationship with PA promotion was not investigated, which indicates that future research should examine the relationship between these important perceived influencing factors and PA promotion. Perceived influencing factors for which a significant positive relationship with PA promotion was found were: the full development of an intervention protocol [101], intervention's positive effects on patients' PA levels [115], support for the intervention from PHC organizations and professionals [113] and from staff within the organization [106], the use of other preventive interventions within the organization [88], and longer consultation time [102,106,109]. Furthermore, PA was most often promoted in patients with a high socioeconomic status [118], bad physical health [51,72,81,82,86,88,93,105,109,112,122], and a condition that is linked to PA [72] and PA was most often promoted by PHC professionals with positive attitudes towards the intervention's effectiveness [115,121], positive intentions [104,113], and habits regarding PA promotion [113].

Other factors for which significant relationships with PA promotion were reported lack qualitative evidence and were cited only once, indicating the need for further investigation. The same holds true for the majority of factors for which no relationship with PA promotion was found (i.e., lack of formal education [77], patients' employment status [112], and PHC professionals' education level [80], smoking behavior [115], and perceived role/responsibility [83]). For many other factors, particularly those related to characteristics of the patient and adopting person, we found inconclusive relationships with PA promotion. These findings might be explained by the variety in intervention type, intervention's target group, specific PHC practice, or country under study. This suggests that influencing factors with regard to these characteristics might be specific to each PA intervention and its context. Additional qualitative research on these factors might clarify their influence on PA promotion under a variety of circumstances.

In summary, included studies used a variety of methods to identify factors, leading to different categories of factors. Factors related to characteristics of the innovation, socio-political context, and simple innovation strategies were foremost identified by qualitative methods and barrier/facilitator ratings, whereas factors related to characteristics of the organization, patient, adopting person, and combined innovation strategies were foremost identified by quantitative methods (i.e., investigation of the relationship between factors and PA promotion and the effectiveness of introduction strategies). Many inconclusive relationships were found for the factors related to the characteristics of the patient and adopting person. These results might be explained by the variety in the type of intervention, the intervention's target group, specific PHC practice, or country under study. This suggests that influencing factors with regard to these characteristics might be specific to each PA intervention and its context. The results indicate a lack of studies on the relationship between PA promotion in general, and factors related to the innovation, socio-political context, and simple innovation strategies in particular. Furthermore, additional qualitative research may be necessary to examine factors related to the patient and adopting person. In line with Palinkas et al. [126], we therefore propose a combination of qualitative and quantitative methods to understand the effective introduction of innovations in practice. Moreover, the findings suggest that future research should investigate determinants of PA promotion by using a comprehensive theoretical framework taking into account all categories of factors affecting the introduction of innovations in health care, including factors related to the innovation, socio-political and organizational context, patient, adopting person, and innovation strategy [17,64]. Chaudoir et al. [64] provide an overview of measures that can be used to assess these categories of factors.

The factors identified in this review correspond with determinants discussed in the literature on the introduction of innovations in health care settings, such as Rogers' [24] characteristics of innovations (i.e., the innovation's compatibility, complexity, and observability), environmental factors and innovation strategies in Greenhalgh et al.'s [27] theoretical model on the translation of research in health care practice, and characteristics of the adopting person in Cane et al.'s [30] Theoretical Domains Framework. This suggests that the factors found might affect the implementation of evidence-based interventions in general, not merely PA interventions. Some factors are consistent with barriers related to PA promotion identified by Eakin et al. [58] and Hébert et al. [65], such as lack of time, lack of reimbursement, lack of resources, lack of patient receptiveness, and lack of knowledge, skills, and training, while others are an addition to these reviews. For example, a multitude of potential determinants related to the patient emerged from the data, suggesting the importance of taking these factors into account in implementation studies and frameworks, in which they are now often neglected [64].

Some limitations of the study should be noted here. Although the literature search was performed in both medical and psychological databases, broad search terms were used, and reference lists were cross-checked, articles may have been overlooked. Next, a discrepancy between perceived influencing factors and factors related to PA promotion was made based on the methods that were used to identify factors, yet the quality of these methods was not assessed or taken into account. With regard to the identified factors, relationships between factors, their relative importance, and their changeability could not be determined in this study. On the other hand, one of the strengths of this study is the inclusion of studies with a variety of methods and multiple sources of data to

identify factors, which allows for a broader examination than would qualitative or quantitative studies alone, as well as the inclusion of studies solely focusing on PHC professionals' as a source of data. In addition, the review investigated factors influencing PA promotion in general, without limitation to a specific intervention or target group, which makes our results applicable to a wide range of PHC-based PA interventions (e.g., PA promotion and counseling in general, exercise referral schemes).

Conclusion

This systematic literature review has identified many factors potentially influencing PHC professionals' PA promotion practices. These include factors related to the development, delivery, and effects of the innovation, the socio-political and organizational culture, resources, and support, patient and PHC professional characteristics, and innovation strategies. Knowledge on these factors can inform intervention developers and implementers on how to effectively introduce PA interventions in PHC [1,7,17,34]. Taking into account the methods that were used to identify these factors we can conclude that the findings are not unequivocal. First, for many factors their relationship with PA promotion was not examined and significant relationships with PA promotion were only found for a minority of factors. Overall, the findings emphasize the need for additional research on PA promotion determinants. Specifically, they suggest that a combination of qualitative and quantitative methods is desirable to investigate influencing factors. Finally, a further study into the relationships between factors, their relative importance, and changeability, and causal relationships between factors and the introduction process would lead to a better understanding of the exact role of all the potentially influencing factors that were distinguished through this literature review.