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ORIGINAL ARTICLE

The German recommendations for physical activity promotion

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Abstract

Aim This article describes the German recommendations for physical activity promotion. Such recommendations serve as an important stepping stone to increase physical activity prevalences on the population level.

Subjects and methods The German recommendations for physical activity promotion are based on three separate reviews: (1) a systematic review of reviews to formulate recommendations on the efficacy and effectiveness of interventions for physical activity promotion, which included 213 reviews; (2) a systematic review of reviews to investigate the cost-effectiveness of interventions for the promotion of physical activity, comprising of 18 reviews; (3) a review to identify literature on quality criteria for the conceptualisation, implementation and evaluation of interventions for physical activity promotion, which encompassed 24 studies and documents. Through an expert consensus panel, findings from each review were utilised to formulate specific recommendations for Germany.

Results Recommendations for physical activity promotion are provided for the following target groups: children and adolescents, adults, older adults, adults with a chronic disease and the general population. For each target group, other than the general population, the recommendations are structured by setting. Alongside recommendations on the efficacy and effectiveness of interventions, recommendations were also formulated for health equity, cost-effectiveness and quality criteria.

Conclusion From a political perspective, the development of recommendations for physical activity promotion highlights an important milestone for Germany. Not only do the national recommendations describe the amount of physical activity people should engage in, but they also provide organisations with information on how to support people in becoming more active.

Keywords Physical activity · Recommendations · Review · Efficacy · Cost-effectiveness · Quality

Background

In the field of physical activity (PA), two types of recommendation can be distinguished. According to Leon and Pesce (2017), the first type—physical activity recommendations—can be described as an evidence-based, clinically guided framework that centres on the nature, duration, intensity and volume of PA. Such recommendations focus on health-enhancing levels of PA by providing specific guidance on PA amounts and modalities through different fitness levels and age groups (Leon and Pesce 2017). The World Health Organisation (WHO) has urged nations to develop PA recommendations (WHO 2004), with a number of nations already having done so. For example, out of 37 European nations, 21 currently adopt this form of recommendation (Kahlmeier et al. 2015).

The second type of recommendation concerns physical activity promotion. This type attends to stakeholders such as practitioners, professionals and organisations involved with health prevention and promotion as well as political decision-makers and institutions. Recommendations for PA promotion target evidence-based interventions in specific settings and concentrate on daily living. The intention is not to define PA practice in terms of amount and frequency, but to inform policy on how to promote health-enhancing PA (Leon and Pesce 2017). Nations have been called upon to increase efforts for PA promotion, and guiding documents have been

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developed on the supranational level (European Commission 2008; Council of the European Union 2013; WHO 2009). On a national level, however, recommendations on how to promote PA are rarely seen. For example, the UK and the USA have published guidance on PA promotion (e.g. CDC 2011; NICE 2008), but PA and PA promotion recommendations have not been integrated into one single document.

From a Public Health perspective, the development of national recommendations for PA promotion can be challenging. This is due to several key points that need to be considered regarding the formulation of recommendations for physical activity promotion. First, it is essential that the efficacy of recommended interventions has been demonstrated. Commonly, intervention efficacy is shown in trials that utilise randomised and/or controlled designs. However, interventions should also prove that they are effective outside of the laboratory setting and can actually be implemented as part of public health practice (Flay 1986). Alongside efficacy and effectiveness, it is important to comprehend the effects that PA interventions have on existing health inequalities. Doing so will admit the formulation of PA recommendations that are potentially able to address and reduce health inequalities. From a governmental perspective, the promotion of PA also needs be cost-effective. In this regard, the costs and benefits of different PA interventions should be compared. Alongside efficacy, effectiveness, cost-effectiveness and impact on health equity, the success of an intervention will also depend on implementation.

In Germany, increases in political effort centred around PA promotion have been seen in recent years through collaboration between the Federal Ministry of Health—responsible for PA promotion in Germany—and the Federal Ministry of Nutrition. This heightened level of engagement can be partially credited for the development of national recommendations on PA and PA promotion. The decision to formulate the recommendations was supported by Germany's Conference of Health Ministers and Germany's Conference of Sport Ministers (2015). It was agreed that such recommendations should serve as a scientific guide for stakeholders and organisations within Germany to support the development of future activities in the field.

Regarding PA prevalence, Germany is comparable to other European nations. For example, 1/4 of boys and 1/6 of girls are sufficiently active in their leisure time (Lampert et al. 2007). Furthermore, 1/5 of women and 1/4 of men meet WHO PA recommendations (Finger et al. 2017). Considering PA patterns, a large proportion of the German population is active in sport clubs (27 Million people in 2017) (DOSB 2018). Moreover, Germany shows higher than average rates in reported exercise (European Commission 2014) or cycling (European Commission 2013) compared with other European nations.

This article describes the developmental process that resulted in the formulation of German recommendations for physical activity promotion. It is important to mention that reviews of reviews on interventions for PA promotion have already been conducted. These reviews deal partly with interventions that take place in a specific setting such as schools (e.g. Kriemler et al. 2011) or childcare facilities (e.g. Steenbock et al. 2014). Others deal with PA promotion across different settings, but are limited by focusing solely on efficacy/effectiveness (e.g. Heath et al. 2012; Jepson et al. 2010) or health equity (e.g. Lorenc et al. 2012). Differing from other reviews of reviews, our work encompasses a life course perspective and considers efficacy, effectiveness, health equity, cost-effectiveness and quality criteria of interventions for the promotion of PA. It reports on PA interventions for the target groups of children and adolescents, adults, older people, adults with a chronic disease and the general population. The process and results described could support other nations in the development of their own recommendations for physical activity promotion.

Methods

Three separate reviews were conducted, which were drawn upon for the overall formulation of recommendations for physical activity promotion. A brief description of the methodology employed for each separate review, as well as the process to build an expert consensus that followed to formulate the recommendations, can be found below. A more detailed description can be found elsewhere (Abu-Omar et al. 2017a, b; Messing and Rütten 2017).

Efficacy/effectiveness

First, a systematic review of reviews was conducted to support the formulation of recommendations that centre on the efficacy and effectiveness of interventions (Abu-Omar et al. 2017a). Six electronic databases (PubMed, Scopus, Sport Discus, PsycInfo, ERIC, IBSS) were searched. In collaboration with a university librarian, the following search terms were agreed upon: "physical activity", "intervention", "evidence", "effect", "health" and "review". Alternative terms (e.g. bike, biking, cycling, walking, active transport, human powered transport, sedentary, exercise, sport) were defined and MESH terms were formulated. Two independent reviewers screened the titles and abstracts deriving from the obtained literature and excluded duplicates. The screening process was based on the following criteria: (1) the review contains empirical results from single studies; (2) the review includes interventions focused on the promotion of PA or the reduction of inactivity; (3) the review focuses on the efficacy and/or

effectiveness of interventions; (4) reviews are written in English or German.

To ensure the above inclusion criteria were met, the titles and abstracts of the identified records were screened. In a secondary screening process, two reviewers independently screened full texts from 223 reviews. Hand searches were conducted to identify additional reviews. The 213 remaining reviews were then categorised by target group (children and adolescents, adults, older people, adults with a chronic disease, general population). Review quality was assessed by one independent researcher using the AGREE instrument (The AGREE Collaboration 2003), which was also utilised in the formulation of the Canadian Physical Activity Guidelines (Tremblay et al. 2010). For each target group, two researchers independently evaluated the reviews by following the methodology proposed by Smith et al. (2011).

Cost-effectiveness

A second systematic review of reviews was conducted to investigate the cost-effectiveness of interventions for the promotion of PA (Abu-Omar et al. 2017b). Ten electronic databases were searched: PubMed, Scopus, EBSCOhost, PsychInfo, SPORTDiscus, EBSCON-ECON LIT, Pro-Quest, ERIC, IBSS and NH-SEED. Included search terms comprised of "physical activity", "cost", "intervention", "systematic review" and "health outcome". Alternative terms were included and MESH terms were formulated. From the 762 identified reviews, titles and abstracts were screened and 247 duplicates were removed. In a screening process, two independent reviewers applied the following inclusion criteria: (1) reviews are written in English or German; (2) reviews model or summarise the health economic evaluation of interventions for PA promotion; (3) reviews document their search strategy and state inclusion/exclusion criteria; (4) The objective of interventions is to increase PA and/or improve health; (5) interventions target healthy individuals. Of the 515 remaining reviews, researchers agreed on 8 that met the above inclusion criteria. A hand search was conducted and ten additional reviews were identified. One independent reviewer assessed the quality of the 18 included reviews by following the National Collaborating Centre for Methods and Tools (2008).

Quality criteria

A third review was conducted to identify literature on quality criteria for the conceptualisation, implementation and evaluation of interventions for PA promotion (Messing and Rütten 2017). This review followed the methodology of a state-of-the-art review (Grant and Booth 2009). A systematic search was conducted in the electronic databases PubMed and Scopus. A Google search was also conducted to include English and German publications that (1) have been issued by governmental and non-governmental organisations and (2) have not been published in scientific journals. Included search terms comprised the following: "physical activity promotion", "sitting", "health promotion", "quality criteria" and "good practice". Fifty-five documents were identified and screened in a process that applied the following inclusion criteria: The document contains quality criteria focused on the conceptualisation, implementation and evaluation of interventions for PA promotion. Thirty-eight documents met the inclusion criteria for analysis in a secondary step. This process led to the exclusion of another 14 documents, which either did not meet the inclusion criteria or were classified as dated. With emphasis on quality criteria, the formulation of the recommendations occurred through the analysis of the 24 final included documents.

Expert consensus

Based on these three literature reviews, National Recommendations for Physical Activity Promotion were formulated by a range of experts. Based on prior expertise, two reviewers were assigned to assess the efficacy/effectiveness of reviews for a specific target group (e.g. children and adolescents). Once assigned to a target group, both reviewers underwent a systematic reviewing process: (1) conduction of an independent review of the identified literature and compilation of a draft summary statement; (2) a meeting comprising both reviewers to discuss statements and agree on a conjointly revised summary statement; (3) presentation and discussion of the summary statement with reviewers assigned to other target groups. Further adjustments were made to each summary statement through necessary feedback. (4) Conduction of a workshop meeting to present each summary statement to the whole project group (including scientists involved in drafting the PA recommendations) as well as an International Scientific Advisory Board. Each summary statement was revised on the basis of expert feedback. (5) Drafting of recommendations for each target group using the finalised summary statements. A template specifying how to draft the recommendations was developed and provided by project leaders. (6) Circulation of the drafted recommendations for review by the whole project group as well as the International Scientific Advisory Board.

Regarding cost-effectiveness and quality criteria, the same reviewers assigned for each target group were provided with analysis results deriving from the respective reviews. Reviewers sorted through results and selected outcomes relevant to their target group and also searched for additional target group-related information. Through this process, recommendations on cost-effectiveness and quality criteria were formulated.

Regarding health equity, the same reviewers assigned for each target group analysed the results of the systematic review

of reviews for efficacy/effectiveness. Based on the selected results and the obtainement of additional information from the original reviews, recommendations on health equity were formulated.

Recommendations were made when both reviewers rated the available evidence as strong or medium based on the following criteria: (1) the number of available reviews focusing on a given intervention type is sufficient to formulate recommendations; (2) the reviews show conclusive evidence for efficacy and/or effectiveness. Recommendations were not made when the above criteria were not fulfilled (weak or inconclusive evidence).

Results

General results on cost-effectiveness

The cost-effectiveness of an intervention was analysed by comparing the intervention costs to the expected intervention benefit. The key results of a systematic review of reviews (Abu-Omar et al. 2017b) informed the recommendations regarding cost-effectiveness. In short, the results have been summarised as follows: low-cost interventions (e.g. playground markings on existing schoolyards compared with building new playgrounds) and regulatory measures (e.g. policies for active breaks) were identified as being more cost-effective across different target groups. Interventions that are rather brief and reach a wider population (e.g. point-of-decision prompts) were also defined as cost-effective. Costly interventions might be appropriate for target groups that cannot be reached by simplistic measures or high-risk groups.

General results on quality criteria

The success of an intervention also depends on the quality of implementation. Based on a state-of-the-art review, a list of 18 evidence-based quality criteria was developed for the conceptualisation, implementation and evaluation of interventions for PA promotion. The key results of this study (Messing and Rütten 2017) were integrated into the formulation of the recommendations by defining quality criteria that are most relevant to the respective target group.

General results on health equity

Recommendations were formulated regarding the health equity of different interventions. Due to the small amount of available research, evidence was insufficient to define specific recommendations for each target group. Our analysis indicates three findings: (1) environmental approaches seem to address health inequalities better than behavioural and/or individual approaches (Lorenc et al. 2012); (2) health equity can be promoted by interventions that directly address socially disadvantaged groups (Durand et al. 2014); (3) interventions should enable the target group to actively participate in decisions concerning conceptualisation and implementation (Durand et al. 2014).

Children and adolescents

Based on the number of empirical studies on PA promotion, research pertaining to the target group of children and adolescents is clearly dominant (Rütten et al. 2016). This is due to the extent of school-related research (WHO 2009).

The formulation of recommendations for physical activity promotion among children and adolescents was based on 39 reviews. Of those 39, 3 were reviews of reviews (Heath et al. 2012; Kriemler et al. 2011; Steenbock et al. 2014); 33 were systematic reviews, with 6 having conducted a meta-analysis (Beets et al. 2009; Cushing et al. 2014; Kamath et al. 2008; Lonsdale et al. 2013; van Grieken et al. 2012; Waters et al. 2014). The other three were non-systematic reviews (Public Health England 2015; Trost et al. 2010; Ward et al. 2010). Of the 39 reviews, 28 dealt with PA promotion in schools (Atkin et al. 2011; Barr-Anderson et al. 2011; Beets et al. 2009; Brennan et al. 2014; Broekhuizen et al. 2014; Chillón et al. 2011; Crutzen 2010; De Meester et al. 2009; Dobbins et al. 2009, 2013; Dudley et al. 2011; Escalante et al. 2014; Heath et al. 2012; Kriemler et al. 2011; Langford et al. 2014; Larouche et al. 2014; Lonsdale et al. 2013; Naylor et al. 2015; Parrish et al. 2013; Pate et al. 2011; Public Health England 2015; Quitério 2013; Salmon et al. 2007; van Grieken et al. 2012; Van Lippevelde et al. 2012; van Sluijs et al. 2008; Waters et al. 2014; WHO 2009), 4 reviews were based on childcare (Ling et al. 2015; Mehtälä et al. 2014; Steenbock et al. 2014; Ward et al. 2010), and 3 reviews focused on the family and home setting (Marsh et al. 2014; Mitchell et al. 2012; Xu et al. 2015). The four remaining reviews attended to interventions that address multiple health behaviours (Cushing et al. 2014; Hillier-Brown et al. 2014), obesity prevention (Kamath et al. 2008) and computer-based interventions (Hamel et al. 2011).

Recommendations were drafted for the family and home setting, childcare facilities and schools (see Table 1). In particular, the school setting has proved to be central in the promotion of PA among children and adolescents. Due to the large number of identified reviews, strong evidence exists in this setting for the development of specific recommendations. The recommendations for the family and home setting and childcare facilities are based on a small number of studies that place emphasis on the individual level (medium evidence). Additionally, specific recommendations were formulated based on the cost-effectiveness of interventions and quality criteria for effective implementation. Due to the low number

Table 1 German recommendations for physical activity promotion: children and adolescents

	Family and home setting	Child care facilities	Schools
Efficacy	Involve parents in interventions for physical activity (PA) promotion		
	Encourage parents to be physically active together with their children and to be a role model in PA Provide children with play material that encourages PA	Create an appropriate environment for PA, especially spaces that can be freely designed by children Accompany children's activity through educational staff well trained in PA promotion	Conduct multi-component interventions. As part of a multi-component intervention or as single-component intervention: - Increase the amount of time spent in PA - Improve the quality of PA offers - Develop the skills of staff involved in PA promotion Only as part of a multi-component intervention: - Integrate the promotion of PA in school curricula - Create a school environment conducive to PA - Promote active transport
Cost-effectiveness	Conduct regulatory measures in institutions that lead to more PA time or improve teaching skills Change the environment through low-cost measures Conduct resource-intensive interventions for selected target groups who are difficult to reach or have health risk factors		
Quality criteria	Ensure the resources necessary for implementation Develop the capacities needed for successful implementation Ensure long-term support from management and the institutional administration Adjust the intervention to the specific context Ensure the involvement of all relevant stakeholders		
Health equity	No recommendations		

of available studies (weak evidence), recommendations were not made for computer-based interventions and health equity.

Adults

The formulation of recommendations for physical activity promotion among adults was based on 45 reviews. Of those 45, 5 were reviews of reviews (Brand et al. 2014; Heath et al. 2012; Jepson et al. 2010; Kahn et al. 2002; WHO 2009); 25 reviews analysed PA counselling and exercise programmes (Adams and White 2003; Anokye et al. 2012; Barr-Anderson et al. 2011; Bully et al. 2015; CADTH 2014; Campbell et al. 2012; Chau et al. 2010; Conn et al. 2009; Dishman et al. 1998; Engbers et al. 2005; Fry and Neff 2009; Lin et al. 2010; Malik et al. 2014; Marshall 2004; Morgan 2005; Morton et al. 2014; Orrow et al. 2012; Passon et al. 2011; Pronk 2009; Proper et al. 2003; Schroer et al. 2014; Senore et al. 2012; Shrestha et al. 2015; Stensel 2009; Wong et al. 2012), 7 reviews pertained to technology-based interventions (Broekhuizen et al. 2012; Cavill et al. 2012; Eakin et al. 2007; Maher et al. 2014; Neville et al. 2009; van den Berg et al. 2007; Vandelanotte et al. 2007), 3 reviews were pedometer-based interventions (Bravata et al. 2007; Freak-Poli et al. 2013; Kang et al. 2009), and 2 reviews addressed the topic of health equity (Cleland et al. 2013; WHO Europe 2013). The three remaining reviews dealt with different settings or specific intervention types (Matson-Koffman et al. 2005; Mitchell et al. 2013; Webel et al. 2010). It was striking to see that although a many reviews focused on a particular setting (13 workplace, 7 health care), most of them did not analyse the intervention type. For example, one meta-analysis showed that PA interventions at the workplace can be effective without comparing the effects of different intervention types (Conn et al. 2009).

Recommendations were defined for the workplace setting as well as for PA counselling and exercise programmes in different settings (Table 2). These recommendations are based on medium-level evidence. Additionally, specific recommendations were formulated regarding both cost-effectiveness of interventions and quality criteria for effective implementation. Due to the low number of available studies (weak evidence), recommendations were not made for health equity.

Older adults

The formulation of recommendations for physical activity promotion among older adults was based on ten reviews. Of those ten, four reviews dealt with general interventions for PA promotion (Cyarto et al. 2004; Hobbs et al. 2013; Morgan 2005; WHO 2009), with four reviews focusing on interventions in the health care setting (Arbesman and Mosley 2012; Hinrichs and Brach 2012; Neidrick et al. 2012; Stevens et al. 2014). The remaining reviews dealt with specific intervention

Table 2 German recommendations for physical activity promotion: adults

	Workplace	PA counselling and exercise programmes in different settings
Efficacy	Conduct multi-component approaches that incorporate the following elements: - Specific course offers for staff - Redesigning work processes - Creating infrastructures that promote PA at work	Conduct PA counselling and exercise programmes in different settings. Even short interventions can have an impact, but an increase in PA is more likely when more time is allowed Combine the counselling with specific activation measures, in particular the use of pedometers
Cost-effectiveness	Multi-component approaches to promote PA at the workplace are cost-effective Brief PA counselling sessions are cost-effective, but only achieve small effects on PA behaviour. For special target groups, the implementation of more intensive PA counselling and exercise programmes is recommended (i.e. socially disadvantaged individuals, people with health risk factors)	
Quality criteria	Use theory-based approaches Train staff responsible for PA counselling appropriately Use different strategies to promote PA (multi-component approach)	
Health equity	No recommendations	

types (Clark et al. 2012) and quality criteria for interventions based on PA promotion (Marques et al. 2011).

Recommendations were put forward for PA counselling and exercise programmes in different settings (Table 3). These recommendations are based on medium-level evidence. Additionally, specific recommendations were formulated for both the cost-effectiveness of interventions and quality criteria for effective implementation. Due to the low number of available studies (weak evidence), recommendations were not made for health equity.

Adults with a chronic disease

The formulation of recommendations for physical activity promotion among adults with chronic disease was based on 26 reviews. From those 26, 2 reviews focused on general interventions for PA promotion (Conn et al. 2009; Leidy et al. 2014), whereas 9 reviews dealt with interventions that address adults with one specific chronic disease (Aldcroft et al. 2011; Beinart et al. 2013; Cox et al. 2013; Cramp et al. 2013; Iversen et al. 2012; Kavookjian et al. 2007; Morris et al. 2014; Short et al. 2013; ter Hoeve et al. 2015). Nine reviews addressed the primary care setting (Ashenden et al. 1997; Hudon et al. 2008; McGrane et al. 2015; Morgan 2005; Neidrick et al. 2012; Orrow et al. 2012; Pavey et al. 2011; Smith 2004; Sorensen et al. 2006), with the six remaining reviews concentrating on specific intervention types (Bossen et al. 2014; Mansi et al. 2014; Mastellos et al. 2014; Munro et al. 2013; O'Halloran et al. 2014; Sargent et al. 2012).

Recommendations were made for interventions in health care institutions (Table 4). These recommendations are based on medium-level evidence. Additionally, specific recommendations were formulated for both the cost-effectiveness of interventions and quality criteria for effective implementation. Due to the low number of available studies (weak evidence), recommendations were not made for health equity.

Table 3 German recommendations for physical activity promotion: older adults

	PA counselling and exercise programmes in different settings
Efficacy	Offer PA counselling and exercise programmes in the home, community and health care setting. These programmes should be specifically tailored to older adults and take the socio-spatial context into consideration
	Conduct scientific research on PA promotion in older adults
Cost-effectiveness	Older adults are a particularly relevant target group for cost-effective PA promotion as health gains and a reduction in illness costs through PA can be achieved faster than in other target groups
	No recommendations regarding specific intervention types
Quality criteria	Adapt the measure to the target group to ensure that individual barriers can be taken into account
	Plan the content and organisational process for the measure in detail
	Ensure sufficient time resources for involved stakeholders
Health equity	No recommendations

Table 4 German recommendations for physical activity promotion: adults with a chronic disease

	Health care institutions
Efficacy	Introduce exercise referral schemes
Cost-effectiveness[a]	Training programmes tailored to the respective patient target group seem to be cost-effective
Quality criteria	Use theory-based approaches
	Tailor PA behaviour specifically
	Tailor the target group appropriately
Health equity	No recommendations

[a] As the review of reviews on cost-effectiveness was limited to healthy adults only, recommendations regarding cost-effectiveness for adults with a chronic disease were based on these five reviews: Park et al. 2013, Pavey et al. 2011, Pinto et al. 2012, Roine et al. 2009 and Taylor et al. 2014

General population

Due to the extent of reach, PA-promoting interventions targeting the general population present high public health potential. However, scientifically analysing the efficacy of policy and environmental interventions is very difficult using an experimental design. As a consequence, prioritising experimental studies would lead to the prioritisation of intervention strategies that are least relevant for public health and health promotion. To counter this dilemma, reviews that allowed a broad range of study designs were also taken into account.

The formulation of recommendations for physical activity promotion among the general population was based on 31 reviews. Ten reviews cover a broad range of population-based interventions (Baker et al. 2011, 2015; Heath et al. 2012; Jepson et al. 2010; Lorenc et al. 2012; Mozaffarian et al. 2012; NICE 2008; Reynolds et al. 2014; WHO 2009; Zaza et al. 2005), with the other 21 reviews focusing on one specific intervention type. Of these 21 reviews, 5 deal with the promotion of active transport (de Nazelle et al. 2011; Fraser and Lock 2010; Ogilvie et al. 2007; Pucher et al. 2010; Yang et al. 2011), 2 with infrastructures (Lee and Maheswaran 2010; McCormak and Shiell 2011), 1 with economic instruments (Shemilt et al. 2013), 3 with mass-media campaigns (Abioye et al. 2013; Brown et al. 2012; Leavy et al. 2011), 3 with sport organisations or sport events (Jackson et al. 2005; Murphy and Bauman 2007; Priest et al. 2008), 4 with intersectoral policy (Chircop et al. 2014; Durlak and DuPre 2008; Naylor et al. 2015; Shankardass et al. 2015) and 3 with health equity (Durand et al. 2014; Hillier-Brown et al. 2014; WHO Europe 2013).

Recommendations were made for mass-media campaigns, point-of-decision prompts, community-based multi-component approaches, environmental approaches, policy approaches and PA promotion through sport clubs (Table 5). These recommendations are based on medium-level evidence. Additionally, specific recommendations were formulated for health equity, the cost-effectiveness of interventions and quality criteria for the effective implementation of interventions.

Discussion

The above-described recommendations for physical activity promotion were centred on three reviews. Investigation into existing evidence for PA interventions was undergone regarding efficacy/effectiveness, cost-effectiveness, impacts on health inequalities and quality criteria for implementation. The main purpose of this investigation was to generate a robust evidence base for the comprehensive formulation of PA recommendations. To our knowledge, such a rigorous process to incorporate recommendations for physical activity and physical activity promotion has not been conducted in other nations. The effective process employed to draft the recommendations may thus serve as helpful guidance for nations looking to adopt a similar strategy for the formulation of national PA recommendations.

Conducting this review of reviews helped shed light on a number of research gaps:

(1) A vast majority of identified reviews dealt with issues relating to the efficacy of PA interventions. Considerably less is known about the effectiveness of PA interventions. Reviews that deal with issues focused on the health equity of PA interventions are currently scarce. A number of reviews address the issue of cost-effectiveness, but research is currently limited for certain interventions in the field (e.g. policy and environmental).
(2) By capturing the life course perspective, differences were exposed with respect to the amount of reviews available by target group. Regarding the efficacy of PA interventions, approximately 40 reviews dealt each with children and adolescents or adults. In comparison, only ten reviews were conducted that placed the spotlight on older

Table 5 German recommendations for physical activity promotion: general population

	Mass-media campaigns	Point-of-decision prompts	Community-based multi-component approaches	Environmental approaches	Policy approaches	Physical activity promotion through sport clubs
Efficacy	Conduct mass-media campaigns if they are part of a multi-component approach that integrate environmental and policy approaches as well as context-based PA offers	Utilise point-of-decision prompts, e.g. to use the stairs instead of elevators only as part of a multi-component approach	Conduct community-based multi-component approaches when they consist of effective single components. They should integrate environmental and policy approaches as well as context-based PA offers	Create a built environment that provides: - geographical proximity, land use mix and connectivity of residential, commercial and school/work zones - traffic-calmed, safe and aesthetically appealing zones in the residential environment - sports and leisure facilities and parks close to home and accessible for the entire population - cycling and walking path infrastructure that is as extensive as possible	Implement policies that promote PA as a constitutive part of regulations for urban and spatial planning and traffic policy, as well as policy on green spaces and sports areas	Conduct scientific research that relates to sport club PA promotion, specifically their possible contribution to the promotion of health-enhancing PA
Cost-effectiveness	Conduct low-cost regulatory and infrastructural measures Combine information approaches such as mass-media campaigns and point-of-decision prompts with other measures					
Quality criteria	Ensure the involvement and empowerment of socially disadvantaged groups in the context of planning, implementation and evaluation Develop and continue intersectoral partnerships for the implementation of policy and environmental approaches					
Health equity	Consider health equity in PA promotion when selecting population-based measures. Policy and environmental approaches might be more suitable in avoiding inequality than informational measures					

people. This finding highlights the need to conduct more research concentrating on the effects of PA interventions among older people.

(3) Differences were observed in the amount of available research in particular settings. When reviewing each target group, it was clear to see that interventions in the school setting were researched the most. Interventions in settings such as the workplace, health care and family have been researched, though gaps in the knowledge base remain. Surprisingly, very little research has been conducted on PA interventions in the sport club setting.

(4) When comparing the number of available reviews with the various intervention types, it becomes apparent that many reviews deal much more with individual-level interventions than with policy and environmental-level interventions.

The above-mentioned gaps posed a number of challenges when formulating the recommendations. First, due to the contrasting amount of available evidence, questions were raised regarding the quantity of evidence required to formulate a specific recommendation. While certain schemes have been proposed to classify the available evidence (e.g. Guyatt et al. 2008), such schemes do not consider that the amount of evidence might differ between intervention types. Considering the "inverse evidence law" (Brownson et al. 2009; Petticrew et al. 2004), there is currently much more evidence available for individual-level interventions. However, policy- and environmental-level interventions might be more promising in increasing PA levels that in turn influence public health impact.

Other challenges arose when attempting to weigh the available evidence on the different aspects of efficacy/effectiveness, cost-effectiveness, health equity impact and quality criteria:

(1) The more quality criteria one considers in development, implementation and evaluation, the more costly an intervention will be. Though adhering to quality criteria will increase the likelihood of an intervention's success, incurring costs may make implementation less likely.

(2) Certain cost-effective interventions seem to result in smaller, rather short-term increases in PA (e.g. point-of-decision prompts). The potential public health impact of these intervention types therefore has to be questioned.

(3) Certain brief and cost-effective interventions might not be able to reach vulnerable and at-risk population groups (e.g. mass-media campaigns) and may thus increase health inequalities when implemented. Interventions better suited to reach these groups are often more intensive and therefore more costly.

The development of recommendations for physical activity promotion highlights an important milestone for Germany. Committed engagement from a large group of scientists was instrumental in the formulation of the recommendations, as was the financial backing from the Federal Ministry of Health. To a certain degree, the process of formulating the recommendations may also reflect the political context of PA promotion in Germany. The Federal Ministry of Health took the political lead; other sectors were integrated into the process of dissemination, but did not play a large role in the formulation of the recommendations. The German Federal structure might cause challenges when taking the implementation of certain recommendations into account (e.g. changing state-level school curricula to allow for more physical education). Other nations that wish to develop recommendations for physical activity promotion will need to consider their own political context in this process.

Research limitations were related to the sheer number of reviews and the diversity of methodologies employed by such reviews. The extraction and summarisation of key findings proved to be a challenge due to the fact that certain reviews dealt with specific target groups, whereas others pertained to a specific setting or intervention type. Although more than 200 reviews were included for analysis, these reviews may only represent part of the existing research on this topic. Furthermore, the current layout of the recommendations comes across as rather broad. To further support implementation into public health practice, the recommendations may benefit from being developed into more specific action plans.

Conclusion

Our research stresses the great importance of integrating recommendations for PA promotion into national physical activity recommendations. Not only do the national recommendations describe the amount of PA people should engage in, they also provide information for organisations on how to support people in becoming more active. Though nations should adjust the process of recommendation development to their own political context, stakeholder engagement may prove valuable.

The research gaps identified in this review of reviews are significant and should thus be addressed in the future. Considering demographic changes and emerging chronic disease patterns, the inadequate depth of research on older people could signal cause for concern.

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Compliance with ethical standards

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