

Effects of physical and athletic activity on health

- A review of German speaking publications in the years 2012 - 2015

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This review comprises German monographs and anthologies as well as articles published in professional journals between the years 2012 and 2015. This article ties in with the reviews on 'Physical Activity, Sport and Health' published in the 'International Journal of Physical Education' between the years 2000 and 2012. The following professional journals were examined systematically: 'Sportwissenschaft', 'Spectrum der Sportwissenschaften', 'Zeitschrift für Sportpsychologie', 'Zeitschrift für Sportpädagogische Forschung', 'Sport und Gesellschaft', 'Deutsche Zeitschrift für Sportmedizin', 'Bewegungstherapie und Gesundheitssport', 'Sportunterricht', 'Sportpädagogik', 'Motorik', 'Praxis der Psychomotorik' as well as 'Prävention'. In part one of this review (published in issue 02/2016) the basics, questions regarding diagnostics, determinants as well as characteristics of health-related physical activity were discussed. This second part of the review addresses the general effects of health-related physical activity (chapter 1) and the specific aspects regarding children and youth (chapter 2), as well as for adults and seniors (chapter 3).

1 Effects of health-related physical activity

The important role of physical activity on health and subjective well-being is the initiating factor of the conceptualization of health-related physical activity programs. In this regard, Erlacher, Gebhart, Ehrlenspiel, Blischke and Schredl (2012) highlight the correlation of athletic activity and sleep quality as an aspect of well-being in their overview.

The meaning of physical activity as a way of regulating stress and therefore influencing health is frequently discussed. This aspect is particularly important to workplace health promotion. However, based on an analysis of current research, Klaperski, Seelig and Fuchs (2012) don't recognize convincing empirical evidence for the reduction of stress through physical activity. The results from Reiner, Niermann, Krapf and Woll (2013) also point in this direction. Based on data from 453 middle-aged adults, the authors were able to find evidence for the effectiveness of higher levels of athletic activity as a "stress-buffer-effect", however not for lower intensity levels of physical activity. Huber (2015) provided a research overview on the importance of movement therapy in the context of workplace oriented rehabilitation.

Within this review period numerous empirical studies were published on workplace health promotion. Gerber, Fuchs and Pühse (2013) present the results of their study on self-control strategies for police officers with a high level of perceived stress, but who also have many barriers to physical activity. The results show, "that action planning and coping planning are associated with an increased level of exercise" (p. 107). Müller, Schnieders and Schlüter (2013) completed a study on employees of an industrial company who mainly work at an assembly line and who are therefore especially faced with ergonomical stress through monotonous, repetitive movements. They were able to demonstrate that, through a twelve week training intervention both at work and individual home training plans, a "significant improvement of core strength endurance, a distinct reduction of movement induced pain and a significant increase in self-perceived fitness can be achieved" (p. 208). Bös, Jaizay, Härtel, Gundelfinger and Bergdolt (2014) evaluated a weight loss program within the context of workplace health management and could show that the middle-aged participants were able to reduce their weight as well as improve their risk profile.

The fact that participation in sports itself can be detrimental to health is not only shown consistently in published articles on sport induced injuries and accidents, but also through the effects of doping on health (due to lack of space, both these topics were not taken into consideration for this review period). Sport addiction in relation to endurance sports was examined by Ziemainz, Stoll, Drescher, Erath, Schipfer and Zeulner (2013). They were able to prove that the parameters, 'amount of training' and the 'number of years spent training' correlate to the severity of the sport addiction. Relevant to this topic is also the 2013 published article by Zeeck, Leonhart, Mosebach, Schlegel, Linster and Hartmann, who introduce the German adaptation of the 'Exercise Dependence Scale'.

In the field of rehabilitation, two textbooks for sports therapy were published during this review period: Sport therapeutic aspects for cancer patients is addressed by Rank, Freiberger and Halle (2012) and Markser and Bär (2015) highlight sport and exercise therapy for mental illnesses. However, it is important to mention that both textbooks are explicitly oriented on functional aspects of sports medicine and, regarding the publication by Markser and Bär, the sport therapy treatment is mainly limited to aspects of physical training; thus, not meeting the requirements of a holistic therapy approach for mental conditions as established by the field of sports therapy.

The handbook by Wegner, Scheid and Knoll (2015) is directed towards physical activity for people with disabilities. This textbook introduces fundamental aspects and the development of physical activity for people with disabilities. In addition, information regarding specific target groups, organizational forms and agencies as well as teaching aspects and the spectrum for possibilities of physical activity and sport disciplines is presented.

As in the previous years, publications addressing secondary prevention through physical activity concentrate on cardiovascular diseases (including Eckert, Lange & Huber, 2012; Pottgießer, Bode & Röcker, 2014). The review by Hansel, Burgstahler and Nieß (2012) provides an overview on studies “that address the importance of lack of physical activity as a risk factor for the prevalence of cardiovascular diseases” (p. 19). Particularly interesting in this regard is the practice oriented textbook by Matlik and Späker (2012) on designing group physical activity programs for heart patients.

In addition to the leading cardiovascular diseases observed in morbidity statistics, other selected medical conditions and the extent to which they can be influenced by movement and/or sports therapy have been taken into consideration; such as overweight and obesity (e.g. Hänsel, Zocher, Ennigkeit & Rühl, 2013), metabolic syndrome (e.g. Graf, 2015), diabetes mellitus (e.g. Huber, 2012), symptoms and disorders of the skeletal system (Hofmann, Geidl and Pfeifer, 2012) or mental illness (including Florange & Göhler, 2014). Deimel (2013) points out the possibilities of a movement therapy approach to ‘burnout’. Current studies regarding movement therapy (cf. also the review by Peters, Götz, Kannegießer & Ziemainz, 2014) show that body awareness oriented methods can be integrated particularly well into a movement therapy program. Relevant examples for this are presented by Ernst and Deimel (2014) as well as Sochor and Deimel (2014) with studies on the positive effects of movement therapy programs that include body awareness training for people with burnout or depression.

The influence of movement and sport on less studied medical conditions is discussed by, for example, Zügel and Weydt (2015) in their review on physical activity and sport for patients with rare neurological degenerative diseases. Wonneberger, Drogge, Schmidt and Froböse (2012) as well as Wonneberger and Schmidt (2015) highlight the changes to gait patterns after endurance training as well as the amount of exercise in correlation to the level of fatigue in patients with multiple sclerosis. Raabe-Oetker (2013) show how fatigue and psychological well-being of patients with multiple sclerosis can be improved through training with an ergometer. Peters, Pfeifer and Tallner (2013) present a concept of ‘patient education’ for physical activity and exercise for multiple sclerosis. Particularly interesting to this concept is the internet based approach and therefore, the inclusion of modern, individualized communication technology for patient education.

The effects of physical activity on the risk of cancer as well as the influence on the progression of the disease are documented in the review by Steindorf, Schmidt and Ulrich (2012). The authors were able to show “that regular physical activity could convincingly reduce the risk of colon cancer, likely reduce the risk of endometrial and postmenopausal breast cancer and probably reduce the risk for premenopausal breast cancer, prostate, lung and pancreatic cancer. The magnitude of the relative risk reduction is between 10 and 30%. An absolute value of 9 to 19% of the most common tumors can be attributed to lack of sufficient physical activity. [...] Exercise is also gaining in importance relative to cancer treatment. It is most likely that physical activity is possible, safe and even advisable in almost all stages of cancer” (p. 11). Ulrich, Wiskemann and Steindorf (2012) present the underlying physiological and molecular mechanisms affected by physical activity, thus how physical activity influences cancer risk and progression of the disease. Huber, Baumann and Schüle (2012) examined the effects of an exercise program for women with breast cancer and found evidence for the “reduction of fatigue, improvement in endurance ability and quality of life” (p. 62). With the use of physical activity, Lau, Deutscher and Boese (2014) demonstrate how a change in lifestyle can be achieved in patients with colorectal carcinoma. Jensen and Oechsle (2014) discuss the extent to which movement therapy can improve quality of life in the end stage of cancer patients.

Ley, Lintl & Movi Kune Team (2014) explored new territory with their study on implementing movement therapy for survivors of war and torture. The authors were able to show that “the relevance of self-determined activity, positive personal experience, self-reflexion while

experiencing safe surroundings, control, success and joy as well as the effects of a relational group experience” (p. 71) play an important role in designing movement classes for this target group.

2 Health-related physical activity with children and youth

In the area of health-related physical activity with children and youth, several articles have been published within this review period that address topics such as motor performance ability, athletic activity and health of children and youth (including Augste & Künzell, 2015; Kriemler, Lawrenz, Schober, Dorner, Graf, Titze & Samitz, 2014; Krombholz, 2015). Particularly interesting to this review period is the review by Krug, Jekauc, Poethko-Müller, Woll and Schlaud (2012) on the correlation of physical activity and health of children and youth. The authors come to the conclusion: “In consideration of socio-demographic factors, the results indicate a positive correlation between general health and various types of physical activity” (p. 113). Based on current research, Stodden and Holfelder (2013) present data from a psychological development perspective revealing correlations between various aspects of motor skill development and physical activity, health-related fitness, obesity and psychological health” (p. 10).

The fact that differences in motor development and movement behavior in pre-school aged children are socially conditioned is shown by Augste, Jaitner and Storr (2012) with their evaluation of ‘school entry health examinations’ for 1498 children. The results show a correlation between the level of education of the parents, as well as a non-German speaking background, with the factors of being overweight, low activity level and high media consumption. Krombholz (2015) presents the results of a longitudinal study over a period of 21 months on the development of physical traits as well as motor and cognitive performance of 281 pre-school aged children. The results show a correlation between low level of motor performance and being overweight. In addition, these children have an above average chance of profiting from intervention measures for improving motor performance ability. In contrast, Roth, Jain, Schenk and Hebestreit (2015) examined the effects of a ten month physical activity program in a school for children with learning disabilities. They were only able to show improvements in balance ability and aerobic endurance; however, not for other factors of motor performance ability or anthropometric values.

Manz, Schlack, Poethko-Müller, Mensing, Finger and Lampert (2014) present data on physical and athletic activity and the use of electronic media for children and youth. The data revealed a correlation between the high amount of time spent with screen technology (e.g. computer) and a low level of sport participation. Kesztyüs, Kettner, Kobel, Fischbach, Schreiber, Kilian and Steinacker (2013) examined quality of life and frequency of illness in elementary aged children in correlation with physical activity and media consumption. They were able to show that, with at least 4 hours of physical activity per week, health-related quality of life was higher and the number of sick days was lower than for less active children. In their review, Kettner, Wirt, Fischbach, Kobel, Kesztyüs, Schreiber, Drenowatz and Steinacker (2012) also indicate the necessity for intervention and promotion of physical activity for children and youth. According to this review, only “a third of the children in Germany are physically active for at least 60 minutes per day” (p. 94) and only 6% of youth.

In the form of a consensus essay, Graf, Beneke, Bloch, Bucksch, Dordel, Eiser, Ferrari, Koch, Krug, Lawrenz, Manz, Naul, Oberhoffer, Quilling, Schulz, Stemper, Stibbe, Tokarski, Völker and Woll (2013) published recommendations for the promotion of physical activity for children and youth in Germany. “Essentially they recommend 90 minutes of movement, i.e. at least 12 000 steps, daily. Furthermore, additional lifestyle components, such as limiting media consumption, were also integrated” (p. 441).

Similarly, the collaborative action campaign, ‘Platform nutrition and movement’ (peb), advocates against the so-called ‘sitting lifestyle’ (e.g. Lambeck, 2014 as well as Aue & Huber, 2014). For years, peb has encouraged the promotion of a healthy lifestyle with balanced nutrition and a high level of physical activity for children and youth. Based on the position paper “Generation S – Sitting lifestyle of children and youth” and within the context of the above mentioned campagne, peb presented promotional measures towards a more active lifestyle (Beck & Eichner, 2014; for sport clubs: Hülse, 2014; in schools: Aue, Dreger, Huber & Ungerer-Röhrich, 2014; Müller, Krieger, Suchert, Johannsen, Sauer, Hanewinkel & Isensee, 2015). Also relevant to this topic is the study by Kühnis (2013), which shows that physical activity in elementary aged children in Switzerland could be improved by implementing an ‘active way to school’.

Relevant to the topic of health promotion in educational institutions, the collection of articles by Balz, Erlemeyer, Kastrop and Mergelkuhl (2015) is noteworthy for this reporting period, which discusses the fundamentals of health promotion. Central themes of health promotion in physical education (e.g. interdisciplinary teaching of health) are discussed and practical examples for applying health promotion in schools are presented (e.g. health during daily school life). In this

publication it becomes clear that the focus on 'health' is not only a vital perspective at the classroom level, but is also important for curriculum planning and school development (cf. also Volkmann, 2015). Complimentary in this regard are the recommendations of the Standing Conference of the Ministry of Education and Cultural Affairs of the Länder in the Federal Republic of Germany 2012 on health promotion and prevention in schools. Fessler and Knoll (2013) discuss how movement centred health promotion can be didactically applied in a school setting and, with the example of physically based relaxation training, present how this can be implemented (cf. also Fessler, 2013 as well as Fessler & Knoll, 2015).

Erhorn (2012) "tracks down physical inactivity" with his study on both in-school and extracurricular activity behavior of elementary aged children. This ethnographic study puts movement activities of children as a daily social activity at the centre of the analysis. Based on the results, the author advocates for physical education classes that are more relevant to the children's daily life and also presents strategies for application for didactical lesson preparation.

The publication by Schmidt (2013) addresses the so-called "German education and health catastrophe". Starting with key social problems (e.g. education inequality), not only are various aspects of health promotion discussed, but also the increasing discrimination in education. Early intervention and structural measures are recommended, such as physically active oriented kindergartens.

The direct effects of physical education on the health of students, e.g. the improvement of fitness, have been – as indicated above – frequently studied. This, however, is not the case for the indirect effects physical education can have on health. This aspect was examined by Demetriou, Sudeck and Höner (2014) in connection with a fitness program. The results reveal a gender specific effect: girls evaluated the program more positively and indicate positive tendencies regarding the indirect effects on health (knowledge, attitude towards sports and physical activity), while this was not the case for the boys. Therefore, the program must be designed to meet the specific interests for both boys and girls.

The importance of 'fitness' in physical education and how this can be implemented during lessons is highlighted in the anthology by Lange and Baschta (2013). In addition to the aspects of traditional fitness training, forms of muscle contraction and relaxation are also addressed, such as the use of sports and fitness equipment.

As mentioned in the previous review, the topic of 'learning in motion', in particular for children and youth, has been the focus of various sport scientific studies for many years (e.g. Boriss, 2015). Exemplary to this topic for this review period are the reviews by Hillman and Schott (2013) and Wegner, Windisch and Budde (2012). While Hillman and Schott highlight the connection of fitness, cognitive performance ability and cerebral activity, Wegner, Windisch and Budde put the psychological effects of acute physical stress within a school context at the centre of their discussion.

By including physical activities in daily school life, e.g. physical activity at recess (Möhrle, Steinacker, Szagun & Kobel, 2015), questions arise concerning coordinating the school day with planned rotations of classroom lessons and recreation time; thereby, establishing the foundation for an overall healthy student development in a 'School in Motion'. Relevant to 'School in Motion' is the study by Brehm, Meier and Single (2012), which could deliver positive results from an evaluation of a health education week 'FugS – Fit and healthy in Schullandheim'. The long term implications of a 'School in Motion' on individual health parameters, i.e. weight, smoking and physical activity, is examined by Greier (2014) in a 4 year intervention study with elementary aged students. Ten years after the start of the project, he is able to prove positive effects on weight and physical activity behavior; however, no detectable effects on smoking behavior. Simpson, Dohnke, Fuchs and Lührmann (2015) highlight drinking habits of children and youth in a school setting. According to the results, the students do not drink enough, especially after physical education class. The authors advocate for making water available in the classroom, therefore, improving cognitive performance. Also noteworthy is the collection of exercises and games for an active recess break presented by Mess, Ossig and Woll (2014).

In addition to the articles presented on primary prevention, there have once again been articles published in the past couple of years which focus on secondary prevention. These publications address the influence of physical activity on various illnesses in children and youth (e.g. Augste & Lichtner, 2014). Regarding overweight and obesity (e.g. Heydenreich, 2015) the study by Kuni, Rühling, Wagner, Hegar, Roth and Schmitt (2015) is worth mentioning, which demonstrates how ball games can compensate for orthopaedic deficits in children who are overweight. Also noteworthy is the study by Schwerin, Gruber, Molz and Holl (2014) on body composition and motor skills in children and youth who are overweight and obese. Based on a qualitative-explorative study, Möhwald (2014) highlights the negative experience in physical education of students who are obese

and provides corresponding recommendations for didactical planning of a successful physical education lesson. In contrast to this Prohl, Ott and Albrecht (2015) refer to the results from 685 grade 4 students and prove that elementary students who are overweight do not vary significantly to other students regarding social recognition and individual well-being.

In an overview article, Winter and Rosenbaum (2014) show the importance of physical activity intervention programs during treatment for children and youth with cancer, while Söntgerath, Wulfstange and Eckert (2014) provide an overview on the current research regarding strength deficiencies during illness and after treatment of cancer in children and youth.

Leithäuser and Beneke (2013) highlight the role of physical activity and sports in children with Attention Deficit Hyperactivity Disorder (ADHD) (regarding increase in prevalence cf. Köttgen, 2014). In her review, Lehnert (2014) goes a step further and presents the medial and moderated influence of physical activity on ADHD-specific deficits in the form of a conceptual framework model. In their overview, Schlink and Fischer (2012) discuss the role of executive functions in explaining AD(H)D and advocate for the combination of forms of cognitive (so-called “tools of the mind” and “if-then-plans”) and physical training.

Zwicker and Holfelder (2013) address the group of children with developmental coordination disorder (DCD). In their article, the authors approach the disorder from a neuroscience perspective and discuss current data from studies using medial imaging.

From the many practical oriented aids for the development of physical activity programs, the publication by Kunert and Plümpe (2014) is especially noteworthy, which presents “Kids Vital” – a health-oriented physical activity program consisting of 12 units for children between the ages of 6 and 10.

3 Health-related physical activity with adults and seniors

Physical activity, fitness and health are being increasingly addressed as central elements across an individual’s lifespan from a sports scientific point of view (cf. Knoll & Woll, 2008). Based on telephone interviews with 21,262 adults, Mensink and Müters (2012) reveal the prevalence of physical and athletic activity in the adult population in Germany. Moschny, Klaatzen-Mielke, Platen and Hinrichs (2014) collect data on the activity behavior of adults above the age of 65 in relation to house and garden work, walking and athletic activity. They were able to show gender specific differences in the amount of activity: The “higher level of general activity of women is a result of the significantly higher level of household related activities” (p. 56).

This reporting period delivers predominately publications addressing the older population. Schlicht and Schott (2013) present a textbook that describes the effects of physical activity behavior and presents intervention possibilities for an active lifestyle for older adults. Based on current research, Schlicht and Schott highlight the importance of physical activity for successful aging.

The results from Fuchs, Busch, Gößwald, Hölling, Kuhnert & Scheidt-Nave (2013) are of particular interest, which reveal the decrease in physical and cognitive abilities in adults between the ages of 65 and 79. Kemmler, Engelke and von Stengel (2012) describe the effects of an entire body electromyostimulation on muscle degeneration and body composition in inactive women over the age of 70. Stöver presents results of a six week coordination training program on cognitive ability in 28 older adults (with an average age of 70). Positive effects could be detected for spatial awareness and concentration ability; however, no improvements were seen in reaction ability or in short-term and working memory. In their overview article, Erickson and Hohmann (2013) highlight the effects of age and exercise on cognitive ability and are able to recognize that “a series of questions remain unanswered in relation to how physical training (length, frequency, intensity, type) can play a role as well as to other moderated factors influencing cognitive ability and health of the brain” (p. 25). Streber, Wolff and Rütten (2015) describe how socially disadvantaged, physically inactive adults over the age of 60 can be encouraged to take part in physical activity programs aimed at preventing dementia, while Battellini (2013), with her exemplary “holistic cognitive training”, describes how such a promotional program could look.

Molinari, Schmid, Sudeck and Conzelmann (2015) examined the effects of physical activity on the current well-being of older adults. They were able to show that the participants, who were all over the age of 65, reported “a predominately positive effect of athletic activities on the current well-being, both at the group and individual levels” (p. 139).

Scharpf, Servay and Woll (2013) present a literary review on the effects of physical activity on dementia disorders. The authors point out the inconsistencies in relation to process and evaluation of the studies included in the review and recommend that people with dementia take part in a physical activity program for at least four months with two to three units per week, consisting of strength, endurance and balance exercises (cf. also Woll & Servay, 2013). Recommendations for designing rehabilitation physical activity programs for people with dementia were also presented by

Schick (2015) from the perspective of the Association of Disability and Rehabilitation Sport of North Rhine-Westphalia. Voß (2015) was able to show that the prevalence of physical activity can positively affect the perceived stress of family caregivers of people with dementia in a home-care situation.

The academic journal 'Bewegungstherapie und Gesundheit' dedicated the issue 5/2014 to the topic of osteoporosis. While Bartl (2014) gives an overview on definition, symptoms, diagnostic and precautions, Kemmler, Bebenek and von Stengel (2014) present evidence based recommendations for exercise therapy for fracture prevention in patients with osteoporosis. Bühne, Begerow, Meierjürgen, Kleinfeld, Schüle and Freikamp (2014) present an empirical analysis on similarities and differences of various forms of rehabilitation sport as well as functional exercises for osteoporosis patients. Werle (2014) shares considerations on methods and didactics for incorporating movement therapy aspects into a general osteoporosis treatment. Complimentary to this are the practice oriented publications by Agoston (2014) and Jansenberger (2015), in which precautionary exercises for osteoporosis, i.e. "homework" for patients with osteoporosis, are put together.

Considering current demographic developments and the increasing numbers in the older population, the importance of addressing fall prevention for older adults was of particular importance in this reporting period. Of particular interest is the study by Mayer, von Stengel, Bebenek, Pfeifer and Kemmler (2012), which examined the influence of a comprehensive rehabilitation physical activity program on the prevalence of falls and injuries in women over 65 and were able to prove an effective reduction in falling incidences. With "Older Adults in Motion", Tittlbach, Binder and Bös (2012) present a program which is primarily aimed at promoting motor abilities (especially strength, flexibility and coordination), specifically designed for implementation in senior care-giving centres. A practical oriented publication for health related physical activity for adults and seniors was brought forth by Kunert and Szepanski (2014), who, with the program "Vital and Confident", presents exercises aimed at preventing falls. Also practice oriented are the publications by Jansenberger and Mairhofer - "Homework for Patients at Risk of Falling" (2012) and "Homework for Patients with Parkinson Disease" (2014).

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