

***Health-related physical activity: Basics, diagnostic, determinants and characteristics***  
***- 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 this review, basics (chapter 1), questions regarding diagnostics (chapter 2), determinants (chapter 3) as well as characteristics of health related physical activity (chapter 4) will be discussed. The second part of this review, appearing in issue 03/2016 of this journal, addresses the effects of health-related physical activity and the specific aspects regarding children and youth, as well as for adults and seniors.

***1 Introduction: Basics***

Physical activity and health is an interdisciplinary field of study within sports sciences. For many years it has been an established discipline in German speaking research and is discussed within various disciplines. This is expressed in the many sport scientific congresses and conventions that have taken place within this reporting period.

In cooperation with researchers of various sport scientific disciplines, the Health Committee of the German Society of Sport Sciences<sup>1</sup> (dvs) sets the scientific standards for German speaking sports sciences through annual conventions and represents the continuity as well as the variety in the development of this area of research. Within this review period, four annual conventions were held: In 2012 "Resource movement – Challenges for health and sport systems including scientific research" where questions were discussed regarding the implementation of movement and sport in prevention and rehabilitation, with the focal point on the interdisciplinary coalition of partners and institutions within health and sport systems (cf. Eckert & Wagner, 2012). In 2013 the annual convention "Interdisciplinary health research in and with sports sciences" was included in the program for the 21<sup>st</sup> Sport Scientific Conference of the dvs (cf. Mess, Gruber & Woll, 2013). In 2014 the annual convention focussed on the influence of competencies on health-related decisions for physical and athletic activities for various subjects in differing settings<sup>2</sup>. The annual convention of 2015 – included in the dvs 22<sup>nd</sup> Sport Scientific Conference (cf. Könecke, Preuß & Schöllhorn, 2015) – was oriented on the Health Committee's 20<sup>th</sup> anniversary and its achievements over the past two decades.

In addition to the dvs Health Committee, other sport scientific disciplines also addressed the topic of "sport and health" with various conventions; for example, the dvs Biomechanics Section annual convention with the topic "Active health: Movement is healthy" (Arampatzis, Mersmann, Bohm & Marzilger, 2015) or the collective committee for Sport Psychology with the 2015 annual convention titled "Stress regulation and sport" (Wunsch, Müller, Mothes, Schöndube, Hartmann & Fuchs, 2015).

In addition, multiple professional conventions have taken place over the years which are directed particularly towards teachers (including pre-school), fitness instructors and trainers and aide in effective transfer of scientific understanding of physical activity and health into practical situations. The congress "Childhood in motion", which takes place biennially at the University of Osnabrück, is representative of many organized professional events and regularly addresses health-related

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<sup>1</sup> [www.dvs-gesundheit.de](http://www.dvs-gesundheit.de)

<sup>2</sup> The convention proceedings have not yet been published.

questions, i.e. health promotion for children and youth (cf. corresponding congress proceedings published within this reporting period by Hunger & Zimmer, 2012 and 2014).

Various fundamental articles were published within this review period which are particularly relevant to the topic “physical activity and health”; for example, the anthology by Becker (2014), in which not only aspects of physical activity and health are examined at various stages of life (children, youth and adults) and in various occupational contexts, but also the role of physical activity in health promotion, such as in a school setting (i.e. in prevention and rehabilitation). In their anthology, Fuchs and Schlicht (2012) provide an excellent overview on current research regarding the effects and functions of physical activity on aspects of mental health. The spectrum of topics spans from aspects of stress regulation, to questions regarding health-related quality of life as well as medical conditions, such as depression or schizophrenia. Especially interesting to this topic is the review by Schulz, Meyer and Langguth (2012) which highlights the connection between physical activity and mental health as well as addressing the previously mentioned aspects. From the field of rehabilitation, the fundamental article by Reimers, Reuter, Tettenborn, Broocks, Thürauf, Mewes and Knapp (2013) is directed towards prevention and therapy of neurological (e.g. stroke, Parkinson Syndrome) and mental (e.g. depression, schizophrenia) conditions through physical activity.

The professional journal, ‘Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz’ dedicated an entire issue to the topic ‘physical activity and health’ (issue 01/2012), which is particularly relevant regarding the representation of current research on effects and functions of physical activity (Brandes, 2012; Gabrys, Thiel, Minakawa, Saborowski, Vogt, & Banzer, 2012). Noteworthy is the article by Abu-Omar and Rütten (2012) on the role of physical activity in public health, which contrasts the current recommendations of amount and intensity with data for prevalence of physical activity and discusses evidence based recommendations for interventions for physical activity promotion for the general public. The authors come to the conclusion: “The results show positive effects at the individual level, even though the ability to reach certain target groups with these methods seems difficult. Current findings on the effectiveness of interventions at the community level and mass media campaigns prove to be conflicting. Interventions within health-related treatment programs provide mostly temporary effects towards physical activity behavior. For political and environmental interventions it seems the evidence base has been established.” (p. 67). Expanding on this topic, Brehm, Bös, Graf, Hartmann, Pahmeier, Pfeifer, Rütten, Sygusch, Tiemann, Tittlbach, Vogt and Wagner (2013) provide expertise on “physical activity as a method in prevention, rehabilitation and health promotion”, demonstrate the conceptualization for program development in sport clubs – health-related athletic training, fitness training, amateur sports, rehabilitation – and aim to create a base of communication for the partners involved in the sports and health systems (p. 1387).

Various sport scientific academic journals addressed the topic ‘health’ within this reporting period. For example, the journal ‘Motorik’ published the special issue 2/2012 in which questions regarding health promotion from a ‘motology oriented’ perspective are taken into consideration. In this regard, Seewald (2012) presents conceptual considerations and practical consequences of “motology oriented health promotion” (cf. also Hanne-Behnke, 2012), while Jessel (2012) justifies the relevance of a body awareness concept for psychomotor facilitation with the terms “awareness – physicality – health” and Schache and Künne (2012) address the effects of a “health promotion perspective, based on appreciation, composure, flexibility and openness” (p. 86). Kohne (2012) uses the example of ‘circus projects’ to present how a primary addiction prevention program can be successful as part of modern health promotion in schools. Beckmann-Neuhaus (2012) focuses on the importance of attentive interaction as part of “self-care” for people with psychological medical conditions. Complementary to this topic is also the publication by Haas, Golmert and Kühn (2014), which uses practical examples to demonstrate how play and physical interaction can be implemented in psychomotor health promotion for adults and addresses the aspects that should be taken into consideration for didactical application. Based on survey data evaluating stressors and preventive measures, the health condition of professionals working in the field of psychomotor therapy as well as the strategies regarding the attentive efforts towards one’s own health was examined by Späker (2014).

Within this reporting period, various articles were published that address the correlation of professional stressors and physical activity. Brandl-Bredenbeck, Kämpfe and Köster (2013) examine the health conditions and health behavior of a group of university students. Particularly interesting is the importance of physical activity and sport in the lifestyle of the students for implementing appropriate courses that promote positive health behaviour. In contrast, Ziert (2012) examined the thus far hardly researched aspect of the “stressful phase during the professional internship of physical educators”. The extent to which future physical educators experience this start

to their “school career” as stressful and how they deal with it is shown by Ziert with qualitative data, who also provides consequential recommendations for interns on how to deal with potential stressors. Origins and preventative measures regarding ‘burnout’ of physical educators are discussed by Schneider and Ziemainz (2015), while Armbruster, Bös and Anstett (2013) present data on fitness and the health condition of German doctors.

The publications discussed thus far predominantly address topics regarding ‘physical activity and health’. Within this reporting period, a series of publications appeared that, in addition to addressing various characteristics of health related physical activity, also discuss questions regarding diagnostics and determining factors of athletic activity, i.e. influencing factors on an individual as well as at a collective level. The the following chapters will discuss the articles that focus on diagnostics, parameters and characteristics of health-related physical activity.

## **2 *Diagnostics and health-related physical activity***

Of particular importance during this reporting period are measuring techniques for objective assessment of physical activity, whether it be as simple as a pedometer or the technically more complicated accelerometry. Noteworthy in this area of study are the overview articles by Rosenbaum (2012) as well as Gabrys, Thiel, Tallner, Wilms, Müller, Kahlert, Jekauc, Frick, Schulz, Sprengeler, Hey, Kobel and Vogt (2015). Hey, Anastasapoulou and von Haaren (2014) outline the possibilities and limitations of accelerometry from a technical perspective, while Lange and Eckert (2014) present results from a scientific study on the measurement accuracy of an accelerometry based multisensor for the metabolic rate of people who are of average weight, overweight and obese.

Jekauc, Reimers and Woll (2014) provide an overview of methods for measuring activity levels of children and youth, while Schröder, Schmid and Kohlmann (2015) examine the improvement of compliance of elementary school students in accelerometry studies.

The implementation of cycle ergometry for measuring cardiovascular fitness is discussed in a nationwide study on the health of adults in Germany by Finger, Gößwald, Härtel, Müters, Krug, Hölling, Kuhnert and Bös (2013), while Scharhag-Rosenberger and Meyer (2013) describe the implementation of ergometry for collecting data on the effects of endurance training and indicate the necessity of further research regarding the dose-effect-relationship. Von Stengel and Kemmler (2013) published results in this regard: They demonstrate that, with a strength and endurance combination multifunction training with high intensity and training frequency of more than two times per week, improvements in metabolic and cardiovascular risk factors can be achieved. Lawrenz and Stemper (2012) compared the results of the 6-Minute Run with a progressive spiroergometry test. The results show that the “6-Minute Run Test has limitations in assessing cardiopulmonary performance ability of 8-10 year old children, since other factors such as previous experience with similar tests can influence the results.” (p. 102). Hacke and Weisser (2012) discuss the correlation between resting and exercise blood pressure with cardiovascular risk factors of youth. They also show that, already in adolescence, blood pressure during exercise correlates negatively with fitness performance (assessed with the use of cycle ergometry).

In addition to ergometric assessment, other assessment methods for motor skills were also discussed within this reporting period. Ruploh and Keßel (2015) presented data on further development of a motor skills test for four to six year old children (MOT 4-6), while Schilling (2014) presents an expansion of a coordination test for children (KTK). A special issue from the academic journal ‘Sportunterricht’ is dedicated to questions regarding motor performance and assessment using a standardized motor skills test – DMT 6-18 (Ghanbari, Tietjens, Seidel & Strauß, 2012; Holzweg, Ketelhut & Brandt, 2012; Seidel & Bös, 2012; Worth, Albrecht, Wagner, & Oberger, 2012).

Articles related to rehabilitation and diagnostics in oncology were also published within this review period. Banzer, Vogt, Hübscher and Thiel (2012) highlight standards of sport medicine diagnostics in oncology. Recommendations for assessment methods used in scientific studies on physical training for oncology patients were published by Scharhag-Rosenberger, Becker, Streckmann, Schmidt, Berling, Engeroff, Exner, Gutekunst, Hofmeister, Jensen, Kähnert, Kneis, Limbach, Mau-Möller, Röcker, Schmidt, Schmidt, Stöckel, Wehrle, Wiskemann, Zimmer, Zopf and Steindorf (2014).

## **3 *Determinants of health-related physical activity***

In the development of health-related physical activity programs, determinants play a fundamentally important role – i.e. the question if and under which conditions an individual will decide to take part in health-enhancing physical activity. In other words: Although the positive effects of physical activity on health is well-known, many people still are not able to include physical activity and sport as a permanent component of their lifestyle. Relevant to this are the results of a study on the health of adults in Germany in 2013 (DEGS1). These results show that, although the self-perceived

assessment of current physical activity behavior has increased (in comparison to data from a nationwide health survey in 1998), as few as one fifth of the surveyed subjects comply with the health-oriented recommendations for physical activity of 2.5 hours at moderate intensity per week (Krug, Jordan, Mensink, Müters, Finger & Lampert, 2013).

Potential reasons for this lack of compliance are addressed by Strobl (2015). Based on the results from 2082 people, it is shown that emotional factors in particular play a role in behavior change and this aspect must therefore play a more important role in the development of future intervention programs. Also relevant to this topic, is the article by Mastnak (2015) in which motivation for participating in sports is highlighted. The results show that people undergoing rehabilitation for heart conditions have the highest motivation values relevant to “intentional promotion and maintenance for a healthy heart as well as the possibility to control rehabilitative and cardiovascular risk factors through personal physical activity, i.e. not dependant on medication alone and be dominated by the heart condition”.

Peters, Sudeck and Pfeifer (2013) take a step further and emphasize the necessity of competency promotion in health-related physical activity as a basis for shaping overall individual health competency. In this regard, activity-related health competency is composed of “movement and control competency and movement self-regulatory competency” (p. 210). The model outlining activity-related health competency presented by the authors (p. 211) is based on fundamental motor abilities and skills (physical fitness, motor skills and body awareness), physical and movement-related knowledge (knowledge effect and know-how) as well as positive characteristics of individual behavior and evaluation tendencies (self-efficacy, attitude and motivational structure). “People with high self-regulatory competence are able to effectively carry through with regular physical/athletic activities. This means that physical exercise and training should be adequately connected with learning and experiencing in order to ensure an optimal competency development in all areas.” (p. 210).

Relevant to this, are the findings in a study by Wilke, Nagel, Biallas and Froböse (2013), who were able to show that in an average middle-class company, employees who were physically active demonstrated a higher level of health competency as those who were not.

In their handbook, Geuter and Holleder (2012) present possibilities of health-oriented physical activity promotion and address this in relation to different stages of life (childhood and youth, adulthood and advanced adulthood) as well as with various target groups (e.g. people with social disadvantages) in various settings (e.g. kindergarten, sports clubs, work, community). Pahmeier, Tiemann & Maatmann (2012) present data on the analysis of primary prevention physical activity courses: They were able to show that these programs “by no means only reach privileged citizens belonging to the middle and higher classes, but also those who belong to the uneducated class” (p. 22).

The handbook by Bucksch and Schneider (2014) focusses on the setting ‘community’ and introduces the prevention and intervention approach of ‘Walkability’ (long time discussed program from the USA) into German speaking academic discussions. ‘Walkability’ does not only apply to the narrow definition of ‘walking’, but applies to a broader understanding of “movement friendly streets, neighborhoods and urban areas” (p.9). The environmental perspective of health promotion and physical activity is emphasized, as is the case with public health research (for an overview: Abu-Omar & Rütten, 2012). It is not only about changing one’s health behaviour by promoting a more active lifestyle, rather the surrounding social environment that facilitates health promoting physical activity (regarding quality management: Rütten & Frahsa, 2012). As part of a public health strategy, the ‘Walkability’ approach is transdisciplinary oriented and incorporates, for example, ideas from city and traffic planning. The current relevancy of ‘Walkability’ is shown by articles from Huber (2014) as well as from Bucksch and Schlicht (2014), who both outline the health risks of a predominately sedentary lifestyle and advocate for more physical activity in everyday tasks (cf. also Huber, 2015 as well as Ziesche, Blatz & Lerchen, 2015). The fact that low intensity physical activity (e.g. leisurely walks) can already lead to health benefits is proven by Wallmann and Froböse (2012), who examined the effects of everyday activities in accordance with a campaign by the German Federal Ministry for Health – “3000 steps more a day”. In their study, Wenger, Lackinger, Reupichler and Titze (2014) highlighted an interesting aspect of ‘Walkability’: how the frequency of using the stairs in a shopping centre can be increased with face-to-face prompting. The authors were able to demonstrate that a personal invitation to take the stairs lead to a significant increase in the use of the stairs; however, these results apply only during the intervention phase.

The fundamental question of dose-effect-relationships regarding physical activity programs targeting various chronic conditions was addressed in a review by Vogt and Banzer (2012), from which they derive recommendations for a minimal effect dose – “1-7 hrs of moderate to intense physical activity per week” (p.43).

To increase the accessibility of physical activity programs, a specified consultation can be applied, as introduced by Gabrys, Thiel, Saborowski, Vogt and Banzer (2013). Müller, Richter, Lösche, Schulze and Hottenrott (2014) also go in this direction with their study on individualized intervention programs including the elements of nutrition, physical activity and stress management. They were able to demonstrate the efficiency and effectiveness of this 'health coaching' concept. Geidl, Hofmann and Pfeifer (2012) as well as Hofmann, Geidl and Pfeifer (2012a, b) developed building blocks leading towards commitment to a physically active lifestyle. Here the focus is on facilitation of information on the optimal dose and consequences of physical (in)activity, facilitation of information and competencies for carrying out health-related physical activity, the analysis of physical function, the choice of level of difficulty and the documentation of and reflecting on changes that have occurred.

#### **4 Characteristics of health-related physical activity**

Of the various types of physical activities, endurance training continues to be the primary method of fitness training in health-related and rehabilitative physical activity, of which the importance for physiological and psychological health has been proven (cf. e.g. Knoll, 1997; Knoll, Banzer, Bös, 2006). In this reporting period, Scharhag (2012) presented an overview on both acute and chronic effects of endurance training. Also relevant to this study are the results from the first phase of the study on the health of adults in Germany (DEGS1) in 2013, which presents an overview of physical activity (Krug, Jordan, Mensink, Müters, Finger & Lampert, 2013) – i.e. the extent of cardiorespiratory fitness – in adults between the ages of 18 and 64 years (Finger, Krug, Gößwald, Härtel & Bös, 2013). Hottenrott, Müller and Schulze (2015) examined aspects of leisure hiking as a group course and, based on various anthropometric and performance physiological health parameters, point out the efficiency and effectiveness for improved health. Kemmler, Bebenek and von Stengel (2012) examined the influence of a long-term endurance and strength training program consisting of an average of 2.1 training units per week over 49 weeks on "metabolic syndrome as 'risk factor clustering' for cardiovascular conditions in post menopausal women" (p. 13). Meant for practical application is the endurance oriented course manual "Cycle Training 60+" by Wagner, Brammer, Bunte and Hagemeister (2015).

Wiskemann und Steindorf (2014) highlight the importance of strength training as part of therapy for cancer patients and Kinkel (2015) for patients with heart insufficiency. Also for practical application are the publications by Bechheim (2014) on 'health conscious strength training' and Kunert (2012) on prevention oriented back training.

Of particular interest within this reporting period are the published articles on the use of new media in the development of health-related physical activity programs. Hois, Schmidt and Flatau (2012) highlight the possibilities for implementation of an e-training software program and demonstrate that, in combination with the internet, an improvement in physical activity behaviour can be achieved. Pfeifer, Peters, Salb and Hois (2012) presented data from a movement and behavior related E-Training program directed towards facilitation of a healthy back and also confirmed the acceptance and effectiveness of this type of internet supported intervention.

Also noteworthy are selected publications addressing the topic of health in relation to performance sports (e.g. Frank, Nixdorf & Beckmann, 2013; Leithäuser & Beneke, 2013; Sallen, Hemming & Richartz, 2015).

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