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Book of abstracts

Kind, Sport und Gesundheit
L'enfant, le sport et la santé

12th congress of the SGS/4S in Basel

06. / 07.02.2020

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Keynotes

Keynote 1:
Vascular Adaptation to Exercise in Children and Adults: Role of Hemodynamic Stimuli
Prof. Dick Thijssen (Liverpool John Moores University)

Keynote 2:
Sports & Kids - more activity, better performance, less injuries
Prof. Evert Verhagen (VU Amsterdam)

Keynote 3:
Health and physical activity in marginalized settings
Jürg Utzinger (Swiss TPH)

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Symposium

Thursday 06.02.2020

Room 115 **Verläufe im Kinder- und Jugendsport – ein Symposium des Forschungskomitees Sportsoziologie**
Chair: Claudia Klostermann; Markus Lamprecht, Siegfried Nagel

11:00 Veränderung des Sportverhaltens zwischen Kindheit, Jugend und Adoleszenz
Angela Gerbert

11:20 Who stays on? The link between psychosocial patterns and changes in exercise and sport behaviour when adolescents make transitions in education
Julia Schmid

11:40 Sport im Jugendalter als Motor für ein lebenslanges Sporttreiben? Ein narratives Review
Lars Lenze

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Title:

Verläufe im Kinder- und Jugendsport – ein Symposium des Forschungskomitees Sportsoziologie

Authors:

Klostermann C[1], Lamprecht M[2], Nagel S[3].

[1]Professur Bewegungsförderung und Sportdidaktik im Kindesalter, Pädagogische Hochschule FHNW, Schweiz

[2]Schweizer Sportobservatorium c/o Lamprecht und Stamm Sozialforschung und Beratung, Schweiz

[3]Institut für Sportwissenschaft, Universität Bern, Schweiz

Abstract:

Sportlichen Aktivitäten werden vielfältige positive Wirkungen zugeschrieben, z.B. im Hinblick auf Gesundheit, Persönlichkeitsentwicklung oder soziale Integration (Breuer & Rittner, 2004). Dabei wird insbesondere dem Sporttreiben im Kindes- und Jugendalter eine besondere Bedeutung beigemessen. In diesem Lebensabschnitt werden die höchsten Sportpartizipationsquoten erreicht (z.B. Lamprecht et al., 2015) und durch die Sozialisationserfahrungen soll gerade in diesem Lebensabschnitt die Grundlage für lebenslange Sportaktivität geschaffen werden (z.B. Frogner, 1991). Demgegenüber stehen relativ hohe Ausstiegs- und Fluktuationsraten im Jugendalter (z.B. Schlesinger, Löbig, Ehnold & Nagel, 2018). Vor diesem Hintergrund stellt sich damit die Frage, welche Stabilität das Sportengagement im Kindes- und Jugendalter aufweist und durch welche Faktoren bzw. Ereignisse der Verlauf der Sportaktivität beeinflusst wird.

Im Symposium *Verläufe im Kinder- und Jugendsport* wird insgesamt eine lebenszeitliche Perspektive eingenommen. Es werden zwei aktuelle Längsschnittstudien präsentiert, welche das Sportengagement zum einen im Übergang Kindheit und Jugend (Beitrag von Gebert et al.) und zum anderen bei der Transition von der obligatorischen Schule in eine weiterführende Ausbildung (Beitrag von Schmid et al.) in den Blick nehmen. Ein dritter Beitrag hingegen thematisiert im Sinne eines narrativen Reviews die Bedeutung der sportlichen Aktivität im Jugendalter für ein lebenslanges Sportengagement (Beitrag von Lenze et al.).

References:

Frogner, E. (1991). *Sport im Lebenslauf. Eine Verhaltensanalyse zum Breiten- und Freizeitsport*. Stuttgart: Ferdinand Enke.

Lamprecht, M., Fischer, A., Wiegand, D., & Stamm, H. P. (2015). *Sport Schweiz 2014: Kinder- und Jugendbericht*. Magglingen: Bundesamt für Sport.

Schlesinger, T., Löbig, A., Ehnold, P. & Nagel, S. (2018). What is influencing the dropout behaviour of youth players from organised football? A systematized review. *German Journal of Exercise and Sport Research*, *48*, 176-191. doi: 10.1007/s12662-018-0513-4 Schlesinger

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Title:

Veränderung des Sportverhaltens zwischen Kindheit, Jugend und Adoleszenz

Authors:

Gebert A[1], Lamprecht M[1], Probst-Hensch N[2], Bringolf-Isler B[2].

[1]Lamprecht und Stamm Sozialforschung und Beratung AG, Switzerland

[2]Swiss Tropical and Public Health Institute, Switzerland

Abstract:

Introduction:

Mit der SOPHYA-Studie (Bringolf-Isler, Probst-Hensch, Kayser, & Suggs, 2016) und der „Sport Schweiz"-Studie (Lamprecht, Fischer, & Stamm, 2014) existieren in der Schweiz zwei ausgezeichnete Instrumente mit denen Querschnittsdaten zum Bewegungsverhalten von Kindern und Jugendlichen erhoben werden. Fragen zur Veränderung des Bewegungsverhaltens im Übergang zwischen Kindheit, Jugend und Adoleszenz sowie zur Entwicklung der Sportkarriere der jungen Schweizerinnen und Schweizer konnten bislang allerdings nicht beantwortet werden.

Methods:

Daher wurden Kinder und Jugendliche, welche 2013/14 an der SOPHYA-Studie oder an „Sport Schweiz" teilgenommen hatten, im Jahr 2019 erneut telefonisch und teilweise auch online zu ihrem Bewegungs- und Sportverhalten befragt. Anhand dieser Daten kann die Veränderung des Sport- und Bewegungsverhaltens in drei verschiedenen Panels analysiert werden:
G1: Alter 2014 6-10 Jahre, Alter 2019 11-15 Jahre, Ausschöpfung 72.5%, n=515,
G2: Alter 2014 11-15 Jahre, Alter 2019 16-20 Jahre, Ausschöpfung 54.7%, n=734,
G3: Alter 2014 16-20 Jahre, Alter 2019 21-25 Jahre, Ausschöpfung 41.3%, n=370.

Results:

Mit Blick auf das Panel G1 zeigt sich, dass 41% der Kinder in dieser Lebensphase ihre Sportaktivität erhöhen und dass 36% auf gleichem Niveau bleiben. Im Alter zwischen 6-10 und 11-15 Jahren geht neben Schwimmen und Turnen die Ausübung jener Sportarten zurück, welche häufig beim freien Spielen betrieben werden (Radfahren, Fussball, Inline-Skating, Skateboarding). 59% der Kinder waren zu beiden Befragungszeitpunkten im Sportverein und zwischen 6-10 und 11-15 Jahren halten sich die Ein- und Austritte mit je 15% in etwa die Waage.
Im Panel G2 hingegen reduziert mit 39% ein verhältnismässig hoher Anteil der Jugendlichen die sportliche Aktivität. Dieser Rückgang wirkt sich auf die Ausübung vieler verschiedener Sportarten aus. Eine besonders starke Abnahme zeigt sich beim Schwimmen, Radfahren und Fussballspielen. Im Gegensatz dazu gewinnen Wandern, Jogging und Fitnesstraining an Beliebtheit. Zwischen 11-15 Jahren und 16-20 Jahren treten 28% der Jugendlichen aus dem Sportverein aus.
Auch im Alter zwischen 16-20 Jahren und 21-25 Jahren (Panel G3) reduziert ein verhältnismässig hoher Anteil der jungen Erwachsenen die Sportaktivität (32%). Wandern gehört zu den wenigen Sportarten, welche in dieser Lebensphase vermehrt ausgeübt werden. Austritte aus dem Sportverein sind auch im Panel G3 häufig zu beobachten.

Discussion/Conclusion:

Die Sport- und Bewegungsaktivität ist in jungen Jahren keine Konstante. Es sind in allen drei Panels interessante Veränderungen zu beobachten und der Anteil an Kindern und Jugendlichen, welche zu beiden Befragungszeitpunkten in gleichem Masse aktiv oder inaktiv waren, liegt sowohl im Panel G2 als auch im Panel G3 bei lediglich einem Viertel.

References:

Bringolf-Isler, B., Probst-Hensch, N., Kayser, B., & Suggs S. (2016). *Schlussbericht zur SOPHYA-Studie*. Basel: Swiss Tropical and Public Health Institute.

Lamprecht, M., Fischer, A., & Stamm, H. P. (2014). *Sport Schweiz 2014: Sportaktivität und Sportinteresse der Schweizer Bevölkerung*. Magglingen: Bundesamt für Sport BASPO.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Title: Who stays on? The link between psychosocial patterns and changes in exercise and sport behaviour when adolescents make transitions in education

Authors:
Schmid J[1], Gut V[1], Yanagida T[2], Conzelmann A[1].
[1]Institute of Sport Science, University of Bern, Switzerland.
[2]Department of Economic Psychology, Educational Psychology and Evaluation, University of Vienna, Austria.

Abstract:
Introduction: Individuals often reduce their level of exercise and sport during adolescence and young adulthood (Corder et al., 2017); especially the transition from lower to upper secondary education appears to have an impact on the exercise and sport behaviour of these adolescents. In view of the various positive, long-term effects on health and well-being, it is vital to promote exercise and sport among adolescents during this transition. However, to develop interventions that promote exercise and sport, it is essential not only to identify factors that influence the behaviour, but also to understand their interplay within each individual. In this study, we examined the impact of psychological and social factors and derived specific variables from the motivational and volitional process model (Fuchs, Göhner, & Seelig, 2011) and the social-ecological framework (Sallis et al., 2006). The first aim was to identify psychosocial patterns among adolescents at lower secondary school. Self-concordance, action planning, social support, and club-related exercise and sport activities were included as indicators. The second aim was to examine how these patterns are associated with the maintenance of exercise and sport during students' transition to upper secondary education. The last aim was to investigate whether the associations were moderated by individuals' subjective evaluation of the transition.

Methods: One-year longitudinal data of 392 adolescents were analysed. All variables were measured via online self-report.

Results: Based on latent profile analysis, four patterns were found: 'averages', 'club enthusiasts', 'club engaged planners', and 'less motivated and social uncommits'. Regression analyses showed that the club engaged planners were more likely to adopt and maintain exercise and sport than to drop out. Additionally, moderation analyses revealed that the averages were less likely to be maintainers/adopters when they evaluated the transition more negatively.

Discussion/Conclusion: People with relatively high action planning and a high number of club-related activities were less vulnerable to decreasing their activity time during the transition to upper secondary education. Furthermore, transitional stress bore no negative association with students' exercise and sport behaviour. One can interpret that these individuals have already get used to regulating their behaviour and doing exercise and sport in both an organised and flexible way before the transition. When faced with increased academic demands and time pressure at upper secondary school, they were able to rely on these skills to maintain or adopt their behaviour.

References:

Corder,K., Winpenny, E., Love, R., Brown, H. E., White, M., & van Sluijs, E. M. F. (2017). Change in physical activity from adolescence to early adulthood: A systematic review and meta-analysis of longitudinal cohort studies. *British Journal of Sports Medicine.* Advance online publication.

Fuchs, R., Göhner, W., & Seelig, H. (2011). Long-term effects of a psychological group intervention on physical exercise and health: The MoVo concept. *Journal of Physical Activity and Health*, *8*(6), 794–803.

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*, *27*, 297–322.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Title:

Sport im Jugendalter als Motor für ein lebenslanges Sporttreiben? Ein narratives Review

Authors:

Lenze L[1,2], Klostermann C[1], Nagel S.[2]

[1]Pädagogische Hochschule Fachhochschule Nordwestschweiz

[2]Institut für Sportwissenschaft, Universität Bern, Schweiz

Abstract:

Introduction: Das Sporttreiben ist zwar im Kindes- und Jugendalter eine sehr beliebte Freizeitbeschäftigung und ihm wird eine hohe Bedeutung für das lebenslange Sportengagement beigemessen, doch nach der Jugend ist eine deutliche Abnahme an Sport- und Bewegungsaktivitäten zu beobachten (Corder et al., 2019). Insgesamt kann das Sportverhalten über den Lebensverlauf hinweg als wenig stabil bezeichnet werden (Telama, 2009). In Anlehnung an Konzepte der Lebensverlaufs-Forschung können Verläufe der sportlichen Aktivität als Abfolge von Ereignissen und Aktivitäten in einem einheitlichen formalen, kategorialen und empirischen Bezugsrahmen aufgefasst werden. Die Ereignisse und Episoden (z.B. sportliche Aktivitäten) sind dabei nicht isoliert, sondern abhängig von früheren Ereignissen zu betrachten (Mayer, 1990). Hierbei existieren verschiedene Hypothesen zu Wirkmechanismen hinter diesen Abhängigkeiten für das Sporttreiben im Lebensverlauf (Telama, 2009). Ziel dieses Beitrags ist es, den aktuellen Forschungsstand über den möglichen Einfluss von Sportaktivitäten im Kindes- und Jugendalter auf das Sporttreiben im Erwachsenenalter im Überblick darzustellen.

Methods: In Anlehnung an Baumeister und Leary (1997) wurden für das narrative Review längsschnittliche Beiträge gesucht, die das Forschungsfeld möglichst ganzheitlich abdecken, so dass auf einem höheren Abstraktionsniveau – im Vergleich zu Einzelbeiträgen – Schlussfolgerungen für diese spezifische Thematik formuliert werden können.

Results: Die gesichteten Studien aus verschiedenen westlichen Ländern weisen recht einheitlich darauf hin, dass die Sportaktivität im Jugendalter ein Prädiktor für lebenslanges Sporttreiben sein kann – allerdings mit eher geringen und mit zunehmenden Alter abnehmenden Effekten.
Als spezifische Prädiktoren aus dem Jugendalter werden ein frühes Einstiegsalter, ein kontinuierliches Ausüben der Sportaktivität, ein organisiertes Sporttreiben bzw. Sport im Verein, Wettkampfsport und gute sportmotorische Fertigkeiten genannt. Hingegen ist der Forschungsstand recht uneinheitlich zu der Frage, ob oder welchen Einfluss spezifische Sportarten aufs spätere Sporttreiben aufweisen.

Discussion/Conclusion: Wie im theoretischen Ansatz angenommen (Mayer, 1990), hängen frühere Ereignisse im Lebensverlauf mit späteren Ereignissen hinsichtlich sportlichen Aktivitäten zusammen. Die Hypothesen zu den dahinterliegenden Wirkmechanismen nach Telama (2009) werden für die spezifischen Prädiktoren diskutiert und Schlussfolgerungen daraus abgeleitet.

References:

Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. *Review of General Psychology, 3,* 311-20.

Corder, K., Winpenny, E., Love, R., Brown, H. E., White, M., & van Sluijs, E. M. F. (2019). Change in physical activity from adolescence to early adulthood: A systematic review and meta-analysis of longitudinal cohort studies. *British Journal of Sports Medicine, 53,* 496-503.

Mayer, K. U. (1990). Lebensläufe und sozialer Wandel. Anmerkungen zu einem Forschungsprogramm. In K. U. Mayer (Ed.), *Lebensverläufe und sozialer Wandel* (Kölner Zeitschrift für Soziologie und Sozialpsychologie, Sonderheft 31/1990, 7-21). Opladen: Westdeutscher Verlag.

Telama, R. (2009). Tracking of physical activity from childhood to adulthood: A review. *The European Journal of Obesity, 3,* 187-195

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Symposium

Thursday 06.02.2020

Room 117 **Sports didactics – current trends and tendencies in Switzerland**
Chair: Christelle Hayoz

11:00 Learning and teaching in physical education (LELEPS)
Christelle Hayoz

11:20 Des tâches complexes pour enseigner et apprendre la course de durée à l'école en Suisse romande
Nicolas Voisard

11:40 Professionelle Kompetenzen von Sportlehrpersonen und ihre Wirkungen auf Unterricht und Schülerleistungen (PCK-Sport 3:1).
André Gogoll

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Title:

Sports didactics – current trends and tendencies in Switzerland
Sportdidaktik – aktuelle Trends und Tendenzen in der Schweiz
Didactique en éducation physique et sportive – trends et tendances actuelles en Suisse

Authors:
Hayoz C[1]
[1] Fachdidaktikzentrum Sport, Pädagogische Hochschule und Universität Bern, Switzerland

Abstract:
Within this symposia, current trends and tendencies in the context of sports didactics in Switzerland are introduced. The common sense of the presented topic is that the scientific research in the different research fields and linguistic regions of Switzerland focuses on sports didactics which effects physical education and therefore the physical and sports activity of all children and youth.
First, a national research project called "LELEPS – learning and teaching in physical education" will be presented. It is a fundamental work about sports didactics which is conducted by eight different teaching universities of the German- and French-speaking parts in Switzerland.
Furthermore, due to the introduction of the new competence oriented curriculum another intercantonal research project "PEREPS - from the objectives of the plan d'étude romand (PER) to evaluations in physical education in the different cantons", which is currently conducted in the French speaking part of Switzerland is presented. It is about competence oriented physical education and its evaluation.
As a third topic in the actual discourse about sports didactics, the project "Professional competencies of sports teachers and their effects on teaching and student performance (PCK-Sport 3:1)" will be introduced during this symposium. It shows that not only a competence oriented teaching, but also the professional competences of teachers have an effect on teaching and student performance.

The aim of this symposium is to transmit the current trends and tendencies of sports didactics in Switzerland by presenting and discuss several intercantonal projects in the field of physical education to a mixed audience - teaching universities and universities from different linguistic regions in Switzerland and other countries. As a consequence, physical education can benefit and physical and sports activity of children and youth could qualitatively as well as quantitatively be increased.

Hayoz, Christelle (Fachdidaktikzentrum Sport, PH Bern und Universität Bern):
Leaching and teaching in physical education (LELEPS).

Voisard, Nicolas (HEP BEJUNE) :
Des objectifs du Plan d'étude romand (PER) aux évaluations en éducation physique et sportive dans les cantons (PEREPS).

André Gogoll (EHSM) :
Professionelle Kompetenzen von Sportlehrpersonen und ihre Wirkungen auf Unterricht und Schülerleistungen (PCK-Sport 3:1).

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Title:

Learning and teaching in physical education (LELEPS)

Authors:

Hayoz C[1], Lanthemann N[2]

[1]Fachdidaktikzentrum Sport, Pädagogische Hochschule und Universität Bern, Switzerland

[2] Haute école pédagogique Vaud, Switzerland

Abstract:

Introduction :

The project-related network of the eight teaching universities HEP BEJUNE, HEP/PH Fribourg, PH Lucerne, PH St. Gallen, IFUE Geneva, PH Zurich, HEP Vaud and PH Berne has initiated the development project “LELEPS – Lernen und Lehren en education physique et sportive” with the support of swissuniversities. The project LELEPS is a cross-lingual and all educational level review of the didactics fundamentals of physical education in Switzerland and should further develop science-based teacher training in physical education.

The aim of the project LELEPS is to establish didactics competences at national level and to use these competences for research and teaching in sports didactics. On the basis of theoretical and empirical expertise, the didactics discourse among specialists (didactics experts, scientists and teachers in physical education) at all educational levels is conducted and the general concept of "physical education in Switzerland" or teaching and learning in physical education is developed.

Within the framework of this four-year project, interdisciplinary didactics core aspects of physical education are determined and clarified on a scientifically sound and practice-oriented basis at national level. The project LELEPS is accompanied by the consideration of the current curricula in the language regions in Switzerland (LP21, PER) and the developments in other teaching materials. Taking into account general didactics, sports didactics, educational and sports science perspectives, central aspects of teaching and learning in physical education are defined with the aim of developing a basic tool for teacher education. In addition, the subjective professional understanding of sports didactics experts is investigated in parallel within the framework of a research project.

Methods:

Since the beginning of the project LELEPS, experts have scientifically supported and theoretically worked through the first three chapters of the development project: "professional understanding", "learners and learning" and "teachers and teaching". In the following, the further chapters "planning", "implementation" and "evaluation" will be elaborated on the basis of practical examples. Furthermore, the research project conducted a total of 18 interviews with didactics experts in physical education, which are analysed by the qualitative content analysis (Mayring, 2019).

Results: Currently, several student papers are being written on the subjective understanding of the school subject physical education, the subjective understanding of sports didactics as well as the subjective professional understanding of didactics experts in physical education.

Conclusion: The project will end in december 2020 and be published in German and French during the first semester 2021. The book is planned to serve as a reference document for all experts involved in the teaching of sports didactics.

References:

Mayring, P. (2019). *Qualitative Inhaltsanalyse.* Weinheim: Beltz.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Titre :

Des tâches complexes pour enseigner et apprendre la course de durée à l'école en Suisse romande

Auteurs :

Voisard N.[1], Lenzen B.[2,3], Barthe Léchenne C.[1], Deriaz D.[1], Cordoba A.[2], Poussin B.[3], Suter Y.[4], Pürro C.[5], Saillen L.[6]

[1] Centre de compétences EP-S à l'école, Haute école pédagogique BEJUNE (Bienne) [2] Faculté de psychologie et des sciences de l'éducation, Université de Genève (Genève) [3] Institut universitaire de formation des enseignants, Université de Genève (Genève) [4] Université de Fribourg (Fribourg) [5] Haute école pédagogique Fribourg (Fribourg) [6] Haute école pédagogique Valais (St-Maurice)

Introduction : La préservation de son capital santé par le choix responsable d'activités sportives est une des finalités centrales du Plan d'études romand (PER, 2010) en éducation physique et sportive (EPS). L'institution scolaire attend de manière explicite que les enseignant·e·s développent la capacité aérobie de leurs élèves, et ce tout au long de la scolarité obligatoire. Pour aider les enseignant·e·s d'EPS à répondre à cette attente, une équipe de 10 chercheur.e.s issus de 5 institutions de formation de Suisse romande s'est constituée autour du projet PEREPS. Organisée en deux étapes - (1) élaborer et (2) mettre à l'épreuve du terrain des formes de pratique scolaire (FPS) en course de durée conçues selon l'approche par compétence prescrite par le PER - ce projet intercantonal ambitionne de faire vivre aux élèves « dans le cadre scolaire une expérience sportive spécifique et culturellement signifiante (…) et de développer une activité adaptative singulière» (Mascret & Dhellemmes, 2011). La communication se limitera à une présentation de la 1ère étape.
Méthode : Inspirée d'une démarche de type ingénierie didactique (Artigue, 1989), la 1ère étape du projet a consisté en une analyse préalable du curriculum visant la reformulation des attentes disciplinaires fondamentales, souvent fragmentées, dans le sens de l'approche par compétence. Ce travail a servi de base à l'élaboration de quatre FPS (tâche complexe) destinées à l'enseignement et l'évaluation aux élèves de 8 ans (4H), 12 ans (8H), 15 ans (11H) et 18 ans (sec 2). L'analyse a priori de ces FPS a permis de pointer les enjeux d'apprentissage adaptés à l'âge des élèves que devraient viser les enseignant.e.s lors de l'expérimentation de celles-ci dans leurs classes (2ème étape).
Résultats : La complexité nécessaire à l'émergence de la compétence en course de durée se retrouve dans les formes de pratique scolaire élaborées par l'équipe. Pour réussir dans la tâche, l'élève doit non seulement réaliser une performance mais aussi maîtriser différents enjeux d'apprentissage : vitesse adaptée à la durée, régularité de l'effort, utilisation de repères pour gérer sa course, etc. Par ailleurs, au cours de processus d'apprentissage, l'élève est amené à faire des choix et à prendre des décisions en connaissance des règles établies, pour lui ou pour son groupe.
Discussion/Conclusion : La mise en œuvre à l'école des principes d'entraînement de la capacité aérobie (fréquence, volume et répétition) butte sur un programme riche qui réduit le temps disponible. Par la nature diverse des savoirs qu'elle suppose, l'approche par compétence - à défaut peut-être d'agir efficacement sur les mécanismes physiologiques - peut être une réponse à ces limites. Accompagner la traditionnelle mesure de performance de critères de maîtrise individualisés et de rôles sociaux (observateur, coach) laisse à penser que des traces utiles et durables peuvent se construire et inciter les élèves à entrer dans une gestion autonome de leur vie physique.

Références :

Artigue, M. (1989). Ingénierie didactique. *Recherches en Didactique des Mathématiques*, *9*(3), 281-308.

Mascret, N. & Dhellemmes, R. (2011). Culture sportive et culture scolaire des APSA. In M. Travert & N. Mascret (coord.), *La culture sportive* (pp. 99-115). Paris : Editions EP&S

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Title:

Professionelle Kompetenzen von Sportlehrpersonen und ihre Wirkungen auf Unterricht und Schülerleistungen (PCK 3:1) – Zur Erfassung operativ-produktiver und analytisch-reflexiver sportlicher Bewegungshandlungskompetenz von Schülerinnen und Schülern der Sekundarstufe I

Authors:
Gogoll A, Siffert A.
Ressort Sporterziehung, Eidg. Hochschule für Sport Magglingen (EHSM), Schweiz

Abstract:

Introduction: Bislang ist nur wenig darüber bekannt, wie sich professionelle Kompetenzen von Sportlehrpersonen auf die Gestaltung und Qualität ihres Sportunterrichts und den daraus hervorgehenden Lernerfolg der Schülerinnen und Schüler auswirken. Im Rahmen des vom SNF geförderten Projekts PCK 3:1 (Gesuchsteller: Roland Messmer, PH FHNW, Christian Brühwiler, PH SG, André Gogoll, EHSM) haben wir nun erstmals die Gelegenheit, diese für den Fachbereich Bewegung und Sport bislang nicht untersuchte Wirkungskette empirisch zu untersuchen.

In einer ersten Phase dieses 2019-2023 laufenden Projekts entwickeln wir u. a. einen rasch-skalierten Leistungstest zur Messung der sportlichen Bewegungshandlungskompetenzen von Schülerinnen und Schüler für den technisch-spielerischen sowie den technisch-gestalterischen Leistungsbereich. Sowohl bei der Erarbeitung und Modellierung des Kompetenzkonstrukts, als auch bei der Entwicklung und Validierung des Kompetenztests betreten wir (nicht nur) für die wissenschaftlich sportdidaktische Forschung Neuland.

In unserem Beitrag wollen wir die konzeptionellen Grundlagen des Schülerkompetenztests, sowie erste Ergebnisse aus der Laborpilotierung der entwickelten Testitems präsentieren.

Methods: Die bisher entwickelten Items werden aktuell prä-pilotiert. Um die Lösungswege bei der Beantwortung der Items nachvollziehen zu können, sowie um etwaige Fehlkonstruktionen der Items zu identifizieren, werden Studierende zur schriftlichen Evaluation des Tests und zum «lauten Denken» im Cognitive Lab gebeten.

Results: Stehen noch aus

Discussion/Conclusion: Die in der Prä-Pilotierung erzielten Ergebnisse werden zur Anpassung der Items im Schülerkompetenztest genutzt. Erst danach erfolgt die Validierung des Tests durch eine Pilotierungsstudie an etwa N=1'200 Schülerinnen und Schülern.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Thursday 06.02.2020

Aula **Sports and Exercise Science & Sports and Exercise Medicine: A Joint Session**

Chairs: Arno Schmidt-Trucksäss; Bengt Kayser

11:00 Exercise in the Prevention and Treatment of Heart Disease
Christian Schmied

11:20 Exercise and brain health with a special focus on GABAergic (inhibitory) processes
Wolfgang Taube

11:40 Exercise and Vascular Health during the Lifespan: From Exercise Physiology to Patient Care
Henner Hanssen

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

The topic of the session

Sports and Exercise Science & Sports and Exercise Medicine: A Joint Session

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- **Prof. Arno Schmidt-Trucksäss, Sports and Exercise Medicine, Department of Sport, Exercise and Health, University of Basel**
- **Prof. Bengt Kayser, Institut des sciences du sport de l'Université de Lausanne**

- **Prof. Christian Schmied, Sports Cardiology, University Hospital Zürich**

  Prof. Wolfgang Taube, Sports & Exercise Science, University of Fribourg

  Prof. Henner Hanssen, Sports and Exercise Medicine, Department of Sport, Exercise and Health, University of Basel

Title:
Sports and Exercise Science & Sports and Exercise Medicine: A Joint Session

Scope: The invited session aims at giving an overview on selected current research concepts on an interdisciplinary level in the field of sports science and sports medicine. This joint session of the Swiss Society of Sports Science with the Swiss Society of Sports Medicine features interdisciplinary research with a focus on exercise as an intervention strategy to prevent or alleviate chronic disease during the lifespan. It has a focus on exercise in the prevention and treatment of heart failure and vascular dysfunction and gives insights into the importance of neuromuscular function to maintain health. The session aims at giving updates on these issues based on the current literature and offers discussions on practical recommendations for exercise treatment. It represents a translational approach from applied exercise physiology to health maintenance and prevention as well as patient care.

Exercise in the Prevention and Treatment of Heart Disease (Christian Schmied): Regular exercise and cardiovascular lifestyle adaption have become major issues in cardiovascular treatment in a primary as well as in secondary preventive settings. Still, in secondary prevention, evidence mainly has been gained from meta-analyses, where relevant clinical endpoints, such as cardiovascular mortality and overall mortality, as well as recurrent cardiovascular events and hospitalizations were shown to be significantly less in patients following cardiac rehabilitation. As such, cardiac rehabilitation cannot longer be seen as a possible addition to standard (e.g. pharmacologic) therapies - it has to be established as the crucial fundamentum in multimodal cardiovascular treatment. Finally, a tailored exercise program leads to health benefits in almost all cardiovascular diseases. In primary prevention, a sub-study of the PURE trial recently was able to demonstrate impressively that regular exercise is able to reduce cardiovascular events and even mortality in individuals that follow a regular training independently from further cardiovascular risk factors. Moreover, these benefits show a "dose-effect relationship". However, exercise recommendations should not only follow a simple "the more the better" strategy: More sophisticated and specified recommendations, to reach "optimal" health benefits, should be the aim.

Exercise and brain health with a special focus on GABAergic (inhibitory) processes (Wolfgang Taube): It is known for some time now that physical activity positively influences (cognitive) brain function not only in elderly but also young people; in both the short- and long-term. Furthermore, physical activity is a key factor to prevent neurodegenerative diseases. One aspect, which is commonly impaired in many neuro-pathologies but also in patients with motor control deficits, cognitive decline, insomnia or some types of depression is the cortical inhibitory system. Only very recently, it was discovered that sports activities have the potential to up- (e.g. balance training) or downregulate (e.g. strength training) the strength of the inhibitory circuits of the GABAergic system (i.e. cortical interneurons). The present talk will present preliminary evidence that physical activity strongly acts on the inhibitory system and that this impact may explain – at least partly – the positive influence of sports activities on pathologies that are known to go along with impaired (reduced) inhibitory capacity.

Exercise and Vascular Health during the Lifespan: From Exercise Physiology to Patient Care (Henner Hanssen): Cardiovascular disease (CVD) is a main determinant of morbidity and mortality in western countries and physical activity is a key lifestyle factor for the prevention and treatment of CVD. It is associated with complex structural and functional alterations of the macro- and microvascular bed. The mechanisms of exercise-induced improvements of vascular health on a molecular and vascular level remain poorly understood. Retinal vessel analysis (RVA) is a non-invasive technique that allows direct investigation of the microvascular bed. In recent years we have developed and applied vascular biomarkers such as RVA to help define subclinical vascular dysfunction, allowing us to study the effects of different exercise modalities on vascular health. The presentation gives insights into the vascular adaptations in response to different endurance exercise stimuli in children and adults. We aim to demonstrate the importance of specific exercise programs to achieve healthier ageing as a long-term goal.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Thursday 06.02.2020

Room 118 **Motorische Basiskompetenzen im Kindesalter**
Chairs: Uwe Pühse ; Christian Herrmann

11:00 Motorische Basiskompetenzen im Kindergarten – Monitoring und Fremdeinschätzung durch die Lehrpersonen.
Ilaria Ferrari

11:20 Monitoring motorischer Basiskompetenzen von 6-10-jährigen Primarschulkindern in zwölf europäischen Ländern
Christian Herrmann

11:40 Gender-specific Sport Socialization and Basic Motor Competencies (MOBAK) predictor – A Mediation Model
Elke Gramespacher

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Motorische Basiskompetenzen im Kindesalter

Chair:

Pühse U[2] & Herrmann Ch[1,2]
[1]Didaktik Bewegung und Sport, Pädagogische Hochschule Zürich, Schweiz
[2]Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz

Mantelabstract:

Motorische Basiskompetenzen gewährleisten als erlernbare und funktionale Leistungsdispositionen, dass Kinder aktiv und qualifiziert an der Sport- und Bewegungskultur teilnehmen können. Sie sind Grundlage für den Aufbau eines aktiven Lebensstils (Hulteen, Morgan, Barnett, Stodden & Lubans, 2018). Der Erwerb motorischer Basiskompetenzen ist eng an schulische und ausserschulische Sozialisationsprozesse (u. a. Sportverein) gebunden und kann daher sehr unterschiedlich ausfallen. Dem Sportunterricht kommt daher die erzieherische Aufgabe zu, einen Mindeststandard an motorischen Basiskompetenzen zu sichern (Herrmann, Seiler, Pühse & Gerlach, 2017). Mit den MOBAK-Testinstrumenten (u. a. Herrmann, 2018) können die motorischen Basiskompetenzen im Sportunterricht jahrgangsstufenspezifisch und curricular valide erhoben und potentieller Förderbedarf frühzeitig erkannt werden. Der Arbeitskreis beinhaltet drei Präsentationen, welche die motorischen Basiskompetenzen von Kindergarten- und Primarschulkindern darstellt und in Beziehung zu endogenen und exogenen Faktoren setzt:

Im **ersten Beitrag** von Ferrari et al. wird die Untersuchung der motorischen Basiskompetenzen von N = 403 Kindergartenkindern (46 % Mädchen; M = 5.69 Jahre, SD = .56) mit dem neu entwickelten MOBAK-KG-Instrument (Herrmann, Seelig, Ferrari & Kühnis, 2019) dargestellt. Neben Geschlechts- und Altersunterschieden in den motorischen Basiskompetenzen wird auch die Akkuratheit der Einschätzungen der Lehrpersonen zu den motorischen Basiskompetenzen untersucht (Kühnis, Ferrari, Fahrni & Herrmann, 2019). Der **zweite Beitrag** von Herrmann et al. fokussiert N=4590 Kinder (M = 6.90 Jahre, SD = 0.63) der ersten und zweiten Klasse sowie N=2138 Kinder (M = 9.38 Jahre, SD = 0.71) der dritten und vierten Klasse aus zwölf europäischen Ländern. Es werden die länderspezifischen Stichproben hinsichtlich des Leistungsniveaus, des Anteils an förderbedürftigen Kindern sowie des Zusammenhangs mit BMI, Geschlecht und Vereinssportengagement verglichen. Der **dritte Beitrag** von Gramespacher et al. zeigt anhand einer Studie mit N = 697 Erstklässlern (M = 6.83 Jahre, SD = 0.44) geschlechterbezogene Befunde unter Einbezug des ausserschulischen Sports (Gramespacher, Herrmann, Ennigkeit, Heim & Seelig, 2020/in print). Untersucht wird, inwiefern die Geschlechterunterschiede in den motorischen Basiskompetenzen auf einen mediierenden Effekt der Teilhabe am Vereinssport zurückzuführen sind.

References:

Gramespacher, E., Herrmann, C., Ennigkeit, F., Heim, C. & Seelig, H. (2020/in print). Geschlechtsspezifische Sportsozialisation als Prädiktor motorischer Basiskompetenzen. Ein Mediationsmodell. *motorik (Themenscherpunkt Gender und Psychomotorik)*, (1).

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Herrmann, C., Seelig, H., Ferrari, I. & Kühnis, J. (2019). Basic motor competencies of preschoolers: Construct, assessment and determinants. *German Journal of Exercise and Sport Research*, *49*(2), 179–187. https://doi.org/10.1007/s12662-019-00566-5

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Hulteen, R. M., Morgan, P. J., Barnett, L. M., Stodden, D. F. & Lubans, D. R. (2018). Development of Foundational Movement Skills. A Conceptual Model for Physical Activity Across the Lifespan. *Sports Medicine (Auckland, N.Z.)*. https://doi.org/10.1007/s40279-018-0892-6

Kühnis, J., Ferrari, I., Fahrni, D. & Herrmann, C. (2019). Motorische Basiskompetenzen von 4-6-Jährigen in der Schweiz. Eine vergleichende Untersuchung in Regel- und Bewegungskindergärten. *Swiss Sports & Exercise Medicine*, *67*(2), 54–58.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Motorische Basiskompetenzen im Kindergarten – Monitoring und Fremdeinschätzung durch die Lehrpersonen

Authors:
Ferrari, I.[1], Kühnis, J.[2], Hermann, Ch.[1],
[1]Pädagogische Hochschule Zürich, Schweiz
[2]Pädagogische Hochschule Schwyz, Schweiz

Abstract:

Introduction:

Die motorischen Basiskompetenzen ermöglichen den Kindern, an unterschiedlichen Bewegungssituationen teilnehmen zu können. Gemäss Fachlehrplan Bewegung und Sport des Lehrplan 21, sollen die Schülerinnen und Schüler ihre Bewegungskompetenzen sukzessiv erweitern, um aktiv an der Bewegungs- und Sportkultur partizipieren zu können. Ein entsprechendes motorisches Können bildet deshalb bereits im Kindergarten eine wichtige Grundvoraussetzung (Kühnis, Ferrari, Fahrni & Hermann, 2019). Im Lernprozess ist eine realistische Einschätzung der motorischen Basiskompetenzen der Kindergartenkinder durch die Lehrperson eine wichtige Voraussetzung für eine förderorientierte Gestaltung des Sportunterrichts.

Methods:

Anhand des MOBAK-KG-Instruments (Herrmann, Seelig, Ferrari & Kühnis, 2019) wurden die motorischen Basiskompetenzen "Sich-Bewegen" (Faktorreliabilität: FR=0.67) und "Etwas-Bewegen (FR=0.71) von N=403 Kindern (46% Mädchen; M=5.69 Jahre, SD=.56) aus 25 Kindergartenklassen erhoben. Parallel dazu schätzten die N=25 Lehrpersonen (88% Frauen) das Leistungsniveau der gesamten Gruppe in jedem der gemessenen MOBAK-KG-Testitems auf einem Fragebogen ein. Die auf Gruppenebene aggregierte Leistungen wurden mit den Einschätzungen der Lehrpersonen deskriptiv verglichen. Zusätzlich wurden Differenzwerte (geschätzte – getestete Leistung) mittels Regressionen in Bezug zum durchschnittlichen Leistungsniveau und -varianz in der Gruppe gesetzt. Weiterhin wurde geprüft, inwieweit Lehrpersonen eines bewegungsorientierten Kindergartens akkuratere Diagnosen vornehmen.

Results:

In den beiden Kompetenzbereichen, «Sich-Bewegen» und «Etwas-Bewegen» zeigten ältere Kinder deutlich bessere Werte. Im Geschlechtsvergleich schnitten die Mädchen deutlich schlechter im Kompetenzbereich «Etwas-Bewegen» und etwas besser im Kompetenzbereich «Sich-Bewegen». Zudem wurden bedeutsame Leistungsunterschiede in Abhängigkeit der Wohnregion und zwischen Regel- und Bewegungskindergarten nachgewiesen (vgl. Kühnis et. al., 2019). Die Lehrpersonen überschätzten die Leistungen der Kinder in den einzelnen Testitems wie auch in den beiden Kompetenzbereichen deutlich. Lehrpersonen aus bewegungsorientierten Kindergärten schätzten die motorischen Leistungen der Kinder, wenn auch nicht signifikant, präziser ein.

Discussion/Conclusion:

Aufgrund der ersten Resultate ist eine Erweiterung der motorischen Basiskompetenzen auf nationaler Ebene wünschenswert. Gleichzeitig sollen Aufgabenformate entwickelt werden, die die Entwicklung des motorischen Lernstands der Kinder unterstützen und dessen Einschätzung durch die Lehrpersonen ermöglichen. Unsere Befunde deuten zudem auf die Wichtigkeit der Schulung der diagnostischen Kompetenz in der Aus- und Weiterbildung von Lehrpersonen hin.

References:

Herrmann, C., Seelig, H., Ferrari, I. & Kühnis, J. (2019). Basic motor competencies of preschoolers: Construct, assessment and determinants. *German Journal of Exercise and Sport Research*, *49*(2), 179–187.

Kühnis, J., Ferrari, I., Fahrni, D. & Hermann, C. (2019). Motorische Basiskompetenzen von 4-6-Jährigen in der Schweiz. Eine vergleichende Untersuchung in Regel- und Bewegungskindergärten. *Swiss Sports and Excercise Medicine, 67 (2)*, 54-58.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Monitoring motorischer Basiskompetenzen von 6-10-jährigen Primarschulkindern in zwölf europäischen Ländern

Authors:

Herrmann Ch[1,2], Wälti M[2] & Seelig H[2]

[1]Didaktik Bewegung und Sport, Pädagogische Hochschule Zürich, Schweiz

[2]Sportwissenschaft, Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz

Abstract:

Problemstellung: Motorische Basiskompetenzen gelten in den europäischen Lehrplänen der Primarstufe als zentrale Lernziele des Sportunterrichts. Sie bilden die Basis für die Partizipation an der Sport- und Bewegungskultur und sind Grundlage für den Aufbau eines aktiven Lebensstils. Kinder sollten diese Minimalstandards im Sportunterricht erreichen und der Förderbedarf frühzeitig erkannt werden. Im Zentrum dieses Vortrags stehen die länderspezifischen Leistungsniveaus und Förderbedürfnisse in den motorischen Basiskompetenzen in zwölf europäischen Ländern sowie deren Zusammenhänge mit bedeutsamen endogenen und exogenen Faktoren.

Methode: Im Rahmen des von Erasmus+ geförderten Projekts BMC-EU (Basic Motor Competencies in Europe) wurden die beiden motorischen Kompetenzbereiche «Etwas-Bewegen» (EB) und «Sich-Bewegen» (SB) mit dem MOBAK-1-2 (Herrmann, 2018) bei N=4590 Erst- und Zweitklässlern (M = 6.90 Jahre, SD = 0.63) in zehn europäischen Ländern (z.B. Belgien, Griechenland, Niederlande, Portugal, Slowakei) erfasst. Mit dem MOBAK-3-4 (Herrmann, 2018) wurden die N=2138 Dritt- und Viertklässler (M = 9.38 Jahre, SD = 0.71) aus neun europäischen Ländern (z.B. Italien, Litauen, Österreich, Schweiz) erfasst. Zusätzlich erfolgte eine Befragung der Kinder zu ihrer ausserschulischen sportlichen Aktivität sowie eine Messung der Körpergrösse und Körpergewicht zur Berechnung des BMI. Zur Prüfung der länderspezifischen Unterschiede wurden Kovarianzanalysen und Partialkorrelationen berechnet.

Ergebnisse: Die psychometrische Qualität der Messung der motorischen Basiskompetenzen wurde in allen Ländern zufriedenstellend erfüllt. Das Niveau der motorischen Basiskompetenzen unterschied sich zwischen den länderspezifischen Stichproben der 1 und 2. Klassen (EB: $F=18.39$, $p<.001$, $eta^2=.044$; SB: $F=78.22$, $p<.001$, $eta^2=.167$) wie auch der 3. und 4.Klassen (EB: $F=37.11$, $p<.001$, $eta^2=.130$; SB: $F= 90.37$, $p<.001$, $eta^2=.269$) deutlich. Dabei zeigte sich eine grosse Bandbreite im Anteil an Kindern mit Förderbedarf zwischen den Ländern. Insgesamt lag in der MOBAK-1-2 bzw. MOBAK-3-4-Stichprobe im EB der Anteil an förderbedürftigen Kindern bei 27% bzw. 21% (Range: 14%-62% bzw. 5%-31%), im SB bei 21% bzw. 15% (Range: 6%-69% bzw. 3%-28%). In allen länderspezifischen Stichproben zeigten die Jungen bessere Leistungen im EB, die Mädchen bessere Leistungen im SB. Das Alter stand in einem positiven Zusammenhang mit den motorischen Basiskompetenzen. Ältere Kinder schnitten besser ab als Jüngere. In der 1. und 2. Klasse stand der BMI in keinem Zusammenhang mit EB und in einem kleinen bis mittleren negativen Zusammenhang mit SB. In der 3. und 4. Klasse stand der BMI in beiden Kompetenzbereichen in einem mittleren negativen Zusammenhang. Übergewichtige Kinder verfügen über niedrigere motorische Basiskompetenzen. Weiterhin zeigten Kinder, welche in ihrer Freizeit Ballsport und/oder Individualsport betreiben, bessere Werte in beiden Kompetenzbereichen.

Anhand der Konfidenzintervalle der Korrelationen wurde ersichtlich, dass die genannten Zusammenhänge der motorischen Basiskompetenzen mit Geschlecht, Alter, BMI und Vereinssportengagement sich nicht bedeutsam zwischen den länderspezifischen Stichproben unterscheiden.

Diskussion: Der in einzelnen länderspezifischen Stichproben festgestellte hohe Anteil an förderbedürftigen Kindern zeigt durchaus Handlungsbedarf auf. Trotz dieser unterschiedlichen Kompetenzniveaus sind jedoch die Zusammenhänge mit endogenen und exogenen Faktoren in allen Stichproben ähnlich ausgeprägt.

References:

Herrmann, C. (2018). MOBAK 1-4: Test zur Erfassung motorischer Basiskompetenzen für die Klassen 1–4. Hogrefe Schultests. Göttingen: Hogrefe.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Gender-specific Sport Socialization and Basic Motor Competencies (MOBAK) predictor – A Mediation Model

Authors:

Gramespacher E[1], Seelig H[2], Herrmann C[2,3].

[1]Institute for Kindergarten and Early Primary Education, University of Teacher Education, University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Switzerland

[2]Department of Sport, Exercise and Health, University of Basel, Switzerland

[3]Didactics Exercise and Sport, Zurich University of Teacher Education, Switzerland

Abstract:

Introduction: Basic motor competencies focus on mastering motor tasks. The MOBAK tests comprise two domains of motor performances, i.e. "locomotion" and "object control". All previous studies with MOBAK tests showed gender related differences (Herrmann, 2018).

We investigate whether gender only shows direct effects on MOBAK test results or if such effects could be due to other effects, namely the gender related socialization in exercise and sport environments. Based on the assumption that the choice of and engagement in a particular type of exercise and/or sport depends, among other things, on gender, we expect *mediating* (rather than moderating) effects. Data stemming from a former project („Schulkids in Bewegung", Herrmann, Heim & Seelig, 2017) were used to test potential mediation of children's exercise activities on the relation between gender and MOBAK-results (Gramespacher et al., in press).

Methods: Data assessment took place in October 2016 at 22 primary schools in Frankfurt/Main. The basic motor competencies of N = 1,031 first graders were measured by using the MOBAK-1 test (Herrmann, 2018). In addition, the parents of the pupils filled out a questionnaire in which they provided information about: a) (if and) what kind of exercise activities the child practices in a sports club (or the like) and b) how often the child exercises in club(s) per week (response rate: 67 %). Data of an ad hoc sample of N = 697 children (M = 6.83 years, SD = 0.44; n = 352 boys, n = 345 girls) were examined using M-Plus 7.11 (Muthén & Muthén, 2012), which allows to account for the multi-level-structure of the data.

Results: Analyses revealed significant (direct and) indirect effects of gender on MOBAK test results. Gender differences are mediated through specific type and frequencies of exercise activities in sports clubs: Differences in locomotion were (completely) mediated by the exercising in (and frequency of) individual sport activities ($\beta_{ind.}$ = .04; $BCI_{95\%}$ = [.01; .06]) and differences in object control were (partially) mediated ($\beta_{ind.}$ = .12; $BCI_{95\%}$ = [.08; .16]) by team sport activities.

Discussion/Conclusion: Gender differences in MOBAK test results may be explained by an interplay of gender and sport socialization. Due to the cross-sectional character of the analyses, its results are rather exploratory. Even if the findings are limited in this respect, our analyses indicate that it is worthwhile to account for gender related socialization processes (i.e. gendering processes) in further studies. Implications for physical education will be discussed.

References:

Gramespacher, E., Herrmann, C., Ennigkeit, F., Heim, C., & Seelig, H. (in press). Geschlechtsspezifische Sportsozialisation als Prädiktor motorischer Basiskompetenzen. Ein Mediationsmodell. *'motorik'. Zeitschrift für Psychomotorik in Entwicklung, Bildung und Gesundheit, 42*(1).

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Thursday 06.02.2020

Room 118 **Extended Symposium: From the field to the lab to the field – Transferring the demands of coaches into evidence-based practice.**
Chair: Oliver Faude

16:00 Tradition und Innovation für den Leistungssport
Silvio Lorenzetti

16:20 Implementing performance enhancement and injury prevention strategies: why the context and evidence matters?!
Jörg Spörri

16:40 Long-term development of neuromuscular ´Key Performance Indicators´ in elite youth athletes – Insights from the FC Basel 1893 Academy
Thomas Bernhard

17:00 Performance diagnostics in sport climbing: Inefficient force generation
Peter Wolf (added to symposium)

17:15 Blood flow restriction during low intensity rowing increases V̇O2max in highly trained endurance Athletes: A 5-weeks randomized controlled trial
Steffen Held (added to symposium

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
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Symposium:

From the field to the lab to the field – Transferring the demands of coaches into evidence-based practice.

Session Summary:

Coaches in elite sports concentrate their attention on optimizing the competitive performance of their individual athlete or team. In most sports, the potential rewards increase just like the risks and competitive pressure accumulate while the performance differences between athletes diminish. This particular challenge led to an advancing collaboration between practitioners and researchers in order to give the athlete the cutting edge. However, coaches, athletes and researchers frequently have different and partly conflicting views on sport science knowledge and its application in the field. Furthermore, there may be several (perceived) barriers in this regard, e.g. funding, time investment, the mutual recognition of coaches, athletes and researchers or poor matching between the demands from practice and valid research questions. The mutual understanding, however, increased with time, leading to fruitful integration of practitioner expertise, athlete ideas and research evidence, thereby optimizing the decision-making process in elite sports. This symposium aims at integrating the experience and knowledge of leading experts in the field of evidence-based practice in elite sports, based on the vision of the Swiss Federal Institute of Sport as well as of two examples from particular sports disciplines, i.e. alpine skiing and football.

Session Chair:

Oliver Faude

Department of Sport, Exercise and Health, University of Basel (Basel, Switzerland)

Speakers:

Silvio Lorenzetti

Swiss Federal Institute of Sport Magglingen (Magglingen, Switzerland)

Jörg Spörri

Department of Orthopedics, Balgrist University Hospital, University of Zurich (Zurich, Switzerland)

Thomas Bernhard

FC Basel 1893 Academy, Department of Sport, Exercise and Health, University of Basel (Basel, Switzerland)

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Presentation 1:

Tradition und Innovation für den Leistungssport
Silvio Lorenzetti

Die Rolle der Sportwissenschaft innerhalb des Leistungssports ist wichtig (Pillar 9, Spliss) und hat sich aber in den letzten Jahren nicht nur entwickelt, sondern auch erheblich verändert. Immer häufiger arbeiten Sportwissenschaftler/innen direkt für die Verbände. Diese können der Schlüssel für eine erfolgreiche Zusammenarbeit zwischen der Hochschule und der Leistungssportpraxis sein. Das Ressort Leistungssport realisiert multidisziplinär Dienstleistung sowie Forschungs- und Entwicklungsprojekte für die Sportverbände. Nebst langjährigen Standardtests werden innovative Projekte vorgestellt.

Presentation 2:

Implementing performance enhancement and injury prevention strategies: why the context and evidence matters?!
Jörg Spörri

How to bring relevant questions from the field to the lab and evident findings from the lab to the field? Do we really still need a lab or should we directly work in the field? What's the purpose of scientific evidence in a world of expert beliefs anyway? With these and similar questions we all are confronted when working on the border between science and practice; however, do we as contemporary sports scientists have an answer on them?
Within his talk, Jörg Spörri will present examples from implementing evidence-based performance enhancement and injury prevention strategies in competitive alpine skiing and will address the aspect of why the context and evidence indeed matters.

Presentation 3:

Long-term development of neuromuscular ´Key Performance Indicators´ in elite youth athletes – Insights from the FC Basel 1893 Academy
Thomas Bernhard

When to integrate organized neuromuscular training in youth is a fundamental research topic in sport science. Ample evidence exists to support the view that children should preferably not be exposed to sport-specific drills in early childhood. A long-term approach is favorable, in which neuromuscular and biomechanical key performance factors for future football are implemented gradually. But, how can an evidence-based approach be applied to the field?
The FC Basel 1893 Academy enjoys a good reputation for developing young elite football players. Thomas Bernhard will offer insights on how the Academy integrates scientific knowledge in their training philosophy.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Performance diagnostics in sport climbing: Inefficient force development

Authors:

Wolf P[1], Spoerri RF[2], Wittmann F[1]

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Abstract:

Introduction: With its inclusion in the Olympic Program in Tokyo 2020, sport climbing is experiencing a boost in professionalization. In order to remain an Olympic discipline, it will be essential to have a suitable presentation of information to enable spectators to assess climbing performance. An example would be if data could be used to show that a climber is climbing efficiently. Based on measured interaction forces, the current study makes a first attempt to determine efficient climbing. For this purpose, it is investigated whether climbers modulate their force as a function of submaximal train distances.

Methods: Four dedicated force plates (Bauer, Simnacher, Stöcker, Riener, & Wolf, 2014) were equipped with one wooden rung each (width: 140 mm, depth 20 mm, undercut 10°). Two of these instrumented rungs were each fixed centrally on a vertical rail to a 10° inclined climbing wall in order to realize pulls of 300 mm, 500 mm, and 700 mm. The horizontal distance between the centres of each rail was 400 mm. The participants could select their preferred finger position. The feet touched neither the floor nor the wall. For each distance and hand three tests were carried out, in randomized order. For each starting rung, the impulse was calculated within 0.8 s before releasing the hand to grip the higher rung. In addition, the maximum force per hand was measured during one-armed hangs. The study was approved by the ETH Ethics Committee (EK-2018-N-121). To date, three athletes (male, 2x Swiss junior national squad (born 2001) or former member of Swiss national squad (born 1996)) have been measured.

Results: All participants chose the half-crimp finger position. All participants are right-handed, but showed 4-10% higher maximum forces on the left. For the hand remaining on the start rung, greater impulses were measured for all participants than for the hand pulling. Only the athlete with the longest experience increased the impulse of the pulling hand with increasing pulling distance.

Discussion/Conclusion: Since the total impulse of the younger participants did not change with the pulling distances, it can be concluded that these athletes accelerated their bodies inefficiently for shorter pulling distances. On the other hand, the most experienced climber (Swiss champion in lead climbing) acted efficiently at lower distances. The chosen test setup represents typical climbing conditions and thus has potential for performance diagnostics, which has to be demonstrated by further measurements with other athletes. However, it remains to be seen whether the impulse monitored in competition climbing can be used to show efficiency, since in competition, the route settings and required moves are quite manifold, and athletes move quite differently depending on their experience and physical conditions.

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Bauer, F., Simnacher, M., Stöcker, U., Riener, R., & Wolf, P. (2014). Interaction forces in climbing: Cost-efficient complementation of a 6dof instrumentation. *Sports Technology*, 7(3-4), 120-127.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Blood flow restriction during low intensity rowing increases $\dot{V}O_2$max in highly trained endurance Athletes: A 5-weeks randomized controlled trial

Authors:

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Abstract:

Introduction: The present 5-week randomized controlled trial examined the effects of practical blood flow restriction (pBFR) on maximal oxygen uptake ($\dot{V}O_2$max) during low intensity rowing.

Methods: Thirty-one elite rowers were either assigned to the intervention (INT) or control (CON) group, using the minimization method (Strata: Gender, Age, Height, $\dot{V}O_2$max). While INT (n=16; 4 female, 12 male, 21.9 ± 3.2 years, 180.4 ± 8.7 cm, 73.6 ± 10.9 kg, $\dot{V}O_2$max: 63.0 ± 7.9 ml/min/kg) used pBFR during boat- and indoor-rowing training, CON (n=15, 4 female, 11 male, 21.7 ± 3.7 years, 180.7 ± 8.1 cm, 72.5 ± 12.1 kg, $\dot{V}O_2$max: 63.2 ± 8.5 ml/min/kg) completed the identical training without pBFR. pBFR of the lower limb was applied via customized elastic wraps (Behringer, Behlau, Montag, McCourt, & Mester, 2017). pBFR Training took place three times a week over 5 weeks (accumulated net pBFR: 60 min/week; occlusion per session: 2-times 10 min/session) and was used exclusively at low intensities and during rowing. A spiroergometric ramp test ($\dot{V}O_2$max; 30-40 W/min increase) on rowing-ergometer and an one-repetition maximum test of the squat exercise (SQ1RM) was employed to assess endurance and strength capacity.

Results: Very large and highly significant group × time interactions (p=0.001, η_p^2=0.26) in favour of INT were found for $\dot{V}O_2$max (63.0 ± 7.0ml/min/kg to 69.7 ± 9.4ml/min/kg ; +9.1 ± 6.2%, Effect Size = 1.3) compared to CON (63.2 ± 8.5ml/min/kg to 64.9 ± 8.6ml/min/kg ; +2.5 ± 6.1%, Effect Size=0.3). Also, Power at $\dot{V}O_2$max P_{VO2MAX} showed significant group × time interactions (p=0.001; η_p^2=0.33) in favour of INT (383 ± 121 W to 442 ± 101 W; +15.3 ± 9.7%, Effect Size = 1.4) compared to CON (396 ± 89 W to 408 ± 98 W; +3.1 ± 9.7%, Effect size = 0.3). In contrast, SQ1RM (η_p^2=0.01) was not affected by the pBFR intervention for INT (106.2 ± 20.0kg to 111.9 ± 20.9kg; +5.4 ± 5.7%, Effect size = 0.8) and CON (99.1 ± 25.1kg to 103.7 ± 25.4kg; +4.6 ± 5.3%, Effect size = 1.0). Additionally, training intensity distribution (TID) and total training volume of INT (13.7 ± 4.4 h/wk) and CON (13.0 ± 4.7 h/wk) was similar (p=0.953, d=0.02).

Discussion/Conclusion: This study revealed that 15 sessions of pBFR application with a cumulative total pBFR stimuli of 5h over a 5 weeks macrocycle remarkably increased $\dot{V}O_2$max. This is particularly important as the $\dot{V}O_2$max is considered to be an essential surrogate parameter of rowing performance (Ingham, Whyte, Jones, & Nevill, 2002). Ultimately, pBFR provides a feasible, promising and beneficial complementary training stimulus to traditional rowing training. Thus, pBFR might serve as promising means to improve aerobic capacity in highly trained endurance athletes.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Friday 07.02.2020

Room 115 **Travail, Trajectoires, Transferts - Le football suisse au prisme de ses migrations**
Chairs: Grégory Quin; Siegfried Nagel

08:30 Repenser l'arrêt Bosman. Réflexions préliminaires sur l'internationalisation du football suisse (1980-2010)
Grégory Quin

08:50 Soziale Integration in Schweizer Fussballvereinen
Matthias Buser

09:10 Sport as a Tool for Social Inclusion. The Example of FLAG21 in Geneva
Kataria Mridul

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Travail, Trajectoires, Transferts. Le football suisse au prisme de ses migrations

Authors:

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[2]Institut für Sportwissenschaft, Universität Bern, Schweiz

Abstract:

Depuis un premier comité central de la *Schweizerische Football Association* formé de quatre citoyens britanniques (sur cinq membres) jusqu'aux accents « multi-kulti » de la Nati de ces dernières années en passant par l'augmentation croissante des joueurs étrangers dans les clubs et la création de clubs comme les *Juventus* ou les *FC Centre Portugais*, le football suisse masculin (élite et amateur) se construit largement sur les apports des migrations qui ont touché le pays depuis le milieu du XIXe siècle.

De ce fait, il nous semble important et opportun d'organiser un symposium pour revenir sur différentes dimensions et différents moments de l'histoire (passée et présente) du football suisse, entre compréhension de l'influence des différents processus migratoires que connaît le pays depuis la fin du XIXe siècle et les processus de la progressive professionnalisation du champ du football d'élite masculin. Ces démarches visent notamment à comprendre les différentes influences qui agissent de manière sous-jacente dans l'essor et le développement d'une pratique parfois perçue comme « étrangère », mais qui constitue aussi un vrai trait d'union entre les régions linguistiques et culturelles du pays. De fait, le « club de football » constitue souvent le creuset d'une intégration et d'une appartenance sociale forte, mais aussi le lieu de la formation des futurs talents.

Si le football est véritablement un « sport national » en Suisse depuis l'entre-deux-guerres, il est aussi toujours plus internationalisé, marqué par les dynamiques d'une concentration du football d'élite dans les quatre (ou cinq) principaux championnats européens, où les « autres » pays jouent un rôle de relais ou de tremplin. Dans ce cadre, nous souhaitons aussi proposer une lecture de l'implication des acteurs situés « autour du jeu (et des joueurs) », comme les dirigeants ou les agents de joueurs.

Dans le cadre de ce symposium, il s'agit alors pour nous d'engager un dialogue interdisciplinaire et interculturel autour de différents projets de recherche actuellement menés de part et d'autre de la Sarine à l'Université de Lausanne, à l'Université de Berne et au Graduate Institute à Genève.

Présentations

Repenser l'arrêt Bosman. Réflexions préliminaires sur l'internationalisation du football suisse (1980-2010)

Grégory Quin, Gianluca Sorrentino, Philippe Vonnard (Université de Lausanne)

Soziale Integration in Schweizer Fussballvereinen

Siegfried Nagel, Matthias Buser, Benjamin Egli (Université de Berne)

Sport as a Tool for Social Inclusion. The Example of FLAG21 in Geneva

Mridul Kataria (Graduate Institute, Geneva)

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Repenser l'arrêt Bosman
Réflexions préliminaires sur l'internationalisation du football suisse (1980-2010)

Authors:
Quin G. [1], Sorentino G[1], Vonnard P.[1], Marston, K.[2]
[1]Institut des Sciences du Sport de l'Université de Lausanne, Université de Lausanne, Suisse
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Abstract:
L'arrêt Bosman, promulgué en 1995, est considéré par plusieurs commentateurs comme un tournant majeur dans l'internationalisation du marché des transferts des footballeurs européen. S'il a indéniablement permis un accroissement des transactions - qui ont d'ailleurs engendré des problèmes au sujet du traitements de nombreux jeunes joueurs dans les transferts Sud-Nord ainsi que des difficultés pour les clubs formateurs des petits championnats -, nous pouvons supposer que l'arrêt Bosman n'est pas la seule cause de ce processus. En effet, l'écart entre « grands » et « petits » clubs se repèrent déjà dans les années 1960-1970 et les années 1980 sont marquées par l'élargissement des possibilités en matière de recrutement de joueurs étrangers (d'abord 2 puis 3, voire 4 selon les championnats européens). En outre, et comme l'a bien montré le sociologue Manuel Schotté, la structure même du marché des transferts en football n'a pas été modifiée par l'arrêt Bosman.
Tenant compte de ces constats, cette contribution pose l'hypothèse que parallèlement à cette décision de type juridique, s'opère une structuration progressive du marché des transferts. Ce sont en particulier deux nouveaux métiers qui émergent dans les années 1980-1990, à savoir les agents de joueurs et les directeurs sportifs, qui vont largement contribuer à cette structuration, qui favorise elle-même l'internationalisation du football.
L'enquête, encore préliminaire, est conduite sur la base des documents règlementaires produits par l'Association Suisse de Football et par la Swiss Football League (règlements de jeu notamment), mais aussi plus particulièrement autour de l'exemple du Lausanne-sport. Basée aussi sur une lecture de la presse sportive romande et sur de premiers entretiens exploratoires avec d'anciens acteurs du jeu (joueurs, entraîneurs, directeurs sportifs, agents et président), il s'agit de poser des premiers jalons en vue d'une meilleure compréhension de l'internationalisation qu'a connu le football suisse entre les années 1980-2010.

Références

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SPORTWISSENSCHAFTLICHE SOCIETE SUISSE DES GESELLSCHAFT DER SCHWEIZ SCIENCES DU SPORT

Title:

Soziale Integration in Schweizer Fussballvereinen

Authors: Buser M[1], Adler Zwahlen J[2], Schlesinger T[3], Egli B[4], Nagel S[1]
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[2]Fachstelle Integration und Prävention, Bundesamt für Sport, Schweiz
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Abstract:

Einführung:

Sportvereinen wird in integrationspolitischen Debatten eine hohe Integrationskraft zugeschrieben. Insbesondere den Schweizer Fussballvereinen kommt dabei aufgrund der Popularität der Sportart Fußball sowohl bei Einheimischen als auch bei Menschen mit Migrationshintergrund (MMH) eine besondere Bedeutung zu. Das primäre Ziel der Sportvereine ist jedoch in der Regel die Förderung der Sportaktivitäten. Es stellt sich deshalb die Frage, in welchem Ausmass Vereinsmitglieder sozial integriert sind und welche vereins- und teambezogenen Merkmale für die soziale Integration von Vereinsmitgliedern relevant sind. Soziale Integration wird dabei nach Esser (2009) durch die Dimensionen Interaktion, Identifikation, Kulturation und Platzierung konzeptualisiert.

Methodik:

Erste Erkenntnisse liefern Daten aus dem Projekt «Integration von Jugendlichen und jungen Erwachsenen mit Migrationshintergrund im Vereinssport». Ausgehend von einer Mehrebenen-Heuristik wurden mittels schriftlicher Fragebogen Ziele und strukturelle Bedingungen auf Vereinsebene sowie die wahrgenommene Integration auf Mitgliederebene erhoben. In 35 Deutschschweizer Sportvereinen liegen Daten von mindestens fünf Vereinsmitgliedern vor, wobei insgesamt 764 Mitglieder (M_{Alter}= 20.64 Jahre; ♀: 37.6%; MMH: 38.4%) befragt wurden.

Resultate:

Sowohl Mitglieder mit als auch ohne MH sind insgesamt gut in die Vereine integriert. MMH in erster Generation weisen jedoch in drei von vier Dimensionen geringere Integrationswerte auf als Einheimische und MMH in dritter Generation.

Erste Analysen der strukturellen Rahmenbedingungen deuten auf Unterschiede zwischen den Sportarten hin. Turn- und Kampfsportvereine zeichnen sich durch die höchsten Integrationsmittelwerte aus. Interessanterweise sind Mitglieder in Fussballvereinen weniger gut integriert. Weiter sind mitgliederstärkere Vereine und Abteilungen sowie das Vorhandensein von hauptamtlichen Mitarbeitern verbunden mit einer tieferen Platzierung der Mitglieder im Verein. Vereinsziele spielen für die Integration ebenfalls eine Rolle: Die Bewertung der Ziele Geselligkeit sowie Kooperation mit anderen Einrichtungen korreliert positiv mit der sozialen Integration der Mitglieder. Die Analysen berücksichtigen die Integrationsangaben aller Vereinsmitglieder (mit und ohne MH). Unterschiede in der Mitgliederzusammensetzung in den verschiedenen Sportarten und Vereinen sind in weitergehenden Analysen noch vertieft zu berücksichtigen.

Diskussion:

Die Studie zeigt, dass der organisierte Sport einen wichtigen Beitrag zur sozialen Integration, insbesondere von MMH, leisten kann. Der Beitrag der Vereine scheint jedoch nicht unabhängig von deren Strukturen und Zielen. Bislang nicht berücksichtigt sind Merkmale auf der Teamebene, die für die soziale Integration von wichtiger Bedeutung sein dürften. Gerade in Teamsportarten ist zu vermuten, dass die soziale Umgebung der Sportler im Team relevanter ist als allgemeine Vereinsmerkmale. Das Projekt «Soziale Integration in Schweizer Fussballvereinen» in Zusammenarbeit mit dem Schweizerischen Fussballverband erweitert die Mehrebenen-Heuristik um Faktoren auf der Teamebene und dürfte zusätzliche Anhaltspunkte zur Erklärung der sozialen Integration von Vereinsmitgliedern liefern. Untersucht werden Vereinsmitglieder in über 120 Teams in 42 Fussballvereinen der deutschen und französischen Schweiz.

Referenzen:

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Understanding the local integration of refugees through sport: A case study of Flag 21, Geneva

Author:
Kataria M
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Abstract:
Sport has become an increasingly important part of humanitarian activities across the globe. Humanitarian organizations implement sports-based programming on a large scale, with various goals in mind. The interest in sport has largely translated into local organizations where sport has become a medium to work towards social outcomes, including local integration.
Placed in a context of the growing body of work (academic and professional) around "sport and forced displacement", the study tries to locate and understand the dynamics of an organization and the people who make it up. Drawing from the academic literature around "integration", the thesis looks how the term attains different meanings and dimensions across different contexts, and how that plays out in the case of Flag 21, an organization working towards the local integration of refugees in Geneva, Switzerland. The study further aims to gain an insight into the daily workings of the organization, and the place it holds in the lives of refugees and locals who attend the weekly running sessions.
The study further looks at the different dimensions of the organization, and aims to understand how it is facilitating local integration into the city, economically and socially – using first-hand accounts from refugees who are an active part of it. The thesis combines the literature from two different disciplines – history and anthropology. It further takes cue from the work being done in relation to sport and migration in general. It is an attempt to locate Flag 21 within the professional and academic worlds, and place it within the increasingly complex world of "sport and development".

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Friday 07.02.2020

Room 117 **Associations of physical activity and health-related factors in children**
Chair: Martin Keller

08:30 Cardiovascular prevention in primary school children: The Sportcheck Study
Giulia Lona

08:50 The SOPHYA cohort on objectively measured physical activity trajectories in Swiss youth
Johanna Hänggi

09:10 Swiss Preschoolers' Health Study (SPLASHY)
Amar Arhab

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Associations of physical activity and health-related factors in children

Authors:

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Abstract:

Life expectancy is increasing worldwide, changing the classic age pyramid in many western countries due to ageing societies. This change in societal structures, combined with a sharp increase in sedentary lifestyles, results in a situation, which – from a public health perspective – should be viewed with serious concern as it is leading to a massive increase in noncommunicable diseases such as obesity, diabetes, cancer, cardiovascular disease amongst others. It is well accepted that physical activity should be the cornerstone of the treatment strategy for most of these diseases. Nowadays we know that overweight people who engage in regular physically active are faced with smaller health issues than inactive overweight people.

The development and implementation of adequate programs to promote physical activity is therefore highly relevant. The promotion and development of "fundamental movement skills" during childhood is a relevant approach to achieving lifelong enjoyment in physical activities and for the successful development of a child.

This symposium deals with “associations of physical activity and health-related factors in children”. The speakers will show that physical activity in (early) childhood is not only important for motor development but also relevant from a public health perspective as physical inactivity is already related to health issues in young age. Three young but successful scientists will present their studies that have shed further light on the association of physical activity and health. Presentations will be given by:

- Giulia Lona: Cardiovascular prevention in primary school children: The Sportcheck Study
- Johanna Hänggi: The SOPHYA cohort on objectively measured physical activity trajectories in Swiss youth
- Amar Arhab: Physical activity, sedentary behaviour and adiposity in preschool children – the chicken and egg causality dilemma (SPLASHY study).

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Cardiovascular prevention in primary school children: The Sportcheck Study

Authors:

Lona G[1], Endes K[1], Köchli S[1], Infanger D[1], Zahner L[1], Hanssen H[1]

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Abstract:

Childhood obesity is a growing burden globally and often the origin for the development of further cardiovascular risk factors. Children with overweight or obesity are tree times more likely to develop high blood pressure compared to lean children. The progression to cardiovascular disease is an accumulative and multifactorial process over several years. The lack of hard endpoints in children urges the need for surrogate biomarkers to determine cardiovascular health and to insert prevention measures at early age. Therefore, the Sportcheck study was conceptualized with its unique integrative approach. The study determines cardiovascular health in association with physical activity and fitness in primary schoolchildren of the canton Basel. Cardiovascular health was examined in the small and large vascular bed through retinal vessel analysis and arterial stiffness measurements. With each unit increase of body mass index and systolic blood pressure, arteriolar vessel diameters decreased and pulse wave velocity increased significantly. Children with the highest cardiorespiratory fitness had wider arteriolar vessels and lower PWV compared with least fit children. Additionally, a low socioeconomic status was associated with poor physical fitness, higher BMI and low-activity behavior. Children with migration background spent more time in front of the screen and were less active compared to non-migrant children. Since the start of the study, additional sports lessons were offered voluntarily from the cantonal sports department to set grounds for an active and healthy lifestyle as a long-term goal. Prospective follow-up studies are needed to investigate the development of cardiovascular health in relation to improvement of physical fitness and activity.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The SOPHYA cohort on objectively measured physical activity trajectories in Swiss youth

Authors:

[1]Johanna Hänggi, [1]Bettina Bringolf-Isler, [1]Kees de Hoogh, [2]Bengt Kayser, [3]Suzanne Suggs, [1]Medea Imboden, [1]Nicole Probst-Hensch

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Abstract:

Background: SOPHYA 1 was the first Swiss-wide population-based study describing objectively measured physical activity (PA) in the young. At baseline in 2014/15 1230 children and adolescents aged 6 to 16 years participated and wore accelerometer devices for 7 days. The data obtained allowed studying the association of PA with social and environmental characteristics of the children including exposures modelled to their residential address. The simultaneous assessment of objectively measured PA levels in one or both parents allowed analysing the influence of the familial environment. Finally the PA levels were linked to health outcomes. We will present some results of the associations between objectively measured PA and sociodemographic, social and environmental factors.

Objective and Methods – SOPHYA follow-up and sample enrichment: By transforming the SOPHYA study into a cohort, we aim at studying the longitudinal trajectory of PA from childhood to adolescence and from adolescence to young adulthood and the association of these trajectories with baseline characteristics. A special focus will be set on sport club participation. We aim to investigate whether organised sport mainly reaches physically active children, or whether organized sport results in equal sport opportunities for all children.

The integration of remote blood sampling will allow studying DNA methylome features associated with chronic PA patterns in order to improve biological mechanisms linked to them and possibly mediating their adverse health effects. In 2018/19, SOPHYA participants with valid accelerometry data at baseline will be reassessed. Consistent with the study design at baseline, the first participant contact will be a telephone interview about the sport behaviour. Next, accelerometers for the child and the parents will be mailed to consenting families. A questionnaire on health, lifestyle, well-being, injuries and perceptions of the local neighbourhood and a time-activity diary will be filled in on paper. Participants will be asked to collect a dried bloodspot from a finger prick. Specific objective environmental data (e.g. built environment or social environment) will be modelled to the children's address. In 2019/20, the SOPHYA study will be enriched with a new sample of 6 to 10 year olds providing information about temporal trends of physical activity in young age groups. They will be randomly sampled from national registry data, consistent with the sampling at baseline. The new SOPHYA participants will undergo the baseline assessment and additional components added at follow-up as described above.

Relevance of the SOPHYA cohort: The SOPHYA cohort will facilitate comparing PA patterns in the young across regions in Switzerland and with international data. The time-resolved analysis of factors associated with long-term activity patterns in SOPHYA is of utility for health-in-all-policies aiming at preventing the incidence and mortality from non-communicable diseases.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Physical activity, sedentary behaviour and adiposity in preschool children – the chicken and egg causality dilemma (SPLASHY study).

Authors:

Amar Arhab[1], Nadine Messerli-Bürgy[2], Tanja H. Kakebeeke[3,4], Kerstin Stülb[2], Annina Zysset[3], Claudia S. Leeger-Aschmann[5], Einat A. Schmutz[5], Andrea H. Meyer[6], Simone Munsch[2], Susi Kriemler[5], Oskar G. Jenni[3,4] and Jardena J. Puder[1].

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[6]Department of Psychology, University of Basel, Basel.

Abstract:

Introduction: Despite physical activity (PA) being recognized as a critically important factor for good physical and mental health early in life and throughout the life course, prospective data on activity behaviour and the role PA in reducing future adiposity during the preschool years remain scarce (Carson et al., 2017; Schmutz et al., 2018). One of the aims of the *Swiss Preschoolers' Health Study (SPLASHY)* was to examine the trajectories and the role of PA behaviours on children's physiological health, particularly to understand the associations between PA and ST with adiposity.

Methods: Data were drawn from the SPLASHY study, a multi-site prospective cohort study including 555 children (53% boys) aged 2-to-6 years at baseline. A follow-up was conducted after 12 months. Activity behaviours were measured using accelerometers. Adiposity measures included body mass index z-score (BMI z-score), waist-to-height ratio (WHtR), and the sum of four skinfold thickness (SF). A cross-lagged panel model was used to determine the prospective associations between PA and ST with adiposity and whether the associations were bidirectional, adjusted for the respective baseline measures.

Results: All children were sufficiently physically active according to published international recommendations for preschoolers. Trajectory profiles revealed a marked increase in PA in boys and girls whereas ST remained fairly stable over time. Cross-lagged modelling demonstrated that baseline PA, especially vigorous PA, predicted reduced adiposity one year later, independent of ST ($p \leq 0.01$). Baseline ST did not predict any future adiposity measures before or after adjustment for moderate-to-vigorous PA ($p \geq 0.05$). On the other hand, baseline adiposity measures did not predict PA or ST one year later ($p \geq 0.05$).

Discussion/Conclusion: In this healthy physically active cohort of preschoolers, PA especially of higher intensity was protective against the future development of adiposity, whereas ST seemed less important in this age group and population. In our cohort adiposity did not predict future PA. Encouraging young children to engage in PA of at least moderate intensity may be effective and more important than reducing ST for preventing adiposity in healthy preschool children.

References:

Carson, V., Lee, E. Y., Hewitt, L., Jennings, C., Hunter, S., Kuzik, N., Tremblay, M. S. (2017). Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). BMC Public Health, 17(Suppl 5), 854. doi:10.1186/s12889-017-4860-0

Schmutz, E. A., Haile, S. R., Leeger-Aschmann, C. S., Kakebeeke, T. H., Zysset, A. E., Messerli-Burgy, N., Kriemler, S. (2018). Physical activity and sedentary behavior in preschoolers: a longitudinal assessment of trajectories and determinants. Int J Behav Nutr Phys Act, 15(1), 35. doi:10.1186/s12966-018-0670-8

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Friday 07.02.2020

Aula **VO2max in Health and Performance**
Chair: Arno Schmidt-Trucksäss

08:30 VO_{2max} - The most underused health marker
Arno Schmidt-Trucksäss

08:50 Aerobic fitness: testing for endurance exercise assessment and prescription
Davide Malatesta

09:10 VO_{2max} - Variability and verification – important implication for measurement
Raphael Knaier

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Symposium "VO_{2max} in Health and Performance"

Authors:

Schmidt-Trucksäss, A[1]. Malatesta[2], D, Knaier, R[1]

[1]Department of Sport, Exercise and Health, Division Sports and Exercise Medicine, University of Basel, Switzerland

[2]Institute of Sport Sciences of the University of Lausanne (ISSUL), Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland

Abstract:

The symposium "VO_{2max} in Health and Performance" addresses a most important topic in sport science and sports medicine which is the clinical meaning, measurement, validity, reproducibility and variability of maximal oxygen uptake as the most important parameter to assess cardiorespiratory fitness.

This symposium will be held by three experts in the field, Dr. Davide Malatesta from University of Lausanne and Dr. Raphael Knaier and Prof. Arno Schmidt-Trucksäss from University of Basel with the presentations:

VO_{2max} - The most underused health marker
By Arno Schmidt-Trucksäss

Aerobic fitness: testing for endurance exercise assessment and prescription
By Davide Malatesta

VO_{2max} - Variability and verification – important implication for measurement
By Raphael Knaier.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

VO_{2max} - The most underused health marker

Symposium "VO_{2max} in Health and Performance"

Authors:

Schmidt-Trucksäss, A[1].

[1]Department of Sport, Exercise and Health, Division Sports and Exercise Medicine, University of Basel, Switzerland

Abstract:

Evidence of the importance of cardiorespiratory fitness (CRF) as an important health parameter has been growing for about four decades. Nevertheless, the CRF has not yet been included in most mortality risk scores. CRF is also far too seldom used in sports medicine and sports science practice for training control. Large epidemiological studies show impressively that the predictive power of CRF is clearly superior to all classic cardiovascular risk factors such as smoking, hypertension, LDL and HDL cholesterol. For example, according to numerous studies, individuals per metabolic equivalent (MET) higher CRF can expect a 10-25% reduction in all-cause mortality, corresponding to a systolic blood pressure reduction of 5-7 mmHg, 1-1.2 mmol/L reduced fasting glucose or a 7-10 cm reduction in abdominal circumference (Kodama et al, 2009). People with an unfavorable risk factor profile can also benefit greatly from a good CRF, which was demonstrated in a prospective observational study (22,878 participants, age 47.4 (10.3) years to baseline, follow-up 9.2 (SD 4.1) years, 505 deaths). Fit persons (≥11 MET for treadmill ergometry) with a high risk factor profile showed a relative mortality risk reduced to one quarter compared to unfit persons (<11 MET) (Israel et al, 2016).

Standard values are required to facilitate orientation towards the CRF in clinical practice. To this end, registries are being established worldwide to enable the best possible classification of the health risk on the basis of the CRF. The worldwide largest register is the FRIEND registry, which focuses on data from the USA (Kokkinos et al, 2018). For the first time in Switzerland, reference data for healthy men and women between 20 and 100 years of age will be compiled as part of the COmPLETE project at the University of Basel. In addition, force, neuromuscular coordination and objective physical activity will be measured in order to describe further potential determinants of CRF. The aim is to facilitate the use of the most underused health marker in clinical practice (Wagner et al, 2019).

References:

Israel A, Kivity S, Sidi Y, Segev S, Berkovitch A, Klempfner R, et al. Use of exercise capacity to improve SCORE risk prediction model in asymptomatic adults. Eur Heart J. 2016;37(29):2300-6.

Kodama S, Saito K, Tanaka S, Maki M, Yachi Y, Asumi M, et al. Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women: a meta-analysis. JAMA. 2009;301(19):2024-35.

Kokkinos P, Kaminsky LA, Arena R, Zhang J, Myers J. A new generalized cycle ergometry equation for predicting maximal oxygen uptake: The Fitness Registry and the Importance of Exercise National Database (FRIEND). Eur J Prev Cardiol. 2018;25(10):1077-82

Wagner J, Knaier R, Infanger D, Arbeev K, Briel M, Dieterle T, et al. Functional aging in health and heart failure: the COmPLETE Study. BMC Cardiovasc Disord. 2019;19(1):180.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Aerobic fitness: testing for endurance exercise assessment and prescription

Symposium "VO_{2max} in health and performance"

Authors:

Malatesta D[1]

[1]Institute of Sport Sciences of the University of Lausanne (ISSUL), Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland

Abstract:

Aerobic (or cardiorespiratory) fitness is one of the main determinants of endurance performance (di Prampero, 2003) and is inversely associated with mortality risk (Blair et al., 1989). The maximal incremental exercise testing with direct assessment of the oxygen uptake ($\dot{V}O_2$) is commonly used in exercise physiology to determine the maximal oxygen uptake ($\dot{V}O_{2max}$) and critical thresholds (i.e., maximal and submaximal aerobic fitness parameters, respectively) and prescribe endurance training (Wasserman, Hansen, Sue, Stringer, & Whipp, 2004). However, testing of aerobic fitness is not trivial. In sport and clinical settings, the proper assessment of aerobic fitness needs: 1) an accurate gas and volume calibration of the gas exchange devices; 2) an adequate standardization of pre-testing conditions in terms of physical activity and diet; 3) a specific choice of the ergometer used (cycle-ergometer vs. treadmill vs. arm-ergometer); and 4) a proper testing protocol individualization. This latter should consider the individual's exercise capacity, the locomotion used during the training program and the variables employed to determine the critical thresholds and prescribe the training intensity into the field (Bishop, Jenkins, & Mackinnon, 1998; Lanzi et al., 2015; Midgley, Bentley, Luttikholt, McNaughton, & Millet, 2008; Wasserman et al., 2004).

The aim of this presentation will be to introduce the different criteria to standardize and individualize the maximal and submaximal incremental exercise testing to properly assess aerobic fitness in clinical, normal and athletic populations.

References:

Bishop, D., Jenkins, D. G., & Mackinnon, L. T. (1998). The effect of stage duration on the calculation of peak VO2 during cycle ergometry. *J Sci Med Sport, 1*(3), 171-178.

Blair, S. N., Kohl, H. W., 3rd, Paffenbarger, R. S., Jr., Clark, D. G., Cooper, K. H., & Gibbons, L. W. (1989). Physical fitness and all-cause mortality. A prospective study of healthy men and women. *JAMA, 262*(17), 2395-2401. doi:10.1001/jama.262.17.2395

di Prampero, P. E. (2003). Factors limiting maximal performance in humans. *Eur J Appl Physiol, 90*(3-4), 420-429. doi:10.1007/s00421-003-0926-z

Lanzi, S., Codecasa, F., Cornacchia, M., Maestrini, S., Capodaglio, P., Brunani, A., . . . Malatesta, D. (2015). Long maximal incremental tests accurately assess aerobic fitness in class II and III obese men. *PLoS One, 10*(4), e0124180. doi:10.1371/journal.pone.0124180

Midgley, A. W., Bentley, D. J., Luttikholt, H., McNaughton, L. R., & Millet, G. P. (2008). Challenging a dogma of exercise physiology: does an incremental exercise test for valid VO 2 max determination really need to last between 8 and 12 minutes? *Sports Med, 38*(6), 441-447. doi:10.2165/00007256-200838060-00001

Wasserman, K., Hansen, J. E., Sue, D. Y., Stringer, W. W., & Whipp, B. J. (2004). *Principles of exercise testing and interpretation*. Philadelphia: Lippincott Williams & Wilkins.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

VO_{2max} - Variability and verification – important implication for measurement

Symposium "VO_{2max} in Health and Performance"

Authors:

Knaier, R[1].

[1]Department of Sport, Exercise and Health, Division Sports and Exercise Medicine, University of Basel, Switzerland

Abstract:

The maximum volume of oxygen uptake (VO_2max) is considered to be the gold standard to measure cardiorespiratory fitness. VO_2max is a strong predictor for mortality and morbidity (Blair et al., 1995) and it allows to evaluate the effectiveness of exercise interventions on cardiorespiratory fitness. Therefore, it is not surprising that currently >1200 trials are registered on clinicaltrials.gov that are assessing VO_2max, either as an outcome or as a participant characteristic. Especially in longitudinal studies it is essential to measure VO_2max precisely to increase signal-to-noise ratio. If VO_2max is falsely measured too low at baseline it increases the estimated effect. If it is measured falsely too low during follow-up the estimated effect is decreased. However, in both cases it leads to false conclusions about the effectiveness of an intervention or therapy.

The three common methods that are used to detect if true VO_2max is reached are a VO_2-plateau, secondary VO_2max criteria, and a verification-phase. A VO_2-plateau is generally considered as the primary criterion, but the definition of a plateau is highly debated and regardless of the definition used some participants do not show a plateau although they reached VO_2max (Marsh, 2018). The secondary criteria are maximum respiratory exchange ratio (RERmax), maximum heart rate (HRmax), maximum blood lactate concentration (BLmax), and maximum rating of perceived exertion (RPEmax). Similarly, to the VO_2-plateau the cut-offs are debated and a clear distinction of false and true VO_2max is not present (Midgley et al., 2007). Verification phases are additional supramaximal exercise tests which are performed immediately after a short regeneration phase subsequent to the initial cardiopulmonary exercise test. However, the protocol to be used and the cost-benefit ratio of this additional test is questionable (Schaun, 2017).

This presentation will discuss the advantages and disadvantages, as well as the cut-offs and definitions of the different methods to determine VO_2max. Further, the strongly neglected aspects of diurnal and day-to-day variability will be discussed. These are of high relevance regarding the fact that VO_2max is tested throughout the day and on multiple occasions in clinical settings and in intervention studies.

References:

Blair SN, Kohl HW, Barlow CE, Paffenbarger RS, Gibbons LW, Macera CA. Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. JAMA. 1995;273(14):1093–8.

Marsh CE. Validity of oxygen uptake cut-off criteria in plateau identification during horizontal treadmill running. J Sports Med Phys Fitness. 2018; doi:10.23736/S0022-4707.18.07952-5.

Midgley AW, McNaughton LR, Polman R, Marchant D. Criteria for Determination of Maximal Oxygen Uptake. Sports Med. 2007;37(12):1019–28.

Schaun, GZ.The Maximal Oxygen Uptake Verification Phase: a Light at the End of the Tunnel? Sports Med Open. 2017 Dec 8;3(1):44.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Friday 07.02.2020

Room 118 **Intensität im gymnasialen Sportunterricht: Untersuchungen an der Schnittstelle Forschung - Praxis**
Chair: Roger Scharpf

08:30 Status quo in HIT research
Christina Spengler and/or Fernando Beltrami

08:50 Effektivität von HIT-Circuits und verschiedenen Tabatas
Ch. Huber/ N. Müller

09:10 Resultate eines 6- bzw. 8-wöchigen HIT-Trainings im Grundlagenfach resp. Ergänzungsfach Sport
D. Häner / Ch. Fässler

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Intensität im gymnasialen Sportunterricht: Untersuchungen an der Schnittstelle Forschung - Praxis.

Authors:

Häner, D.[1]; Huber, Ch. [1]; Fässler Ch. [1]; Baumgartner, D[1].; Häfliger, St[1].; Müller, N. [1], Scharpf, R.[2]; Spengler, Ch.[3], Beltrami, F.[4]

[1]Master-Studierende/ Doktoranden Health Science and Technology ETH Zürich, Absolvent/innen Lehrdiplom Sport.

[2] Dozent Fachdidaktik Sport, HST ETH Zürich

[3]Prof. Physiology and Exercise Physiology in the context of performance, health and technology HST, ETH Zürich

[4]Phd. Physiology and Exercise Physiology in the context of performance, health and technology HST, ETH Zürich

Abstract:

Seit ungefähr einer Dekade hat die HIT-Diskussion auch die Schule erreicht, mit Schwerpunkt Grundstufe/ Sek I. Die Frage ist nicht mehr, *ob* hochintensive Trainingsformen auch im Unterricht eine Berechtigung haben, sondern, mit *welchen* Formen sich die erwünschten Effekte erzielen lassen. In verschiedenen gymnasialen Unterrichtssettings (Spielsituationen, Tabatas, Circuits, Lauftraining) wurden die Effekte von HIT-Interventionen über Pulsmessungen kurz- und mittelfristig erfasst. Aus den Resultaten werden entsprechende Konsequenzen für eine methodische Umsetzung gezogen.

Das Symposium vermittelt einen Überblick über den aktuellen Stand der HI(I)T-Forschung, anschliessend werden die Ergebnisse der HI(I)T-Interventionen in den Schulklassen und Konsequenzen für die Umsetzung vorgestellt.

Im **ersten Beitrag** fassen Ch. Spengler und/ oder F. Beltrami die Forschungslage zu HIT zusammen und leiten Erkenntnisse daraus ab.

Es folgt eine **Einleitung** durch R. Scharpf zum grundsätzlichen Problem der Intensität im (gymnasialen) Sportunterricht und den folgenden Beiträgen.

Kurzbeitrag 1 von Ch. Huber stellt die Ergebnisse einer Tabata-Intervention in einer Frauenklasse Gymnasium dar.

Kurzbeitrag 2 von Ch. Fässler präsentiert die Resultate eines 8-wöchigen HIT-Trainings im Ergänzungsfach Sport.

Kurzbeitrag 3 von R. Scharpf zeigt die methodische Umsetzung der Arbeiten auf.

References:

Wydra, G (2010). Untersuchungen zur Belastungsintensität im Sportunterricht. In: P. Frei, S. Körner (Hrsg): Ungewissheit – Sportpädagogische Felder im Wandel (S. 227-234). Hamburg: Feldhaus.

Kappenstein J, Ferrauti A.: Intervallsprinttraining verbessert die aerobe Ausdauer im Grundschulalter. Dtsch Z Sportmed. 2015; 66: 128-133.

Sperlich, B, et al.: Effects of 5 weeks of high-intensity interval training vs. volume training in 14-year-old soccer players. J Strength Cond Res. 2011 May;25(5):1271-8.

Bacquet, G. et al: Effects of high intensity intermittent training on peak VO(2) in prepubertal children. Int J Sports Med. 2002 Aug;23(6):439-44.

Mc Manus, A. et al.: Improving aerobic power in primary school boys: a comparison of continuous and interval training. Int J Sports Med. 2005 Nov;26(9):781-6.

Fernandez-Fernandez J., et al: The Effects of Sport-Specific Drills Training or High-Intensity Interval Training in Young Tennis Players. Int J Sports Physiol Perform. 2017 Jan;12(1):90-98.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Intensität im gymnasialen Sportunterricht: Untersuchungen an der Schnittstelle Forschung – Praxis: Kurzbeiträge

Authors:

Häner, D.[1]; Huber, Ch. [1]; Fässler Ch. [1]; Baumgartner, D[1].; Häfliger, St[1].; Müller, N. [1]

[1]Master-Studierende/ Doktoranden Health Science and Technology ETH Zürich, Absolvent/innen Lehrdiplom Sport.

Abstract:

Kurzbeitrag 1: Intensität von unterschiedlichen Spiel-Settings in Unihockey und Fussball

Klasse: 1AG Herren, 23 Schüler, 16-17jährig, Grundlagenfach

Erfasst wurden folgende Spielsituationen: 4-4 ganze Halle mit Intervallen von 45 Sek. und 2 Minuten; 3-3 im Halbfeld mit Intervall 45 Sek.

Kurzbeitrag 2: Intensität von unterschiedlichen Circuit- und Tabata-Settings

Circuit: Klasse 1AG Herren (siehe oben):

HIT-Parcours mit 8 Stationen, Intervall 20'-10' und 30'-20'

Tabata: Klasse 1BH Damen, 21 Schülerinnen, 16-17jährig, Grundlagenfach:

HIT-Training Ganzkörper vs. nur untere Extremitäten, mit/ ohne Steps

Kurzbeitrag 3: Ergebnisse einer 6- bzw. 8-wöchigen HIT-Intervention im Laufbereich.

Intervention 6 Wochen:

3 erste Klassen Herren, 16-17jährig.

Zweimal wöchentlich 20 bis max. 30 Min HIT im Unterricht in Kombination mit Spiel.

Pre-/Posttest Shuttle Run korreliert mit indiv. Pulsfrequenz

Intervention 8 Wochen:

Ergänzungsfach Sport, 22 SUS koedukativ, 18-20jährig

1x wöchentlich HIT-Lauftraining im Unterricht, 2x indiv. Lauftraining ausserhalb Unterricht mit tiefer/ mittlerer/hoher Intensität.

Pre-/Posttest Conconi korreliert mit indiv. Pulsfrequenz

Methods:

Mittels Shuttle-Run/ Conconi-Test wurden die individuellen Pulswerte erfasst und die Pulsuhren entsprechend konfiguriert; die Resultate der Trainings wurden individuell den Zielzonen 70-90%/90-95%/95-100% zugewiesen.; Korrelation mit individueller Motivation.

Results:

Zielzonen werden in allen Formen erreicht, aber: individuelle Differenzen sind grösser als die Differenzen zwischen den Unterrichtsformen. Kein signifikanter Gewinn durch längere Intervalle.

Die Langzeitinterventionen zeigen in beiden Fällen positive Effekte, die Resultate sind jedoch im Ergänzungsfach wesentlich kongruenter als im Grundlagenfach. Pre-Posttest Shuttle Run durch Lerneffekt problematisch, Conconi erheblich aussagekräftiger.

Discussion:

Die Resultate lassen im Spielsport kleinere Spielfelder bezüglich Intensität sinnvoller erscheinen; bei HIT-Parcours hat sich ein Intervall 30'-20' bewährt. inwiefern sich in Langzeitinterventionen im Grundlagenfach eindeutige Effekte zeigen, muss weiter untersucht werden, im Ergänzungsfach mit hoher Eigenmotivation hat sich ein kombiniertes High-Low-Intensity-Training bewährt.

Motivation ist dominanter Faktor!

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Intensität im gymnasialen Sportunterricht: Untersuchungen an der Schnittstelle Forschung – Praxis: Kurzbeiträge

Authors:

Häner, D.[1]; Huber, Ch. [1]; Fässler Ch. [1]; Baumgartner, D[1].; Häfliger, St[1].; Müller, N. [1]

[1]Master-Studierende/ Doktoranden Health Science and Technology ETH Zürich, Absolvent/innen Lehrdiplom Sport.

Abstract:

Kurzbeitrag 1: Intensität von unterschiedlichen Spiel-Settings in Unihockey und Fussball

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Erfasst wurden folgende Spielsituationen: 4-4 ganze Halle mit Intervallen von 45 Sek. und 2 Minuten; 3-3 im Halbfeld mit Intervall 45 Sek.

Kurzbeitrag 2: Intensität von unterschiedlichen Circuit- und Tabata-Settings

Circuit: Klasse 1AG Herren (siehe oben):

HIT-Parcours mit 8 Stationen, Intervall 20'-10' und 30'-20'

Tabata: Klasse 1BH Damen, 21 Schülerinnen, 16-17jährig, Grundlagenfach:

HIT-Training Ganzkörper vs. nur untere Extremitäten, mit/ ohne Steps

Kurzbeitrag 3: Ergebnisse einer 6- bzw. 8-wöchigen HIT-Intervention im Laufbereich.

Intervention 6 Wochen:

3 erste Klassen Herren, 16-17jährig.

Zweimal wöchentlich 20 bis max. 30 Min HIT im Unterricht in Kombination mit Spiel.

Pre-/Posttest Shuttle Run korreliert mit indiv. Pulsfrequenz

Intervention 8 Wochen:

Ergänzungsfach Sport, 22 SUS koedukativ, 18-20jährig

1x wöchentlich HIT-Lauftraining im Unterricht, 2x indiv. Lauftraining ausserhalb Unterricht mit tiefer/ mittlerer/hoher Intensität.

Pre-/Posttest Conconi korreliert mit indiv. Pulsfrequenz

Methods:

Mittels Shuttle-Run/ Conconi-Test wurden die individuellen Pulswerte erfasst und die Pulsuhren entsprechend konfiguriert; die Resultate der Trainings wurden individuell den Zielzonen 70-90%/90-95%/95-100% zugewiesen.; Korrelation mit individueller Motivation.

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Die Langzeitinterventionen zeigen in beiden Fällen positive Effekte, die Resultate sind jedoch im Ergänzungsfach wesentlich kongruenter als im Grundlagenfach. Pre-Posttest Shuttle Run durch Lerneffekt problematisch, Conconi erheblich aussagekräftiger.

Discussion:

Die Resultate lassen kürzere Intervalle im Schulsport sinnvoller erscheinen; inwiefern sich in Langzeitinterventionen im Grundlagenfach eindeutige Effekte zeigen, muss weiter untersucht werden, im Ergänzungsfach mit hoher Eigenmotivation hat sich ein kombiniertes High-Low-Intensity-Training bewährt.

Motivation ist dominanter Faktor!

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium

Friday 07.02.2020

Room 118 **Extended Symposium: Exercise interventions in pediatric cancer (survivors)**
Chair: Valentin Benzing; Sofia Anzeneder

14:00 The Brainfit study: efficacy of working memory training and physical exercise in improving cognitive performance in pediatric cancer survivors
Valentin Benzing

14:17 Functional Capacity and Cardiovascular Risk Factors in Childhood Cancer Survivors – Baseline Results from the SURfit Study
Christina Schindera

14:34 Can Physical Activity mitigate Low Bone Health in Childhood Cancer Survivors?
Ruedi Jung

14 51 Exercise interventions for children with chemotherapy-induced peripheral neuropathy – state of the art
Fiona Streckmann

15:08 Physical and mental health outcomes of physical exercise training in young cancer inpatients and survivors - a systematic review of RCTs
Sofia Anzeneder

15:25 From academic in 'Exercise is Medicine' to wearing the "cancer patient" shoes first-hand: personal perspectives and reflections on Exercise Oncology in Switzerland
Ilaria Croci

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Symposium:
Exercise interventions in pediatric cancer (survivors)

Abstract:

Although most children survive pediatric cancer, both the disease itself and the available treatment is frequently associated with severe side- and late-effects. Negative consequences for affected children are prevalent in several cognitive and physical domains. In the submitted session, therefore, we will have a closer look at three areas of common negative consequences of pediatric cancer, and additionally pursue the question as to whether physical exercise interventions may have a positive impact on said negative consequences. In doing so, results of two randomized controlled trials will be presented; the effects of physical exercise on cognitive functions and bone mineral density in pediatric cancer survivors, and the state of the art on exercise interventions for children with chemotherapy-induced peripheral neuropathy.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The Brainfit study: efficacy of working memory training and physical exercise in improving cognitive performance in pediatric cancer survivors

Authors:

Benzing V[1,2,3], Spitzhüttl J[2,3,4], Siegwart V[2,3], Schmid J[1], Grotzer M[5], Roebers C[4], Steinlin M[3], Leibundgut K[2], Everts R[2,3], Schmidt M[1].

[1]Institute of Sport Science, University of Bern, Bern, Switzerland

[2]Division of Pediatric Hematology and Oncology, University Children's Hospital Bern, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

[3]Division of Neuropaediatrics, Development and Rehabilitation, University Children's Hospital Bern, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland.

[4]Institute of Psychology, University of Bern, Bern, Switzerland

[5]Division of Pediatric Oncology, University Children's Hospital Zurich, Zurich, Switzerland

Abstract:

Introduction: Due to improved diagnosis and treatment, survival rates for pediatric cancer have increased by over 80%. Nonetheless, pediatric cancer survivors bear a high risk for late effects in cognitive domains such as executive functions (Krull et al., 2019), for example. In order to remediate potential late effects, interventions are needed. Therefore, the aim of this study was to compare the effects of a working memory training, physical training and a wait-list control group on cognitive functions in pediatric cancer survivors.

Methods: In a randomized clinical trial (Benzing et al., 2018), 69 pediatric cancer survivors between 7-16 years (*M* = 11.35; *SD* = 3.53) were randomly assigned either to a working memory training, an exergame intervention group, or a wait-list control group. Participants in the experimental conditions were instructed to train for 8-weeks (3 x 45 min per week). The primary outcome was the core executive functions (inhibition, switching, visual working memory), and the secondary outcomes included nonverbal intelligence, planning, verbal working memory, verbal memory, selective attention, processing speed and motor abilities. Measurements were taken for each outcome before, immediately after intervention termination and at three-months follow-up.

Results: Linear mixed models showed that children in the working memory training group improved over time in visual working memory compared to the exergaming and the control group. No additional intervention effects on secondary outcomes were detected.

Discussion/Conclusion: This study shows that working memory training improves visual working memory in pediatric cancer survivors. This beneficial effect was detected in an area where deficits occur frequently in pediatric cancer survivors. Although this finding is in line with previous empirical evidence, it shows that near transfer effects are to be expected from the training. Given this finding, interventions tailored on the individual cognitive profile are needed to best support development after cancer and its treatment.

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Benzing, V., Eggenberger, N., Spitzhüttl, J., Siegwart, V., Pastore-Wapp, M., Kiefer, C., … Leibundgut, K. (2018). The Brainfit study: efficacy of cognitive training and exergaming in pediatric cancer survivors – a randomized controlled trial. *BMC Cancer*, 18(1), 18.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Functional Capacity and Cardiovascular Risk Factors in Childhood Cancer Survivors – Baseline Results from the SURfit Study

Authors:

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Abstract:

Introduction: Cardiovascular disease (CVD) is the leading non-malignant cause of death in childhood cancer survivors (CCS) and is related to cancer treatment and an unfavorable lifestyle. We aimed to assess prevalence of CVD risk factors in a sample of adult CCS and their association with physical fitness.

Methods: We analyzed baseline data of the SURfit study (Rueegg et al., 2017), an exercise intervention study initiated at the University Children`s Hospital Basel in September 2015 and completed in February 2019 including ≥5-year survivors, aged ≤16 years at diagnosis and ≥16 years at study. We categorized cancer treatment into low, moderate, and high risk for CVD depending on exposure to cardiotoxic chemotherapy with anthracyclines and cardiac radiation dose. We assessed functional capacity by a 1-minute sit-to-stand test (STS). The following CVD risk factors were assessed: overweight and obesity, high waist circumference, hypertriglyceridemia, insulin resistance, and hypertension. We estimated the association between functional capacity and different CVD risk factors by logistic regression models adjusted for sex, age, and CVD risk group.

Results: We included 162 survivors, diagnosed 1976-2012 (56% male) with a median age of 6.7 years (interquartile range (IQR) 3.1-11.8) at diagnosis and 28.4 years (IQR 23.4-36.6) at study. Of the 162 survivors, 28% were at low, 40% at medium, and 32% at high risk for CVD. Median STS repetitions for females were 45 (IQR 38-54; median of Swiss normal population=47, IQR 40-54), and for males 53 (IQR 45-62; median norm=48, IQR 40-56). Survivors were overweight and obese in 25% and 9%, respectively, had high waist circumferences in 27%, hypertension in 18%, hypertriglyceridemia in 19%, and insulin resistance in 29%. Per 10 more repetitions in the STS, we found a decreased risk for high waist circumference (OR 0.62, 95%CI 0.44-0.87, P=0.006), hypertriglyceridemia (OR 0.58, 95%CI 0.41-0.82, P=0.002), and insulin resistance (OR 0.69, 95%CI 0.52-0.92, P=0.011). There was no statistically significant association with overweight/obesity and hypertension.

Discussion/Conclusion: This cohort of CCS is at considerable risk for CVD with a high prevalence of CVD risk factors. Increased functional capacity was associated with reduced CVD risk. Our longitudinal data will show whether an exercise intervention can improve the CVD risk in CCS.

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Rueegg, C. S., Kriemler, S., Zuercher, S. J., Schindera, C., Renner, A., Hebestreit, H., . . . von der Weid, N. X. (2017). A partially supervised physical activity program for adult and adolescent survivors of childhood cancer (SURfit): study design of a randomized controlled trial [NCT02730767]. *BMC Cancer, 17*(1), 822. doi:10.1186/s12885-017-3801-8

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Can Physical Activity mitigate Low Bone Health in Childhood Cancer Survivors?

Authors:

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Abstract:

Introduction: Childhood cancer survivors (CCS) have an increased risk of low bone mineral density (BMD) that is partly related to physical inactivity. In our cross-sectional study, especially high impact loading was positively correlated with BMD (Zuercher et al., 2019) in CCS. We therefore aimed to assess the effect of a one-year physical activity (PA) intervention without specific lower body impact loading on BMD of adolescence and young adult CCS.

Methods: The SURfit study is a randomized, controlled one-year PA intervention study (Rueegg et al., 2017) including CCS identified from the Swiss Childhood Cancer Registry. Survivors were ≥16y at enrollment, <16y at cancer diagnosis, and ≥5y in remission. The intervention group was asked to perform an additional ≥2.5h of intense PA/week, while controls performed exercise as usual over one year. Bone health was assessed as secondary trial endpoint at baseline and post-intervention. We measured tibia (distal epiphysis and shaft) BMD and morphology by peripheral quantitative computed tomography and lumbar spine, hip, and femoral neck BMD by dual-energy X-ray absorptiometry. Exercise adherence was assessed by self-reported (online diary and questionnaire) and assumed (respiratory exercise test) PA. We estimated the intervention effect on lower body bone parameters by multilevel linear regression models adjusting for age, sex, tumor type and baseline bone health. We performed intention-to-treat, two per protocol and a subgroup analyses.

Results: 151 survivors (43% females), 7.5±4.8y at diagnosis and 30.4±8.5y at enrollment were included. Intention-to-treat analyses revealed no significant differences in changes of bone parameters between treatment groups in any measurement. However, in the per protocol analysis, compliant survivors increased femoral neck (for self-reported compliance) and tibial trabecular BMD (assumed compliance) significantly by 1.9% (95% CI 0.48%-3.47%, p=0.01) and 1.3% (95% CI 0.19%-2.40%, p=0.02), respectively, compared to the control group. Subgroup analysis indicated that trabecular BMD increased by 2.8% (95% CI 0.15%-5.46%, p=0.04) more in survivors of the intervention group with BMD z-score ≤-1 at baseline compared to those starting at z-score >-1.

Discussion/Conclusion: A general intense PA program over one year might not be specific and appealing enough to promote bone health in CCS, although it is reassuring that those compliant to the program and those with initially low BMD profited most. Novel PA trials may include specific bone stimulating exercise programs, target risk groups with low bone health and be attractive enough to maximize compliance.

References:

Rueegg, C. S., Kriemler, S., Zuercher, S. J., Schindera, C., Renner, A., Hebestreit, H., Meier, C., Eser, P. & von der Weid, N. X. (2017). A partially supervised physical activity program for adult and adolescent survivors of childhood cancer (SURfit): study design of a randomized controlled trial [NCT02730767]. *BMC Cancer, 17*, 822. doi: 10.1186/s12885-017-3801-8

Zuercher, S. J., Jung, R., Monnerat, S., Schindera, C., Eser, P., Meier, C., Rueegg, C. S., von der Weid, N. X. & Kriemler, S. (2019). High Impact Physical Activity and Bone Health of Lower Extremities in Childhood Cancer Survivors: A Cross-sectional Study of SURfit. *Submitted for publication*

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Exercise interventions for children with chemotherapy-induced peripheral neuropathy – state of the art

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Abstract:

Chemotherapy forms the backbone in pediatric cancer treatment and is making a big contribution to the improved survival rates simultaneously raising the focus on the reduction of side-effects and patients' quality of life. A very prevalent and medically highly relevant side-effect is the chemotherapy-induced peripheral neuropathy (CIPN). The reported prevalence in pediatric cancer patients varies between 50-100%, depending on the neurotoxic agent and is assumed to be underreported (Kandula, Park, Cohn, Krishnan, & Farrar; Moore & Groninger, 2013). Recent data suggest that Oxaliplatin for instance, causes neuropathy in 50% of the children while Vincristine for instance has a prevalence of 78-100% (Kandula et al. 2016). In a study of 128 children with ALL, 78% developed peripheral neuropathy that persisted throughout the first year of treatment, even with reductions in vincristine dose intensity (Lavoie Smith et al., 2015).
The severe symptoms such as loss of sensation, numbness, pain, absent reflexes as well as loss of balance control not only delays motor development milestones such as walking, running, jumping or climbing, diminishing children's quality of life and affecting their social reintegration, but is also of high clinical relevance. Additionally, recovery is poor and there are currently no effective options to prevent or treat the symptoms of CIPN. Promising results have so far been achieved with specific exercise interventions. We postulate that a specified, neuromuscular stimulating training is necessary to also target neural damage, most likely responsible for many of the dysfunctions children have to deal with even after medical therapy.
Therefore, we would like to give an overview on the current state of the art of exercise interventions for children with CIPN and which results could be transferred from research in adults to help children maintain their sensory and motor abilities to become fitter and better-integrated survivors.

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Kandula, T., Park, S. B., Cohn, R. J., Krishnan, A. V., & Farrar, M. A. (2016). Pediatric chemotherapy induced peripheral neuropathy: A systematic review of current knowledge. *Cancer Treat Rev*, 50, 118-128. doi:10.1016/j.ctrv.2016.09.005

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Physical and mental health outcomes of physical exercise training in young cancer inpatients and survivors - a systematic review of RCTs

Authors:

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Abstract:

Introduction: Physical activity (PA) is increasingly recognized as a means to mitigate impairments in physical, psychological, cognitive and social functioning in young cancer inpatients and survivors (Braam et al., 2016). Nevertheless, mounting evidence indicates inadequate PA levels in this population that extend into adulthood. To prevent inactivity and related health problems, it is vital to develop and evaluate tailored PA interventions. In order to identify the features of efficacious interventions, the aim of this systematic review was to synthesize the findings from randomized controlled trials (RCTs) investigating the effects of PA interventions on physical and mental health outcomes in young cancer inpatients and survivors.

Methods: We searched in Pubmed, EMBASE and Web of Science (until August 2019) for RCTs of PA interventions in children and adolescents with cancer during and after treatment that reported effects on at least one physical and/or mental health outcome. Two authors identified studies meeting inclusion criteria, extracted data and assessed risk of bias.

Results: From 1141 identified articles, 22 RCTs met the eligibility criteria, leading to a total of 1315 participants aged 1 to18 years (M_{age} = 11.7 years). Studies were conducted with inpatients (10), survivors (10), or both (2). In twenty-one studies, chronic PA interventions (with only one acute PA) including aerobic, resistance or combined motor-cognitive training were carried out. All studies included physical health outcomes (mostly cardiorespiratory fitness, muscle strength and fatigue); 17 included in addition psychological health outcomes (mostly depression and quality of life); three objectively assessed cognitive functions. Benefits were most frequently reported (> 50%) for strength, fatigue and self-efficacy, but differences in training session durations and intervention lengths hinder thorough comparisons. No negative effects were found.

Discussion/Conclusion: PA appears to be safe and feasible for this special population. Chronic PA interventions, particularly for inpatients, mainly focus on enhancing physical fitness and reducing fatigue symptoms. Motor competence is rarely targeted, even though it is a predictor of health and later PA levels (Robinson et al., 2015). Few interventions combine motor and cognitive trainings. This is surprising, since not PA itself, but its cognitive and skill acquisition challenges seem a prerequisite to reap largest cognitive benefits (Tomporowski & Pesce, 2019). Emerging forms of playful technological exercise with physical and cognitive challenges may represent a new frontier to include cognitive and skill acquisition challenges (Benzing et al., 2018). In conclusion, there are some promising results, but more high-quality RCTs are needed to understand how various types of PA influence both motor and cognitive development in young cancer inpatients and survivors.

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Benzing, V., Eggenberger, N., Spitzhuttl, J., Siegwart, V., Pastore-Wapp, M., Kiefer, C. et al. (2018). The Brainfit study: efficacy of cognitive training and exergaming in paediatric cancer survivors – a randomized controlled trial. *BMC Cancer,* 18:18.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

From academic in 'Exercise is Medicine' to wearing the "cancer patient" shoes first-hand: personal perspectives and reflections on Exercise Oncology in Switzerland.

Authors:
Ilaria Croci [1,2]

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Abstract:
"Participatory Medicine" refers to a health model where shared-decision making and interaction between patient and health care providers is valued. It contrasts with traditional "top-down" health care approaches where the patient has a rather passive role. In order to favour "Participatory Medicine" in Sports and Exercise Medicine, the top journal in the field, The British Journal of Sports Medicine, recently started welcoming narratives of patients who underwent unique medical journeys. Consistently, the most recent Exercise Oncology guidelines encourage academics to interact more with cancer patients in order to better understand patients' needs and wishes.

I found myself in the position of having that "interaction" in my own head. Wearing both hats: that of an academic in Exercise is Medicine, and that of a cancer survivor, who underwent a long and complex oncological journey to cure a rare cancer.

Exercise training has been an invaluable medicine. Through a rigorous daily training program, within a year, I went from "bed rested /unable to walk" to completing a triathlon. This while spending a total of over 60 days hospitalised, and undergoing 30 sessions of radiotherapy. Prescription was individualised and targeted all components of physical fitness. High-intensity interval training and resistance training were also included in the program.
Periodization of training according to chemotherapy cycles was crucial. While hospitalized and receiving chemotherapy infusions, I was managing to perform sessions of 20-40min of moderate intensity aerobic exercise. Experiencing the potency of physical activity and exercise training for counteracting side-effects of treatment such as fatigue and nausea, while well described in the literature, was astonishing.

Observation of the medical system from the two perspectives during my oncological "Tour de Suisse" (received care in 3 different cantons) lead to a range of questions and thoughts. Most importantly: what lessons has "the Exercise Professional" learned from "the patient"? What advices can be shared with other exercise professionals (Maitres APA/Sport Therapeuten) and health care practitioners? And, based on this journey, how did the scientific evidence on Exercise Oncology match up against the experienced clinical practice?

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

YIAs

Thursday 06.02.2020

	Aula	YIAs
13:00		Development of a model in vitro system to study skeletal muscle adaptations to sprint interval training in normoxia and normobaric hypoxia *Chris Donnelly*
13:20		Long-term Effects of Physical Activity, Body Mass Index and Blood Pressure on Retinal Microvascular Health in School Children: The Sportcheck Follow-Up Study *Giulia Lona*
13:40		The social meaning of steps. User reception of a mobile health intervention on physical activity *Bastien Presset*
14:00		Can we optimize the use of transcranial direct current stimulation to improve endurance performance? *Christel Schäfer*
14:20		Cardiorespiratory Fitness, Executive Functions and Scholastic Performance: examining the cognitive mediation mechanisms *Marc Yanguez Escalera*

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Development of an *in vitro* model to study skeletal muscle adaptations to sprint interval training in normoxia and normobaric hypoxia

Authors:
Donnelly C, Zanou N, Kayser B, Place N
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Abstract:

Introduction: In recent years, the application of molecular biology techniques to exercise physiology has provided novel insights into intracellular signaling networks involved in the response to exercise. Indeed, in attempt to amplify endurance training adaptations coaches and athletes use strategies to impose greater "metabolic stress" in the belief that provoking extreme disturbances to homeostasis will maximize intracellular responses in skeletal muscle, promote superior training adaptations, and enhance the factors underpinning endurance performance (Hawley, Lundby, Cotter, & Burke, 2018). Sprint interval training (SIT), hypoxia and a combination of both have been demonstrated to activate potent cell signaling pathways that regulate many of the hallmark muscle adaptations inherent to endurance training (Lundby & Jacobs, 2016). However, the triggers of the apparent enhanced training adaptation remain unknown.

One potential trigger of these adaptations is increased muscle fiber cytoplasmic [Ca^{2+}] in the resting state (Place et al., 2015), a signal that increases skeletal muscle mitochondrial biogenesis via the activation of PGC1a (Lundby & Jacobs, 2016). Ca^{2+} released from the sarcoplasmic reticulum via the ryanodine receptor type-1 (RyR1) channel is the main source of cytoplasmic [Ca^{2+}] increase in skeletal muscle during contraction (Zalk, Lehnart, & Marks, 2007). Among various modulators of RyR1 function, calstabin stabilizes the channel in a closed state. Upon RyR1 modifications (e.g. oxidation) calstabin can dissociate from the complex leading to a "leaky" channel (i.e. calcium efflux from the sarcoplasmic reticulum through the RyR1 under resting conditions; Zalk, Lenhart & Marks, 2007). Interestingly, both SIT (Place et al., 2015) and hypoxia (Zalk, Lehnart, & Marks, 2007) have been demonstrated to modify the RyR1 and skeletal muscle Ca^{2+} handling. However, the effect of combining SIT and normobaric hypoxia on RyR1 modifications, Ca^{2+} handling and changes in mitochondrial content is unknown. Given the complexity of *in vivo* biology and the difficulties linking a molecular mechanism to a physiological manifestation we are obliged to perform complimentary experiments in *ex vivo* models to decipher the role of the RyR1 and cytoplasmic [Ca^{2+}] in the skeletal muscle response and adaptation to sprint interval training.

With this in mind, here we present the development of a new *in vitro* model to study skeletal muscle responses and adaptations to SIT in normoxia and normobaric hypoxia.

Methods:

Human experiments: Sixteen healthy recreationally active men took part in one experimental trial. Knee-extensor neuromuscular function was assessed and *vastus lateralis* skeletal muscle biopsies were collected under normoxic conditions, before (Pre), immediately after (Post) and 24h after (+24h) a session of SIT performed in normoxia (fraction of inspired oxygen (FiO_2) = 21%; n = 8) or hypoxia (FiO_2 = 15%; n = 8). The SIT session consisted of a 5-min warm-up at 100W followed by six 30-s "all-out" cycling bouts at 0.7 Nm/kg body weight on a cycle ergometer, with 4-min rest between bouts.

Neuromuscular function assessment involved paired femoral nerve-stimulations at 100 Hz (PS100) and 10 Hz (PS10). The ratio between PS10 and PS100-evoked forces (PS10:PS100) was used to evaluate low-frequency force-depression (Place, Yamada, Bruton, & Westerblad, 2010).

Analyses of skeletal muscle biopsies included RyR1 biochemistry and mitochondrial protein content. RyR1 was immunoprecipitated and the levels of total RyR1 and bound calstabin were

measured. Mitochondrial oxidative phosphorylation (OxPhos) complex proteins were also analysed and reported relative to a loading control for each sample. Data were analysed using repeated measures ANOVA with time as a within-factor and group as a between-factor. Statistical significance was set at $p < 0.05$. Data in text are raw values or expressed as % change from Pre, and presented as mean ± SD.

In vitro experiments: To model *in vivo* conditions, we used the mouse skeletal muscle C2C12 cell line. These cells differentiate into myotubes that contract in response to electrical stimulation and can therefore be used to mimic exercising muscle. Myoblasts were proliferated and differentiated into myotubes in normoxia. The myotubes were then stimulated to contract in normoxia or hypoxia using an electrical stimulation protocol. We use a SIT-mimicking stimulation protocol consisting of six 30s-bouts of stimulation at 50Hz separated by 4-min recovery. The cells were returned to normoxia to recover. We used 5% and 1% O_2 to mimic *in vivo* skeletal muscle O_2 tensions in normoxic and hypoxic conditions respectively (Richardson et al., 2006).

A series of time course experiments were performed to assess the exposure to hypoxia that is required to model the *in vivo* conditions. Readouts of cellular hypoxia were measured, and assessments of cellular morphology, structure and function were performed. To validate the model, lactate release, cell signaling and mitochondrial responses to the SIT-mimicking electrical stimulation protocol in normoxic and hypoxic conditions were assessed.

Results:

Human experiments: There were no differences in the work performed (1.3 ± 0.2kJ kg^{-1}) during the six sprints between groups ($p > 0.05$). Low-frequency force-depression was observed immediately after exercise (PS10:PS100 = -56 ± 12%; $p < 0.01$) with no significant differences between groups ($p > 0.05$).

Calstabin dissociation was greater immediately post SIT in hypoxia (-93 ± 3%) compared with normoxia (-35 ± 8%; $p < 0.001$). In addition, calstabin dissociation persisted 24h after SIT in hypoxia (-38 ± 6%) but not after SIT in normoxia (105 ± 8%; $p < 0.001$). The protein content of mitochondrial complexes I, II and IV was increased 24h after SIT in normoxia (complex I = 44±39%, complex II = 68 ± 43%, complex IV = 42 ± 44%) but not after SIT in hypoxia (complex I = -5±32%; $p = 0.014$, complex II = -23 ± 37%; $p < 0.01$, complex IV = -22 ± 16%; $p = 0.01$).

In vitro experiments: Consistent with observations in humans, exposure to hypoxia reduced the PO_2 in the cell environment to 1-2% (Richardson et al., 2006), increased hypoxia-inducible factor-1α (HIF-1α) protein content and the expression of selected HIF1α target genes (e.g. VEGF; Ameln et al., 2005). The 2-hour hypoxic exposure did not cause any morphological or structural changes (e.g. actin staining) in the myotubes nor changes in intracellular Ca^{2+} stores. This allows us to directly compare the effects of normoxia and hypoxia on the skeletal muscle response to the SIT-mimicking electrical contractions.

Extracellular lactate was increased after the SIT-mimicking electrical stimulation and was greater in hypoxia compared with normoxia, consistent with published results from humans (Bowtell, Cooke, Turner, Mileva, & Sumners, 2014). Cell signaling and mitochondrial responses to stimulation in normoxia and hypoxia are different consistent with our findings in humans. These results confirm the validity of our model to study muscle adaptations to SIT in normoxia and hypoxia.

Discussion/Conclusion:

Here we report the development and characterization of a valid *in vitro* model to study skeletal muscle responses and adaptations to SIT in normoxia and hypoxia. In addition, our human experiments provide novel data demonstrating that a single session of SIT in normoxia increases skeletal muscle mitochondrial content but performing SIT in hypoxia blunts this response. We also report that performing SIT in normoxia leads to calstabin dissociation from the RyR1 and that the

dissociation is greater following SIT in hypoxia. These findings show that SIT leads to Ca^{2+} leak through the RyR1 and suggests a key role of Ca^{2+} leak in mitochondrial adaptations. Further experiments using our *in vitro* model, including pharmacological modulation of the RyR1 and Ca^{2+} leak which are not possible in humans, are in progress.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Long-term Effects of Physical Activity, Body Mass Index and Blood Pressure on Retinal Microvascular Health in School Children: The Sportcheck Follow-Up Study

Authors:

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Abstract:

Introduction: The prevalence of high childhood blood pressure (BP) (Zhou et al., 2017) and body mass index (BMI) (Abarca-Gómez et al., 2017) are rising globally. Both have been associated with subclinical vascular impairments in children (Aggoun et al., 2008; Franks & Bennett, 2010). Physical activity (PA) seems to have beneficial effects on cardiovascular health. Results of cross-sectional studies have demonstrated that higher PA and fitness are associated with favorable wider retinal arteriolar and narrower venular diameters (Köchli, Endes, Infanger, Zahner, & Hanssen, 2018). Longitudinal data on the association of retinal microvascular health with development of high BP in children are lacking. This study aimed to primarily analyze the association of baseline central retinal arteriolar (CRAE) and venular (CRVE) diameters and its ratio (AVR) with longitudinal development of higher BP over four years in young school children. Moreover, to investigate the influence of longitudinal changes in BP and BMI on retinal microvascular health. The second objective was to analyze the influence of longitudinal changes in PA and physical inactivity (PIA) on the retinal microvasculature.

Methods: At baseline in 2014, 391 children aged 6-8 years were screened for BP, BMI, PA and retinal vessel diameters and using standardized protocols. Retinal Vessel analysis was performed using a retinal vessel analyzer to determine CRAE and CRVE. Physical activity and inactivity (screen time) were subjectively assessed through a parental questionnaire. In 2018, 262 children were followed-up by assessing all parameters using the same standardized protocols.

Results: During four years, systolic and diastolic BP increased significantly (Δ 3.965 ± 8.25 mmHg and 1.733 ± 7.63 mmHg, respectively), while CRAE decreased by Δ -6.325 ± 8.55 µm without significant changes in CRVE. Children with narrower CRAE at baseline developed higher systolic BP after four years of follow-up (β [95%] -0.082, 95% [-0.144 to -0.019], P=0.01). Change in BMI was inversely and independently associated with lower arterio-to-venular diameter ratio (AVR) (β [95%] -0.003, 95% [-0.006 to -0.001], P=0.016). Children, who achieved higher PA during the 4-years period had wider CRAE (β [95%] -0.111, 95% [-0.122 to -0.099], P=0.001) at follow-up. In addition, higher PIA (screen time) was negatively associated with wider CRVE (β [95%] 0.052, 95% [0.005 to 0.099], P=0.029) and lower AVR (β [95%] -0.002, 95% [-0.001 to 0.001], P=0.039).

Discussion/Conclusion: An increase of childhood BP and BMI was related to unfavorable development of retinal microvascular health. Narrowing of retinal arterioles seems to predict development of systolic BP. Being more physically active appears to be beneficial for microvascular health, whereas physical inactivity has detrimental effects. Early detection of microvascular impairments as primary prevention strategies may help reduce incidence hypertension and associated cardiovascular risk during childhood and later in life. Moreover, physical activity programs should be promoted as a means to improve childhood health and reduce the burden of cardiovascular disease long-term.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The social meaning of steps
User reception of a mobile health intervention on physical activity

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Abstract:

Introduction: In recent years, mobile health (mHealth) technologies have received increasing attention from industry and researchers. In the fields of health and physical activity, these terms generally refer to the measurement of bodily functions via connected tools. Such technologies have been the focus of both criticism and high expectations, a reception characteristic of the 'promise economy' often observed in innovation (Audétat, 2015). A 'healthist' (Lupton, 2017) sociocultural context often frames the marketing of these technologies (Fotopoulou & O'Riordan, 2017). But aside from promises and discourses, few empirical studies have been conducted on actual everyday life uses. Our goal in this article is to analyze the reception of an mHealth self-tracking system in users' daily life. Our results show that self-tracking in the context of health promotion can lead to a moralizing appropriation of measures by users. They also indicate that such appropriation seems closely tied to certain social positions. These results have empirical importance for public health institutions and contribute to our theoretical understanding of mHealth technologies.

Methods: Our research is based on 23 interviews with the participants of a smartphone-based mobile health intervention aimed at increasing physical activity (ALLY). ALLY rely on daily measures of steps associated with a financial reward in case the objective (10'000 steps) is attained. The interviews were conducted in the four months following the end of a six-week digital health intervention organized by the ETHZ. A noncoercive interview guide was prepared based on two exploratory interviews and the literature (Corbin & Strauss, 1990). The guide was divided into six main themes, namely, practical software use, use of data, engagement in tracking, motivations, body, and sociality. When needed, the guide was modified during data collection (Corbin & Strauss, 1990). The collected data were coded by using QSR International's Nvivo 11 software. An open coding phase, which was conducted sentence-by-sentence, led to the identification of 59 codes. Collaborative axial coding and a focus on user-system interaction as a research question led to the emergence of three relevant themes (Corbin & Strauss, 1990): "quantification", "social rhythms" and "moralization". In this presentation, we choose to focus on "moralization".

Results:

The application

Before we present our results, it seems important to describe the embedded characteristics of technical system itself. Analysis of mHealth applications by social scientists identified common characteristics that we also found to be present in ALLY. The first characteristic is a reductionist approach to health and its quantification (Lupton, 2014). In the functioning of ALLY, physical activity is reduced to the sole measurement of steps as a metric unit. A second characteristic is the "bracketing" of the social environment and contexts of use (Maturo & Setiffi, 2016). This is also the case for ALLY, which does not consider context during the intervention. Finally, it has been shown that a 'neoliberal ideology that implicitly stigmatizes people who are not capable of meeting the standard definition of "healthy"' is often embedded in self-tracking applications (Fotopoulou & O'Riordan, 2017). In the ALLY intervention, people who reach their objective received an encouraging message and a financial reward. The participants who were unable to reach their standardized daily step objective were not rewarded but were encouraged by the chatbot to ameliorate their behavior in the future.

Moralization

> *"I think that ALLY can mostly help people who do not have this consciousness and who are maybe lazy. So that they might say: well, I did 7,000 steps; I will try to go out for a little walk so that ALLY is happy (laugh). I think that it would be a good thing. (41-year-old woman, nurse)"*

As exemplified in this quotation, the term 'lazy' appeared with surprising frequency in the interviews, and 'laziness' emerged as one of the largest coding categories. Physical activity was often understood in opposition to laziness by the participants. This opposition between physical activity and laziness was mostly dominant in the self-perceived 'inactive' interviewees and framed their understanding of themselves and the step objective. The necessity for people to take care of themselves both individually and as a part of a mutualized health system, notably through step-counting, was a preeminent idea for the interviewees. In the participants' accounts, the step objective is reinterpreted in moral terms. The number of steps is transformed into a way to measure laziness and, by extension, good citizenship. As stated before, the moral implications were already embedded in ALLY, both in the objective-reward logic and in some of the chatbot dialogues. However, they were never expressed via morally laden terms such as 'laziness' or 'unhealthy'. Users were thus able to match their vision of health and responsibility to ALLY's vision. In the context of the interview, that is, under the attention of the interviewer, users converted the objectives into the moral language of 'active-lazy'.

Discussion/Conclusion:

The neoliberal ethos embedded in ALLY – and most of market leading applications – did fit with our users' expectations. One group of our interviewees considered that they were 'active and responsible individuals' because they easily reached their objectives. The other group considered themselves to be 'lazy' and viewed step-counting as part of their effort to become active. These results are consistent with the idea that health as a social practice can be a way to affirm a specific ethos and strengthen social distinctions (Cockerham, 2017; Crawford, 2006). The idea that a responsible user should be physically active to maintain his or her good health was dominant in our sample. The technical specificity of ALLY and the assignment of a daily step objective linked to a reward and supported by a chatbot were thus consistent with the users' ethos. The mHealth intervention fosters a quantifiable and actionable materialization of this ethos, which reinforces and objectifies it. Interestingly, although ALLY was conceived as an individual surveillance system, our interviewees also viewed it as a tool for 'lateral surveillance' (Andrejevic, 2006). This concept, which refers to peer-to-peer surveillance, has recently been used with respect to the role of the 'surveillant consumer' (Stark & Levy, 2018). In our context, it is important to underline the importance of the step-counting measurement apparatus itself. It uses a specific mode (reduction and quantification) of these distinction and surveillance processes and crudely brings them to the individual's attention.

It is important to note that not all sociocultural groups were represented in this study. The appropriation that we documented reflects the values of a specific social group (our sample) and promotes their particular definition of 'health'. That group mostly comprised highly educated and financially well-off individuals. We acknowledge that devices such as ALLY can incite certain users to conform to 'healthist' forms of citizenship and thus increase their physical activity. However, these devices may create barriers for people who do not share the same values. The appropriation of ALLY and the engagement in the intervention is correlated with certain values that seem to be connected to certain social positions. This exemplifies the idea that the way that people domesticate technologies can be influenced by socioeconomic factors (Hynes & Rommes, 2005). As noted by scholars, the diffusion of practices similar to ALLY could lead to the progressive exclusion and marginalization of citizens who have not interiorized these values (Halford & Savage, 2010). Health policies should not be blind to this potential for an opposing social reception of self-tracking tools. For certain sociocultural groups, which are paradoxically the purported main target of health promotion, self-tracking might contradict the aims of a public policy that supports physical activity as a way to prevent disease and promote health.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Can we optimize the use of transcranial direct current stimulation to improve endurance performance ?

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Abstract:

Introduction:

Direct current transcranial stimulation (tDCS) is a non-invasive stimulation technique that delivers a constant, low-intensity electrical current flow (1-2 mA) to the brain, aiming at exciting or inhibiting the motor cortex area (M1) corresponding to the muscle group of interest (Nitsche et al., 2008). Increasing M1 excitability with anodal tDCS over the contralateral M1 during endurance exercise, such as holding a submaximal isometric force, has been shown to improve time to task failure, possibly by delaying the development of supraspinal fatigue (Oki et al., 2016; Williams et al., 2013). However, other studies did not show any performance improvement (Muthalib et al., 2013; Radel et al., 2017). Inconsistent effects of tDCS on endurance performance might be due to the stimulation parameters (e.g. duration of stimulation) and heterogeneity in different individuals' sensitivity to tDCS (Wiethoff et al., 2014). Therefore, the objective of the current study was to optimize the use of tDCS to improve endurance performance by counteracting the development of central fatigue.

Methods: Thirteen healthy and physically active subjects (5 men and 8 women, 25 ± 5 years old, 173 ± 10 cm and 65 ± 11 kg) participated in two subsets of experiments. The first subset of experiments (two experimental sessions) consisted in the assessment of corticospinal plasticity of the elbow flexors during and after a 20-min period of anodal tDCS (vs. sham) at rest. The second subset of experiments (another two experimental sessions) consisted in anodal (vs. sham) tDCS prior to and during a submaximal contraction sustained until task failure with the elbow flexors. In all sessions, the participants were seated in a height-adjustable seat. The shoulder-trunk angle was 90° in the sagittal axis, the elbow angle was set at 90° with the right forearm vertical while the hand was holding an adjustable handle connected to a strain gauge.

The duration of the preconditioning stimulation was determined individually during the first two experimental sessions and tDCS was delivered throughout a fatiguing task. This task consisted of a sustained isometric elbow flexion performed at ~25% maximal voluntary contraction (MVC) force. The electromyographic (EMG) activity of the *biceps brachialis* (BB), *brachioradialis* (BRA) and antagonist *triceps brachii* (TRI) muscles were recorded with pairs of circular surface electrodes positioned lengthwise over the middle of the muscle belly. Ratings of perceived exertion (RPE) and perceived muscular pain were obtained at every ~15-30s using the 0-100 Borg scale. Motor evoked potentials (MEPs) were obtained in BB and BRA muscles using transcranial magnetic stimulation to monitor changes in corticospinal excitability during and after anodal vs. sham tDCS in the first two experimental sessions and before vs. after exercise in the last two sessions. Furthermore, central and peripheral fatigue were assessed during these last two sessions via the combination of transcutaneous electrical stimulation, transcranial magnetic stimulation and voluntary

contractions. Paired t tests or mixed linear models were used to test for significant differences. Statistical significance was set at $p<0.05$. Data are mean ± SD.

Results: In the first subset of experiments there was a significant increase of the BB MEP amplitude after 5, 10 and 15 min of anodal tDCS while no change was observed for sham (anodal tDCS: pre: 0.18±0.12 mV vs. post: 0.34±0.19 mV, $p<0.05$; sham: pre: 0.28±0.22 mV vs post 0.22±0.14 mV, $p>0.05$). No change was observed for BRA ($p>0.05$). Despite this increased corticospinal excitability observed for BB in resting condition, we observed no difference in the time to task failure with tDCS or Sham stimulation in the second set of experiments (389±193 s for anodal tDCS vs. 374±153 s for sham, $p>0.05$). The EMG activity of BB, BRA and TRI as well as RPE and muscle pain increased significantly during exercise ($p<0.05$) but there were no significant differences regarding the conditions. Similarly, there were no statistically significant changes in corticospinal excitability between the sham and tDCS sessions after the fatiguing task ($p>0.05$). Elbow flexor MVC force decreased at task failure with no difference between conditions (-61±12% for anodal tDCS vs. -58±13% for sham, $p>0.05$). Central (voluntary activation level, cortical activation, coactivation level) and peripheral (M wave, muscle twitch) fatigue was observed after exercise ($p<0.05$) with no differences between conditions.

Discussion/Conclusion: In the present study, two subsets of experiments were used aiming at optimizing the use of tDCS to improve endurance performance. The results of the first set of experiments suggest that anodal tDCS successfully modulates BB corticospinal excitability when the duration of stimulation is individualized. In the second set of experiments, our results showed no effect of tDCS on time to task failure or the extent and origin of neuromuscular fatigue. These findings are in agreement with a recent study conducted in the same muscle group with a larger sample size and using high-density (i.e. more focal) tDCS (Radel et al., 2017). Our results obtained during and after the fatiguing task are also consistent with the results of a recent meta-analysis (Machado et al., 2019), although we successfully optimized the stimulation parameters as advised by authors. At this stage, our findings do not support the use of tDCS to improve endurance performance of elbow flexors. Further work aiming at (i) optimizing electrode placement using MRI or (ii) individualizing tDCS intensity (Machado et al., 2019) may facilitate more definitive conclusions to be made.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Cardiorespiratory Fitness, Executive Functions and scholastic performance: examining the cognitive mediation mechanisms

Authors:

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Abstract:

Introduction:

A growing body of evidence suggests that physical activity not only has positive effects on children's physical condition, but also on their cognitive functioning and scholastic performance (Donnelly et al., 2016; Greeff, Bosker, Oosterlaan, Visscher, & Hartman, 2018). Executive functions (EF) have been proposed as the cognitive mechanism that explains how indices of physical activity (PA - e.g. aerobic fitness or motor ability) are positively associated with enhanced academic performance (Schmidt et al., 2017). EF seem to play an important role on scholastic performance, according to the results from several studies (e.g. Cantin, Gnaedinger, Gallaway, Hesson-mcinnis, & Hund, 2016; Vandenbroucke, Verschueren, & Baeyens, 2017). To understand how PA is related to scholastic performance, recently two studies have investigated whether EF mediate the link between PA and scholastic performance. Aadland et al (2017) conducted an intervention study and found no relationship between PA indices, such as aerobic fitness, and EF or scholastic performance. On the other hand, a cross-sectional study showed that EF mediate the relationship between motor ability and academic scholastic performance (Schmidt et al., 2017). However, this latter study does not characterizes which EF components may explain such relationship as it only used one global construct of EF. Yet, according to the literature, the structure of EF may vary as a function of children's age from a 1-factor model (global EF) to a 4-factor model (inhibition, working memory, cognitive flexibility and global EF) (Brydges, Fox, Reid, & Anderson, 2014; Friedman et al., 2008; Lee, Bull, & Ho, 2013; Wiebe et al., 2011). Thus, the aim of this study is to investigate to what extent the different components of EF (inhibition, cognitive flexibility, working memory and/or global EF) mediate the relationship between cardiorespiratory fitness (CRF) and scholastic performance. In addition, we examine whether the mediation is specific to academic topics since previous studies have observed a direct link between CRF and reading, spelling and math (Fedewa & Ahn, 2011; Singh et al., 2018).

Methods:

193 children (8 to 12 years) participated in this study. 11 children were excluded from data analyses due to learning or attention disorders. To evaluate EF we used nine classical cognitive tasks tapping inhibition, cognitive flexibility and working memory (3 tasks per cognitive construct). To evaluate CRF, children completed the 20 meter shuttle run test during the physical education course (Léger, Mercier, Gadoury, & Lambert, 1988). School teachers provided us the grades in French I (reading), French II (spelling) and Math over three trimesters. Data collection was conducted in eight schools from Geneva.

Results:

First, we explored the structure of EF according to the different models of EF proposed in the literature. Four confirmatory factor analyses (CFA) were conducted to examine what model of EF fitted better to the data (1-factor vs 2-factor vs 3-factor vs bifactor model). The bifactor model

(inhibition, working memory, cognitive flexibility and global EF) obtained the best fitting, RMSEA=.041, SRMR= .031, CFI= .98, TLI= .953. Therefore, the constructs of the bifactor model were used in the subsequent analyses. Then, through multiple mediation analyses, we tested whether EF mediate the relationship between CRF and school grades (reading, spelling and math).

CRF, EF and math

The results from the mediation analyses revealed a total effect on math (β= .28, *SE*= .08, *p*= .001) explained by an indirect effect of the different components of EF (β= .07, *SE*= .02, *p*< .001). This total indirect effect is mostly driven by cognitive flexibility, as shown by the associated coefficient (β= .11, *SE*= .04, *p*= .007).

CRF, EF and reading

Regarding the grades on reading, the total effect was not significant (β= .13, *SE*= .09, *p*= .115), although there was a total indirect effect through the EF components (β= .12, *SE*= .03, *p*< .001). This effect was also mainly driven by a specific indirect effect through cognitive flexibility (β= .08, *SE*= .04, *p*= .043).

CRF, EF and spelling

There was also a total effect on spelling (β= .23, *SE*= .09, *p*= .007), explained by an indirect effect through the EF components (β= .12, *SE*= .03, *p*< .001). Cognitive flexibility (β= .12, *SE*= .04, *p*=.008) was again the main component of EF driving this effect.

Discussion/Conclusion:

Our results show for the first time, that on children 8 to 12 years old, the structure of EF might be more complex than what has been shown before (Brydges et al., 2014; Lee et al., 2013), including a main construct known as global EF, which captures what is common between all EF tasks, and three sub-process known as inhibition, working memory and cognitive flexibility. A similar structure has been reported in adolescents (Friedman et al., 2008).

Second, mediation analyses revealed that the different components of EF mediate the link between CRF and scholastic performance. These results are in line with Schmidt et al (2017), who documented a mediation effect through a latent, global EF, construct. Note that this is the only EF construct Schmidt et al could test for. Our results demonstrate that when the different processes involved in EF are considered separately, cognitive flexibility mainly mediates the effect of CRF on specific subjects like math, reading or spelling. Cognitive flexibility builds on working memory capacities as well as inhibition; it develops later and at a slower rate (Diamond, 2013). Thus, physical exercise could be acting on the brain by fostering EF development, resulting also in a better scholastic performance through enhanced cognitive flexibility. These results point out the importance of considering the different processes involved in EF separately, rather than considering EF only as a global factor, in order to understand the cognitive mechanisms that explain how CRF is related to scholastic performance.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

YIA Applicants

Friday 07.02.2020

	Aula	YIA applicants
16:00		Modelling training adaptation in swimming using artificial neural network geometric optimization *Justin Carrard (YIA applicant)*
16:16		Repeated-Sprint Training in Hypoxia in Well-Trained Tennis Players *Thomas Blokker (YIA applicant)*
16:30		Comparison of thermoregulatory responses between Swiss high- and low-point wheelchair rugby players during a real game *Fabian Grossmann (YIA applicant)*
16:45		Effectiveness of endurance training guided by oxidative stress analysis *Amélie Parolini (YIA applicant)*
17:00		The Blood Steroidal Profile: Impact of Topical Testosterone Treatment in Healthy Women *Olivier Salamin (YIA applicant)*
17:15		Effects of parameter definition for performance prediction during 40-km cycling time-trials *Fernando Beltrami*

SPORTWISSENSCHAFTLICHE
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SCIENCES DU SPORT

Title:

Modelling training adaptation in swimming using artificial neural network geometric optimisation

Authors:

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Abstract:

Introduction: In 2017, a consensus statement on training monitoring stated that "monitoring athletes' training load is essential for determining whether they are adapting to their training program, understanding individual responses to training, assessing fatigue and the associated need for recovery, and minimising the risk of overtraining, injury, and illness"(Bourdon et al., 2017, p. S2 161). Several methods have been developed to quantify training load and assess fatigue and recovery (Bourdon et al., 2017). The choice of the adequate methods should depend on sport-specific context, the goal of the monitoring program, as well as on available means and resources (Bourdon et al., 2017; Gabbett et al., 2017). Once collected, data need to be analysed to provide coaches and athletes with actionable information (Foster, 2019; Gabbett et al., 2017). To achieve the latter, several mathematical techniques to model training effects on performance have been proposed (Jobson, Passfield, Atkinson, Barton, & Scarf, 2009). Traditional models, like impulse-response and multiple regression models, "are based on linear mathematical concepts such as regression analysis and linear differential equations" (Jobson et al., 2009, p. 839). However, because biological adaptations are complex non-linear processes, non-linear mathematical concepts like Artificial Neural Network (ANN) are believed to provide a more accurate description of training adaptation (Balagué & Torrents, 2005; Edelmann-Nusser, Hohmann, & Henneberg, 2002; Fister, Ljubič, Suganthan, Perc, & Fister, 2015; Jobson et al., 2009; Pfeiffer & Hohmann, 2012). To the best of the authors' knowledge, no study has used ANN geometric optimisation to model training adaptation yet. Compared to ANN, ANN geometric optimisation can separate domains of influence of identified patterns in a Euclidean space (Bishop & Tipping, 1998; Tipping, 2000). By separating adaptation from maladaptation (to training), this graphical technique could facilitate outcome visualisation and comprehension to most coaches and athletes. This study had three aims. Firstly, to monitor training, recovery and performance among competitive swimmers. Secondly, to model training adaptation using ANN geometric optimisation. Thirdly, to assess the stability of the model.

Methods: During 26 weeks, 38 swimmers recorded their training and recovery data on a web platform. ANN geometric optimisation was used to model and graphically separate adaptation from maladaptation (to training) for each swimmer individually. Three different time series, X(t), Y(t), and Z(t), were projected on a three dimensional Euclidean space. Using the collected data, five different combinations of three time series were used to feed the model. In each combination, performance was used as the time series Z(t). Weekly performance values were dichotomised by comparing each performance value against the personal best time of the swimmer at the beginning of the study. This allows separation of weeks with improvement (adaptation), vs no improvement (maladaptation). Geometric Activity Performance Index (GAPI) is introduced and defined as the ratio of the adaptation to the maladaptation area. The techniques of jittering and ensemble modelling were used to reduce overfitting of the model (Churchill, 2014; Perrone & Cooper, 1992). Indeed, ten percent white noise perturbation was superimposed to the original data sets creating new data sets (Kuo, 2018). For each swimmer and combination, 50 different data sets were created and the model was then run 50 times. Simple averaging was used to combine the obtained outputs (Sharkey, 1996). A model is considered as stable, if the output does not vary much with small perturbation in the input (Bousquet & Elisseeff, 2001; Council, 2012; Mukherjee, Niyogi, Poggio, &

Rifkin, 2006; Poggio, Rifkin, Mukherjee, & Niyogi, 2004). The ability of a model to generalise from a training set to unseen data is key in machine learning (Poggio et al., 2004). Stability is considered sufficient for generalisation (Bousquet & Elisseeff, 2001; Mukherjee et al., 2006). Therefore, stability of the model was tested. The norm of differences of GAPI derivatives was used as an error measure (Bowman & Azzalini, 1997). Finally, to identify the GAPI which best correlates with performance, correlation (Spearman rank) and independence tests (Blomqvist β) were run between GAPI and performance measures.

Results:
Of the initial 38 swimmers, 13 met the analysis inclusion criteria. The norm of differences of GAPI derivatives was small for each swimmer. Thus, the output does not vary much with small perturbation in the input and the model is considered as stable. After correcting the p-values with the Bonferroni-Holm method, GAPI of the first (distance and session-Rating of Perceived Exertion) and to a lesser extent, fourth (training monotony and recovery) combinations were positively and significantly correlated with performances measures for both Spearman rank and Blomqvist β.

Discussion/Conclusion: The model was shown stable and therefore able to generalise from training data to unseen data. The suggested model can graphically track athletes along the season and determine, based on the learning process of ANN, at any given week if a swimmer is located in the adaptation or maladaptation area. Additionally, this model provides coaches and athletes with graphical clues on how to reach the adaptation area. This study has several limitations. Firstly, ANN is considered as a "black box" due to its inability to identify causal relationship between input and output (Churchill, 2014; Hellard, Avalos, Guimaraes, Toussaint, & Pyne, 2015). Thus, the interpretation of the obtained results might be more complex. Secondly, this model is currently based on only two variables at a time. Whilst it is clear that more than two variables contribute to training adaptation, this work attempts to provide coaches and athletes with an easy-to-use tool able to estimate training adaptation rather than to predict performance in the most accurate way. In theory, it would be possible to include more variables by computing n-dimensional graphs. However, such graphs will be far less readable. Finally, while GAPI was used to evaluate the stability of the model, it is only a numerical simplification of the geometrical output. Theoretically, different graphs could have the same GAPI. To conclude, ANN geometric optimisation seems to be a promising technique to model individual training adaptation. GAPI could be an interesting numerical surrogate to track during a sporting season. The GAPI based on external load (distance) and internal load (session-RPE) showed the strongest correlation with performance measures.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Repeated-Sprint Training in Hypoxia in Well-Trained Tennis Players.

Authors:

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Abstract:

Introduction: Repeated-sprint training in hypoxia (RSH) has been reported to improve intermittent high-power performance, in particular by enhancing fatigue resistance and thus parameters such as repeated-sprint ability (RSA). One of RSH's primary interest lies in the fact that adaptations are triggered with reduced hypoxic exposure (< 5 h) and with less than six to ten training sessions. Since tennis players have full in-season calendars with limited training time frames in-between tournaments, and given the explosive nature of the sport, it was hypothesized that RSH would be a suitable method to improve tennis-specific performance.

Methods: Thirty well-trained tennis players (28.8 ± 5.9 years, 72.3 ± 9.9 kg, 179.1 ± 6.7 cm, FTF ranking: 1.54 ± 2.84, $\dot{V}O_{2max}$ 57.2 ± 6.2 ml/min/kg) were randomly distributed in three groups: two experimental groups who performed five sessions of four sets of five 8-s maximal sprints with ball strokes either in normoxia (RSN) or in normobaric hypoxia (RSH), at a simulated altitude of 3000 m, and a control group (CON). Subjects were tested before (PRE), after (POST1) and 21 days after (POST2) the intervention. Tests consisted in the Test to Exhaustion Specific to Tennis[1] and a RSA test during which leg muscle and cerebral oxygenation were assessed with near-infrared spectroscopy.

Results: From PRE to POST1 and to POST2, RSH improved the time to exhaustion by 18.2% and by 17.3% (p<0.001), respectively. They also increased by 24.4% (p=0.003) and by 19.8% (p=0.027) the time to the onset of blood lactate accumulation, while the two other groups did not change their performance significantly. RSH was also the only group to improve tennis performance at the last stage at POST1 (+32.8%, p=0.025). Regarding the RSA test total time, both groups ameliorated it, though RSH (-1.9%, p=0.009, at POST1; -2.2%, p=0.002, at POST2) to a greater extent than RSN (-1.2%, p=0.049 at POST1; -1.2%, p=0.041, at POST2) in comparison to PRE values. Only RSH improved the RSA test best sprint time (-2.33%, p=0.01 at POST1; -3.4%, p<0.001, at POST2). Leg muscle tissue saturation was lower at POST1 (-81.6 ± 7.5% vs -72.5 ± 24.5%, p<0.001) only for the RSH group, but it was back to similar to PRE values at POST2, even though performance gains were maintained. Significant decrease in cerebral oxygenation were measured in all three groups at POST1 and POST2.

Discussion/Conclusion: Specific (i.e. with strokes) repeated-sprint training in hypoxia enhanced RSA and tennis-specific performance to a larger extent than similar training in normoxia and therefore appears valuable for well-trained tennis players.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Comparison of thermoregulatory responses between Swiss high- and low-point wheelchair rugby players during a real game

Authors:

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Abstract:

Introduction: Human bodies' temperature is controlled by the thermoregulatory center in the hypothalamus, which triggers the corresponding efferent answer to an afferent input (Fortney & Vroman, 1985; Gisolfi & Wenger, 1984). A spinal cord lesion results in an altered control of different physiological mechanism including thermoregulation. More precisely, there is a reduced afferent input to the thermoregulatory center and the vasomotor control as well as the sweating capacity below the lesion level are interrupted (Freund, Brengelmann, Rowell, & Halar, 1984; Guttmann, Silver, & Wyndham, 1958). Consequently, individuals with paraplegia have greater amounts of afferent and efferent information compared to those with a tetraplegia (Guttmann et al., 1958), which could lead to an increased exercise-induced heat strain (Gass, Gass, & Gwinn, 1992). Guttmann and colleagues (1958) as well as Hopman et al. (1993) detected during rest or exercise in a laboratory setting that the increase in core temperature was proportional to the lesions level. To verify those findings and to check the transferability into the field, the goal of our study was to investigate the body core temperature, sweat rate and thermal sensation of Swiss wheelchair rugby players during real games and to compare players with a high vs. low tetraplegia. We hypothesized that low-point players will reach a higher core temperature due to the higher lesion level and the larger impairment.

Methods: 10 male tetraplegic national league wheelchair rugby players (mean ± SD, age 37.1 ± 7.4 years; body mass: 76.6 ± 11.3 kg) with a lesion level between C5 and C8 participated on different days in two competitive Swiss league rugby games. The duration of each game was 4 x 8 minutes (effective) and the conditions were 23.1 ± 1.3 °C, 41.8 ± 2.2 % rh. Players were divided into two groups depending on their classification levels: Five high-point players (2.0 - 3.5 points) and five low-point players (0.5 - 1.5 points). Core temperature (Tc) was constantly monitored before, during and after the games by using an intestinal telemetric pill with a frequency of six values per minute. Maximal (Tc_{max}), average (Tc_{avg}) and the difference between baseline and end core temperature (Tc_{up}) were calculated afterwards. Athletes were weighted before and after the game to calculate fluid loss (FL). Drinking volume was included into the calculation. Rated perceived exertion (RPE) and thermal sensation were recorded before and immediately after the game. Playing time was calculated by using the time they were at play. Data were checked for Gaussian distribution by using the Shapiro-Wilk test and by visual inspection of the normality plots. Paired t-test was used for intra-group comparison and the unpaired t-test for comparison between the two groups. Results were presented in mean ± SD and the level of significance was set at $p < 0.05$.

Results: Tc significantly increased in low-point players (game 1: 0.9 ± 0.42° C, $p = 0.009$, game 2: 0.74 ± 0.05° C, $p < 0.001$) in both games and in high-point players in game two (0.84 ± 0.19° C, $p < 0.001$). For game one, there was no significant increase in Tc for high-point players ($p = 0.06$). There were no significant differences for Tc_{max} (game 1: $p = 0.59$, game 2: $p = 0.25$), T_{avg} (game 1: $p = 0.50$, game 2: $p = 0.46$) and Tc_{up} (game 1: $p = 0.95$, game 2: $p = 0.32$) between low- and high-point players for both games. Likewise, there was no significant difference for FL (game 1: $p = 0.06$, game 2: $p = 0.10$), RPE (game 1: $p = 0.07$, game 2: $p = 0.43$) and thermal sensation (game 1: $p = 0.46$, game 2: $p = 0.80$). Low-point players played in game one 42:56 ± 24:20 minutes, high-point players 43:50 ± 10:47 minutes. In game two low-point players played 41:31 ± 20:01 minutes and high-point players

39:40 ± 16:29 minutes. There were no significant differences between the groups (game 1: p = 0.94, game 2: p = 0.74) for both games. Comparing the two games, for all measured parameters, no significant differences were found. Additionally, results of the Pearson correlation indicated that there was a significant association between playing time and Tc_{avg} (r = 0.80, p = 0.005, n = 10) as well for playing time and Tc_{up} (r = 0.64, p = 0.045, n = 10) for game one. For game two, there were no significant correlations between playing time and Tc_{avg} or Tc_{up}. For low-point players there was a strong correlation between Tc_{max} and thermal sensation (r = 0.88, p = 0.045, n = 5) in game two. In game one, no significant correlation was found (p = 0.053). For high-point players, no correlation was found between Tc_{max} and thermal sensation.

Discussion/Conclusion: During a real competitive wheelchair rugby game, the core temperature for both, high- and low-point players increased significantly. These results are consistent with earlier findings (Griggs, Leicht, Price, & Goosey-Tolfrey, 2015). On the other hand, there weren't any significant differences between high- and low-point rugby players within Tc_{max}, Tc_{avg}, Tc_{up}. These findings are not consistent with the findings of Hopman et al. (1993) and Guttmann et al. (1958), where increases in core temperature were proportional to lesion level. Gass et al. (1992) demonstrated the largest increase in core temperature for tetraplegic athletes with the lowest-level spinal cord injury, suggesting that a reduction in metabolic heat production results from the reduced active muscle mass. However, even these results cannot be confirmed. It has to be noted that those studies were performed in a laboratory with controlled exercises during controlled conditions. The present work was the first, which investigated the differences between different classification groups of individuals with a tetraplegia in a competitive field setting. Each game has its own character and it's not possible to simulate it in a laboratory. Factors such as the airstream can have an important cooling effect. No studies have considered this yet.

Although there was no significant difference for FL between the two groups, there seemed to be a tendency (game 1: p = 0.06, game 2: p = 0.10) that high-point players have a greater FL compared to low-point players. This tendency is unisonous with the actual reports in the literature review by Price (2018). In the present work, FL may be underestimated as players where weighted in their competition wheelchair. Thus, the sweat inside the upholstery has not been included in the calculation.

Like in previous works (Price & Campbell, 1997, 1999), there was a large inter-individual variation, which makes a generalization much more difficult. Therefore, further research is needed to clarify if there are any thermoregulatory differences between different tetraplegic lesions levels and high- or low-point classification.

In conclusion, the recent work shows that wheelchair rugby athletes with a spinal cord injury suffer under the impairment of their thermoregulatory functions. Heat strain for low-point players seems to be larger compared to players with a higher point classification. It has to be noted, that inter-individual differences are large and each player needs a specific treatment. This finding supports coaches and team staff to understand that each player is different in his response to exercise-induced heat strain. Therefore, this data gives the chance to establish player-profiles with individual measures concerning pre- or per-cooling techniques and, based on the playing time-Tc_{up}-correlation, recommendations for optimal ratio of playing time and rest periods.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Effectiveness of endurance training guided by oxidative stress analysis

Authors:

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Abstract:

Introduction: In endurance sports, following a standardized training program doesn't lead to homogeneous physiological responses (Bouchard et al. 1999). The load-performance relationship and the ability to tolerate high training loads are highly individual (Foster 1998).

Several monitoring methods are widely used today by coaches. They allow to control the evolution of the training load, the individual responses of each one and the recovery needs in order to minimize the risks of overtraining, injuries and diseases (Bourdon et al. 2017). In recent years there has been a growing interest in monitoring the status of the autonomic nervous system via measures of heart rate variability (HRV) at rest (Kiviniemi et al., 2007). This is a good determinant of training adaptations and may prevent overreaching state.

During periods of intensive training, oxidative stress can increase and plays an important role in the production of muscle lesions and post-exercise inflammation. Therefore, it may be one of the actors of the overtraining syndrome (MC Kenzie et al., 1999). At this stage and to our knowledge, oxidative stress analysis has not been investigated in the context of the daily monitoring of training.

The purpose of this study was to assess the effectiveness of endurance training guided by oxidative stress analysis using a measurement tool named "O2 score".

The first hypothesis is that training guided by daily oxidative stress measurements would increase aerobic performance gain when compared to the control group following the standard predefined training program.

The second hypothesis is that endurance training guided by oxidative stress would regulate daily obtained values and would therefore also influence and decrease the HRV index present when fatigue occurs.

Methods: Twenty-three endurance athletes were randomized into an oxidative stress guided training group (guided, n = 12) and a control predefined training group (control, n = 11). At the end of a baseline week, a performance pre-test was performed before starting a 4-wk protocol followed by a post-test. Sleep duration, O2 score, subjective fatigue, training load and stress score were recorded daily. Heart rate variability (HRV) was measured three times a week. The training adjustment in the guided group was based on individual changes in O2 score values combined with the subjective fatigue. If the O2 score value was higher or lower than the individual recovery zone (calculated by the redox sensor) combined with a high total score of fatigue, a lower training load or rest was prescribed. The control group followed the standard predefined training program.

Results: There was a significant ($F = 2.45$; $P = 0.02$) group x time interaction for O2 score. The average training volume was lower in the guided group in comparison to the control group (w3: $P = 0.029$, w4 $P= 0.008$). O2 scores were in both groups correlated with the training volume ($R = 0.82$, $P < 0.05$), $RMSSD_{SU}$ ($R = 0.69$, $P < 0.05$) and HR_{SU} ($R = -0.91$, $P < 0.001$). However, no performance change was observed in both guided and control groups (pre-to-post- change 0.4 vs. -0.2%).

Discussion/Conclusion: As expected, daily individualized adjustment of the training loads based on oxidative stress stabilized the O2 score in the guided group while it continued to increase in the control group. Aerobic performance remained unchanged in both groups despite a lower training volume in the guided group. Of interest is the correlation between the O2 score values and the training volume. These two parameters are also related with some HRV parameters. Overall, the O2 score seems sensitive to training volume and direct or indirect markers of fatigue. Therefore, the redox sensor may be a practical tool for monitoring endurance training.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The Blood Steroidal Profile: Impact of Topical Testoterone Treatment in Healthy Women

Authors:

Olivier Salamin[1]*, Cheng Xu[2], Raul Nicoli[3], Tiia Kuuranne[3], Nelly Pitteloud[3] and Martial Saugy[1]

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Abstract:

Introduction: The implementation of the 'urinary steroidal module' of the Athlete Biological Passport (ABP) has positively improved the detection capability of testosterone (T) doping in sport. However, this tool suffers from some limitations due to several confounding factors such as enzyme polymorphism, bacterial contamination and ethanol consumption that may alter the specificity of the model. Moreover, in females, the low circulating testosterone level combined with the lack of negative T feedback hamper a sensitive identification of urinary fluctuations caused by T administration. Therefore, new strategies have been explored to improve detection of T doping, such as measurement of steroid hormones in blood. In the present work, we investigated the effect of transdermal testosterone treatment on the blood steroidal profile in healthy women.

Methods: Seven healthy normally-cycling women volunteers were recruited in the clinical trial which was divided into three phases. Each phase corresponded to one menstrual cycle. The first cycle was the control phase, followed by the treatment phase during which a testosterone gel was administered daily. The third phase corresponded to the post-treatment phase. For each phase, serum samples were collected and analyzed to quantify endogenous steroids using a validated UHPLC-MS/MS method (Ponzetto et al., 2016).

Results: Among the quantified steroids, testosterone and DHT were the most affected by the 28-day T treatment. The treatment did not impact the menstrual status of the volunteers, thus naturally cycling such as progesterone, LH and FSH were unaffected by the treatment. SHBG slightly increased during treatment phase, but not significantly. The longitudinal monitoring of T and DHT using intra-individual thresholds showed that a high percentage of the samples collected during treatment phase exceeded individual limits set for the expected fluctuation.

Conclusion: The longitudinal follow-up of blood steroid profile represents a powerful complementary approach to the urinary module, in particular for the detection of T doping in female athletes.

References:

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Oral Session

Thursday 06.02.2020

Room 115 **Sport, Exercise & Mental Health**
Chair: Markus Gerber

16:00 Can you ever do too much sport? Differences in psychiatric profile between individuals above and below the cutoff for exercise addiction
Flora Colledge

16:15 Exploring psychosocial mediators of remote physical activity counselling: A secondary analysis of data from a 1-year randomized control trial (Movingcall)
Xenia Fischer

16:30 Eignet sich Sprint Intervall-Training als Therapieform in der Depressionsbehandlung?
Markus Gerber

16:45 The Acute Effects of Heightened Physiological Arousal and Focus of Attention on State Interoceptive Accuracy
Amie Jones-Wallmann

17:00 Associations of acute and habitual physical activity and aerobic fitness with endocrine, autonomous and psychological stress reactivity – results from two TSST studies
Manuel Mücke

17:15 Low Intensity Morning Exercise for Adolescents with late Chronotype. A Novel Treatment to Improve Sleep Health
Christin Lang

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Can you ever do too much sport? Differences in psychiatric profile between individuals above and below the cutoff for exercise addiction

Authors:

Flora Colledge, Ursula G Buchner, André Schmidt, Uwe Pühse, Markus Gerber, Marc Walter

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[2] Deutsche Hochschule für Gesundheit und Sport GmbH, Steinheilstraße 4, D-85737, Ismaning, Germany.

[3] University Psychiatric Clinics, University of Basel, Wilhelm Klein Strasse 27, 4056 Basel, Switzerland.

Abstract:

Introduction: To date, exercise addiction is not yet recognized as a psychiatric disorder (Potenza, 2014). This is due to the fact that insufficient research into the psychological profiles of potentially affected people has been carried out. Consequently, it remains unclear if excessive exercise represents a behavioral addiction, or whether it is a symptom that accompanies other disorders, such as anorexia nervosa (Freimuth, Moniz, & Kim, 2011). The aim of this study is to compare the scores of individuals above and below the cutoff for a possible exercise addiction on measures of disorders which frequently accompany substance-related addictions.

Methods: Individuals who engage in 7 or more hours of exercise per week, and who exercise despite illness or injury, were recruited via flyers in gyms, sports clubs, and public places. Participants reported the type and amount of exercise they engaged in, and completed the Beck Depression Inventory, the Childhood Trauma Questionnaire, the "Homburger ADHS Skalen für Erwachsene", and the Exercise Dependence Scale. The results of individuals falling below and above the cutoff for exercise addiction were compared.

Results: 62 individuals took part in the study. 10 scored above the cutoff for exercise addiction. Those above the cutoff had significantly higher scores for depression, ADHD and childhood trauma. A higher exercise addiction score correlated significantly with higher scores on the above three variables; however, these correlations were not found for more hours of training per week

Discussion/Conclusion: Individuals with symptoms of exercise addiction, but not those who simply exercise a lot, appear to have a psychologically disturbed profile. The results are compared with profiles of individuals with addictions to other substances. Based on these findings, more detailed clinical interviewing can address whether exercise behaviors represent a distinct addictive disorder.

References:

Freimuth, M., Moniz, S., & Kim, S. R. (2011). Clarifying Exercise Addiction: Differential Diagnosis, Co-occurring Disorders, and Phases of Addiction. *International Journal of Environmental Research and Public Health, 8*(10), 4069. Retrieved from http://www.mdpi.com/1660-4601/8/10/4069

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Exploring psychosocial mediators of remote physical activity counselling: A secondary analysis of data from a 1-year randomized control trial (Movingcall)

Authors:

Fischer X[1], Donath L[2], Zahner L[1], Faude O[1], Gerber M[1].

[1]Department of Sport, Exercise and Health, University of Basel, Switzerland

[2]Department of Intervention Research in Exercise Training, German Sport University Cologne, Germany

Abstract:

Aim: The present study investigated whether psychosocial determinants mediate the effect of a telephone coaching intervention on physical activity levels.

Methods: Two hundred eighty-eight adults were randomly assigned to a six-month telephone coaching intervention (n = 12 calls) or a control group receiving a single written recommendation. Seven psychosocial determinants as defined in the MoVo model (Fuchs, 2007) as well as objective and self-reported physical activity levels were measured after 6 and 12 months. Participants also reported which taught intervention strategies (behavior change techniques) they perceived as most useful. Structural equation modeling (SEM) was used to determine the mediating role of psychosocial determinants. Up to 227 participants with complete data on psychosocial determinants and physical activity were included in the mediation analyses.

Results: Compared to the control group, a greater increase in self-reported and objectively assessed physical activity levels was observed the coaching intervention group. The mediation analyses showed that the intervention had a positive effect on self-efficacy, outcome expectations and intention strength after 6 months and on action planning and barrier management after 6 and 12 months. Increases in objectively assessed physical activity after 6 months were mediated by increased barrier management. None of the other psychosocial determinants worked as mediating factors on self-reported or objectively assessed physical activity. The participants perceived 'action planning' and 'problem solving' as the most useful strategies to increase their physical activity levels.

Conclusion: Further understanding of working mechanisms of remote physical activity promotion is needed.

References:

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Titel:

Eignet sich Sprint Intervall-Training als Therapieform in der Depressionsbehandlung?

Autoren:

Gerber M[1], Minghetti A[1], Beck J[1], Faude O[1], Zahner L[1], Donath L[3].

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Abstract:

Einleitung: Sprint Intervall-Training (SIT) ist eine neue Form des Ausdauertrainings, die in den letzten Jahren an Popularität gewonnen hat. Bei gesunden Personen hat sich SIT als effiziente Methode erwiesen, um die kardiorespiratorische Fitness zu verbessern. Diesen Befunden zum Trotz zweifeln einige Experten daran, ob SIT auch bei körperlich wenig aktiven Personen als Trainingsmethode eingesetzt werden kann. Insbesondere wird angenommen, SIT sei zu anstrengend und führe zu einer Überforderung, wodurch Misserfolgserlebnisse, ein Gefühl der Inkompetenz und des Scheiterns entstehen können, was sich wiederum negativ auf den Selbstwert und die Motivation einer Person auswirken kann.

Methode: Im Rahmen einer randomisierten Kontrollgruppe wurde mit Patienten in stationärer Behandlung wegen unipolarer Depression die Wirksamkeit von SIT und herkömmlichem Ausdauertraining (HAT) verglichen. Die Intervention dauerte 4 Wochen und beinhaltete insgesamt 12 Trainingseinheiten. Beide Trainingsprogramme wurden zusätzlich zur gewohnten Therapie implementiert. Es wurden vor, während und nach Abschluss der Intervention zahlreiche Outcome-Variablen zur Motivation, zum mentalen Wohlbefinden und zur kardiovaskulären Gesundheit erfasst.

Resultate: In beiden Interventionsgruppen (SIT und HAT) war eine ähnliche Abnahme in der depressiven Symptomatik zu erkennen (Mighetti et al., 2018). Beide Trainingsformen führten zu einer substantiellen Zunahme der kardiorespiratorischen Fitness. Beide Trainingsformen führten zu mehr intrinsischer Motivation für Bewegung und Sport. Ebenfalls zeigten die Teilnehmenden beider Gruppen während bzw. nach dem Training ähnliche affektive Reaktionen. Sowohl SIT als auch HAT führten zu einer verbesserten selbst-wahrgenommenen Fitness (Gerber et al., 2018). Unabhängig von der Trainingsform waren Verbesserungen in der kardiorespiratorischen Fitness mit einer stärkeren Abnahme der depressiven Symptombelastung assoziiert (Gerber et al., 2019).

Diskussion: Sowohl SIT als auch HAT scheinen bei depressiven Störungen als Therapieform in Frage zu kommen. Den Patienten bietet sich somit die Wahl für eine der beiden Trainingsformen. Ein systematisches Monitoring der Fitness während der Therapie scheint wünschenswert, da sich positive Veränderungen in der Fitness in einem gesteigerten Wohlbefinden niederschlagen.

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Gerber, M., Minghetti, A., Beck, J., Zahner, L., & Donath, L. (2019). Is improved fitness following a 12-week exercise program associated with decreased symptom severity, better wellbeing, and fewer sleep complaints in patients with major depressive disorders? A secondary analysis of a random-ized controlled trial. *Journal of Psychiatric Research, 113*, 58-64.

Minghetti, A., Faude, O., Hanssen, H., Zahner, L., Gerber, M., & Donath, L. (2018). Sprint interval training (SIT) substantially reduces depressive symptoms in major depressive disorder (MDD): A randomized controlled trial. *Psychiatry Research, 265*, 292-297.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The Acute Effects of Heightened Physiological Arousal and Focus of Attention on State Interoceptive Accuracy

Authors:
Wallman-Jones A[1], Schmidt M[1].
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Abstract:

Introduction: Since interoception, defined as the sensing of signals originating within the body (Craig, 2003), is integral to self-regulation and health, research has focused on methods to improve interoceptive accuracy (IA). Previous studies have shown that both physiological (e.g. induced physiological arousal) and cognitive (e.g. focus of attention) manipulations can be used to alter state IA. Here, attention regulation appears to be key, where physiological arousal is proposed to narrow attentional resources to favour task-relevant stimuli (Schulz & Vögele, 2015), whilst directed attention towards a specific sensory channel is thought to increase its precision in perception (Petzschner et al., 2018). Considering the success of both manipulations in isolation, this study tested for potential interaction effects. Thus, the hypothesis was that individuals' IA would be most affected by an activity in which the focus of attention is directed towards internal bodily signals (i.e. adopting an internal focus of attention) whilst the signals are more easily accessible to our conscious awareness (i.e. while being physiologically aroused).

Methods: 24 healthy adults (12 females, 12 males) participated in this study. A 2x2 crossover design was used to study the effects of physiological arousal (active vs sedentary) and focus of attention (internal vs external) on state IA. All participants completed all conditions (4x20 mins), with IA measured by means of a heartbeat tracking task immediately after each manipulation. In the active conditions (cycling), the incremental intensity ensured participants surpassed the lactate threshold in the final stages, whereas in the sedentary conditions, participants remained seated. In the internal focus conditions, participants were guided to focus their attention towards internal bodily signals (heart, lungs and muscles), whereas in the external focus conditions, participants listened to an audiobook.

Results: At baseline, an independent *t*-test showed that IA was significantly higher in males (M = 0.82, SD = 0.16) than females (M = 0.48, SD = 0.37), $t(22) = 2$, $p = .001$, $d = 1.18$. An ANOVA (2x2 repeated measures) testing the main hypothesis revealed no significant effect of physiological arousal or focus of attention, and no interaction effect. However, when controlling for sex and attention regulation (AR) scores, there was a significant effect for physiological arousal, $F(2,23) = 16.83$, $p = .001$, $n_p^2 = .45$. Splitting the groups by sex revealed that the significant effect for physiological arousal was driven by the females, $F(2,23) = 23.75$, $p = .001$, $n_p^2 = .70$, since it didn't reach significance in males ($p > .05$).

Discussion/Conclusion: These findings provide useful information for the development of future interventions, supporting the importance of physical activity to interoceptive processes. Furthermore, results highlight the importance of taking individual differences into consideration; the subjective ability to switch focus between internal and external cues (AR) could be fundamental in determining effects. Future studies should increase the sample size to allow for comparison between sexes, and also between athletes and sedentary individuals.

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Petzschner, F. H., Weber, L. A., Wellstein, K. V., Paolini, G., Do, C. T., & Stephan, K. E. (2018). Focus of attention modulates the heartbeat evoked potential. *NeuroImage*, *186*, 595–606.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Associations of acute and habitual physical activity and aerobic fitness with endocrine, autonomous and psychological stress reactivity – results from two TSST studies

Authors:

Mücke M[1], Ludyga S[2], Brand S[1], Pühse U[2], Gerber M[1].

[1]Section Sport and Psychosocial Health, Department of Sport, Exercise and Health, University of Basel, Switzerland

[2]Section Sport and Health Pedagogy, Department of Sport, Exercise and Health, University of Basel, Switzerland

Abstract:

Introduction: According to the cross-stressor-adaptation hypothesis, physical activity has health-beneficial effects on psychosocial stress reactivity. However, studies investigating such effects on adolescents are scarce. Therefore, we conducted two studies investigating the association of acute and habitual physical activity and aerobic fitness with stress reactivity in male adolescents.

Methods: In both studies, modified versions of the Trier Social Stress Test (TSST) were used to induce psychosocial stress in healthy male academic high school students aged 16 to 20 years. Before, during and after stress, salivary cortisol and alpha-amylase, heart rate and psychological stress (short questionnaires on anxiety, mood and calmness) were measured. For physiological response parameters, the area under the response curve (AUC) was calculated. Psychological parameters were analyzed using pre-post-stressor comparisons. In Study 1 on acute effects of exercise, 60 participants were randomly assigned to a pre-stress acute exercise group (30 min of moderate ergometer exercise, N=30) and an active control group (30 min of reading, N=30). In Study 2, 42 participants with self-reported habitual exercise of either >6h/week (N=21) or <2h per week (N=21) were recruited. Activity levels were verified via 7-day actigraphy measurement. Additionally, aerobic fitness was determined using the Physical Working Capacity 170.

Results: In both studies, the TSST elicited significant stress reactions in all measured parameters (paired T-Tests for baseline-to-peak comparison, p<.001). Study 1 revealed that the exercise group showed lower alpha-amylase reactivity ($t(58)=-3.45$, $p=.001$, $d=0.91$) and less increase in state anxiety ($t(58)=-2.04$, $p=.046$, $d=0.53$) than the control group. No differences in the other stress reactivity parameters were present ($p>.184$). In Study 2, the high and low physical activity group did not differ in any of the stress reactivity parameters ($p>.215$). However, higher aerobic fitness was associated with lower alpha-amylase reactivity ($r(40)=-.32$, $p=.044$).

Discussion/Conclusion: Our results partly corroborate the notion that in male adolescents, single bouts of exercise and better aerobic fitness are connected to lower stress reactivity. After a single bout of exercise, the autonomous nervous system, as represented by alpha-amylase, shows lower reactions to a psychosocial stressor and participants report less anxiety when under stress. Autonomous stress reactivity was also inversely related to fitness. Stress reactivity of the hypothalamus-pituitary-adrenal axis, as represented by cortisol, remained unrelated to physical activity and fitness. In total, both studies reveal potentially health-beneficial effects of acute exercise and aerobic fitness on stress reactivity.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Low Intensity Morning Exercise for Adolescents with late Chronotype. A Novel Treatment to Improve Sleep Health

Authors:

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[2]Centre for Emotional Health, Department of Psychology, Macquarie University, Australia

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Abstract:

Introduction:

Although adolescents require approximately 9 hours of sleep per night for optimal cognitive and emotional functioning (Fuligni, Bai, Krull & Gonzales, 2019, Short, Weber, Reynolds, Coussens & Carskadon, 2018) very few achieve the recommended sleep duration, particularly on school nights (Gradisar, Gardner & Dohnt, 2011). One of the primary contributing factors is the ubiquitous delay in circadian and sleep timing across adolescence (Crowley, Wolfson, Tarokh, Carskadon, 2018). Therefore, interventions aiming to advance circadian and sleep timing in young people are needed, as they may increase sleep duration and ameliorate daytime consequences of inadequate sleep. Morning bright light therapy is recommended for adolescents with a delayed circadian rhythm (Auger et al., 2015). However, sufficient ambient light may not always be available, particularly in countries with limited daylight hours. An alternate chronotherapy is scheduled exercise, as movement exerts control over the circadian rhythm (Klerman et al., 1998). Most research has focused on facilitating adjustment to night work, therefore a bulk of evidence supports the role of nocturnal exercise in delaying circadian timing (Barger, Wright, Hughes & Czeisler, 2004). However, recent research suggests that exercise completed shortly after awakening may phase advance circadian and sleep timing in young normal sleepers (Youngsteadt, Elliot & Kripke, 2019). In addition to the benefits to sleep, scheduled morning exercise may also have positive flow on effects for adolescents' mood and cognitive performance (Kalak et al., 2012). The present study aimed to evaluate the effect of a gradually advanced morning exercise schedule on the circadian timing and daytime functioning of adolescents with late chronotype. We anticipated that adolescents who completed the scheduled morning exercise would have earlier circadian timing, and improved mood, relative to sedentary controls.

Methods: 19 sedentary male adolescents aged 15-18 years participated in this RCT. Data assessment took place during one week of school holiday, allowing participants to spend six consecutive nights at the sleep laboratory. Morning procedure includes either 45 min walking on a treadmill at 30-40% HRR (IG) or sedentary activities (CG) in dim light. Saliva dim light melatonin onset (DLMO), cognitive functioning (GoNoGo), daytime sleepiness, and mood (MFQ) were assessed during the first and last night of laboratory attendance. The treatment protocol for morning exercise is based on the bright light approach described by Bjorvatn & Pallesen (2009).

Results: Individuals in the control group had significantly delayed their circadian timing (-18.57± 31.65), while the exercise group has advanced (27.5 ± 32.04). In other words, morning exercise had a beneficial effect of 46.07 min over one week. No significant changes were found for daytime sleepiness, mood, and cognitive functioning.

Discussion/Conclusion: This is the first study to explore the phase advancing effect of low-intensity morning exercise among sedentary adolescents with late chronotype. Although the shift is significant for these teenagers in real live, it might be too small to reflect differences in daytime sleepiness and evening cognitive functioning. However, it can be assumed that the impact within two weeks is even more relevant. With regard to mood, the intensity threshold might have been to low to have a beneficial effect. In contrast, higher exercise intensities in the morning might reduce compliance among this population.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Oral Session

Thursday 06.02.2020

Room 117 Sport Participation & Sport Sociology

16:00 Sport and exercise-related socialization in single-parent and two-parent families
Roman Zehl

16:15 Which motivational patterns are more promising in individual sports? A prospective longitudinal study
Michael J. Schmid

16:30 Stabilität und Veränderbarkeit von psychosozialen Mustern des Sportverhaltens von Jugendlichen während des Bildungsübergangs
Vanessa Gut

16:45 Professionalization types and organizational problems of sport clubs: is there a relationship?
Grazia Lang

17:00 Situer autrement le rôle des activités physiques et sportives dans les enjeux éducatifs et sanitaires: la dimension sociale automatique de l'engagement corporel
Nicolas Margas

17:15 Environnement spécifique du football professionnel en Suisse et modèles sportivo-économiques des clubs
Zahid Mustafi

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Sport and exercise-related socialization in single-parent and two-parent families

Authors:

Zehl R[1], Nagel S[1].

[1]Institute of Sport Science, University of Bern, Switzerland

Abstract:

Introduction:

Being important socialization agents, parents may strongly influence the extent to which their children engage in sport and exercise. Both parents from single-parent as well as from two-parent families may do so by means of a wide range of parental sports and exercise-related practices such as parental modeling and different kinds of parental support. However, a number of barriers (e.g., a lack of time, a lack of financial means etc.) can make this more challenging for parents. Single parents are more likely to face such barriers as, per definition, there is only one parent in the household who usually has to fulfil both the functions of child rearing and financial coverage. At the same time, it appears possible to overcome at least some barriers, for instance by relying on social support from other persons (e.g., by other family members). Furthermore, the child as active creator of its own sport and exercise engagement needs to be taken into account.

Guided by interactional socialization-theoretical conceptions (Burrmann, 2005), this study investigates the relevance and interplay of the factors mentioned, namely a) parental sports and exercise-related practices, b) parental barriers, c) social support parents receive from other persons, and d) children as active creators with regard to children's sport and exercise engagement in single-parent and two-parent families.

Methods:

Interviews were conducted with parents from single-parent (n=6) and two-parent families (n=13) whose children were at the age of 6-14, respectively. The constant comparative method was used for analysis.

Results:

While most children both in single-parent and two-parent families engaged in sport or exercise regularly, few were not active at least once a week. As expected, parental sport and exercise-related practices seemed to play important roles with regard to children's sport and exercise engagement both in single-parent and two-parent families. Even if children were active, however, in some cases parents still perceived limitations in the opportunities for their children to engage in *certain types* of sport or exercise. Particularly single parents indicated that parental barriers (lack of time, lack of financial means, impaired parental health) restricted children's opportunities to engage in certain types of sport or exercise. Furthermore, single parents were more likely to perceive restrictions for their own sport and exercise engagement, which limited parental sport and exercise-related modeling. Additionally, the social support parents receive from other persons (and a lack thereof) seemed to play a more important role for the sport and exercise engagement of children in single parent families. Finally, it became evident from the interviews that children can be active creators of their own sport and exercise socialization by both demanding parental support as well as refusing parental offers of support.

Discussion/Conclusion:

From a parental perspective, even if single parents find ways to assure that their children can engage in some form of sport or exercise, restrictions regarding particular types of sport and exercise engagement may still persist.

References:

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SPORTWISSENSCHAFTLICHE
SOCIETE SUISSE DES
GESELLSCHAFT DER SCHWEIZ
SCIENCES DU SPORT

Title:

Which motivational patterns are more promising in individual sports? A prospective longitudinal study

Authors:

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[1] Institute of Sport Science, University of Bern, Switzerland.

Abstract:

Introduction: It is widely recognized that achievement motivation is an important determinant for a successful sports career. Specific patterns of motivational constructs such as achievement goal orientation, achievement motivation and self-determination have recently demonstrated promising associations with future success in the team sports football and ice hockey (e.g., Zuber & Conzelmann, 2015). The present study scrutinizes whether those patterns can also be found in individual sports and whether they are able to predict the future performance level of the athletes. Since considerable dissimilarities between team and individual sports have been reported when examining motivational processes (e.g., Hanrahan & Cerin, 2009), some doubts persist as to whether or not these patterns can be generalized beyond team sports.

Methods: A sample of 155 young athletes from 17 individual sports (M_{Age} = 16.47, *SD* = 2.21) completed different motivation questionnaires (SOQ, AMS-Sport, SMS) at t_1. Two and a half years later (t_2), their performance level was assessed. The person-oriented method Linking of Clusters after removal of a Residue (LICUR; see Bergman, Magnusson, & El-Khouri, 2003) was used to form clusters based on the variables win orientation, goal orientation, hope for success, fear of failure and self-determination at t_1. The relationships between these clusters and the performance level at t_2 were then analyzed.

Results: A four cluster solution was found at t_1 and displayed an *EESS* = 51.78% along with a weighted HC_{mean} = 0.985, which represents an acceptable cluster solution. At t_2, the *highly intrinsically achievement-oriented athletes* were more likely (*OR* = 2.12) to compete internationally compared to the other clusters, whereas the *failure-fearing athletes* were less likely (*OR* = 0.29) to compete at this level.

Discussion/Conclusion: Similar to the current state of the research in team sports, a four cluster solution was found to fit best also in individual sports. However, the patterns differ slightly in comparison to those in team sports. Although team sports and individual sports are different in many respects, they nevertheless seem to be characterized by similar and thus generalizable career-promoting motivational profiles, since the *highly intrinsically achievement-oriented athletes* have the best prospects of success in both team and individual sports.
From a talent development perspective, future studies should examine whether these motivational patterns are stable or can be adapted over time through sport psychological interventions in order to improve the athlete's chances of success.

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Zuber, C., Zibung, M., & Conzelmann, A. (2015). Motivational patterns as an instrument for predicting success in promising young football players. *Journal of sports sciences, 33*(2), 160-168.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Stabilität und Veränderbarkeit von psychosozialen Mustern des Sportverhaltens von Jugendlichen während des Bildungsübergangs

Authors:
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Abstract:

Theoretischer Hintergrund: Der Übergang von der obligatorischen Schule in eine weiterführende Ausbildung stellt ein kritisches Lebensereignis dar, bei dem zahlreiche Jugendliche aufhören, sportlich aktiv zu sein (Lamprecht, Fischer, & Stamm, 2014). Aufbauend auf dem sozialökologischen Ansatz konnte gezeigt werden, dass nicht nur einzelne Einflussfaktoren, sondern eine Vielfalt von psychologischen und sozialen Faktoren für die Veränderung des Sportverhaltens während dieses Übergangs relevant sind (Schmid, Gut, Yanagida, & Conzelmann, 2019). Um gezielt massgeschneiderte Interventionen für diese vulnerable Altersgruppe konzipieren zu können, bedarf es Wissen zur Stabilität und Veränderbarkeit typischer psychosozialer Muster und deren Zusammenhang mit dem Sportverhaltens.

Methode: In einer einjährigen Längsschnittstudie wurden 392 Jugendliche (Altert_1 = 15 Jahre, 54% weiblich) am Ende des 9. Schuljahres (t_1) sowie ein Jahr später nach dem Bildungsübergang (t_2) zu psychologischen (Selbstkonkordanz, Handlungsplanung) und sozialen Einflussfaktoren (soziale Unterstützung der Familie, Sportvereinszugehörigkeit) sowie zu ihrem Sportverhalten befragt. Mittels latenter Transitionsanalyse wurden die Jugendlichen zu beide Messzeitpunkten typisiert sowie die individuelle und strukturelle Stabilität der gefundenen Muster untersucht.

Ergebnisse: Es konnten zu t_1 vier unterschiedliche psychosoziale Muster identifiziert werden, die sich bezüglich ihres Sportverhaltens unterschieden: «Club-Enthusiasten», «wenig Motivierte und sozial Ungebundene», «Durchschnittliche» und «Club-engagierte Planer». Die drei erstgenannten Muster wurden ebenfalls zu t_2 gefunden und weisen eine hohe strukturelle Stabilität auf. Die «wenig Motivierten und sozial Ungebundenen» zeichnen sich zudem durch eine hohe individuelle Stabilität (85.6%) aus. Anstatt der «Club-engagierten Planer» wurde zu t_2 ein neues Muster, die «Club-engagierten intrinsisch Motivierten», gefunden. Hinsichtlich des Sportverhaltens zeigt sich, dass insbesondere Jugendliche, die zu t_2 als «wenig Motivierte und sozial Ungebundene» klassifiziert wurden, aufgehört haben sportlich aktiv zu sein (B = 3.634 [95% CI = 1.508-950.322]; p = .027).

Diskussion: Jugendliche, die sich im stabilen Muster der «wenig Motivierte und sozial Ungebundene» befinden, sind besonders gefährdet während des Bildungsübergangs ihr Sportverhalten zu reduzieren. Daher ist es sinnvoll zukünftig Interventionen auf diese Zielgruppe masszuschneidern. Die Ergebnisse zeigen auf, dass sowohl die strukturelle als auch individuelle Stabilität der psychosozialen Muster von Jugendlichen über die Zeit variieren kann. Ein wichtiger nächster Schritt besteht daher darin, Erklärungen für die Stabilität und Veränderbarkeit der Muster zu finden, z. B. welchen Einfluss unterschiedliche Bildungsübergänge und deren subjektive Bewertung haben könnten.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Professionalization types and organizational problems of sport clubs: is there a relationship?

Authors:

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Abstract:

Introduction: Sport clubs in Europe have been reporting increasing organizational problems in the last decades (e.g., volunteer recruitment, member retention, financial situation), which they are facing due to value change (e.g., individualism, decreasing reputation of volunteering), growing expectations of members and stakeholders (e.g., high quality programs) and increasing competition with commercial sport providers (Wicker & Breuer, 2013). Some sport clubs have reacted to these organizational problems with the professionalization of structures, processes, and staff (Sharpe, Beaton, & Scott, 2018). However, while professionalization may reduce certain problems (e.g., recruitment of capable staff), it may also increase other problems (e.g., higher financial requirements for paid staff, decreasing willingness to volunteer). To date, it remains unclear to what extent professionalization can solve organizational problems. Therefore, the aim of this study is to investigate the relationship between professionalization of sport clubs and severity of the clubs' organizational problems. This analysis is relevant for sport clubs to know which problems they can solve and which problems they may intensify with professionalization.

Methods: Factor and cluster analysis was applied to identify types of professionalization among Swiss sport clubs (n= 3968; 26.3%). Once the types were identified, ANOVA was applied to analyze whether the professionalization types differ in terms of the severity of organizational problems the respective clubs indicate (e.g., recruitment of members and volunteers, financial situation of the club).

Results: Four types of professionalization were identified, which are characterized by paid staff on the field (cluster 1), paid staff off and on the field (cluster 2), few paid work and low strategic orientation (cluster 3), and few paid work and increased strategic orientation (cluster 4). The analysis of organizational problems shows that the professionalization types differ with regard to recruitment and retention of members, particularly kids and youths, recruitment and retention of referees and judges, and financial situation of the club. While the more highly professionalized types (clusters 1 and 2) show less problems in recruiting and retaining members, they indicate more problems in activating enough financial resources than the less professionalized types. Furthermore, the sport clubs with paid staff on the field (cluster 1) show more problems in recruiting referees and judges (i.e., volunteers).

Discussion/Conclusion: The results show that professionalization does not only reduce organizational problems (e.g., recruitment and retention of members), as commonly expected, but also increase certain problems (e.g., more difficult financial situation). Accordingly, professionalization is neither recommended to all sport clubs nor the solution to all organizational problems.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Titre:

Situer autrement le rôle des activités physiques et sportives dans les enjeux éducatifs et sanitaires: la dimension sociale automatique de l'engagement corporel

Auteur:

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Résumé:

Introduction: Les politiques publiques considèrent les activités physiques et sportives (APS) comme un vecteur privilégié d'intégration et de cohésion sociales. Notre étude identifie l'une des raisons qui font des APS un média particulier d'affiliation à autrui. En effet, l'engagement corporel qui leur est propre place les pratiquants face à des menaces physiques et symboliques qu'il doit réguler (e.g., peur en escalade, douleur en course de durée). Or, en raison du rôle qu'a eu l'affiliation dans l'évolution de notre espèce, ces menaces sont automatiquement associées à des sorties sociales d'affiliation aux personnes sources de sécurité mais aussi de distanciation vis-à-vis des personnes porteuses d'insécurité. Ainsi l'affiliation sous la menace partagée est un résultat classique en psychologie comme l'individu partageant la menace apporte du support émotionnel (Schachter, 1959). En lien avec ce processus, notre étude teste si un engagement corporel partagé avec des personnes d'un groupe ethnique particulier induit de l'affiliation envers ce groupe.

Méthode: 42 élèves (22 filles et 20 garçons) de 13 à 14 ans (M = 13.12, SD = .33) partagent une situation en gymnastique à fort engagement corporel perçu ou à faible engagement corporel avec un ou une élève d'origine africaine qui sont présentés comme arrivant dans l'établissement. Ils complètent ensuite un questionnaire qui permet d'évaluer (1) la motivation d'affiliation envers les africains mesurée via la modification des jugements de chaleur psychologique sans modification des jugements de compétence (Fay & Maner, 2012), (2) la volonté d'intégrer les africains, et (3) la motivation d'affiliation envers les asiatiques, non présents dans la situation.

Résultats: Les résultats révèlent que le partage d'un engagement corporel intense (vs peu intense) augmente les jugements de chaleur attribués aux africains, F (1, 40) = 8.21, p = .007, η^2p = .170, mais pas les jugements de compétence F (1, 40) = 0.69, p = .413, η^2p = .017 ; améliore les intentions de comportement intégratif à leur égard, F (1, 40) = 62.86, p < .001, η^2p =.611 mais détériore les jugements de chaleur attribués aux asiatiques, F (1, 40) = 9.20, p = .004 η^2p = .187, sans modifier les jugements de compétence à leur égard, F (1, 40) = 0.01 p = .94, η2p = .000. Enfin, la modification des jugements de chaleur attribués aux africains explique la modification des intentions de comportement intégratif à leur égard.

Discussion/Conclusion: Notre étude identifie la dimension sociale automatique mais ambivalente de l'engagement corporel inhérent aux APS. Celle-ci révèle la spécificité des APS dans la construction des relations sociales. Elle ouvre sur la nécessité de mieux la comprendre et sur des innovations potentielles face à des problématiques éducatives épineuses comme l'inclusion scolaire, la prévention des discriminations et du harcèlement. De plus, en tant que besoin humain fondamental, l'affiliation est aussi prépondérante pour la santé (McLaughlin & Clarke, 2010).

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Environnement spécifique du football professionnel en Suisse et modèles sportivo-économiques des clubs

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Abstract :
Introduction : Le football professionnel suisse possède un environnement bien spécifique. Tout d'abord, cela est lié à la non-présence du pays dans l'Union européenne n'imposant pas la « règle Bosman », mais également à sa dimension socio-culturelle. Le pays a en effet connu une forte présence de joueurs étrangers, issus notamment des grandes vagues d'immigration. De surcroît, la Suisse possède également un petit marché de 8.5 millions d'habitants en trois langues. D'où le fait que les droits TV, le sponsoring, l'affluence dans les stades ou encore le merchandising sont nécessairement plus modestes que dans les pays du big five. Enfin, la faible régulation de la ligue ne permet pas au football professionnel suisse de passer dans une autre dimension, sportive mais surtout économique. Alors, comment les clubs de la Super League s'y prennent-ils pour développer des modèles sportivo-économiques dans un contexte aussi spécifique ?

Methods:
Nous avons étudié les modèles des clubs de la Super League à partir d'une approche se basant sur le potentiel local d'un club et ses résultats commerciaux, financiers, et sportifs dans un contexte unique. Pour ce faire, sur la base de nos données des cinq dernières années (2014/2019), nous décrivons les caractéristiques spécifiques des différents modèles adoptés par les clubs de football (13 clubs) de première division en Suisse et dressons une typologie empirique de quatre types de clubs.

Discussion/Conclusion:
Voici les différentes typologies de clubs : les leaders, européen et exportateur (FC Basel & BSC Young Boys) dont les ressources viennent majoritairement des compétitions européennes, de la vente de joueurs dans les pays du big five et de sponsors nationaux et internationaux ; les formateurs internes (GC Zürich, FC Zürich, FC Luzern, FC Thun) dont les ressources proviennent pour plus de 25% de la vente des droits de transferts à d'autres clubs suisses et constituent des clubs tremplins nationaux pour les (jeunes) joueurs ; les porte-drapeaux (FC Aarau, FC Sion, NE Xamax FCS, FC St-Gall) dont les ressources viennent de sponsors locaux et qui connaissent un taux de remplissage et un soutien important (supporters, aides publiques…) sur le plan local; les potentiels à développer (FC Lugano, Lausanne-Sport, Genève-Servette) dont le modèle stratégique est en transition vers un des autres trois modèles ou une hybridation de ceux-ci. Face à cette hétérogénéité et un accroissement du déséquilibre compétitif, cette recherche montre les besoins de nouvelle régulation sportivo-économique de la ligue.

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SPORTWISSENSCHAFTLICHE SOCIETE SUISSE DES GESELLSCHAFT DER SCHWEIZ SCIENCES DU SPORT

Oral Session

Friday 07.02.2020

Room 115 **Physical Activity in Educational & Clinical Settings**
Chair: Magali Descoeudres; Sandra Jourdan

14:00 « C'est un peu la fête en gym ». Analyse de l'activité située d'adolescentes au sein d'une classe non mixte en EPS
Antoine Bréau

14:15 Les élèves à besoins spécifiques : une source de développement pour l'enseignant novice?
Magali Descoeudres

14:30 Nutzung kooperativer Lernformen bei Schülern im Sportunterricht
Sandra Jourdan

14:45 How can situational interest increase students' physical activity in a design-based bike exergame?
Cédric Roure

15:00 Patterns of physical activity, depression, sleep complaints and mental toughness in people with diagnosed diabetes mellitus Type 2
Gabriela Faustino

15:15 Two types of aquatic exercising improved depression, subjective sleep and cognitive performance in persons with Multiple Sclerosis
Bahamani Sadeghi

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

« C'est un peu la fête en gym ». Analyse de l'activité située d'adolescentes au sein d'une classe non mixte en EPS

Authors:

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[2]Université de Lausanne, Sciences du Sport, Suisse.

Abstract:

Introduction : Face au maintien des inégalités entre les filles et les garçons au sein des établissements scolaires, l'école continue d'être embarrassée par la mixité. Critiquée en tant que principe pédagogique, la mixité est aujourd'hui de plus en plus remise en question dans différents pays et doit faire face au retour du principe de séparation des sexes, parfois envisagé comme une « nouvelle option éducative » (Calvo Charro, 2013, p. 183). En cours d'éducation physique et sportive (EPS), le débat autour d'un enseignement mixte ou séparé occupe toujours une place importante. En contexte mixte, des études ont par exemple souligné une certaine « marginalisation des filles » aussi bien en termes d'investissement que de résultats scolaires. Présente dans différents pays, et notamment en Suisse, la non-mixité en EPS est notamment envisagée par des enseignant(e)s comme une « stratégie » susceptible de favoriser une meilleure réussite des filles (Murphy, Dionigi & Litchfield, 2014, p. 250). Toutefois, notons que des synthèses réalisées sur l'efficacité de la non-mixité en EPS ont souligné (1) le caractère hétérogène et parfois contradictoire des résultats d'études et (2) la relative absence d'enquêtes notamment qualitatives (e.g., Bréau, Hauw & Lentillon-Kaestner, 2017).

Objectifs de l'étude et Méthode. Notamment basée sur le « *doing gender »* (Vuille, Malbois, Roux, Messant & Pannatier, 2009, p. 7) et plus généralement sur une approche énactive de l'activité (Saury *et al.,* 2013), cette recherche avait deux objectifs : (1) identifier des catégories typiques d'activités chez des adolescentes en contexte non mixte et (2) accéder à leur dynamique de transformation. La réalisation de ce travail s'est notamment basée sur une enquête ethnographique de plusieurs mois, menée au sein d'une classe non mixte au secondaire 1 dans le canton de Genève en Suisse. Deux adolescentes de 15 ans ont ainsi été suivies sur plusieurs activités physiques via des observations filmées en classe (qui avait pour but de recueillir des traces de l'activité) et des entretiens d'autoconfrontations individualisés (n = 8).

Résultats et Discussion. Les résultats de ce travail souligneront d'une part l'hétérogénéité des expériences vécues par les deux filles suivies en contexte non mixte : s'inscrivant parfois comme un lieu de « liberté retrouvée », la non-mixité peut aussi devenir un espace de frustrations, voire d'abandons. D'autre part, nos résultats évoqueront les nouvelles formes de domination présentes en classe. Bien qu'éloignées des garçons et de la « domination masculine », les adolescentes font toujours face, en contexte séparé, à des normes de genre et des codes de féminité à respecter.

Références

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Title:

Les élèves à besoins spécifiques : une source de développement pour l'enseignant novice ?

Authors:

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Abstract:

Introduction: Cette recherche, composée de deux études, vise à comprendre le développement de l'activité d'enseignants d'éducation physique et sportive (EPS) débutants à partir de situations émotionnellement marquantes, notamment de celles provenant d'élèves à besoins spécifiques. La littérature met en avant que le vécu des enseignants novices (EN) est soumis à des variations émotionnelles importantes (Hascher & Hagenauer, 2016).

Methods: La première étude a pour but de dessiner une topographie des situations émotionnellement marquantes auprès de 139 EN en EPS, à partir d'un questionnaire qualitatif (chaque EN rapportant deux situations émotionnellement marquantes vécues) dont les données ont été traitées de façon inductive pour en établir des types. La deuxième étude, clinique, auprès de cinq EN au cours d'une année, vise à comprendre la part subjective du métier qui freine ou favorise le développement de leur activité, à l'épreuve de ces situations émotionnellement marquantes en lien avec les élèves à besoins spécifiques. Le cadre théorique utilisé dans la seconde étude est celui de la clinique de l'activité (Clot, 1999). Trente-deux leçons d'EPS ont été filmées et les acteurs ont ensuite été confrontés aux traces de ces situations émotionnellement marquantes provenant d'élèves à besoins spécifiques lors d'entretiens d'auto-confrontation simple et croisée. Les données ont été traitées grâce à la méthode de Bruno et Méard (2018), dans le but de repérer des invariants du développement.

Results: Les résultats montrent que les EN en EPS vivent de nombreuses situations émotionnellement marquantes, en majorité à valence négative, et induisant, dans une proportion importante, une émotion de surprise. Une partie de ces situations est en lien avec les actions d'élèves à besoins spécifiques. Ces situations se trouvent à la source de conflits intrapsychiques qui favorisent essentiellement un développement potentiel par l'efficience, qu'il s'agisse de situations impliquant de manière positive ou négative des élèves à besoins spécifiques.

Discussion/Conclusion: Les résultats mettent également en avant l'importance de la dimension interactionnelle dans le processus de développement corroborées ou infirmées par la littérature récente. Ils ouvrent aussi des pistes concernant les dispositifs actuels de la formation par alternance des enseignants d'EPS, notamment par une prise en compte de la dimension subjective du métier dans la formation, particulièrement lorsque des élèves à besoins spécifiques sont impliqués.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Titel:

Nutzung kooperativer Lernformen bei Schülern im Sportunterricht: Präsentation erster Ergebnisse und möglicher Leitlinien für die Tätigkeit der Lehrer.

Autoren:

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Abstrakt:

Einführung

Der rasante Anstieg der Informationsmedien ist für einen Evolutionswandel verantwortlich, der sich nicht in den Modalitäten der Schulbildung widerzuspiegeln scheint. In dieser "unveränderlichen Klasse in einer sich verändernden Welt" werden Interaktionen zwischen Schülern, auch im Sport, häufig als störend angesehen. Kooperative Modelle scheinen jedoch vielversprechende Ergebnisse zur Motivation und zum Lernen gemäß der wissenschaftlichen Literatur zu liefern. Doch im Sport scheint es, dass Lehrer sie nicht häufig verwenden, um Gruppenarbeit während des Unterrichts zu gestalten. Der scheinbare Widerstand der Lehrer könnte aus der Vielzahl von Gruppierungsformen im Sportunterricht resultieren. Auf dieser Ebene ist eines der Merkmale des Sportunterrichts, dass er auf Formen von Schülergruppen basiert. Unabhängig davon, ob es explizit angestrebt wird oder nicht, lässt der Lehrer seine Schüler ständig in Teams arbeiten und mit anderen spielen. Sportunterricht basiert auf den ständigen Interaktionen der Schüler.

Es wäre interessant, die Realität einer unzureichenden Nutzung der kooperativen Arbeit im schweizerischen Kontext zu überprüfen und in Abhängigkeit von den Ergebnissen den Widerstand den Lehrer erklären zu können. Der theoretische und methodische Rahmen der Studie ist die Klinik der Aktivität (Cultural Historical Activity Theory- CHAT), genauer gesagt das Modell des Leontievs (1984), dass es erlaubt, "Bedeutung" (Motive) und Effizienz (Operationen) in der Tätigkeit der Arbeiter (hier Sportlehrer) zu identifizieren.

Methoden

Gemäß einer Literaturrecherche zur Ermittlung der erwarteten Ergebnisse wurde eine explorative Befragung durch umfassende Interviews durchgeführt. Zur Umfrage wurden 2016/17 in der Westschweiz zwölf Interviews mit zwölf Sportlehrern durchgeführt. Eine Qualitative Längsschnittstudie über die Tätigkeit von acht Sportlehrern versuchte, ihre Kooperationsaktivitäten durch einfache und persönliche Selbstkonfrontationsinterviews auf der Grundlage von Videospuren zu analysieren. Diese Interviews wurden transkribiert und eine dreifache Überprüfung der (a) Standardpraktiken, (b) Perspektiven und (c) erwarteten Herausforderungen wurde vorbereitet.

Der theoretische und methodische Rahmen des Aktivitätskonzepts (Clot, 1999; Leontiev, 1984; Vygostki, 1934/1998) wird zur Analyse der erhobenen Daten herangezogen.

Ergebnisse

Die Ergebnisse der Studie zeigen Elemente, die helfen könnten, die Lücke zwischen den Empfehlungen der Forscher zu Kooperationsmodellen und der Reproduktion der Schulform im Klassenzimmer besser zu verstehen. Das erste Element ist, dass die meisten der befragten Lehrer sagten, dass sie "nicht über Zusammenarbeit nachdenken" oder keine Zeit haben, sich auf diese Fähigkeiten zu konzentrieren, da es zu Verzögerungen kommen könnte.

Diskussion

Das erste Ziel dieser Forschung ist es, einen Beitrag zu einem wissenschaftlichen Ziel auf die Produktion von Wissen über die Frage der Formen der Zusammenarbeit in Sportunterricht zu leisten. Zweitens, professionelles Wissen für Lehrer, die letztlich Ambitionen, effektivere Instrumente für die Entwicklung von relevanten und effektiven Formen der Zusammenarbeit und eine Bestandsaufnahme der verwendeten Kooperationsmodelle zu erstellen.

Referenzen

Clot, Y. (1999). *La fonction psychologique du travail*. PUF: Paris.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

How can situational interest increase students' physical activity in a design-based bike exergame?

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Abstract:

Introduction: Active video games or exergames are "video games that are also a form of exercise" (Gao & Chen, 2014). Over the last decade, they have been used with promising results as an innovative way to promote physical activity among various populations. Exergames have also the potential to motivate players based on their fun and entertaining nature. According to Sun (2013), these characteristics are capable of inducing a high level of situational interest which has been conceptualized as a multidimensional construct encompassing five dimensions: novelty, challenge, attention demand, exploration intention and instant enjoyment. We adopted a design-based exergame approach to build a bike exergame called Greedy Rabbit with the purpose of promoting players' health-related physical activity outcomes and situational interest (Pasco, Roure, Kermarrec, Pope & Gao, 2017).

Methods: Sixty undergraduate students (M_{age} = 20.8, *SD* = 1.3, 18-25 years, 51.7 % boys) were assigned to two groups: an experimental group playing Greedy Rabbit (N = 41) and a control group playing a placebo version of Greedy Rabbit (N = 19). The physical activity metrics measured were maximum oxygen consumption, heart rate and cadence. They also responded to a validated situational interest questionnaire (Roure, Pasco & Kermarrec, 2016) directly after playing the exergame.

Results: The results from mixed models for the experimental group showed that Greedy Rabbit increased students' physical activity metrics as they progressed through the stages of the exergame. Additionally, the results revealed significant associations between the five situational interest dimensions and the changes in students' physical activity measures for the experimental group.

Discussion/Conclusion: All in all, this study demonstrated that a design-based bike exergame might be a good option to enhance students' physical activity based on the five situational interest dimensions. Greedy Rabbit might be useful for health professionals to promote physical activity participation and adherence among undergraduate students.

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Gao, Z., & Chen, S. (2014). Are field-based exergames useful in preventing childhood obesity? A systematic review. *Obesity Review, 15(8)*, 676-691.

Pasco, D., Roure, C., Kermarrec, G., Pope, Z., & Gao, Z. (2017). The effects of a bike active vido game on players' physical activity and motivation. *Journal of Sport and Health Science, 6*, 25-32.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Patterns of physical activity, depression, sleep complaints and mental toughness in people with diagnosed diabetes mellitus Type 2

Authors:

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Abstract:

Introduction: Individuals with Type 2 diabetes often complain about further psychiatric issues such as symptoms of depression and anxiety (Lloyd et al., 2018). Regular physical activity (PA) improves symptoms of depression (Knapen, Vancampfort, Morien, & Marchal, 2015), and is related to higher scores of mental toughness (Gerber et al., 2018). In the present cross-sectional study, we investigated whether and (if so) to what extent in individuals with Type 2 diabetes higher PA levels were related to higher scores of mental toughness and lower scores of depression.

Methods: A total of 29 individuals with diagnosed diabetes mellitus Type 2 (mean age: 62.52 years; 31% females; BMI: 31.57; duration of diabetes: 13.17 years $\pm$ 10.7) took part in the study. They completed questionnaires covering regular PA (International Physical Activity Questionnaire; weekly exercising), symptoms of depression (Hamilton Depression Rating Scale; experts' ratings), sleep complaints (Insomnia Severity Index), diabetes-related impaired quality of life, and mental toughness (Mental Toughness Questionnaire – 18-item Short Form).

Results: Higher levels of moderate and vigorous PA were not linearly associated with symptoms of depression, diabetes-related impaired quality of life, sleep complaints or mental toughness. Nevertheless, compared to participants with no PA (n=8), participants reporting to be daily physically active (n=8) reported higher moderate and vigorous PA levels, lower sleep complaints, lower symptoms of depression and diabetes-related impaired quality of life, and higher mental toughness scores. Age, duration of diabetes and age at diabetes onset were unrelated to PA levels, sleep complaints, depression, diabetes-related impaired quality of life, and mental toughness.

Discussion/Conclusion: Among a small sample of older individuals with Type 2 diabetes, compared to participants with no PA, participant with daily PA reported more favorable psychological indices. Importantly, such indices were unrelated to participants' age, duration of Type 2 diabetes and age at disease onset, suggesting thus that diabetes-related impaired quality of life might be improved with regular PA.

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Gerber, M., Best, S., Meerstetter, F., Walter, M., Ludyga, S., Brand, S., . . . Gustafsson, H. (2018). Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes. *J Sci Med Sport*.

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Lloyd, C. E., Nouwen, A., Sartorius, N., Ahmed, H. U., Alvarez, A., Bahendeka, S., . . . Xin, Y. (2018). Prevalence and correlates of depressive disorders in people with Type 2 diabetes: results from the International Prevalence and Treatment of Diabetes and Depression (INTERPRET-DD) study, a collaborative study carried out in 14 countries. *Diabet Med, 35*(6), 760-769.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Two types of aquatic exercising improved depression, subjective sleep and cognitive performance in persons with multiple sclerosis

Authors:

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Abstract:

Introduction: Persons with MS (PwMS) are encouraged to stay physically active. Several reviews (Motl et al., 2017; Platta, Ensari, Motl, & Pilutti, 2016) show that regular physical activity (PA) impacts favorably on a broad variety of psychological (depression, anxiety, fatigue; cognitive performance) and physiological (cardiovascular fitness) dimensions. On the flip side, it appears that knowledge on PA-related characteristics such as duration, frequency, and intensity are mixed. To counter this, we investigated, if and if so, to what extent the frequency of 3 sessions of aquatic exercising/week yielded to a higher impact on psychological dimensions, when compared to the frequency of 2 sessions/week, and to an active control condition.

Methods: A total of 94 females with MS (mean age: 37.6 years; mean EDSS score at baseline: 3.5) took part in this 8-weeks lasting interventional study. Participants were randomly assigned to one of the following study conditions: aquatic exercising 2x/week; aquatic exercising 3x/week; active control condition. At baseline and at the end of the study eight weeks later, participants completed questionnaires on depression and sleep complaints; further, participants underwent cognitive performance. An experienced neurologist assessed participants' neurological status (EDSS scores).

Results: Symptoms of depression and sleep complaints improved over time, but more so in the aquatic exercising groups, compared the active control condition. Likewise, cognitive performance (processing speed) improved in both intervention groups, compared to the active control condition. Symptoms of depression, sleep complaints and processing speed were unrelated to EDSS scores. Scores did not differ between the two aquatic exercise conditions.

Discussion/Conclusion: The pattern of results suggests that an additional session of aquatic exercising/week (3 sessions instead of 2 sessions) did neither improve, nor impair symptoms of depression and sleep complaints, and processing speed as a proxy of cognitive performance, and always compared to an active control condition. This result is clinically important, because often PwMS are unable to follow PA-sessions at higher frequency. The results are further important, because they show that neurological impairments (EDSS scores) must not necessarily and linearly match cognitive-emotional processes in PwMS.

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Motl, R. W., Sandroff, B. M., Kwakkel, G., Dalgas, U., Feinstein, A., Heesen, C., . . . Thompson, A. J. (2017). Exercise in patients with multiple sclerosis. Lancet Neurol, 16(10), 848-856. doi:10.1016/s1474-4422(17)30281-8

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Oral Session

Friday 07.02.2020

Room 117 **Ageing and Inactivity**
Chair: Oliver Faude & Lars Donath

14:00 The burden of physical inactivity in Switzerland in 2017
Renato Mattli

14:15 New Secondary Exhaustion Criteria for Cardiorespiratory Fitness Testing in Healthy Adults Aged from 20 to 90 Years Old
Jonathan Wagner

14:30 Association between handgrip and leg strength in different age groups in the COmPLETE study.
Eric Lichtenstein

14:45 Generations on the Move: a five-armed intergenerational exercise- and health promotion trial
Alice Minghetti

15:00 Unstable stepping using exergaming: Findings of a 3-armed randomized controlled trial
Lars Donath

15:15 Respiratory muscle endurance training improves exercise performance but not resting blood pressure and sleep in healthy active elderly
Jan Stutz

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The burden of physical inactivity in Switzerland in 2017

Authors:

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Abstract:

Introduction: Physical inactivity is a major risk factor for different non-communicable diseases which dominate the overall burden of disease in Switzerland. We aimed to estimate the burden attributable to adult physical inactivity in Switzerland and its three culturally different language regions from a societal perspective in terms of disability-adjusted life-years (DALYs), medical costs and productivity losses.

Methods: The burden of physical inactivity was estimated with a population attributable fractions (PAFs) approach. PAFs were calculated based on the prevalence of physical inactivity in the Swiss Health Survey 2017 and literature-based adjusted risk ratios of disease incidence. These PAFs were then applied to the total burden of the diseases related to physical inactivity. The total disease costs stem from a recent study on the costs of non-communicable diseases in Switzerland and the DALYs were taken from the Global Burden of Disease study.

Results: We estimated the DALYs lost due to physical inactivity at 31881 DALYs (95%CI 27484-36663) or at 1.5% (95%CI 1.3%-1.8%) of total DALYs lost in Switzerland in 2017. Medical costs caused by physical inactivity were estimated at 0.811 (95%CI 0.694-0.949) billion Swiss francs or at 1.0% (95%CI 0.8%-1.1%) of total medical costs in 2017. This is equivalent to 112 (95%CI 96-132) Swiss francs per capita per year. Productivity losses were valued at 0.725 (95%CI 0.588-0.888) billion Swiss francs or 101 (95%CI 82-123) Swiss francs per capita per year. The analysis of regional differences revealed that the per capita burden of physical inactivity is about twice as high in the French- and Italian-speaking regions compared to the German-speaking region.

Discussion/Conclusion: This study shows that physical inactivity causes a substantial disease burden in Swiss adults and that the French- and Italian-speaking regions are over-proportionally affected. Reasons include a higher prevalence of physical inactivity, higher per capita health care spending and higher disease prevalence. Investments in interventions aiming to increase physical activity should therefore be considered. Research is needed to identify effective interventions to promote physical activity in the different language regions. Furthermore, we recommend the consideration of regional differences when assessing the cost-effectiveness of such interventions, as these may have consequences for the optimal resource allocation in physical activity promotion policies.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

New Secondary Exhaustion Criteria for Cardiorespiratory Fitness Testing in Healthy Adults Aged from 20 to 90 Years Old

Authors: Wagner J, Knaier R[1], Infanger D[1], Hanssen H[1], and Schmidt-Trucksäss A
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Introduction: The maximal volume of oxygen uptake (VO_{2max}) is a strong risk factor and outperforms other classical risk factors such as body mass index, blood pressure, and smoking. VO_{2max} is an important measurement as described in a recent statement by the American Heart Association, and should be assessed as a vital sign (Ross et al., 2016). Physical exhaustion is necessary to determine VO_{2max} but making the distinction between those subjects who have reached exhaustion and those who did not remains difficult. To address this challenge, we analysed which proposed or often-used exhaustion criteria are reached by subjects of different age categories (20–39, 40–59, 60–79, and ≥ 80 years of age). Using only the tests of those participants confirmed to have reached VO_{2max} ($VO_{2pleateau}$), new criteria for secondary exhaustion criteria were determined.

Methods: Five hundred twenty-six participants underwent medical examinations and cardiorespiratory fitness testing on a bicycle ergometer. After a three-minute warm-up phase, they performed an individualised ramp protocol until exhaustion. Breath-by-breath gas analyses and HR were measured continuously and blood lactate concentration was determined at exhaustion and at one and three minutes after exhaustion. VO_{2peak} was assessed as the highest volume of oxygen uptake over 30 seconds during the test. VO_2 was further assessed for the time points when RER reached 1.0, 1.05, 1.10, and 1.15 and when HR reached 90%, 95%, and 100% of the predicted HR_{max}. To determine new exhaustion criteria one-sided tolerance intervals for the tests confirming $VO_{2pleateau}$ status were calculated using a confidence level of 95% and a coverage of 0.9. A $\dot{V}O_2$-plateau was defined as an increase of $\dot{V}O_2$ < 50% of expected between the last and second to last 30 seconds of the test.

Results: Two hundred fifty-four women and 272 men were included. Mean VO_{2peak} values achieved by the four age groups were 43 ± 8, 37 ± 9, 30 ± 8, 23 ± 4 mL/kg/min, respectively, while the mean exhaustion criteria for the four age groups were HR_{max} values of 188 ± 9, 175 ± 12, 159 ± 16, and 140 ± 18 bpm; RER values of 1.20 ± 0.6, 1.19 ± 0.7, 1.15 ± 0.8, and 1.09 ± 0.8; and Lac_{max} values of 10.2 ± 2.2, 8.6 ± 2.2, 6.6 ± 2.2, and 4.6 ± 1.4 mmol/L. Among those 20 to 39 years old, the mean VO_2 was 67% of their VO_{2peak} at RER = 1.00, was 78% at RER = 1.05, was 88% at RER = 1.10, and was 93% at RER = 1.15. At 90%, 95%, and 100% of the predicted HR_{max}, the VO_2 values were 74%, 80%, and 88% of the VO_{2peak}. All subjects here did reach RERs of 1.0 and 1.05, while six of 152 did not reach RER = 1.1 and 28 did not reach RER = 1.15. One, seven, and 24 participants did not reach 90%, 95%, or 100% of the predicted HR_{max}. Among those 60 to 79 years old, the mean VO_2 was 79% of their VO_{2peak} at RER = 1.00, was 87% at RER = 1.05, was 92% at RER = 1.10, and was 95% at RER = 1.15. At 90%, 95%, and 100% of the predicted HR_{max}, the mean VO_2 values were 69%, 75%, and 79% of the VO_{2peak}. Four of 153 subjects did not reach RER = 1.00, 15 did not reach RER = 1.05, 41 did not reach RER = 1.1, and 82 did not reach RER = 1.15. Five, seven, and 14 participants did not reach 90%, 95%, and 100% of the predicted HR_{max}. Tolerance intervals for the age groups of 20 to 39, 40 to 59, and 60 to 79 and, therefore, suggested new exhaustion criteria are RER values of 1.08, 1.08, and 1.02 or 94%, 92%, and 91% of the predicted HR_{max}.

Discussion: The proposed exhaustion criteria are the first data-based guidelines for CPETs performed on bike ergometers and represent different secondary exhaustion criteria for several age groups. These criteria can be used without taking the risk to declare more than 5% of the subjects in a study as not exhausted although they truly are. Lower criteria are likely to increase false positive results and considering more participants as exhausted even so they have not reached their true $VO2_{max}$.

Reference:

Ross, R., Blair, S. N., Arena, R., Church, T. S., Despres, J. P., Franklin, B. A., . . . Stroke, C. (2016). Importance of Assessing Cardiorespiratory Fitness in Clinical Practice: A Case for Fitness as a Clinical Vital Sign: A Scientific Statement From the American Heart Association. *Circulation, 134*(24), e653-e699. doi:10.1161/CIR.0000000000000461

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Association between handgrip and leg strength in different age groups in the COmPLETE study.

Authors:

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Abstract:

Introduction: Handgrip strength is widely applied as a feasible estimate of whole-body strength (Alonso et al., 2018). It is considered a predictor of cardiometabolic diseases, disability, morbidity and early mortality. In the context of fall prevention and dynapenia (loss of overall muscle function) decreases in explosive strength are more relevant than maximum strength (Power et al., 2013). The decline in explosive strength with age is more pronounced compared to maximum strength due to neuromuscular factors including selective loss of fast-twitch muscle fibres and motor units, changes in myosin heavy chain isoforms, and unstable neuromuscular junctions (Hepple & Rice, 2016). A safe, feasible and economic assessment of explosive strength as a screening tool is lacking. So far, counter movement jumps or sit-to-stand tests on force plates are used to investigate leg power. Therefore, the aim of this study was to investigate the association between leg power and handgrip explosive and maximum strength across different age groups.

Methods: 605 adults aged between 20 and 91years (49.3% female, age: 53.6±19.2 years, VO_2peak: 34.9±10.2 ml/kg/min, BMI: 23.7±2.74 kg/m2) were assessed as part of the COmPLETE study (Wagner et al., 2019). To estimate leg power, three counter movement jumps (CMJ) were performed on a force plate. Grip strength was assessed in a standing position with the arm extended three times. Volunteers were instructed to push as fast and hard as possible. Anthropometric data was collected after strength testing. Maximum strength (MS) was defined as the peak in the force-time curve and the maximum rate of force development (RFD) as the steepest rise in force over a 150 ms window. The maximum power achieved during the CMJ standardized to body weight was analysed. The average of three valid trials was used for analysis. Participants were split into seven age groups (20–30, 31–40, up to 81+) .Correlations were calculated between relative CMJ peak power and handgrip strength parameters.

Results: Over all subjects, the correlation between handgrip MS and CMJ peak power was similar (r=0.66 [95% CI: 0.61; 0.70]) to that between handgrip RFD and CMJ peak power (r=0.63 [0.58; 0.68]). Correlations between handgrip MS and CMJ peak power and handgrip RFD and CMJ peak power respectively, were similar in men (r=0.57 [0.49; 0.64], r=0.5 [0.41; 0.58]) and women (r=0.56 [0.48; 0.64], r=0.59 [0.51; 0.66]). There were inconsistent associations within the age groups for handgrip MS and CMJ peak power (m: r=0.07–0.36; w: r=-0.02–0.47) as well as for the association between handgrip RFD and CMJ peak power (m: r=-0.02–0.38; w: r=-0.07–0.42).

Discussion/Conclusion: In this sample of 20 to 91 year old adults, handgrip strength RFD has no stronger association with leg power than maximum handgrip strength. This finding might be explained by the hand flexor muscles mostly comprising slow-twitch muscle fibres, severely limiting their ability to perform explosive actions. Therefore, to assess whole-body explosive strength that might be more predictive for falls and functional limitations than maximum strength, other assessments, such as CMJ or chair-rise tests, seem warranted.

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Alonso, A.C., et al. (2018). Association between handgrip strength, balance, and knee flexion/extension strength in older adults. *Plos One, 13*(6).

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Hepple, R.T. & C.L. Rice (2016). Innervation and neuromuscular control in ageing skeletal muscle. *J Physiol, 594*(8), 1965-78.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Generations on the Move: A five-armed intergenerational exercise- and health promotion trial

Authors:
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Abstract:
Introduction: Intergenerational exercise possesses the potential to innovatively and simultaneously promote physical activity in both seniors and preschool children (Granacher, Muehlbauer, Gollhofer, Kressig, & Zahner, 2011). An approach combining motor skills and strength exercises while focusing on social interactions between the generations could potentially reduce falls, satisfy physical, social and behavioral needs of children and seniors while reducing health care costs. Up to date, no studies have yet examined the physical and social-emotional effects of intergenerational exercise programs using paralell group designs.
Methods: 68 pre-school children (age: 4.9 y (SD 0.7), m=33, f=35) and 33 residential seniors (age: 81.8 y (7.4), m=6, w=27) were enrolled in this controlled five-armed study and assigned to either the intergenerational group (INT, children [n=20] together with seniors [n=16]), peer group (PG, for each age group separate, children [n=26] and seniors [n=17]), or control group (CON, only children, n=22). Children were tested on motor skills (TGMD-2), jump height and hand grip strength (Leonardo, Mechanography). Kindergarten teachers filled out a questionnaire to each child's social-emotional skills (KOMPIK questionnaire). Seniors performed the Short Physical Performance Battery (SPPB) which included gait speed, repeated chair rising test and balance as well as a hand grip strength test. Questionnaires assessing psycho-social wellbeing (SF-36 and FES) were filled out with help of the research staff. The intergenerational and peer groups received one comparable exercise session a week lasting 45 minutes for 25-weeks. The control group received no intervention. Measurements were performed before and after the 25 weeks intervention phase.
Results: Children: When adjusted for baseline values, large pre-post effects were found for INT compared to PG and CON in TGMD-2 scores (INT vs PG: p=0.012; d=-0.57 [-1.0; -0.20]; INT vs CON: p ≤0.01; d=-0.78 [-1.2; -0.26]) as well as in hand grip strength (INT vs PG: p=0.002; d=-0.72 [-1.2; -0.28]; INT vs CON: p ≤0.01; d=-1.12 [-1.6; -0.67]). Trivial between group changes were detected in favor of INT for jump power (INT vs PG: p=0.46; d=-0.18 [-0.65; 0.30]; INT vs CON: p=0.83; d=-0.05 [-0.52; 0.42]) as well as for total KOMPIK score (INT vs PG: p=0.16; d=-0.18 [-0.44; 0.08]; INT vs CON: p=0.20; d=0.17 [-0.09; 0.43]). **Seniors:** No relevant differences in SPPB scores were observed between the groups when adjusted for baseline values (p=0.83; d=-0.06 [-0.68; 0.54]). Hand grip strength improved in PG compared to INT (p=0.03; d=0.43 [0.04; 0.82]). Changes in gait speed were solely found in INT while PG remained unchanged (p=0.07; d=-0.36 [-0.75; 0.03]). General health did not reveal between group differences when adjusted for baseline values, even though INT increased while PG decreased (p=0.20; d=-0.31 [-0.78; 0.17]), the same was observed for the FES questionnaire (p=0.14; d=0.39 [-0.14; 0.93]).
Discussion: This study is the first examining the physical and psychosocial effects of intergenerational exercise compared to peer group training in an ecologically valid and control settings. Children from the INT group largely benefitted in motor skills, strength parameters as well as in their social-emotional profile compared to CON and PG. Seniors in the INT group profit more in psychosocial wellbeing than in physical functioning and strength compared to PG, while nonetheless improving their functional mobility. Intergenerational exercise seems a promising strategy to improve mental as well as physical health and fitness surrogates in preschool children and residential seniors. Therefore, opportunities for such exercise settings should be facilitated.

References:

Granacher, U., Muehlbauer, T., Gollhofer, A., Kressig, R. W., & Zahner, L. (2011). Evidence-based and evidence-inspired: an intergenerational approach in the promotion of balance and strength for fall prevention. *Gerontology, 57*(5), 424-426. doi:10.1159/000322149

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Unstable stepping using exergaming: Findings of a 3-armed randomized controlled trial

Authors:

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Abstract:

Introduction: Balance and stepping training has shown to reduce falls and improve fall risk factors. Thereby, exergames can be employed as a promising training alternative (Donath, Rössler & Faude, 2016). However, the potential of unstable stepping games has not yet been addressed. Therefore, this non-blinded, three-armed randomized controlled trial aimed at comparing the effects of volitional step training under stable and unstable conditions on balance, mobility and strength adaptations.

Methods: Fifty-one healthy and active older adults (age = 69.4 ± 5.6 years; BMI = 27.4 ± 4.6, physical activity = 9.2 ± 5.1 h/week) were allocated to either volitional stepping (VOL), volitional stepping under unstable conditions (VOL + US) or a control group (CON) using the minimization method (Strata: sex, age, BMI, 6-min walk, dynamic balance performance). Participants underwent eight weeks of exergames based step training with three sessions per week. Pre- and Post-testing included reactive balance (postural sway upon perturbation), functional balance (Y-balance test) and mobility (timed up and go test) to compare the effects of both intervention groups. Strength was tested using the heel rise test and isometric leg extension and leg curl assessment to compare transfer effects of the intervention groups.

Results: Data of 45 participants was finally analyzed. Overall, only 3 drop outs were observed. Adherence was 87 ± 5% in the VOL + US group and 86 ± 6% in the VOL group. No adverse events occurred. Increased reactive balance was observed in VOL + US only ($p < 0.05$, standard mean difference (SMD) = 0.3) whereas both intervention groups improved functional balance ($p < 0.05$, SMD = 0.5-1.0). Only VOL + US led to improved functional mobility performance under dual-task conditions ($p < 0.05$, SMD = -0.4). Both VOL + US and VOL significantly improved calf strength endurance ($p < 0.05$, SMD = 0.7-0.8), whereas isometric strength of the thigh muscles revealed no significant changes ($p > 0.05$). Explosive strength (rate of force development) showed insignificant but medium interaction effects of the leg extensors in favor of VOL + US ($p = 0.08$, $\eta 2p = 0.12$, SMD = 0.2).

Discussion: Volitional step training is an appealing and effective training tool to improve functional balance and calf strength in healthy older adults. Unstable volitional stepping seems to be superior in improving reactive balance and functional mobility under dual-task conditions compared to stepping training under stable conditions. It appears that the volitional stepping under unstable conditions requires motor skills relevant for preventing falls since it is more tasks specific when compared to volitional stepping under stable conditions.

References:

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Respiratory muscle endurance training improves exercise performance but not resting blood pressure and sleep in healthy active elderly

Authors:
Jan Stutz, Selina Casutt, Christina M Spengler
Exercise Physiology Lab, Institute of Human Movement Sciences and Sport, ETH Zurich, Zurich, Switzerland

Abstract:

Introduction: Ageing is associated with higher resting blood pressure (BP), less sleep, decreased pulmonary function and exercise capacity. Whole body exercise is a good strategy to counteract these changes, although the effects on the pulmonary system are controversial. Since the prevalence of impaired mobility also increases with age, new strategies with similar benefits to whole body exercise are desired. We therefore tested the hypothesis that respiratory muscle endurance training (RMET) would lower resting BP, improve sleep, pulmonary function and exercise performance in healthy active elderly.

Methods: Twenty-four active normotensive and prehypertensive participants (age = 65.8 years) were quasi-randomized to either RMET (N=12) or placebo (PLA, N=12). RMET consisted of 30 min of volitional normocapnic hyperpnea at 60% of maximal voluntary ventilation while PLA consisted of 1 inhalation/day of a lactose powder using a mock asthma inhaler. Both interventions were performed on 5 days/week for 4 weeks. Before and after the intervention, resting BP, pulmonary function, time to exhaustion in an incremental respiratory muscle test (incRMET), an incremental treadmill test (IT) and in a constant load treadmill test (CLT) at 80% of peak oxygen consumption, balance, sleep at home, and body composition were assessed. Data was analyzed with 2x2 mixed ANOVAs.

Results: Compared to PLA, there was no change in resting BP, pulmonary function, IT performance, sleep, body composition or balance (all $p > 0.05$). Performance significantly increased in the incRMET (+ 6.3 min) and CLT (+ 3.2min), resulting in significant interaction effects ($p < 0.05$).

Conclusion: RMET might be used on top of physical exercise to improve respiratory and whole body endurance performance but does not improve other functions that are known to decline with age.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Oral Session

Friday 07.02.2020

Aula **Mechanisms in sports sciences**
Chair: Wolfgang Taube

14:00 Neurophysiological mechanisms underlying the fitness-cognition relation in young adults: A simultaneous EEG-fNIRS study
Sebastian Ludyga

14:15 More temporally focused motor commands with an external focus of attention
Yves-Alain Kuhn

14:30 Neural control of perturbations when standing on an instable surface
Michael Wälchli

14:45 Oxidative stress as a mechanism for exercise-induced stem and progenitor cell mobilization
Michelle Schmid

15:00 Exercise and vascular ageing: a cross-sectional and randomized controlled trial
Lukas Streese

15:15 Low energy availability in sports: What about wheelchair athletes?
Joëlle Flück

SPORTWISSENSCHAFTLICHE
SOCIETE SUISSE DES
GESELLSCHAFT DER SCHWEIZ
SCIENCES DU SPORT

Title:

Neurophysiological mechanisms underlying the fitness-cognition relation in young adults: A simultaneous EEG-fNIRS study

Authors:
Ludyga[1], S., Mücke[1],M., Colledge[1], F., Pühse[1], U., Gerber[1], M.
[1]University of Basel, Department of Sport, Exercise and Health, Basel, Switzerland

Abstract:

Introduction:
Aerobic fitness has been found to be linked with the inhibitory aspect of executive control in different age groups. However, the relative contributions of different neurophysiological mechanisms to this fitness-inhibition relation remain unclear and have not yet been examined in young adults. The aims of the present study were twofold: I) to compare performance on an inhibitory control task between high and low-fit young adult men, and II) to examine if fitness effects on inhibitory control are due to differences in conflict monitoring (N450 component of event-related potentials) and lateralized oxygenation difference (LOD) in the DLPFC.

Methods: Participants with different physical activity levels were recruited and divided into low-fit and high-fit participants based on relative power assessed from the PWC170. A computerized Stroop Color-Word task was administered while seated. During the task, EEG-fNIRS was recorded to assess the N450 and LOD, because these neurophysiological processes have previously been linked with behavioral performance.

Results: High-fit compared to low-fit participants had lower Stroop interference and lower negativity of the N450, but no differences between groups was observed for LOD. Based on path-analyses, the relation between aerobic fitness and Stroop interference was indirect and mediated by N450. In contrast, LOD did not explain the fitness-inhibition link, although it was inversely correlated with Stroop interference.

Discussion/Conclusion: Young men with high fitness show greater inhibitory control than their low-fit peers. This behavioral differences was explained by more effective conflict monitoring, but not by differences in cerebral oxygenation in the DLPFC.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

More temporally focused motor commands with an external focus of attention

Authors:

Kuhn Y-A[1], Egger S[1], Keller M[2] and Wolfgang Taube[1]

[1] Department of Neurosciences and Movement Science, Faculty of Science and Medicine, University of Fribourg, Switzerland

[2] Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland

Abstract:

Introduction: Today, it is commonly agreed that an external (EF) compared with an internal focus of attention (IF) enhances motor performance, learning and improves movement efficiency (see Wulf, 2012 for a detailed review). However, the neurophysiological mechanisms underlying these behavioural improvements remain poorly investigated and understood. It has been demonstrated that the general brain activity in the primary motor cortex (M1) (Zentgraf et al., 2009) and specifically the activity of different inhibitory mechanisms within M1 are enhanced when adopting an EF contrasted to an IF (Kuhn, Keller, Lauber, & Taube, 2018; Kuhn, Keller, Ruffieux, & Taube, 2016). The increased inhibition explains very well a more spatially focused motor command. However, it is not known whether the temporal aspects of the motor command are also modified under different attentional situations. The present study therefore investigated if the activation of distinct motor pathways depends on different attentional strategies. For this purpose, the activity of specific motor pathways (fast and slow) were assessed using the H-reflex conditioning technique when adopting different attentional strategies (EF and IF) during a tonic contraction.

Methods: The participants were asked to press on a pedal with the right foot in order to match its position with a target line displayed on a screen placed in front of them. The deviation of the pedal position from the target line was used as a behavioural parameter. Additionally, H-reflexes were conditioned with TMS at different inter-stimulus intervals during the motor task to assess the excitability of fast (direct) and slower (more indirect) motor pathways when adopting different attentional strategies (EF vs IF).

Results: When adopting an EF compared to an IF, the motor performance significantly improved (p = .001): the participants were able to follow the target line with more precision (+24 %) and displayed less background EMG activity in the soleus muscle (p < .001). Additionally, descending corticospinal activity displayed a temporally more focused pattern: the activation of slower pathways was significantly reduced by around 20 % (p = .004).

Discussion/Conclusion: The present findings demonstrate for the first time that the excitability of slower motor pathways can instantly be modulated by using different attentional strategies. The de-activation (or inhibition) of slower corticospinal pathways with an EF is assumed to temporally focus the descending motor command. Together with the spatial restriction (i.e. increased intracortical inhibition and surround inhibition; see Kuhn et al. 2016 & 2018), this concentration on direct descending pathways might be the reason for increased movement efficiency with an EF compared to an IF.

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Kuhn, Y. A., Keller, M., Lauber, B., & Taube, W. (2018). Surround inhibition can instantly be modulated by changing the attentional focus. *Sci Rep, 8*(1), 1085. doi:10.1038/s41598-017-19077-0

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Neural control of perturbations when standing on an instable surface

Authors:

Wälchli M[1], Egger S[1], Taube W[1].

[1] Movement and Sport Sciences, Department of Neurosciences and Movement Sciences, University of Fribourg, Switzerland

Abstract:

Introduction: It is well known that the H-reflex amplitude is instantaneously decreased in more demanding postural tasks (Taube, Gruber, & Gollhofer, 2008). In this context, H-reflexes were reduced when standing on an instable surface where they served simultaneously as postural perturbation (Trimble & Koceja, 2001). However, it is not clear whether the H-reflex was modulated due to the instability or the stimulations (i.e. trying to reduce the H-reflex as a source of postural perturbation). The aim of this study was to test how neurophysiological stimulations are controlled in the neural system when standing on an instable surface.

Methods: One group (COR; 26 participants) received TMS and another group (SPI; 25 participants) PNS while standing on a custom-made seesaw moving in the a-p direction. In the COR group, MEPs were assessed in 3 different conditions: stable standing (STA), mechanical perturbations (MEC) and perturbations caused by TMS (STIM). The SPI group was exposed to STA, MEC, perturbations caused by PNS (STIM-H) and a combination of MEC and STIM-H (DUO). Every condition comprised 11 blocks whereof 1, 6 and 11 were stable (REF1, REF2, REF3) and 8 instable (B2-B5 and B7-B10). In the MEC condition, B2-B4 and B7-B9 were only mechanical and B5 and B10 were only TMS/PNS. Each block consisted of 6 stimulations with a pause of minimum 8 s between two consecutive stimulations. In the instable blocks, the stimulations were evoked according to the position of the seesaw. MEP and H-reflexes were captured in m. soleus (SOL) with EMG and the position of the seesaw by a goniometer (3 seconds before and 3 seconds after the onset of the perturbation). For the analysis, the amplitudes of B5 and B10 were normalized to REF1.

Results: The MEPs on stable ground (i.e. REF blocks) increased with time ($p = .031$) but were not affected by condition. The MEPs on instable ground (i.e. B5 and B10) were comparable between STIM and MEC ($p = .580$). The sway of the seesaw (before and after) was not different in STIM and MEC in B5 and B10, however the seesaw swayed significantly more after mechanical perturbations in blocks B2-B4 and B7-B9. Statistical analysis of the stable blocks (i.e. REF) in the SPI group revealed significant effects for block ($p < .001$), condition ($p < .001$) and a significant interaction ($p < .001$). Post-hoc tests indicated reduced H-reflexes in REF2 and REF3 as well as in STA compared to all other conditions (HREF, MEC, DUO). When comparing B5 and B10 of the instable conditions in SPI, no effect for condition was observed ($p = .287$) despite participants swayed more in DUO compared to HREF (before and after) and MEC (only after).

Discussion/Conclusion: The corticospinal activity was increased when balancing, but as soon as the surface is stable again, the MEPs are comparable to those of the stable standing condition (STA). The H-reflex in instable conditions was inhibited in stable and instable conditions when compared with STA, indicating that the H-reflex is reduced when executing a balance task. However, no difference was found between the instable conditions (STIM-H, MEC, DUO). This suggests that the corticospinal and spinal excitability was modulated independently of the source and intensity of the postural perturbations.

References:

Taube, W., Gruber, M., & Gollhofer, A. (2008). Spinal and supraspinal adaptations associated with balance training and their functional relevance. *Acta Physiol., 193*(2), 101-116.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Oxidative stress as a mechanism for exercise-induced human adult stem and progenitor cell mobilization into the peripheral blood

Authors:

Schmid M[1], Kröpfl JM[1], Spengler CM[1]

[1]Exercise Physiology Lab, Institute of Human Movement Sciences and Sport, ETH Zurich, Switzerland

Abstract:

Introduction: It is established that physical exercise has an acute impact on the number and function of circulating stem and progenitor cells (CPCs) in the peripheral blood (Boppart et al., 2015). The exact mechanisms, however, have not yet been fully resolved. An acute bout of exercise can transiently provoke oxidative stress in muscle tissues and blood. Under such oxidative stress, the free reactive oxygen species (ROS) can attack the DNA of exposed cells and drive them into apoptosis. Circulating apoptotic cells are known to induce a delayed release of CPCs from the bone marrow into the peripheral blood (Mooren & Kruger, 2015). We therefore hypothesized that oxidative stress, provoked by an acute bout of exercise, could transiently increase the number of CPCs in the peripheral blood via a ROS-dependent induction of apoptosis in circulating cells.

Methods: Eighteen young, healthy, normal-weight, non-smoking males performed two identical incremental cycling tests with/without prior supplementation with antioxidative vitamins. Before and 0, 0.5, 1.5, 3 and 4.5h after exercise, a venous blood sample was taken. Mononuclear cells were isolated via density gradient centrifugation, stained with cell type- or cell viability-specific antibodies and analyzed via a flow cytometry-based approach.

Results: Data of 18 subjects shows significant time effects for overall mononuclear cells numbers, apoptotic mononuclear cells and CPCs. All cell subsets increase significantly directly after exercise, then decrease below baseline 30 minutes after exercise. However, no significant main effects of intervention or interaction effects have been found.

Conclusion: Our current data suggests oxidative stress might not play a significant role in exercise-induced stem and progenitor cell mobilization into the peripheral blood, neither directly after exercise nor in a delayed manner.

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Boppart, M. D., De Lisio, M., & Witkowski, S. (2015). Exercise and Stem Cells. *Prog Mol Biol Transl Sci, 135*, 423-456.

Coleman, E. A., Coon, S. K., Kennedy, R. L., Lockhart, K. D., Stewart, C. B., Anaissie, E. J., & Barlogie, B. (2008). Effects of exercise in combination with epoetin alfa during high-dose chemotherapy and autologous peripheral blood stem cell transplantation for multiple myeloma. *Oncology Nursing Forum, 35*(3), E53-61.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Exercise and vascular ageing: a cross-sectional and randomized controlled trial

Authors:

Lukas Streese[1], Arne Deiseroth[1], Henner Hanssen[1]

[1]Department of Sport, Exercise and Health, Medical Faculty, University of Basel, Basel, Switzerland.

Abstract:

Introduction: Vascular ageing can be quantified at subclinical stages by use of sensitive vascular biomarkers of the macro- and microcirculation. Detection of vascular impairments enables initiation of timely treatment strategies to counteract development of CV disease and improve CV outcome. The aims of this study were (a) to compare large artery stiffness and retinal microvascular structure and function in healthy life-long active and healthy sedentary older adults with CV risk patients, and (b) to assess the effects of short-term high-intensity exercise training on vascular health in these patients.

Methods: Seven hundred and eighty-three participants were screened for their CV risk and physical activity profile. We included 38 healthy active (HA, mean age 60±7 years) and 36 healthy sedentary (HS, mean age 60±7 years) as well as 84 sedentary patients with ≥2 CV risk factors (SR, mean age 59±6 years) in the cross-sectional approach. SR were randomized to a 12-week high-intensity interval training (HIIT) or physical activity recommendations after the baseline assessment. Carotid-femoral PWV (cfPWV) was measured as a marker of large artery stiffness and the central retinal arteriolar (CRAE) and venular (CRVE) diameters as well as the retinal arteriolar-to-venular diameter ratio (AVR) were measured as a marker of the microcirculation. Standard procedures of anthropometric measurements were implemented.

Results: Anthropometric parameters differed between the groups according to the inclusion criteria. cfPWV was highest in SR (8.2±1.4m/s) compared to HS (7.5±1.6m/s) and HA (7.0±1.1 m/s). HA had a lower cfPWV compared to HS ($p<0.05$) and SR ($p<0.001$). HA had wider CRAE (179±14µm) and narrower CRVE (204±17µm) compared to HS (CRAE: 172±11 µm; CRVE: 209±11 µm) resulting in a higher AVR in HA (0.88±0.05) compared to HS (0.83± 0.04, $p<0.001$). By contrast, SR showed narrower CRAE (171±14 µm) and wider CRVE (218±16µm, $p<0.05$) compared to HS resulting in a lower AVR (0.79±0.05, $p<0.001$) compared to HS and HA. HIIT in SR improved most classic CV risk factors. Additionally, CRAE increased (pre: 175 ±14µm vs post: 181 ±13µm, $p=0.001$) and CRVE decreased (pre: 222 ±14µm vs post: 220 ±14µm, $p=0.007$) in the HIIT group without changes in the cfPWV. PWV was significantly but moderately associated with AVR ($r=-0.2$, $p=0.01$).

Discussion/Conclusion: Life-long physical activity and fitness were associated with lower arterial stiffness and favourable retinal vessel diameters in healthy individuals. CV patients had higher arterial stiffness and lower AVR. Short-term HIIT improved retinal microvascular phenotype without changes in large artery stiffness. Retinal vessel diameters are sensitive diagnostic tool for CV risk stratification and subclinical vascular disease monitoring in CV patients. Short-term HIIT may postpone development of small vessel disease in older patients.

SPORTWISSENSCHAFTLICHE
SOCIETE SUISSE DES
GESELLSCHAFT DER SCHWEIZ
SCIENCES DU SPORT

Title:

Low energy availability in sports: What about wheelchair athletes?

Authors:

Flueck JL[1], Egger T[2].

[1]Sportwissenschaften, Sportmedizin Nottwil, Schweizer Paraplegiker-Zentrum, Switzerland

[2]Department of Health Sciences and Technology (HEST), ETH Zürich, Switzerland

Abstract:

Introduction: Low energy availability (LEA) is a major problem in sports as athletes ingest often a lower amount of energy compared to their actual needs (Mountjoy et al., 2014). The availability of energy is calculated based on their daily energy intake and the energy cost of the daily training sessions in relation to their fat-free mass. Based on this calculation, it is known how much energy will available for the body (beside the fuel for training) to keep it in optimal physiological functioning. It has been shown (Logue et al., 2018), that LEA occurs very often in female athletes, in endurance athletes as well as athletes in weight-sensitive sports (i.e. jockeys, combat sports, gymnastics, ballet). The purpose of this study was to investigate, whether LEA is a problem in wheelchair athletes as well.

Methods: In 14 wheelchair athletes (8 male, 6 female), energy intake as well as energy expenditure during training were recorded over seven days. In addition, athletes recorded leisure time, physical activity as well as supplement intake. Furthermore, resting energy expenditure (REE) and body composition (DXA) were measured before the start of the study. Based on all recordings, energy availability (EA= (energy intake (EI) – exercise energy expenditure)/fat-free mass) as well as total energy expenditure (TEE) were calculated. EA was categorized into optimal (>45 kcal/kg FFM/d), suboptimal (30-45 kcal/kg FFM/d) and LEA (<30 kcal/kg FFM/d). Energy balance (EB) was calculated from TEE and EI. In addition, it was analyzed whether athletes consumed the correct food before, during and after training session according to sports nutrition recommendations.

Results: The mean value for EA over the 7 days significantly different (36.1 ± 6.7 kcal/kg FFM/d) in male compared to female (25.1 ± 7.1 kcal/kg FFM/d) athletes ($p<0.001$). Those values were categorized as suboptimal (male) and LEA (female). From all athlete days, LEA occurred in 73.3% of the days in female and in 30.4% of the days in male athletes. EB was significantly different between male and female athletes ($p<0.001$) whereas male athletes showed a positive EB (+169.1 ± 304.5 kcal) and female athletes a negative EB (-288.9 ± 304.8 kcal). Concerning the protein guidelines, 70% of male and 39% of female athletes consumed more than 1.2 g/kg/d. After strength or intensive training, 55% of male and 41% of female athletes ingested 20 to 25g of protein. Before training, 63% of male and 71% of female athletes consumed 1 to 4g/kg of carbohydrates.

Discussion/Conclusion: Wheelchair athletes, especially female athletes showed a high occurrence of LEA availability over a seven days period. They might be at a high risk for certain negative health consequences. A higher energy intake would be recommended to meet their energy needs for optimal body functions and maximal adaptation to training stimulus. Further research is needed to elucidate in more detail LEA in wheelchair athletes.

References:

Logue, D., Madigan, S. M., Delahunt, E., Heinen, M., Mc Donnell, S. J., & Corish, C. A. (2018). Low Energy Availability in Athletes: A Review of Prevalence, Dietary Patterns, Physiological Health, and Sports Performance. *Sports Medicine, 48*(1), 73-96.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Mini-Oral Session

Friday 07.02.2020

Aula	**Natural Sciences 1**
15:40	Association of High Blood Pressure, Obesity, and Cardiorespiratory Fitness with Central Arterial Stiffness in Children: A Meta-Analysis *Christoph Hauser*
15:45	Modulation of the force evoked by wide-pulse, high-frequency neuromuscular electrical stimulation: potential implications for rehabilitation *Chris Donnelly*
15:50	play more football *Mirjam Hintermann*
15:55	The reliability of assessing biceps femoris long head architecture using extended field of view ultrasound *Paul Ritsche*
16:00	Neuromuscular activity before ACL rupture and during 12 months of rehabilitation - a case report. *Angela Gentsch*

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Association of High Blood Pressure, Obesity, and Cardiorespiratory Fitness with Central Arterial Stiffness in Children: A Meta-Analysis

Authors:

Christoph Hauser[1]*, Giulia Lona[1]*, Sabrina Köchli[1], Denis Infanger[1], Katharina Endes[1], Arno Schmidt-Trucksäss[1], Henner Hanssen[1]**

[1]Department of Sport, Exercise and Health, Medical Faculty, University of Basel, Basel, Switzerland, *equally contributed, **corresponding author

Abstract:

Background: Central pulse wave velocity (cPWV) is a biomarker for cardiovascular (CV) risk and a predictor for CV events in adulthood. Alterations of arterial stiffness have also been associated with CV risk in childhood.

Objective: Systematic review and meta-analysis on the association of blood pressure (BP), body mass index (BMI), and cardiorespiratory fitness (CRF) with cPWV in children.

Methods: Literature search through the databases PubMed, Web of Science, Embase and the Cochrane Register of Controlled Trials. Only school- and population-related cross-sectional data were included.

Results: A total of 9114 studies were found, and 53 full-text articles were analyzed for their suitability. Twenty-two articles (9604 children and adolescents) were used for assessment and reflection in the systematic review. Eight articles were finally included in the meta-analysis. Higher systolic and diastolic BP were associated with higher cPWV (pooled estimated effect size (ES) 0.02 (95% CI: 0.012 to 0.027), and ES 0.02 (95% CI: 0.011 to 0.029); respectively). Higher BMI was associated with higher cPWV (ES 0.025 (95% CI: 0.013 to 0.038). CRF was inversely related to cPWV (ES -0.033 (95% CI: -0.055 to -0.011).

Limitations: The prediction intervals indicate moderate evidence with a relatively high heterogeneity between the studies.

Conclusions: Our results suggest that higher childhood BP and BMI are associated with impaired arterial stiffness, whereas higher CRF is associated with favorable stiffness. Long-term studies are warranted to investigate the prognostic value of cPWV for CV risk development during childhood and later in life.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Modulation of the force evoked by wide-pulse, high-frequency neuromuscular electrical stimulation: potential implications for rehabilitation

Authors: Chris Donnelly[1], Jonathan Stegmüller,[1] Anthony J Blazevich[2], Bengt Kayser[1], Daria Neyroud[1], Nicolas Place[1]

[1]Institute of Sport Sciences, University of Lausanne, Lausanne VD, Switzerland. [2]Centre for Exercise and Sports Science Research, Edith Cowan University, Joondalup WA, Australia.

Abstract:

Introduction: It is well established that neuromuscular electrical stimulation (NMES) is an effective method for muscle rehabilitation with its' effectiveness proportional to the electrically-evoked torque (Maffiuletti et al., 2017). It has been demonstrated that compared with conventional NMES, at low stimulation intensities NMES-evoked torque is greater when wide-pulse, high-frequency (WPHF) NMES is used (Collins, Burke, & Gandevia, 2001). This is, in part, due to increased reflexive recruitment of motor units. Evidenced by progressive increases in evoked torque (termed "extra torque") and sustained EMG activity (Collins et al., 2001). The purpose of the present study was to modulate motor unit recruitment by WPHF NMES using high-frequency transcutaneous electrical nerve stimulation (TENS; Vance et al., 2014) and direct current stimulation (DCS; Cogiamanian et al., 2012) which are known to decrease and increase neuronal excitability, respectively.

Methods: In both studies, plantar flexor force and *soleus* EMG responses to a 20-s WPHF NMES-evoked contraction were assessed before (Pre) and after (Post) an intervention. In study 1 (10 subjects), TENS or no stimulation (Control trial) was delivered over the *triceps surae* for 15 minutes. In study 2 (13 subjects), DCS or a sham stimulation was delivered to the spinal cord for 20 minutes. Torque-time integral (TTI), extra torque and sustained EMG activity amplitude were quantified for each WPHF NMES contraction. Pre to Post changes were calculated for each trial.

Results: Compared with the control condition, TENS reduced the magnitude of WPHF NMES-evoked torque ($p=0.010$), extra torque ($p=0.014$) and sustained EMG activity ($p=0.006$). In the TENS trial, the change in WPHF NMES-evoked torque was associated with the change in extra torque ($r_s = 0.867$, $p=0.002$) and sustained EMG activity ($r_s = 0.95$, $p<0.001$). Compared with the sham stimulation, DCS had no significant effects on torque or sustained EMG activity.

Discussion/Conclusion: The reduction in WPHF NMES-evoked torque after TENS can be explained via increased inhibition in the spinal cord (Vance et al., 2014) which in turn would modulate reflexive recruitment of motor units. Surprisingly, DCS which has been previously demonstrated to increase neuronal excitability in the spinal cord had no effect on the evoked force. Future studies should examine other methods aiming at increasing spinal motoneuronal excitability to enhance WPHF NMES-evoked torques.

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Cogiamanian, F., Ardolino, G., Vergari, M., Ferrucci, R., Ciocca, M., Scelzo, E., . . . Priori, A. (2012). Transcutaneous spinal direct current stimulation. *Front Psychiatry, 3*, 63. doi:10.3389/fpsyt.2012.00063

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Play more football

Authors:
Hintermann M[1], Fuchslocher J[1], Kern R[2], Walker J[2], Born DP[1], Romann M[1].
[1]Swiss Federal Institute of Sport Magglingen, Magglingen, Switzerland
[2]Swiss Football Association, Muri, Switzerland

Abstract:

Introduction: Match format in children's soccer should be designed to maximize the individual playing time, game involvement and soccer specific skill acquisition. Small-sided games compared to games on a larger pitch show an increased individual playing time, individual game involvement, number of ball contacts, variability and frequency of game situations (Buszard, Reid, Masters, & Farrow, 2016). Playing on a traditional pitch, however, shows increased position specific demands, movement patterns in width and depth and number of long passes (Ometto et al, 2018). Therefore, the aim of this study was to compare the traditional 7v7 match format (TRAD) with a new match format combining a 4v4 and a 7v7 (COMBINED) on technical and tactical indicators in U-11 Swiss youth soccer players.

Methods: 323 (age: 10.23 ± 0.67 years) U-11 soccer players were recruited from regional soccer clubs and divided into two groups to play a tournament with either COMBINED or TRAD. COMBINED contained a 4v4 with reduced pitch size to 20m x 30m and the traditional 7v7 on the age specific regular pitch size of 30m x 50m. To examine the frequency and quality of technical and tactical actions, the matches were video captured and subsequently analyzed by experts on offensive (i.e. passes, ball controls, dribblings, runs with the ball, shot attempts and goals) and defensive indicators (i.e. duels, interceptions and pressing).

Results: The frequency of all measured technical and tactical indicators was significantly higher in the COMBINED compared to TRAD (P<0.05). COMBINED showed an increased number of passes (1.06±0.68 vs. 0.66±0.33, respectively; +61%), ball controls (0.65±0.55 vs. 0.36±0.30; +81%), dribblings (0.47±0.48 vs. 0.30±0.28; +57%), runs with the ball (0.20±0.25 vs. 0.10±0.13; +100%), shot attempts (0.21±0.29 vs. 0.09±0.12; +133%), goals (0.08±0.15 vs. 0.02±0.04; +300%), duels (0.41±0.31 vs. 0.30±0.21; +37%), interceptions (0.29±0.26 vs. 0.21±0.17; +38%) and pressing (0.83±0.58 vs. 0.57±0.32; +46%) per player per minute compared to TRAD. In total children had 61% more actions per player per minute and significantly more successfully (P<0.05) and unsuccessfully (P<0.001) executed actions in COMBINED.

Discussion/Conclusion: The increased number of technical and tactical actions in offensive and defensive match situations in COMBINED should benefit the players' skill development. The COMBINED match format offers children more opportunities for soccer specific skill acquisition. Future research needs to investigate the long-term effects of the COMBINED match format in U-11 soccer players and its impact on training practice.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The reliability of assessing biceps femoris long head architecture using extended field of view ultrasound

Authors:
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Abstract:
Introduction: Hamstring injuries are the most frequent injuries in elite soccer (1). Thirty-four percent of all injuries in elite soccer are affecting the hamstrings, mostly the long head of the biceps femoris (BFlh), with about 16% recurrences (1). Additionally, the hamstrings are the most crucial muscle group needed for propulsion in sprinting (2). Ultrasound is a feasible means to assess the architecture of the BFlh (3). The applied methodological approach should be reliable between sessions as well as between different raters. The aim of this investigation was to assess the inter-rater and inter-session reliability of the measurement of BFlh fascicle length (FL), pennation angle (PA) and muscle thickness (MT) using extended field of view (EFOV) ultrasound.
Methods: Fourteen participants (female n=7, male n=7, age 18-30) were positioned ventral, in a supine position with their knees fully extended. Proximal and distal muscle tendon junction (MTJ) and region of interest (ROI: 50% BFlh length ±5cm) were determined using ultrasound (ACUSON Juniper, SIEMENS Healthineers, Erlangen, Germany) (3). A wooden splint was then mounted alongside the ROI of the BFlh to the participant's leg, granting linear extended field of view (EFOV) ultrasound measurements using a 5.6 cm linear-array probe (6.2-13.3 MHz, 12L3, Acuson 12L3). Three EFOV pictures of the ROI of each leg (BFlh) were independently taken by two assessors at two different sessions with at least one hour in between. BFlh FL, PA and MT were determined manually by both raters in every picture using a specialized software integrated in the ultrasound device (ACUSON Juniper, SIEMENS Healthineers, Erlangen, Germany).
Results: In men, FL was 81.5 mm (SD 12.8), PA was 18.8° (1.9) and MT was 35.4 mm (5.1). In women, FL was 82.6 mm (7.9), PA was 16.3° (1.5) and MT was 31.8 mm (1.7). Inter-session and inter-rater ICC's were calculated. Inter session reliability for fascicle length was SEM (CI 90%) = 4.2mm (3.1, 6.9) and CV = 5.5% (4.0, 9.3), for pennation angle SEM = 1.8° (1.3, 3.1) and CV = 11.1% (7.8, 19.7) and for muscle thickness SEM = 1.1mm (0.8, 1.8) and CV = 3.5% (2.5, 5.8). Inter rater reliability for fascicle length was SEM = 2.6mm (1.9, 4.5) and CV = 3.4% (2.4, 5.9), for pennation angle SEM = 0.8° (0.6, 1.3) and CV = 4.3% (3.0, 7.4) and for muscle thickness SEM = 0.4mm (0.2, 0.6) and CV = 4.2% (3.1, 6.6).
Discussion/Conclusion: Our results are in accordance with published literature (3). However, our calculated SEM's and CV were slightly smaller than those in comparable investigations (3). The inter-session and inter-rater reliability for FL and MT are good. Reliability for PA is acceptable but results should be interpreted carefully. We think that either the quality of the pictures or the manual assessment of the data may have caused the higher SEM's and CV's for PA. Additionally, our results suggest that BFlh MT, FL and PA are different in men and women.
In conclusion, the methodological approach used in this investigation seems to be reliable between raters as well as between sessions for BFlh FL, PA and MT in men and women.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Neuromuscular activity before ACL rupture and during 12 months of rehabilitation - a case report

Authors:

Gentsch A[1], Blasimann A[1], Frangi J[1], Henle P[2], Baur H[1]

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Abstract:

Introduction: Few studies have shown altered neuromuscular activity after anterior cruciate ligament (ACL) rupture, but little is known about pre-injury levels and the development during rehabilitation after surgery (Busch, Blasimann, Henle, & Baur, 2019; Smeets, et al., 2019). The aim of this single-case study was to analyze differences in neuromuscular activity in the affected side before and after ACL rupture and reconstruction until 12 months postoperative.

Methods: Neuromuscular activity of the M. vastus medialis (VM) and lateralis (VL), M. biceps femoris (BF) and M. semitendinosus (ST) of the injured extremity of a 30-year old female athlete (semitendinosus graft, meniscal suturing) was recorded by electromyography (EMG) 3 months before injury (coincidentally), before surgery and 3, 6, 9 and 12 months postoperative. After a 6-minute warm-up on a treadmill (5 km/h), where during the last minute EMG activity was recorded, the athlete ascended at self-selected speed 10 times a 6-step stair with force plates located on step 3 and 4. The EMG of each muscle was split into preactivation (PRE), weight acceptance (WA) and push off (PO) phase. Root mean square values were calculated and submaximally normalized with treadmill EMG data.

Results: Prior to injury, the quadriceps activity showed higher activation of the VM compared to VL in PRE (+46%) and vice versa in PO (+55%). The Hamstrings showed a higher activation of the ST compared to BF in PRE (+66%) and vice versa in PO (+25%). After injury, the ST activation decreased in PRE (-38%) while the other muscles increased in all gait cycle phases (e.g. in PO VM +122%, VL +137). The main changes occurred between surgery and 3 months in PRE (ST +223%, BF +138%) and PO (ST +115%) as well as between 3 and 6 months in WA (VM +158%). After 12 months every muscle in all phases had a higher activation in comparison to preinjury but the differences between VM and VL respectively ST and BF lessened (e.g. VM compared to VL in PRE +21%).

Discussion/Conclusion: Before injury, differences in muscle activity between medial and lateral muscles during stair ascent were detected at PRE (medial > lateral) and PO (lateral > medial) which were less at 12 months. This might point towards injury predisposition (Smeets, et al., 2019). After injury, the activation of the ST decreased whereas all other muscles remain constant or increased. During the rehabilitation the main changes occurred between surgery and 6 months. After 12 months all muscles had a higher activation during all phases.

Active rehabilitation after ACL and meniscal repair seems to have the potential to affect neuromuscular control and seems to result in higher activation of the knee stabilizing muscles.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Mini-Oral Session

Friday 07.02.2020

Room 115 Natural Sciences 2

15:40 Unfallprävention bei J+S - Gelangen die Sicherheitsempfehlungen in die Praxis?
Tobias Arnold

15:45 Urinverlust im (Spitzen-)Sport - (k)ein Problem? Ein narratives Review.
Monika Leitner

15:50 What happens in wheelchair athletics? – A 10 year analysis of women's T54 performance development.
Claudio Perret

15:55 Recovery of mobility function and life-space mobility after ischemic stroke (MOBITEC-Stroke): Study protocol
Roland Rössler

16:00 First Cardiorespiratory Fitness Reference Values for Switzerland: The COmPLETE-Health Study
Jonathan Wagner

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Titel:

Unfallprävention bei J+S – Gelangen die Sicherheitsempfehlungen in die Sportpraxis?

Autoren:
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Abstract:
Einführung: Die BFU, Beratungsstelle für Unfallverhütung, hat in Zusammenarbeit mit dem Bundesamt für Sport (BASPO) und den Sportverbänden Merkblätter zur Unfallprävention in den J+S-Sportarten erstellt. Für jede Sportart wurde ein Merkblatt erstellt, das die in der Sportpraxis zu berücksichtigenden Sicherheitsempfehlungen zusammenfasst. Die Merkblätter haben zum Ziel, das Risiko von Sportunfällen in den J+S-Sportarten zu reduzieren.
Im Rahmen der vorliegenden Evaluation wurde überprüft, ob die Merkblätter bis zu den Zielgruppen gelangen und ob diese die Sicherheitsempfehlungen in der Aus- und Weiterbildung sowie in der Sportpraxis anwenden.

Methoden: Die Erhebungen erfolgten mittels explorativer Interviews und Fallstudien vor Ort im Herbst 2018 sowie einer Online-Befragung bei 246 J+S-Expertinnen und -Experten und 3524 J+S-Leitenden im Februar 2019.

Resultate: Die Ergebnisse zeigen auf, dass das Konzept des Merkblatts grundsätzlich positiv beurteilt wird. Die Merkblätter werden oft als eine Art Checkliste für Sicherheitsaspekte verwendet. Verbesserungspotenzial wird bei der Gestaltung und dem Design verortet: Die Merkblätter sind aktuell rein textlich; sie beinhalten weder Bilder noch grafische Elemente.

Die Diffusion des Merkblatts erfolgt über die Expertinnen und Experten, die dessen Inhalte in ihren Kursen den Leitenden vermitteln sollen. Rund 78% der Experten/-innen und 53% der Leitenden geben in der Online-Befragung an, das Merkblatt zu kennen. Die Tatsache, dass das Merkblatt nicht allen bekannt ist, dürfte damit zusammenhängen, dass die Merkblätter erstens nicht bei allen J+S-Sportarten in den Kursunterlagen enthalten sind und dass zweitens gewisse Personen wenig für das Thema Unfallprävention sensibilisiert sind. Auffällig ist, dass das Merkblatt bei den jüngeren Personen sowie bei französisch- und italienischsprachigen Personen weniger bekannt ist.

Kennt eine Leiterin/ein Leiter das Merkblatt, wenden er/sie es gemäss eigenen Angaben in der Sportpraxis auch an. Es gibt keine Hinweise darauf, dass allenfalls unverständliche Formulierungen die Wirkung der Merkblätter beeinträchtigen. Ebenfalls haben die Empfehlungen keine Auswirkungen auf die Kosten des Sportangebots.

Diskussion/Schlussfolgerungen: Die Evaluation zeigt aber auch Möglichkeiten zur Optimierung der Merkblätter auf. So könnte die Verbreitung der Merkblätter verbessert werden, wenn sie in allen J+S-Sportarten konsequenter in den Kursunterlagen verankert wären. Weiter könnte das Merkblatt in optischer Hinsicht optimiert werden. Schliesslich deuten die Unterschiede zwischen den Sprachregionen sowie zwischen den Altersklassen darauf hin, dass das Merkblatt in der lateinischen Schweiz und bei jüngeren Personen noch besser verankert werden müsste.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Urinverlust im (Spitzen-)Sport - (k)ein Problem? Ein narratives Review.

Authors:

Leitner M[1], Radlinger L[1]

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Abstract:

Introduction:

Urinverlust während sportlicher Aktivitäten oder beim Niesen/Husten wird als Belastungsinkontinenz (BI) bezeichnet [1]. BI hindert Frauen, an sportlichen Aktivitäten teilzunehmen [2]. Joggen und Springen provozieren typischerweise Urinverlust und dadurch ziehen sich betroffene Frauen von sportlichen Aktivitäten zurück [3].

Es gibt keine Evidenz, dass Impact-Belastungen (z.B. Springen, Joggen) BI verursachen [4], vielmehr machen diese eine bestehende Beckenbodenschwäche sichtbar. BI beeinträchtigt die Lebensqualität, die sportliche Leistung und den Selbstwert, erhöht Depression, bewirkt soziale Isolation und sexuelle Dysfunktion [5].

Methods: Es wurde eine Literaturübersicht durchgeführt, um die relevanten Studien in englischer Sprache zu evaluieren, die über BI bei sporttreibenden Frauen und Spitzenathletinnen berichten. Es wurde in den Datenbanken PubMed, Cochrane Library und Google Scholar bis August 2019 gesucht. Die Suchstrategie enthielt die Schlüsselbegriffe "pelvic floor disorders", "urinary incontinence", "athletes", and "sports".

Results: Weltweit ist jede vierte Frau von Urininkontinenz betroffen [6]. Die Prävalenz bei Sportlerinnen liegt zwischen 24% und 80% [7-9]. Für viele ist BI ein Tabuthema und weniger als die Hälfte der Betroffenen suchen professionelle Hilfe. Gründe dafür sind Scham und Peinlichkeit, sowie mangelnde Information über Behandlungsmöglichkeiten [10].

Discussion/Conclusion: Urinverlust im Sport ist ein wenig beachtetes Thema, obwohl die Prävalenz zum Teil sehr hoch ist. Die Scham über den Urinabgang und fehlendes Wissen von Betreuenden, etabliert das Problem als Tabu-Thema. Das gesamte Betreuungsteam von Sportlerinnen sollte in dieser Thematik geschult werden. Beckenbodentraining ist die Therapie erster Wahl bei BI [11] und kann die Häufigkeit und Menge des Urinverlusts verbessern, sowie die Lebensqualität von Athletinnen erhöhen [3]. Sensibilisierung, Information und adäquate Trainingskonzepte für die Beckenbodenmuskulatur sollten ins spitzensportliche Training integriert werden.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

What happens in wheelchair athletics? – A 10 year analysis of women's T54 performance development.

Authors:
Perret C[1]
[1] Institute of Sports Medicine, Swiss Paraplegic Centre, Nottwil, Switzerland

Abstract:

Introduction: The interest in Paralympic summer games was steadily increasing over the past decades (Perret, 2015), whereas the competitions in athletics traditionally attract a huge amount of athletes, spectators and media. Having a closer look at the 1500m finals of women's T54 wheelchair races since Beijing 2008 as an example, the winning time dropped by 7.9% from 3:39.88 min to 3:22.50 min in Rio 2016. Concomitantly, the medal winning time range between first and third place was reduced from 0.52% in Beijing 2008 to 0.08% in Rio 2016. From an athletes' and coaches' point of view the question arises, if this example is only a random single case finding or a general phenomenon and valid for other race distances as well. Therefore, the aim of the present investigation was to analyze performance developments for all of the women's T54 track events (from 100m to 5000m) over the past decade in more detail than just for a single competition such as a Paralympic final.

Methods: A descriptive analysis was performed using the world ranking data between 2009 and 2018 provided by the International Paralympic Committee (https://www.paralympic.org/world-rankings/athletics) for all women's T54 race distances between 100m and 5000m. Calculations were based on the median times of the top eight ranked athletes of each year and data were presented as absolute or relative times over the 10 year data acquisition period.

Results: Median race times of the top eight ranked athletes during the last decade were slowest in 2009 for all distances covered. Fastest times were always found since 2015 or later for all distances (except for the 200m), whereas the development in performance was most pronounced for distances from 800m to 5000m (increase between 10.6 and 18.7% in parallel with longer distance). At the same time 100m and 200m performance only increased by 4.5% and 400m time by 7.9%. Best performances within a Paralympic cycle were generally found in Paralympic years, except for the 200m.

Discussion/Conclusion: One of the main findings of the present analysis was that women's T54 race performance over the longer distances highly and continuously increased in comparison to the sprint distances, where the progress seemed to be rather moderate during the past decade. Possibly the increasing popularity of long distances races such as marathons might have contributed to this development. However, especially during Paralympic years a bigger performance enhancement seems necessary in order to qualify for the final of a certain competition. The 200m competition stands in contrast to the general findings. This can be explained by the fact, that after 2008 the 200m were cancelled at Paralympics in the T54 category.

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Perret, C. (2015). Elite-adapted wheelchair sports performance: a systematic review. *Disabil Rehabil, 39*, 164-172.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Recovery of mobility function and life-space mobility after ischemic stroke (MOBITEC-Stroke): Study protocol

Authors:

Rössler R[1,2], Bridenbaugh S[2], Engelter S[2,3], Infanger D[1], Portegijs E[4], Rantanen T[4], Roth R[1], Giannouli E[1], Schmidt-Trucksäss A[1], Weibel R[5], Peters N[2,3], Hinrichs T[1]

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[3]Department of Neurology & Stroke Center, University Hospital Basel, Switzerland

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[5]Geographic Information Systems Unit, Department of Geography, University of Zurich, Switzerland

Abstract:

Introduction: If survived, stroke is the most common cause of disability in adults. Stroke frequently results in permanent limitations of mobility, and consequently limitation of independence in daily life. Survivors report a restriction in mobility being their number one concern. In order to optimize rehabilitative efforts and their functional outcome, a detailed knowledge of the functional recovery process, in particular regarding mobility, is needed. So far, studies evaluating the recovery of mobility have mostly used self-report measures or simple functional tests. People's life-space, i.e. their mobility in their environment, has been neglected.

Objectives: We will use a battery of innovative data collection methods including wearable sensors and interactive digital maps. The objectives are: 1) To characterize mobility, including physical performance and life-space and changes in mobility within the first year after stroke. 2) To identify and characterize subgroups with different mobility trajectories. 3) To evaluate whether changes in physical performance are associated with changes in life-space. 4) To evaluate patients' motivation for going outdoor as well as transportation use and assistance needed.

Methods: In this prospective cohort study, subjects with incident first stroke treated at the Stroke Center, University Hospital Basel (target N = 59) will be included. Inclusion criteria comprise presence of stroke symptoms potentially affecting mobility; exclusion criteria comprise severe cognitive impairment and physical disability leading to dependency and loss of mobility (modified Rankin score >3). At 3, 6, 9 and 12 months after stroke, a battery of mobility tests will be performed at the study center, including laboratory-based performance tests of balance, strength, and gait (using body-worn sensors and a pressure-sensitive walkway). Life-space assessment (using the Global Navigation Satellite System) will be performed in participants' real life. Sensor-based measures of life-space will be amended by semantic information on visited locations (including motivation, use of transportation, assistance needed) by using interactive digital maps.

Linear mixed effects models will be used to model the trajectories of mobility measures for the total sample and for different subgroups (objective 1). Comparison of trajectories between subgroups will be assessed using likelihood ratio tests. As an exploratory analysis, growth mixture models will be used to identify relevant subgroups with different trajectories (objective 2). After identifying relevant subgroups with different trajectories, multinomial logistic regression models will be used to identify predictors of group-membership. Linear mixed effect models will be used to test whether changes in mobility function parameters are associated with changes in life space mobility (objective 3). Participants' motivation for going outdoors as well as transportation use and assistance needed, will be analyzed descriptively by predefined subgroups (objective 4).

Prospects: Comprehensive and detailed knowledge of recovery patterns will enable the planning of targeted and correctly timed rehabilitation measures. Knowledge about patients' motivation of outdoor mobility will provide the opportunity to define individualized patient-oriented rehabilitation goals.

Acknowledgement: This project is funded by the Swiss National Science Foundation (SNSF) (grant no. 182681).

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

First Cardiorespiratory Fitness Reference Values for Switzerland: The COmPLETE-Health Study

Authors: Wagner J[1], Knaier R[1], Infanger D[1], Königstein K[1], Hanssen H[1], Hinrichs T[1], and Schmidt-Trucksäss A[1]

[1]Department of Sport, Exercise and Health, Division of Sports and Exercise Medicine, University of Basel, Switzerland

Introduction:

The maximum volume of oxygen uptake ($\dot{V}O_{2max}$) as assessed by cardiopulmonary exercise testing (CPET) is a very strong risk factor and outperforms the measurement of other classical risk factors such as body mass index, blood pressure, and smoking. CPET is an important measurement as described in a recent statement by the American Heart Association and its primary outcome, $\dot{V}O_{2max}$, should be assessed as a vital sign (Ross et al., 2016). Beyond $\dot{V}O_{2peak}$, CPET also revealed other markers able to predict health outcomes in healthy subjects and those with heart failure alike such as VE/VCO_2 slope, oxygen uptake efficiency slope, $PETCO_2$ at rest, and VT1. Norm values from an overall healthy population are decisive in ensuring a reliable interpretation of cardiorespiratory fitness (CRF). Differences between the published reference values are striking. CPET norm values seem to be highly dependent on the recruitment and selection of the studied population. Inclusion and exclusion criteria vary widely. There are currently no reference values available for the Swiss population. This prospectively planned study focused on rigorous data assessment and boasted very strict inclusion criteria, including only subjects without having any chronic disease or risk factors, to limit the effect on submaximal and maximal CPET markers.

Methods: In this cross-sectional study, we prospectively recruited 630 subjects aged 20 to 90 years old. All participants completed four hours of general health, cardiovascular health, and physical fitness assessments. CRF markers were assessed breath by breath by way of gas analysis during a bicycle test. After a three-minute warm-up phase, participants performed an individualised ramp protocol until exhaustion. $\dot{V}O_{2peak}$ was assessed as the highest volume of oxygen uptake over 30 seconds during the test. Age- and sex-specific quantile curves were calculated using generalized additive models for location, scale, and shape (GAMLSS). Empirical data are reported in addition to the model-based quantiles and were used for comparisons with other studies.

Results: Five hundred twenty-six subjects (254 women and 272 men) were included in the final analysis. Male subjects achieved a mean $\dot{V}O_{2peak}$ for the age groups of 20 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and ≥ 80 years of 47 ± 8, 44 ± 7, 44 ± 9, 39 ± 9, 37 ± 7, 30 ± 6, and 21 ± 4 mL/kg/min, respectively, while female subjects of the same ages achieved a mean $\dot{V}O_{2peak}$ of 40 ± 9, 39 ± 6, 35 ± 5, 33 ± 5, 27 ± 6, 25 ± 5, and 21 ± 4 mL/kg/min respectively. The rate of decline of the $\dot{V}O_{2peak}$ was approximately 8% for men and 10% for women, and declines per decade increased with increasing age. The mean relative $\dot{V}O_{2peak}$ values of current male subjects were 13%, 44%, 57%, 49%, 62%, and 43% higher when compared with the largest dataset from the United States (US) for the six age decades from the 20s to 70s and 23%, 16%, 20%, 20%, 27%, and 22% higher when compared to the largest dataset in Europe. The corresponding female values were 28%, 77%, 74%, 82%, 62%, and 60% higher when compared with the US data and 23%, 22%, 17%, 24%, 14%, and 18% when compared with the European values.

Discussion: For the first time, reference values for CPET markers in the Swiss population are provided. These data could support more accurate interpretations of CPET markers for Swiss and European populations as compared with datasets from the US or those obtained via treadmill testing. In addition to $\dot{V}O_{2peak}$, we report several other age- and sex-specific normal values for maximal and submaximal CPET markers.

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Ross, R., Blair, S. N., Arena, R., Church, T. S., Despres, J. P., Franklin, B. A., . . . Stroke, C. (2016). Importance of Assessing Cardiorespiratory Fitness in Clinical Practice: A Case for Fitness as a Clinical Vital Sign: A Scientific Statement From the American Heart Association. *Circulation, 134*(24), e653-e699. doi:10.1161/CIR.0000000000000461

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Mini-Oral Session

Friday 07.02.2020

Room 117 Social Sciences 1

15:40 Face-to-face and remote physical activity counselling in in-patients with major depressive disorders – The PACINPAT randomized controlled trial
Robyn Cody

15:45 The PACINPAT study: First experiences with a 12-month physical activity-counselling program in in-patients with major depressive disorders
Jan-Niklas Kreppke

15:50 The acute effects of aerobic exercise on sleep in patients with depression: study protocol for a randomized controlled trial
Gavin Brupbacher

15:55 In persons with Multiple Sclerosis (MS) subjective moderate and vigorous physical activity indices are associated with objectively shorter sleep-onset latency, lower subjective sleep complaints, and lower daytime fatigue, but not with EDSS scores and mental toughness
Oliver Rothen

16:00 Cardiorespiratory fitness but not physical activity buffers real-life stress responses in police officers.
René Schilling

16:05 Effects of self-regulatory skill training on cognitive antecedents and exercise and sport behaviour in high school students: A cluster randomized controlled trial
Manuel Coimbra

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Face-to-face and remote physical activity counselling in in-patients with major depressive disorders – The PACINPAT randomized controlled trial

Authors:

Cody R[1], Kreppke J-N[2], Faude O[2], Zahner L[2], Gerber M[1].

[1]Sport Science and Psychosocial Health, Department of Sport, Exercise and Health, University of Basel, Switzerland

[2]Movement and Training Science, Department of Sport Science, Exercise and Health, University of Basel, Switzerland

Abstract:

Introduction: Major depressive disorder is a chronic disease, which is becoming ever more prevalent and increasingly challenging for those afflicted. Standard treatments for depression are pharmacotherapy and psychotherapy. Limited effectiveness has led to the investigation of exercise as a treatment option, which has proven effective. Physical activity counselling based on behavior change theories, such as the MoVo-LISA model (Fuchs, 2008) and the Behavior Change Wheel (Michie, van Stralen, & West, 2011) can facilitate overcoming the challenges of initiating and maintaining increased physical activity in rehabilitation settings and in healthy populations respectively.

Aim: The aim in this study is to examine whether physical activity counselling based on the aforementioned theories delivered personally and remotely by trained coaches can lead to changes in physical activity levels and an improvement of mental and cardiovascular health among in-patients suffering from depression.

Methods: The study is a multi-centric two-arm randomized clinical trial including an intervention and placebo control group, allocation concealment, and single blinding. Participants (N=334) between the ages of 18 and 65, diagnosed with depression, who are physically inactive and command adequate German skills, are continuously recruited in four Swiss Psychiatric clinics and equally randomized into an intervention and control group via computer-generated code. The intervention group receives a 12-month counselling program delivered by coaches in two personal meetings bi-weekly telephone calls, supported by the use of web application to facilitate planning and self-monitoring. The control group receives two personal meetings in which general physical activity recommendations are provided. The primary outcome, moderate-to-vigorous physical activity, is assessed by waist worn triaxle accelerometer at baseline (upon clinical admission), post (six weeks after discharge) and follow-up (12 months after discharge). Additionally, a healthy group of participants (N=167) is being recruited and assessed at baseline to provide comparison at baseline. Furthermore, a nested qualitative study will be conducted with participants in the intervention group to explore how the intervention is received.

Implications: Improving physical activity may have important implications for tackling metabolic and cardiovascular disease and increasing cognitive functioning in this at-risk population, thus, potentially limiting the future burden of multiple chronic conditions. Increased physical activity may also reduce the likelihood of future depressive episodes, thus, enhancing the quality and quantity of the lives of people suffering from MDD. This study may also give much needed insight into the working mechanisms of behavior change interventions, especially for the promotion of physical activity in an inactive population and provide a more in depth understanding of their experiences.

References:

Fuchs, R. (2008). Aufbau eines körperlich-aktiven Lebensstils im Kontext der medizinischen Rehabilitation: Ein motivational-volitionales Interventionskonzept (MoVo-LISA Projekt). *Unveröffentlicher Endbericht. Freiburg: Universität Freiburg*.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The PACINPAT study: First experiences with a 12-month physical activity-counselling program in in-patients with major depressive disorders

Authors:

Kreppke J-N[1], Cody R[2], Fischer X[1], Faude O[1], Zahner L[1], Gerber M[2].

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Abstract:

Introduction: Depression is a widespread and burdensome chronic disease. Standard treatment for depression includes psychotherapy and pharmacotherapy. In addition, physical activity is an effective method of treatment. Lethargy, low levels of motivation and negative thoughts are associated with this disease. Therefore, people with depression find it particularly difficult to be regularly physically active. In order to increase physical activity despite these challenges, effective programmes to support behavioural change are necessary. In healthy participants, individual telephone coaching and the delivery of certain behaviour change techniques (BCTs) has proven effective in supporting people without time and motivation to initiate physical activity (Fischer et al., 2019). This approach is also promising for people with depression. For implementation, however, population-specific challenges have to be recognised and BCTs, health recommendations and the delivery method must be adapted.

Methods: Within the framework of our PACINPAT study, we offer patients a coaching approach to promote physical activity. Coaching starts with face-to-face meetings in addition to the usual therapy during the stay in the clinic. Thereafter it continues by telephone and the use of a specifically developed online application. This type of remote coaching has the advantage that obstacles such as distance and time are avoided. Because patients often have physical and psychological barriers, special emphasis is placed on building a trusting relationship between the coach and the participant, which may additionally contribute to successfully retaining participants. During the coaching, BCTs such as knowledge transfer, action planning, feedback on behaviour, social support and self-monitoring of behaviour are used which have proven effectiveness in various populations (Samdal et al., 2017). The implementation of BCTs is supported by the online application. Within the password-protected profile, planned and implemented activities can be entered and objectives recorded. The tool also simplifies interaction and communication between coach and participant, as both have access to it.

Results: In this presentation, we will provide insights regarding the procedures and contents of the coaching including the applied online application. We will also describe first experiences regarding the question how the coaching program is perceived by the coaches and the participants.

Conclusion: The coaching, which has been specifically adapted to patients with depression, has so far proved its worth and is currently being implemented at four psychiatric clinics in Switzerland.

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Fischer, X., Kreppke, J.-N., Zahner, L., Gerber, M., Faude, O., & Donath, L. (2019). Telephone-Based Coaching and Prompting for Physical Activity: Short-and Long-Term Findings of a Randomized Controlled Trial (Movingcall). *International Journal of Environmental Research and Public Health, 16*(14), 2626.

Samdal, G. B., Eide, G. E., Barth, T., Williams, G., & Meland, E. (2017). Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults; systematic review and meta-regression analyses. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1), 42.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

The acute effects of aerobic exercise on sleep in patients with depression: study protocol for a randomized controlled trial

Authors:

Gavin Brupbacher[1,2], Doris Straus[2], Hildburg Porschke[2], Thea Zander-Schellenberg[3], Markus Gerber[4], Roland von Känel[5], and Arno Schmidt-Trucksäss[1]

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Abstract:

Introduction: Unipolar depression is one of the most important mental disorders. Insomnia is a symptom of cardinal importance in depression. It increases the risk to develop depression, negatively affects disease trajectory, is the most common symptom after remission, increases the risk of relapse, and is associated with higher suicide rates. Existing therapies for insomnia in depression have limitations. Further adjuvant therapies are therefore needed. Acute aerobic exercise has been shown to have beneficial effects on sleep in healthy individuals and patients with insomnia. We therefore hypothesize that a single session of aerobic exercise has a positive impact on sleep in patients with unipolar depression. This trial aims to investigate the effects of a single bout of aerobic exercise on the subsequent night's sleep in patients with depression.

Methods: This is a two-arm parallel group, randomized, outcome assessor blinded, controlled, superiority trial. Patients between 18 and 65 years of age with a primary diagnosis of unipolar depression (without a psychotic episode) are included. Exclusion criteria are regular use of hypnotic agents, opioids, and certain beta-blockers, as well as the presence of factors precluding exercise, history of epilepsy, restless legs syndrome, moderate obstructive sleep apnea, and a BMI > 40. The intervention is a single bout of aerobic exercise, performed for 30 min on a bicycle ergometer at 80% individual anaerobic threshold. The control group sits and reads for 30 min. The primary outcome is sleep efficiency measured by polysomnography. Secondary outcomes include further polysomnographic variables, subjective pre-sleep arousal, nocturnal cardiovascular autonomic modulation, subjective sleep quality, daytime sleepiness, and adverse events. According to the sample size calculation, a total of 92 patients will be randomized using minimization.

Discussion/Conclusion: This trial will add new information to the body of knowledge concerning the treatment of insomnia in patients with depression. Thereby, the results will inform decision makers on the utility of acute aerobic exercise.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

In persons with Multiple Sclerosis (MS) subjective moderate and vigorous physical activity indices are associated with objectively shorter sleep-onset latency, lower subjective sleep complaints, and lower daytime fatigue, but not with EDSS scores and mental toughness

Authors:

Rothen O[1*], Sadeghi Bahmani D[2,3,4*], Gonzenbach R[5], Bansi J[5], Niedermoser DW[2,6], Gerber M[7], Brand S[2,4,,7,8]

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[8]School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
* Both authors share the first authorship

Abstract:

Introduction: Persons with Multiple Sclerosis (PwMS) are encouraged to stay physically active. In healthy and clinical samples, regular physical activity (PA) is associated with a broad variety of health benefits such as improved subjective and objective sleep indices, lower symptoms of depression, and higher scores of mental toughness. As regards objectively assessed sleep indices, research is less abundant. In a previous study performed in Valens/Switzerland (Sadeghi Bahmani et al., 2019) we showed that an intensive 3-week physical activity intervention improved health indices, including both subjective and objective sleep. In the present study, we assessed PwMS in their natural and home environment.

Methods: A total of 16 PwMS (mean age: 56.6 years; mean EDSS score: 5.40; 13 females) took part in the study. They completed self-rating questionnaires covering sociodemographic information, subjective vigorous and moderate PA, sleep complaints, symptoms of depression, daytime sleepiness, fatigue and mental toughness. Further, in-home sleep-EEG recordings were performed with portable sleep-EEG devices.

Results: Subjective moderate and vigorous PA was associated with objectively assessed shorter sleep-onset latency, higher sleep efficiency, lower subjective sleep complaints, lower daytime sleepiness and fatigue scores. No association was found for EDSS scores and mental toughness.

Discussion/Conclusion: The pattern of results further supports the notion that also among PwMS self-reported PA is associated with favorable subjective and objective sleep indices, along with favorable psychological functioning. EDSS scores do not appear to be associated with sleep indices and psychological functioning.

References:

Sadeghi Bahmani, D., Kesselring, J., Papadimitriou, M., Bansi, J., Puhse, U., Gerber, M., . . . Brand, S. (2019). In Patients With Multiple Sclerosis, Both Objective and Subjective Sleep, Depression, Fatigue, and Paresthesia Improved After 3 Weeks of Regular Exercise. Front Psychiatry, 10, 265. doi:10.3389/fpsyt.2019.00265

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Cardiorespiratory fitness but not physical activity buffers real-life stress responses in police officers.

Authors:

René Schilling[1], Christian Herrmann[2], Flora Colledge[1], Sebastian Ludyga[1], Serge Brand[1,3], Uwe Pühse[1], Markus Gerber[1].

[1] Department of Sport, Exercise and Health, University of Basel, Switzerland

[2] Zurich University of Teacher Education, Zurich, Switzerland

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Abstract:

Introduction: Regular physical activity and high levels of cardiorespiratory fitness have the potential to buffer against physical and mental health impairments, which can result from exposure to occupational stress. Researchers have attributed this protective effect to more favorable stress reactivity patterns among physically active or highly fit individuals. However, most of the existing knowledge has been gained in the laboratory using strongly controlled and standardized tests, such as the Trier Social Stress Test. While high internal validity of such experimental tests can be expected, their external validity can be questioned. Researchers argue that these tests are clearly delimited, controllable, and short-term, where little is at stake for the participants, and the stressors have limited personal impact. Given this background, the purpose of the present study is to examine the stress reactivity of police officers to acute real-life stress situations, and to find out whether officers differ with regard to their stress reactivity depending on their physical activity and fitness levels.

Methods: In total, 201 police officers took part in this study (M=38.6 years, SD=10.1, 35.8% females). Exposure to acute real-life stress was assessed during two consecutive workdays via Ecological Momentary Assessment. Officers were contacted eight times on a smartphone during their workday, and asked to report their current affective states (Positive and Negative Affect Scale), whereas emotional responses were assessed by feelings of stress, and anger. Physiological stress responses and physical activity were assessed via ambulatory assessment using Movisens EcgMove3 devices. Heart rate was measured and heart rate variability (Root Mean Squares of Standard Deviations [RMSSD]; High Frequency [HF] power) was calculated as marker of physiological stress response. Accelerometry-based physical activity was assessed with the same device across a 7-day period, whereas the (submaximal) Åstrand fitness test was used to assess participants' cardiorespiratory fitness levels. Hierarchical linear modeling was used to examine whether participants with high physical activity or cardiorespiratory fitness levels show different physiologic responses to real-life occupational stress.

Results: Police officers with higher cardiorespiratory fitness levels showed lower physiological stress responses, measured as increased parasympathetic reactivity (RMSSD) to feelings of stress at work. These results did not occur in responses to affective states, or anger. Higher levels of weekly physical activity appeared to be a moderator of the interplay between negative affect and HF power. Interestingly, the direction of this relationship was negative, with higher levels of MVPA showing lower HF levels when negative affects states increased.

Discussion/Conclusion: The present study adds insights on possible stress-buffering effects of physical activity and cardiorespiratory fitness in externally valid real-life conditions. Cardiorespiratory fitness appears to be a potential buffer in the physiologic stress response, and is, therefore, recommended to be promoted in highly stressful work environments. Early identification of physiological changes, measured as cardiac vagal control, might help to identify and prevent stress-related pathological developments.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Effects of self-regulatory skill training on cognitive antecedents and exercise and sport behaviour in high school students: A cluster randomized controlled trial

Authors:

Manuel Coimbra[1], Robyn Cody[1], Jan-Niklas Kreppke[1], Markus Gerber[1]

[1]Department of Sport, Exercise and Health, University of Basel, Switzerland

Abstract:

Introduction: School-based physical education has been associated with a multitude of potential learning outcomes (Gerber, 2015). Representatives of a public health perspective suggest that promoting physical activity in and outside the context of school is an important endeavor (Pühse et al., 2011). While the importance of self-regulatory skill training to improve (motor) learning is well documented in both general and physical education (McKenzie & Lounsbery, 2009), the promotion of behavioral skills to foster physically active lifestyles constitutes a rather neglected area in physical education research (Tessier, Sarrazin, Nicaise, & Dupont, 2015). Therefore, the purpose of this study was to examine whether a standardized physical education-based behavior skill training program has the potential to positively impact on adolescents' self-reported exercise and sport participation, as well as cognitive antecedents involved in the regulation of exercise and sport behavior.

Methods: The study was designed as a cluster-randomized controlled trial. A sample of 143 secondary school students (50% girls, aged 14-18 years) attending academic high schools in German-speaking Switzerland were assigned class-wise to the intervention (behavioral skill training) and control condition (conventional physical education lessons). Data was assessed prior and after completion of the 7-week intervention program, which was composed of four 20-min lessons and two reflection phases. Exercise and sport behavior and cognitive antecedents were assessed via self-reports. Effects were tested via repeated measures analyses of covariance.

Results: Compared to a control condition, the intervention program resulted in significant improvements with regard to introjected motivation, coping planning and self-efficacy. The intervention also had a positive impact on adolescents' self-reported sport/exercise behavior.

Discussion/Conclusion: Behavioral skill training as part of compulsory physical education has the potential to improve cognitive antecedents of exercise and sport behavior and to foster adolescents' exercise and sport participation. Enhancing behavioral skills might be one way in which school physical education can contribute to the creation of more physically active lifestyles among adolescents.

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Tessier, D., Sarrazin, P., Nicaise, V., & Dupont, J.-P. (2015). The effects of persuasive communication and planning on intentions to be more physically actie and on physical activity behavioiur among low-active adolescents. *Psychology & Health, 30*, 583-604.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Mini-Oral Session

Friday 07.02.2020

Room 118 **Social Sciences 2**
Chair: Markus Gerber

15:40 Changes in self-reported physical activity predict health-related quality of life among South African schoolchildren: findings from the DASH intervention trial
Stefanie Gall

15:45 KaziHealth: First experiences with a workplace health promotion programme designed for teachers working in disadvantaged primary schools in South Africa
Nandi Joubert

15:50 Potential impact of aerobic exercise intervention with male refugees living in a refugee camp in Greece: An exploratory study
Florian Knappe

15:55 Sleep and physical activity patterns among children from three African countries. Findings from the KaziAfya study
Christin Lang

16:00 Association between nutritional status, physical activity (PA), physical fitness and soil transmitted helminth infections in marginalized areas, Port Elisabeth (PE), South Africa.
Johanna Beckmann

16:05 Physical activity and cardiorespiratory fitness as independent predictors of clustered cardiovascular risk in children living in disadvantaged communities in South Africa: A cross-sectional study
Ivan Müller

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Changes in self-reported physical activity predict health-related quality of life among South African schoolchildren: findings from the DASH intervention trial

Authors:

Stefanie Gall[1], Cheryl Walter[2], Rosa du Randt[2], Larissa Adams[2], Nandi Joubert[1,3,4], Ivan Müller[1,3,] Siphesihle Nqweniso[2], Uwe Pühse[1], Harald Seelig[1], Danielle Smith[2], Peter Steinmann[3,4], Jürg Utzinger[3,4], Markus Gerber[1]

[1]Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland
[2]Department of Human Movement Science, Nelson Mandela University, Port Elizabeth, South Africa
[3]Swiss Tropical and Public Health Institute, Basel, Switzerland
[4]University of Basel, Basel, Switzerland

Abstract:

Introduction: Regular physical activity is associated with multiple health benefits for children(Ortega, Ruiz, Castillo, & Sjostrom, 2008). Evidence from cross-sectional studies suggests that physical activity is positively associated with health-related quality of life (HRQoL)(Breslin et al., 2012; Salvini et al., 2017). The promotion of physical activity, and hence HRQoL, through a school-based intervention is therefore an important endeavor, particularly in disadvantaged areas of low- and middle-income countries, including South Africa(Patel, Flisher, Hetrick, & McGorry, 2007).

Methods: We designed a multicomponent physical activity intervention that was implemented over a 20-week period in 2015 in eight disadvantaged primary schools of Port Elizabeth, South Africa. Overall, 687 children aged 8-13 years participated. HRQoL was measured with the 27-item KIDSCREEN questionnaire. Self-reported physical activity was assessed with a single item of the Health-Behavior of School-Aged Children test, and cardiorespiratory fitness with the 20-m shuttle run test.

Results: Higher baseline levels as well as increasing levels of self-reported physical activity predicted children's HRQoL. Baseline levels and increases in cardiorespiratory fitness predicted children's self-perceived physical wellbeing (a HRQoL subscale). Participation in the multicomponent physical activity intervention only explained limited variance in children's HRQoL.

Discussion/Conclusion: Higher and increasing self-reported physical activity predict HRQoL, which underlines that the promotion of regular physical activity among children living in disadvantaged settings is an important public health measure. Policy makers should encourage schools to create physical activity friendly environments while schools should implement regular physical education as proposed by the school curriculum.

Breslin, G., Gossrau-Breen, D., McCay, N., Gilmore, G., McDonald, L., & Hanna, D. (2012). Physical activity, gender, weight status, and wellbeing in 9- to 11-year-old children: a cross sectional survey. *Journal of Physical Activity and Health, 9*(3), 394-401.

Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjostrom, M. (2008). Physical fitness in childhood and adolescence: a powerful marker of health. *International Journal of Obesity (2005), 32*(1), 1-11.

Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: a global public-health challenge. *Lancet, 369*(9569), 1302-1313.

Salvini, M., Gall, S., Müller, I., Walter, C., du Randt, R., Steinmann, P., . . . Gerber, M. (2017). Physical activity and health-related quality of life among schoolchildren from disadvantaged neighbourhoods in Port Elizabeth, South Africa. *Quality of Life Research*, 1-12.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

***KaziHealth:* First experiences with a workplace health promotion programme designed for teachers working in disadvantaged primary schools in South Africa**

Authors:

Joubert N[1,2,3], Aerts A[5], Adams L[4], Degen J[3], Gall S[3], Gerber M[3], Gresse A[4], van Greunen D[4], Müller I[3], Nqweniso S[4], Probst-Hensch N[1,2], du Randt R[4], Seelig H[3], Shellaby J[5], Smith D[4], Steinmann P[1,2], Utzinger J[1,2], Walter C[4], Pühse U[3].

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Abstract:

Introduction: Globally, non-communicable diseases are increasing and constitute a growing public health problem. Research has revealed that African populations have increasing proportions of deaths attributed to chronic, lifestyle-related diseases (Sitas et al., 2006). The latter findings have been confirmed in South Africa, where non-communicable diseases have steadily increased from 42.9% in total deaths in 2005 to 57.4% of total deaths in 2016 (Statistics South Africa, 2018). With up to 80% of non-communicable diseases preventable through healthy eating and regular exercise, much more emphasis should be placed on educational and prevention strategies. Studies have shown that workplace health promotion programmes have positive effects on participants' physical and mental health, and are effective in improving participants' health-related behaviours (Gerber & Schilling, 2017; Hess, Borg, & Rissel, 2011). This study aims to contribute to healthy communities in disadvantaged settings through developing and evaluating the effects of a school-based, lifestyle health intervention programme for teachers at primary schools in Port Elizabeth, in the Eastern Province of South Africa.

Methods: The study was designed as a cluster randomized controlled trial, including four intervention schools and four schools serving as control, with up to 100 teachers. Health risk assessments included clinical measures, body composition, physical activity, psychosocial wellbeing and nutritional assessments. *KaziHealth*, a short, standardised, theory-based, low cost lifestyle intervention, focusing on physical activity, nutrition and stress and sleep management, was used. During two lifestyle coaching sessions, information was provided, personal health goals were set, barriers identified, and coping strategies planned. Self-monitoring followed thereafter, where the *KaziHealth* mobile application was used to keep teachers motivated by providing short information messages on how new lifestyle behaviours can be performed.

Results: First insights regarding the acceptance and feasibility of the *KaziHealth* programme in the target population will be reported on. Future dissemination of the programme, beyond Port Elizabeth and the Eastern Province of South Africa, will also be shared.

Discussion: *KaziHealth* has the potential to empower teachers to take responsibility for their own health. This study builds on local evidence and offers the opportunity of providing new evidence on health intervention responses to non-communicable disease risk factors and psychosocial parameters. We conjecture that the improved health and well-being of teachers increases productivity, and as role models, benefits will expand to the children they teach and train.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Potential impact of aerobic exercise intervention with male refugees living in a refugee camp in Greece: An exploratory study

Authors:
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Abstract:

Introduction: To date, relatively little is known about suitable treatment options for traumatized refugees (Médecins Sans Frontières, 2017). Although a recent meta-analysis suggests that physical activity can be effective in decreasing PTSD and depressive symptoms (Rosenbaum et al., 2015), few studies have looked at refugee populations (Xin, Karamehic-Muratovic, & Aydt Klein, 2017). Therefore, our study aimed at examining the effects of regular aerobic exercise training on symptoms of PTSD, depression, anxiety, sleep complaints, quality of life, pain, perceived fitness, cardiovascular fitness, and grip strength in male refugees living in a Greek refugee camp.

Methods: In total, 45 refugees (M_{age} = 25.6) volunteered to take part in the data assessment. Refugees mostly came from Syria, Iraq, Kurdistan or Palestine, and 74% were Muslim. All participants were invited to engage in an 8-week exercise intervention. Hierarchical regression analyses were used to analyze the data.

Results: Baseline scores significantly predicted post-intervention scores across all study variables. Regression analyses showed that a higher participation rate predicted fewer anxiety symptoms, better health-related quality of life, higher self-perceived fitness, higher handgrip strength and better cardiovascular fitness at post-intervention. A non-significant trend was also found for PTSD and depressive symptoms, showing that a higher participation rate was associated with fewer complaints at post-intervention.

Discussion/Conclusion: Among male refugees living in precarious conditions in a Greek refugee camp, frequency of participation in an 8-week exercise and sport training program seems to have the potential to positively impact on refugees' health. Due to the pre-experimental study design, our results must be interpreted with caution.

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Médecins Sans Frontières. (2017). *EU border policies fuel mental health crisis for asylum seekers*. Last retrieved on 04 March 2019 on https://www.msf.org/greece-eu-border-policies-fuel-mental-health-crisis-asylum-seekers.

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Sleep and physical activity patterns among children from three African countries. Findings from the KaziAfya study

Authors:

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Abstract:

Introduction: Sleep and physical activity habits during childhood are influenced by developmental, cultural and environmental factors. Poor sleep has been linked to lower immune function, physical activity levels, and psychological functioning. Higher physical activity levels, in turn, are linked to better sleep, higher immune functions and better psychological functioning. However, research on sleep and physical activity within the African population is scarce, particularly among children from marginalized areas. Therefore, the aim of the present study is twofold: First, to close the gap in literature, to report and compare sleep and physical activity patterns of children from three African countries. Second, to investigate the relationship between physical activity and sleep.

Methods: 1320 children aged 5-12 years from each country were recruited**.** *Sleep.* Parents were asked to complete a few sleep-related questions regarding their child`s bed- and rise times. To assess sleep quality, children completed questions from the Pittsburgh Sleep Quality Index (Buysse, Reynolds, & Monk, 1989). To screen for sleep disturbances, children also answered three items of the Insomnia Severity Index (Morin, Belleville, Belanger, & Ivers, 2011), addressing difficulty falling asleep, staying asleep and waking up too early in the morning. *Physical Activity*. Objective physical activity was assessed with an accelerometry (Actigraph wGT3x-BT, Shalimar, FL, USA) worn around the hip. The device was worn for 7 consecutive days to assess a full weekly period, with a sampling epoch of 15 sec (Rowlands, 2007). Time per day spent in MPA (>3 MET) [metabolic equivalents of task]) and VPA (>6 MET) is determined based on the raw accelerometry counts and the ActiLife® computer software, with cut-off values derived from Freedson et al. (1998). The ActiGraph accelerometrys have been validated with children (Crouter, Horton, & Bassett, 2013; Hänggi, Phillips, & Rowlands, 2013).

Results: Data cleaning is currently ongoing. In our presentation, we will report, describe and compare the sleep and physical activity patterns from each country.

Discussion/Conclusion: Adequate sleep and physical activity is crucial for children`s physical and mental development. So far, little is known about the sleep need in African children and its interaction with physical activity and other health related factors in these settings.

SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Association between nutritional status, physical activity (PA), physical fitness and soil transmitted helminth infections in marginalized areas, Port Elisabeth (PE), South Africa.

Authors:

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Abstract:

Introduction:

Children from low and -middle income countries (LMICs) suffer severe consequences from nutritional deficiencies, including increased mortality risk and physical impairments, as well as soil-transmitted helminth (STH) infections (Shrimpton R, 2001 May). Research has shown that undernourishment, especially stunting (low height for age), leads to increased risk of obesity in adulthood (De Lucia Rolfe et al., 2018) especially as communities transition of a westernized lifestyle (i.e. unhealthy diet, low PA-levels). This can lead to both overweight and undernourishment occurring at the same time creating a double burden for public health systems. The present study explores how PA, physical fitness, and infectious diseases are associated with nutritional status among children from marginalized areas in South Africa. Insights regarding the associations will help to develop school health programs that have the potential to improve nutritional status.

Methods:

In 2019, data of 1300 primary schoolchildren, aged 6-12 years old, from four public schools located in marginalized areas were collected in Port Elisabeth region (South Africa), as part of the baseline assessment of the KaziAfya intervention trial. Nutritional status was determined through anthropometry of children including height. STH infection was assessed using the Kato-Katz thick smear technique for stool samples. PA, using moderate-to-vigorous physical activity and sedentary activity counts, was measured with a hip-worn ActiGraph GT3X+ accelerometer during seven consecutive days. Socioeconomic status was assessed through caregiver questionnaires. Multiple linear regressions will be developed to examine whether PA, physical fitness, and STH infections have the potential to "predict" nutritional status. Previous research has shown that children with lower PA levels are more likely to be overweight, poor physical fitness is related to suboptimal nutritional status (Arsenault et al., 2011), and that STH infection is associated with undernourishment. Nevertheless, few studies have considered these variables together in the "prediction" of nutritional status. This void in the literature is addressed in the present paper.

Results:

Data processing is still ongoing. Data analyses will be complete by the end of 2019.

Discussion/Conclusion:

Gaining a deeper understanding of factors that contribute to the explanation of nutritional status and STH-infections is key for the development and implementation of culturally relevant behavioral interventions in resource-poor settings. The promotion of dietary diversity and physical activity as well as the reduction of sedentary time and taxing unhealthy foods in school-aged children could be essential. Elements in policies that encourage a healthy nutritional status and counteract the trend towards increasing levels of overweight/ obesity among children living in LMICs

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SPORTWISSENSCHAFTLICHE GESELLSCHAFT DER SCHWEIZ
SOCIETE SUISSE DES SCIENCES DU SPORT

Title:

Physical activity and cardiorespiratory fitness as independent predictors of clustered cardiovascular risk in children living in disadvantaged communities in South Africa: A cross-sectional study

Authors:

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Abstract:

Introduction: Prevalence rates of cardiovascular diseases (CVDs) increase rapidly especially in low- and middle-income countries such as South Africa. People from socioeconomically disadvantaged backgrounds are highly exposed and are confronted with the double burden of disease. Early detection of children at risk for low cardiorespiratory fitness (CRF) and high blood pressure is recommended to reduce risk for later CVD. The purpose of the present paper was (i) to describe the cardiovascular health risk, physical activity behaviour and CRF levels of primary schoolchildren, attending disadvantaged schools in the Port Elizabeth region, South Africa, and (ii) to examine differences in these variables dependent on children's age and gender.

Methods: We used the cross-sectional follow-up data from the "Disease Activity and Schoolchildren's Health" (DASH) study. Data were assessed between October-November 2017. Blood pressure was assessed with a validated oscillometric digital blood pressure monitor (Omron M6 AC; Hoofddorp, Netherlands). Three measurements were performed, and the means of the last two measurements were used as indicators of systolic and diastolic blood pressure. Based on a standardized test protocol, children's CRF was assessed with the 20 m shuttle run test. To objectively assess children's physical activity, children wore a light triaxial accelerometer device (ActiGraph wGT3X-BT) for seven consecutive days. Children were instructed to wear the monitor continuously around the hip. A 30 Hz sampling rate was used, and recordings were saved as raw files and analysed with the ActiLife software. Data was stored in 10-sec epochs.

Results: The mean age of the total sample was 12.4 years (SD=0.9; age range from 10 – 15 years). The sample was composed of 351 girls and 299 boys. Older children had higher scores for systolic and diastolic blood pressure. While older children engaged less in sedentary activities and light-intensity physical activity, they had higher scores for moderate and vigorous physical activity, and CRF. Compared to boys, girls had higher scores for diastolic blood pressure, thickness of skinfolds and sedentary activity. Results shows that if quartiles are built based on children's CRF or moderate-to-vigorous physical activity level (MVPA), there is a clear gradient of increased clustered cardiovascular risk in children with lower fitness or MVPA levels. Data also show that children who spent more time in sedentary activities had higher systolic blood pressure.

Discussion/Conclusion: This study builds on local evidence and provides insights on cardiovascular health among primary schoolchildren of disadvantaged neighborhoods in the Port Elizabeth region. Regular tracking of blood pressure is essential to detect children at risk for hypertension. Evidence-based data offers the possibility to raise public attention and to justify the need for further engagement in health-promoting policies and primary prevention programs among the most vulnerable groups within South Africa.

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SOCIETE SUISSE DES SCIENCES DU SPORT

Exhibitors

Exhibitors

	Aula	Room 115	Room 117	Room 118
	Prophysics/Kistler: Non-invasive quantification of tissue oxygenation in exercise physiology	**Novotec Medical:** Control your performance	**Imedos Systems:** Retinal Vessel Analysis in Cardiovascular Prevention: Focus on Exercise Therapy	**Neurolite:** Funktionsdiagnostik mit Leonardo Mechanographie und neuromuskuläres Training mit Galileo