

**Special Topic**

*Physical Education's Role in Public Health: Steps Forward and Backward Over 20 Years and HOPE for the Future* (pp. 125–135)

James F. Sallis, Thomas L. McKenzie, Michael W. Beets, Aaron Beighle, Heather Erwin, and Sarah Lee

The 1991 paper, “Physical Education’s Role in Public Health” described the importance of physical education in addressing public health problems. On its 20th anniversary, this article reviews accomplishments in improving the health impact of physical education and identifies areas lacking progress. Major accomplishments include development of evidence-based programs, documentation of health and academic benefits of physical education, and acceptance of physical education as a public health resource. Additional work is needed to evaluate the uptake of evidence-based programs, improve national surveillance of physical education quantity and quality, establish stronger policies supporting active physical education, and achieve wide acceptance of public health goals within the physical education field. These opportunities constitute an agenda for actualizing the promise of Health-Optimizing Physical Education before the next 20-year anniversary.

**Biomechanics**

*Influence of Bicompartamental Knee Replacement on Stand-to-Sit Movement* (pp. 136–142)

He Wang, Jeff Frame, and Lindsey Rolston

Knee osteoarthritis often occurs in medial and patellofemoral compartments. A bicompartamental knee replacement system replaces these two affected knee compartments and keeps the lateral compartment and cruciate ligaments intact. It is yet to be determined whether limbs with bicompartamental knee systems can demonstrate frontal-plane knee mechanics and hamstring coactivation similar to healthy control limbs during daily activities requiring the weight-bearing knees to bend through a large range of motion (e.g., stand-to-sit). Three-dimensional knee mechanics and quadriceps and hamstring electromyographic data were collected from 8 patients with a unilateral bicompartamental knee system and 10 healthy control participants. No differences in frontal-plane knee mechanics and hamstring coactivation were found among the surgical, contralateral, and control limbs during stand-to-sit ( $p > .05$ ).

*Comparison of Lower Body Specific Resistance Training on the Hamstring to Quadriceps Strength Ratios in Men and Women* (pp. 143–151)

Sandor Dorgo, Pradeep Edupuganti, Darla R. Smith, and Melchor Ortiz

In this study, we compared hamstring (H) and quadriceps (Q) strength changes in men and women, as well as changes in conventional and functional H:Q ratios following an identical 12-week resistance training program. An isokinetic dynamometer was used to assess 14 male and 14 female participants before and after the intervention, and conventional and functional H:Q ratios were calculated. Hamstring strength improved similarly in men and women, but improvement in quadriceps strength was significantly greater in men, while women showed only modest improvements. For the conventional and functional H:Q ratios, women showed significantly greater improvements than men. Both men and women were able to exceed the commonly recommended 0.6 conventional and 1.0 functional H:Q ratios after the 12-week lower-body resistance training program.

*Peak Muscle Activation, Joint Kinematics, and Kinetics During Elliptical and Stepping Movement Pattern on a Precor Adaptive Motion Trainer* (pp. 152–159)

Matthew J. Rogatzki, Thomas W. Kernozek, John D. Willson, John F. Greany, Di-An Hong, and John P. Porcari

Kinematic, kinetic, and electromyography data were collected from the biceps femoris, rectus femoris (RF), gluteus maximus, and erector spinae (ES) during a step and elliptical exercise at a standardized workload with no hand use. Findings depicted 95% greater ankle plantar flexion ( $p = .01$ ), 29% more knee extension ( $p = .003$ ), 101% higher peak knee flexor moments ( $p < .001$ ), 54% greater hip extensor moments ( $p < .001$ ), 268% greater anterior joint reaction force ( $p = .009$ ), 37% more RF activation ( $p < .001$ ), and 200% more ES activation ( $p < .001$ ) for the elliptical motion. Sixteen percent more hip flexion ( $p < .001$ ), 42% higher knee extensor moments ( $p < .001$ ), and 54% greater hip flexor moments ( $p = .041$ ) occurred during the step motion. Biomechanical differences between motions should be considered when planning an exercise regimen.

*The Effects of Psoas Major and Lumbar Lordosis on Hip Flexion and Sprint Performance* (pp. 160–167)  
Karine Copaver, Claude Hertogh, and Olivier Hue

In this study, we analyzed the correlations between hip flexion power, sprint performance, lumbar lordosis (LL) and the cross-sectional area (CSA) of the psoas muscle (PM). Ten young adults performed two sprint tests and isokinetic tests to determine hip flexion power. Magnetic resonance imaging was used to determine LL and PM CSA. There were correlations between hip flexion power, sprint performance, and PM CSA, but LL showed no correlation with any parameter. The impact of hip flexion power and LL on sprint stride pattern efficiency was considered. Hip flexion might not have a simple role in the passive knee replacement of the stride pattern; instead, it may be an active parameter. Other investigations are needed to determine the influence of pelvic architecture on sprint performance.

### **Epidemiology**

*African American Preschool Children's Physical Activity Levels in Head Start* (pp. 168–174)  
Bo Shen, Tamara Reinhart-Lee, Heather Janisse, Kathryn Brogan, Cynthia Danford, and K-L. C. Jen

The purpose of this study was to describe the physical activity levels of urban inner city preschoolers while attending Head Start, the federally funded preschool program for children from low-income families. Participants were 158 African American children. Their physical activity during Head Start days was measured using programmed RT-3 accelerometers. Results revealed that the children spent the most time in sedentary and light physical activity, while their participation in moderate-to-vigorous physical activities was low. Given the sedentary class format and limited physical space for the Head Start programs observed, we suggest adding a structured physical activity component to Head Start schools to fight the overweight and obesity crisis.

### **Motor Behavior**

*Expert Anticipatory Skill in Striking Sports: A Review and a Model* (pp. 175–187)  
Sean Müller and Bruce Abernethy

Expert performers in striking sports can hit objects moving at high speed with incredible precision. Exceptionally well developed anticipation skills are necessary to cope with the severe constraints on interception. In this paper, we provide a review of the empirical evidence regarding expert interception in striking sports and propose a preliminary model of expert anticipation. Central to the review and the model is the notion that the visual information used to guide the sequential phases of the striking action is systematically different between experts and nonexperts. Knowing the factors that contribute to expert

anticipation, and how anticipation may guide skilled performance in striking sports, has practical implications for assessment and training across skill levels.

*Distance Reached in the Anteromedial Reach Test as a Function of Learning and Leg Length* (pp. 188–195)

Nicholas P. Bent, Alison B. Rushton, Chris C. Wright, and Mark E. Batt

The Anteromedial Reach Test (ART) is a new outcome measure for assessing dynamic knee stability in anterior cruciate ligament-injured patients. The effect of learning and leg length on distance reached in the ART was examined. Thirty-two healthy volunteers performed 15 trials of the ART on each leg. There was a moderate correlation ( $r = .44-.50$ ) between reach distance and leg length, therefore reach distances were normalized for leg length. Normalized reach distance increased significantly over the 15 trials ( $p < .01$ ), reaching a plateau after 8 trials, identified by a moving average graph. It is recommended that participants be afforded eight practice trials and that reach distances be normalized by expressing them as a percentage of leg length.

*Feedback About More Accurate Versus Less Accurate Trials: Differential Effects on Self-Confidence and Activation* (pp. 196–203)

Rokhsareh Badami, Mohammad Vaez Mousavi, Gabriele Wulf, and Mahdi Namazizadeh

One purpose of the present study was to examine whether self-confidence or anxiety would be differentially affected by feedback from more accurate rather than less accurate trials. The second purpose was to determine whether arousal variations (activation) would predict performance. On Day 1, participants performed a golf putting task under one of two conditions: one group received feedback on the most accurate trials, whereas another group received feedback on the least accurate trials. On Day 2, participants completed an anxiety questionnaire and performed a retention test. Skin conductance level, as a measure of arousal, was determined. The results indicated that feedback about more accurate trials resulted in more effective learning as well as increased self-confidence. Also, activation was a predictor of performance.

*Quiet Eye Duration Is Responsive to Variability of Practice and to the Axis of Target Changes* (pp. 204–211)

Robert R. Horn, Michelle S. Okumura, Melissa G. F. Alexander, Fredrick A. Gardin, and Curtis T. Sylvester

We tested the hypothesis that quiet eye, the final fixation before the initiation of a movement in aiming tasks, is used to scale the movement's parameters. Two groups of 12 participants ( $N = 24$ ) threw darts to targets in the horizontal and vertical axes under conditions of higher (random) or lower (blocked) target variability. Supporting our predictions, random practice and target changes in the vertical axis led to longer quiet eye duration than did blocked practice and target changes in the horizontal axis. Our data suggest that quiet eye is not simply a mediating factor in accuracy, but is responsive to the task's programming demands, being influenced by the necessity to reparameterize the movement from one trial to the next.

## **Pedagogy**

*Exergaming Impact on Physical Activity and Interest in Elementary School Children* (pp. 212–220)

Haichun Sun

In this study, I explored the impact of exergaming on in-class physical activity (PA) and motivation in physical education. Elementary children participated in a 4-week exergaming unit and a 4-week fitness unit. A t test showed the children's in-class PA in the exergaming unit was significantly lower than in

the fitness unit. Results also indicated that students' situational interest in exergaming was significantly higher than in the fitness unit at the beginning and end of instruction. Children's interest declined significantly in both units and at the same rate. The evidence suggests that exergames may have strong motivational power, but it is premature to claim they will increase physical activity enough for children to receive health benefits in physical education.

*An Accomplished Teacher's Use of Scaffolding During a Second-Grade Unit on Designing Games* (pp. 221–234)

Weiyn Chen, Inez Rovegno, Stephen L. Cone, and Theresa P. Cone

The purpose of this study was to describe how an accomplished teacher taught second-grade students to design games that integrated movement and mathematics content. The participants were one physical education teacher, a classroom teacher, and an intact class of 20 second-grade students. Qualitative data were gathered through videotaping of all lessons, descriptions of all 20 children's responses to all lesson segments, and interviews with all participants. In keeping with constructivist principles, the teacher used a progression of tasks and multiple instructional techniques to scaffold the design process allowing children to design games that were meaningful to them. Contrary to descriptions of scaffolding fading across a unit, in this study the scaffolding was a function of the interaction between learners' needs and task content.

*National Board Certified Physical Educators: Perceived Changes Related to the Certification Process* (pp. 235–244)

Amelia Mays Woods and Jesse Lee Rhoades

In this study, we examined National Board certified physical education teachers' (NBCPETs) perceptions of change as a result of certification. Randomly selected NBCPETs (65; women = 53, men = 12) were interviewed. Analysis was done through the lens of Lawson's (1989) Model of the Interactive Factors Influencing Workplace Conditions for the Physical Education Teacher. Several themes connected to teachers' views of themselves as NBCPETs surfaced. In particular, more teaching reflection and a greater focus on student learning and assessment, including an increased emphasis on individualizing teaching were described. An elevation in their perceived status and credibility and expanded opportunities within the educational community also emerged. Alternatively, several NBCPETs explained that the certification process had little or no effect on their teaching.

*College Students' Perspectives, Goals, and Strategies in Sport Education* (pp. 245–254)

Oleg A. Sinelnikov and Peter A. Hastie

We examined the perspective, goals, and strategies of students enrolled in collegiate physical education courses. Our aim was to determine the extent to which a model developed by Allen (1986) describing student-social systems in high schools would approximate those in a collegiate setting. Forty-six students from two elective volleyball classes completed online surveys and participated in group interviews. It was determined that while specific parts of the original model were appropriate for describing college students' agendas for physical education, participation in the Sport Education model provided a more complimentary (in contrast to adversarial) link between the students' quest for good grades and their socializing strategies. A more appropriate model is presented.

*Physical Education "in All Sorts of Corners:" Student Activists Transgressing Formal Physical Education Curricular Boundaries* (pp. 255–267)

Eimear Enright and Mary O'Sullivan

The data for this paper were generated during a 3-year, participatory action research project, with 41 female coresearchers and activists ages 15–19 years old, within and beyond the walls of a secondary school. The two questions we sought to answer were (a) what happens when we engage with students to challenge formal physical education curricular boundaries and connect with students' physical culture; and (b) what are the benefits and the challenges associated with engaging in this sort of practical activism? The findings suggest that a boundary-crossing approach to physical education can facilitate students in finding their own meanings in physical education and physical activity. Supporting boundary-crossing practices is, however, a time- and thought-intensive pedagogical design, which will be challenging for many physical education teachers.

### **Physiology**

*Effect of Strength Training on Rate of Force Development in Older Women* (pp. 268–275)

André Luiz Demantova Gurjão, Lilian Teresa Bucken Gobbi, Nelson Hilário Carneiro, Raquel Gonçalves, Rodrigo Ferreira de Moura, Edilson Serpeloni Cyrino, Leandro Ricardo Altimari, and Sebastião Gobbi

We analyzed the effect of an 8-week strength training (ST) program on the rate of force development (RFD) and electromyographic activity (EMG) in older women. Seventeen women ( $M$  age = 63.4 years,  $SD = 4.9$ ) without previous ST experience were randomly assigned to either a control ( $n = 7$ ) or training ( $n = 10$ ) group. A leg-press isometric test was used for assessment. ST (three sessions/week, three sets of 10–12 repetition maximum, five different exercises) induced significant increases ( $p < .05$ ) on peak RFD (48.4%) and on RFD and EMG of vastus medialis at time intervals of 0–50, 0–100, 0–150, and 0–200 ms (41.1–69.2% and 43.8–64.3%, respectively). Therefore, ST resulted in favorable changes in neuromuscular responses in older women.

*Creatine Kinase Activity Weakly Correlates to Volume Completed Following Upper Body Resistance Exercise* (pp. 276–281)

Marco Machado, Jeffrey M. Willardson, Dailson P. Silva, Italo C. Frigulha, Alexander J. Koch, and Sergio C. Souza

In the current study, we examined the relationship between serum creatine kinase (CK) activity following upper body resistance exercise with a 1- or 3-min rest between sets. Twenty men performed two sessions, each consisting of four sets with a 10-repetition maximum load. The results demonstrated significantly greater volume for the 3-min condition ( $M = 4,156$  kg,  $SD = 867$ , for 3 min; vs.  $M = 3,503$  kg,  $SD = 759$ , for 1 min;  $p < .001$ ), with no significant differences in delta CK activity between conditions ( $p = .574$ ). Nevertheless, there was a weak correlation between the delta CK activity and total volume of exercise completed ( $r = .55$  with a 1-min rest, and  $r = .45$  with a 3-min rest). Therefore, the volume following upper body resistance exercise correlates weakly with serum CK levels, irrespective of rest interval length between sets.

*The Influence of Hydration on Anaerobic Performance: A Review* (pp. 282–292)

Justin A. Kraft, James M. Green, Phillip A. Bishop, Mark T. Richardson, Yasmin H. Neggers, and James D. Leeper

This review examines the influence of dehydration on muscular strength and endurance and on single and repeated anaerobic sprint bouts. Describing hydration effects on anaerobic performance is difficult because various exercise modes are dominated by anaerobic energy pathways, but still contain inherent physiological differences. The critical level of water deficit (~ 3–4%; mode dependent) affecting

anaerobic performance is larger than the deficit (~ 2%) impairing endurance performance. A critical performance-duration component (> 30 s) may also exist. Moderate dehydration (~ 3% body weight; precise threshold depends on work/recovery ratio) impairs repeated anaerobic bouts, which place an increased demand on aerobic metabolism. Interactions between dehydration level, dehydration mode, testing mode, performance duration, and work/recovery ratio during repeated bouts make the dehydration threshold influencing anaerobic performance mode dependent.

*Effects of Different Exercise Intensities With Isoenergetic Expenditures on C-Reactive Protein and Blood Lipid Levels* (pp. 293–299)

Te Hung Tsao, Chang Bin Yang, and Chin Hsing Hsu

We investigated the effects of different exercise intensities on C-reactive protein (CRP), and whether changes in CRP levels correlated with blood lipid levels. Ten men exercised at 25%, 65%, and 85% of their maximum oxygen consumption rates. Participants' blood was analyzed for CRP and blood lipid levels before and after the exercise sessions. Although there was an intensity effect for postexercise high-density lipoprotein levels, there were no significant differences or correlations for postexercise CRP levels or between CRP and lipid levels across the three exercise intensities. In an acute aerobic bout model with isoenergetic expenditures, CRP was not affected by the exercise intensity. Additionally, changes in blood lipid levels might not have been connected to CRP levels for physically fit participants.

**Psychology**

*The Interaction of Functional and Dysfunctional Emotions During Balance Beam Performance* (pp. 300–307)

Jorge Cottyn, Dirk De Clercq, Geert Crombez, and Matthieu Lenoir

The interaction between functional and dysfunctional emotions, as one of the major tenets of the Individual Zones of Optimal Functioning (IZOF) model (Hanin, 2000), was studied in a sport specific setting. Fourteen female gymnasts performed three attempts of a compulsory balance beam routine at three different heights. Heart rate and self-report of functional and dysfunctional emotions were measured during each routine. These data revealed the effectiveness of inducing emotions by manipulating height. Also, performance decreased on the most challenging condition, (i.e., the first attempt on the highest height). Moderated hierarchical regression analysis revealed a significant interaction between functional and dysfunctional emotions only when the dysfunctional emotion level was low.

*The Nature, Occurring Contexts, and Psychological Implications of Weight-Related Teasing in Urban Physical Education Programs* (pp. 308–317)

Weidong Li and Paul Rukavina

This study examined the nature, occurring contexts, and psychological implications of weight-related teasing in urban physical education programs. Semistructured interviews were conducted with 47 participants from a large urban school district. Data were analyzed using inductive analysis and constant comparisons. Most overweight adolescents experienced many different types of teasing in physical education. Victims of teasing felt hurt and experienced uncomfortable feelings due to social comparisons. Overweight students who were not teased reported a variety of reasons. Teachers lacked awareness of and strategies to handle teasing of overweight students. There is a need to implement preventive policies and rules to eliminate weight-related teasing and create inclusive physical education environments.

*Motivation and Exercise Dependence: A Study Based on Self-Determination Theory* (pp. 318–329)  
David González-Cutre and Álvaro Sicilia

The objective of this study was to use self-determination theory to analyze the relationships of several motivational variables with exercise dependence. The study involved 531 exercisers, ranging in age from 16 to 60 years old, who responded to different questionnaires assessing perception of motivational climate, satisfaction of basic psychological needs, motivation types, and exercise dependence. The results of multiple mediation analysis revealed that ego-involving climate and perceived competence positively predicted exercise dependence in a directed and mediated manner through introjected and external regulation. Gender and age did not moderate the analyzed relationships. These results allow us to better understand the motivational process explaining exercise dependence, demonstrating the negative influence of the ego-involving climate in the context of exercise.

### **Sociocultural Foundations**

*“Because I Am Muslim, I Cannot Wear a Swimsuit:” Muslim Girls Negotiate Participation Opportunities for Physical Activity* (pp. 330–339)  
Manal Hamzeh and Kimberly L. Oliver

Drawing on the works of postcolonial critical feminist and Arab Muslim feminist scholars, we discuss in this paper how 4 muslim girls (ages 14–17 years) negotiated their participation in opportunities for physical activity. Data collection methods included self-mapping questionnaires, digital photos, private journal entries, and recordings of informal conversations. We discuss (a) how three discursive challenges emerged in veiling-off opportunities for physical activity, and (b) how the girls uncovered alternative ways of being physically active. To promote active life practices with muslim girls, we need to (a) navigate the diversity of young muslims within the intersecting discourses in their lives that potentially challenge their participation in physical activities, and (b) honor young muslims’ choices while negotiating their chances of maintaining physical activities.

### **Research Notes**

*Using a Single-Item Physical Activity Measure to Describe and Validate Parents’ Physical Activity Patterns* (pp. 340–345)  
Kyra Hamilton, Katherine M. White, and Tom Cuddihy

[No abstract available]

*Movement Pattern and Parameter Learning in Children: Effects of Feedback Frequency* (pp. 346–352)  
Hui-Ting Goh, Shailesh S. Kantak, and Katherine J. Sullivan

Reduced feedback during practice has been shown to be detrimental to movement accuracy in children but not in young adults. We hypothesized that the reduced accuracy is attributable to reduced movement parameter learning, but not pattern learning, in children. A rapid arm movement task that required the acquisition of a motor pattern scaled to specific spatial and temporal parameters was used to investigate the effects of feedback (FB) frequency (100% vs. 62% faded) on motor learning differences between 19 school-age children and 19 young adults. Adults and children practiced the task for 200 trials under the 100% or faded FB condition on Day 1 and returned on Day 2 for a no-FB retention test. On the retention test, children who practiced with reduced feedback performed with greater temporal parameter errors, but not pattern error, than children who received frequent feedback. Motor skill learning in children is influenced by feedback frequency during practice that affects parameter learning but not pattern learning.

*Influence of Emotion on the Control of Low-Level Force Production* (pp. 353–358)  
Kelly M. Naugle, Stephen A. Coombes, James H. Cauraugh, and Christopher M. Janelle

The accuracy and variability of a sustained low-level force contraction (2% of maximum voluntary contraction) was measured while participants viewed unpleasant, pleasant, and neutral images during a feedback occluded force control task. Exposure to pleasant and unpleasant images led to a relative increase in force production but did not alter the variability of force production compared to conditions in which participants viewed neutral images. Findings are discussed with respect to prior work, emphasizing arousal specific changes that emerge at low target force levels.

### **Commentary and Dialogue**

*Do Expert Swimmers Have Expert Technique? Comment on “Arm Coordination and Performance Level in the 400-m Front Crawl” by Schnitzler, Seifert, and Chollet (2011)* (pp. 359–362)

Rod Havriluk

In a recent article by Schnitzler, Seifert, and Chollet (2011), they used an index of coordination (IdC) to quantify arm synchronization in swimming, which has become a practical standard to measure gaps (negative IdC) and overlaps (positive IdC) in arm propulsion. Their previous work supported an increase in IdC as swimming velocity and performance level increase, consistent with mechanics and physiology. Their recent study showed a lower IdC for expert swimmers than for recreational swimmers and concluded “catch-up coordination can be an efficient coordination mode.” In the hopes of preventing coaches and swimmers from using this finding to justify “catch-up stroke,” other explanations are suggested.

*To Glide or not to Glide.... Response to Havriluk’s Comment on “Arm Coordination and Performance Level in the 400-m Front Crawl”* (pp. 363–366)

Christophe Schnitzler, Ludovic Seifert, and Didier Chollet

We recently published an article on arm coordination and performance level in 400-m front-crawl swimming in *Research Quarterly for Exercise and Sport* (Schnitzler, Seifert, & Chollet, 2011). The index of coordination (IdC) was used to quantify interarm coordination. Our results showed that expert swimmers exhibited lower IdC than recreational swimmers over a 400-m trial. In addition to criticizing various methodological points, Havriluk (2012) challenged our conclusion that catch-up could be an efficient model of coordination and instead suggested that it might lead to injuries. An important point in this debate, however, is that our definition of catch-up coordination may differ from the one proposed by Havriluk (2012), which would explain why we consider catch-up coordination to be the dominant mode of coordination used by expert swimmers during training sessions.