

Biomechanics

Effects of Series Elasticity on the Human Knee Extension Torque-Angle Relationship in Vivo -
(pp. 408-416)

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The purpose of this study was to investigate the effects of series elasticity on the torque-angle relationship of the knee extensors in vivo. Forty-two men volunteered to take part in the present study. The participants performed maximal voluntary isometric contractions at eight knee-joint angles (40, 50, 60, 70, 80, 90, 100, 110°). The elongation of the tendon and aponeurosis of the vastus lateralis muscle was directly measured by ultrasonography, while the participants performed ramp isometric knee extensions to the voluntary maximum at 80° of knee angle. There was no significant difference in the torque value between 50° and 100°, although there was variation in the shape of the “torque-angle” relationship. The variability in the torque-angle curve was not affected by the activation level of agonist and antagonist muscles and the moment arm length. The ratio of torque at 100° compared to that at 50° was significantly ($r^2 = 18-23\%$) correlated to the maximal elongation and strain (to initial length) of the tendon structures. These results suggest that increased compliance of tendon structures of the knee extensors may contribute to variations in the torque-angle curves of the knee extensors.

Growth and Motor Development

Kinematic Constraints Associated With the Acquisition of Overarm Throwing Part I: Step and Trunk Actions (pp. 417-427)

David F. Stodden, Stephen J. Langendorfer, Glenn S. Fleisig, and James R. Andrews

The purposes of this study were to: (a) examine differences within specific kinematic variables and ball velocity associated with developmental component levels of step and trunk action (Robertson & Halverson, 1984), and (b) if the differences in kinematic variables were significantly associated with the differences in component levels, determine potential kinematic constraints associated with skilled throwing acquisition. Results indicated stride length (69.3%) and time from stride foot contact to ball release (39.7%) provided substantial contributions to ball velocity ($p < .001$). All trunk kinematic measures increased significantly with increasing component levels ($p < .001$). Results suggest that trunk linear and rotational velocities, degree of trunk tilt, time from stride foot contact to ball release, and ball velocity represented potential control parameters and, therefore, constraints on overarm throwing acquisition.

Kinematic Constraints Associated With the Acquisition of Overarm Throwing Part II: Upper Extremity Actions (pp. 428–436)

David F. Stodden, Stephen J. Langendorfer, Glenn S. Fleisig, and James R. Andrews

The purposes of this study were to: (a) examine the differences within 11 specific kinematic variables and an outcome measure (ball velocity) associated with component developmental levels of humerus and forearm action (Robertson & Halverson, 1984), and (b) if the differences in kinematic variables were significantly associated with the differences in component levels, determine potential kinematic constraints associated with skilled throwing acquisition. Significant differences among component levels in five of six humerus kinematic variables ($p < .01$) and all five forearm kinematic variables ($p < .01$) were identified using multivariate analysis of variance. These kinematic variables represent potential control parameters and, therefore, constraints on overarm throwing acquisition.

History

The American "Alliance" of Health and Physical Education: Scholastic Programs and Professional Organizations, 1920–1950 (pp. 437–450)

Susan G. Zieff

From the 1920s through the early 1940s, school-based programs in both health and physical education – mandated by government legislation and hailed by the public – increased in scope and complexity. By 1937, the assumption of the interconnectedness of the two fields was institutionalized in the merger of the American Physical Education Association with the Department of School Health and Physical Education of the National Education Association to form the American Association for Health and Physical Education. This paper focuses on the role of health education, physical education, and public health professionals in the emergence and critique of scholastic health and physical education programs in the first half of the 20th century.

Measurement and Evaluation

Extending Validity Evidence for Multidimensional Measures of Coaching Competency (pp. 451–463)

Nicholas D. Myers, Edward W. Wolfe, Kimberly S. Maier, Deborah L. Feltz, and Mark D. Reckase

This study extended validity evidence for multidimensional measures of coaching competency derived from the Coaching Competency Scale (CCS; Myers, Feltz, Maier, Wolfe, & Reckase, 2006) by examining use of the original rating scale structure and testing how measures related to satisfaction with the head coach within teams and between teams. Motivation, game strategy, technique, and character building comprised the dimensions of coaching competency. Data were collected from athletes ($N = 585$) nested within intercollegiate men's ($g = 8$) and women's ($g = 13$) soccer and

women's ice hockey ($g = 11$) teams ($G = 32$). Validity concerns were observed for the original rating scale structure and the predicted positive relationship between motivation competency and satisfaction with the coach between teams. Validity evidence was offered for a condensed post hoc rating scale and the predicted relationship between motivation competency and satisfaction with the coach within teams.

Motor Control and Learning

The Evolution of Oscillatory Behavior During Learning on a Ski Simulator (pp. 464–475)
Caroline Teulier, Déborah Nourrit, and Didier Delignières

Recent experiments on the ski simulator produced ambiguous results and raised unanswered questions concerning the true nature of “novice” behavior and the occurrence of behavioral changes during learning. The aim of the present experiment was to analyze the evolving behavior of three beginners during six practice sessions on a ski simulator. The position of the apparatus platform was recorded as time series and used for constructing dynamical models, including stiffness and damping functions. The results showed that novices tended to exploit a Rayleigh damping behavior during the first trials and then transition toward a van der Pol damping. These results replicate previous observations by Nourrit, Delignières, Caillou, Deschamps, and Lauriot (2003) and suggest the transition to the expert behavior could arise early in practice, when the task is of moderate difficulty. The discussion focuses on the properties of the observed learning dynamics and proposes a global conceptualization for acquiring complex motor skills.

Pedagogy

Factors Associated With Transitional Shifts in College Students' Physical Activity Behavior (pp. 476–485)
Susan S. Levy and Bradley J. Cardinal

The Transtheoretical Model (Prochaska & Marcus, 1994) has been widely used as a framework for understanding exercise behavior change. The purpose of this study was to clarify equivocal research findings reported for model predictions when examining stage movement over time rather than static stages and to provide some evidence of the construct validity of transitional stages. Participants were female ($n = 285$) and male ($n = 243$) undergraduates (M age = 19.9 years, $SD = 2.7$) who completed previously validated questionnaires twice, separated by 9 weeks, that assessed stage of change, exercise behavior, processes of change, pros and cons of exercise, and exercise self-efficacy. Participants were classified into one of five transitional shift groups based on their responses at baseline and follow up: (a) stable sedentary, (b) stable active, (c) activity adopters, (d) activity relapsers, and (e) perpetual preparers. Results of a 5 (group) \times 2 (time) repeated measures (RM) analysis of variance (ANOVA) examining exercise behavior revealed a significant interaction ($p < .001$) and supported transitional stage classification, with activity adopters and stable actives increasing exercise over

time and relapsers decreasing activity. Separate 5 (group) x 2 (time) RM ANOVAs examining model constructs revealed no significant interaction for cognitive processes of change; however, activity adopters and stable actives reported significant ($p < .01$) increases in the use of behavioral processes over time, while only the activity relapsers and perpetual preparers reported decreases. Activity relapsers also reported significant ($p < .05$) decreases in the pros of exercise. No significant interactions were found for the cons of exercise behavior. Unlike findings reported in cross-sectional studies, increases in self-efficacy did not accompany increases in exercise stage. The findings strongly support examination of stage movement classifications rather than static stages, as these transitions provide greater insight into the mechanisms of exercise behavior change.

Teachers' Perspectives on the Challenges of Teaching Physical Education in Urban Schools: The Student Emotional Filter (pp. 486–497)

Nate McCaughtry, Sara Barnard, Jeffrey Martin, Bo Shen, and Pamela Hodges Kulinna

The purpose of this study was to analyze how the challenges of urban schools influence physical education teachers' emotional understanding and connections with their students and the implications on their teaching. Sixty-one elementary physical educators from an urban school district in the midwestern U.S. were interviewed multiple times ($N = 136$) over 3 years using interpretive methodology. Teachers reported five unique challenges that significantly shaped their thinking about students and their careers, along with strategies they used to overcome or manage those challenges. The challenges were: (a) insufficient instructional resources, (b) implementing culturally relevant pedagogy, (c) dealing with community violence, (d) integrating more games in curricula, and (e) teaching in a culture of basketball. Implications centered on the guilt-inducing nature of urban teaching, developing an informed and realistic vision of urban physical education, and the role of teacher preparation and professional development.

Does "Sneaky Fox" Facilitate Learning? Examining the Effects of Seductive Details in Physical Education (pp. 498–506)

Bo Shen, Nate McCaughtry, Jeffrey Martin, and Suzanna Dillion

While seductive details are enjoyable, they are unimportant content or activities intentionally inserted to make class fun and interesting. The purpose of this study was to examine the effect of seductive details on students' learning of net games in physical education. Participants were 240 middle school students. A videotaped lesson example named "outfox your opponent" was used as the stimulus, and a 2 x 3 (condition x grade) factorial analysis was designed. The results showed that seductive details directly interrupted students' recall of important learning content and transferring problem solving in learning net games. It is suggested that the function of seductive details on learning should be reconsidered when designing effective motivational strategies in physical education.

Physiology

Metabolic Cost of Stride Rate, Resistance, and Combined Use of Arms and Legs on the Elliptical Trainer (pp. 507–513)

Constance M. Mier and Yuri Feito

We measured the effects of stride rate, resistance, and combined arm-leg use on energy expenditure during elliptical trainer exercise and assessed the accuracy of the manufacturer's energy expenditure calculations. Twenty-six men and women (M age = 29 years, $SD = 8$; M body weight = 73.0 kg, $SD = 15.2$) participated. Twenty-two participants performed two tests, one without the arm poles (leg-only) and the other with arm poles (combined arm-leg). The other 4 participants performed one test without the arm poles. Both tests consisted of six 5-min stages (two stride rates, 110 and 134 strides \cdot min $^{-1}$, and three resistance settings: 2, 5, and 8). Steady-state oxygen uptake (VO_2), minute ventilation (VE), heart rate (HR) and rating of perceived exertion (RPE) were measured. Repeated measures analysis of variance determined higher ($p < .001$) VO_2 , VE, and RPE, but not HR, during combined arm-leg versus leg-only exercise at any given intensity. Increases in stride rate and resistance increased VO_2 , VE, RPE, and HR with the greatest effect on VE and HR from Levels 5 to 8. The manufacturer's calculated energy expenditure was overestimated during both tests. Although the oxygen cost for elliptical trainer exercise was calculated to be approximately 0.1 ml \cdot kg $^{-1}$ per stride and 0.7 ml \cdot kg $^{-1}\cdot$ min $^{-1}$ per resistance level, VO_2 varied widely among individuals, possibly due to differences in experience using the elliptical trainer, gender, and body composition. The elliptical trainer offers (a) a variety of intensities appropriate for most individuals and (b) both arm and leg exercise. Due to the wide variability in VO_2 , predicting the metabolic cost during elliptical trainer exercise for an individual is not appropriate.

Research Notes

Estimation of Errors in Force Platform Data (pp. 514–518)

Stelios G. Psycharakis and Stuart Miller

Agreement in Body Fat Estimates Between a Hand-Held Bioelectrical Impedance Analyzer and Skinfold Thicknesses in African American and Caucasian Adolescents (pp. 519–526)

James C. Hannon, Thomas Ratliffe, and Daniel P. Williams

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