

Biomechanics

Effects of Stretch Shortening Cycle Exercise Fatigue on Stress Fracture Injury Risk During Landing (pp. 1–13)

C. Roger James, Janet S. Dufek, and Barry T. Bates

The purpose of this study was to examine changes in landing performance during fatigue that could result in increased stress fracture injury risk. Five participants performed nonfatigued and fatigued drop landings (0.60 m), while ground reaction force (GRF), electromyographic (EMG) activity, and kinematics were recorded. Fatigue was defined as a 5–20% reduction in vertical jumping performance. Single-subject analyses revealed that all participants were affected ($p \leq .05$) by fatigue. Post hoc comparisons revealed a group effect ($p \leq .05$) for selected variables. Participants landed with (a) less joint flexion at contact and used a greater range of motion, (b) greater GRF peaks and loading rates, and (c) less EMG activity. These changes were consistent with greater risk of stress fracture.

Epidemiology

Steps Counts Among Middle School Students Vary With Aerobic Fitness Level (pp. 14–22)

Guy C. Le Masurier and Charles B. Corbin

The purpose of this study was to examine if steps/day taken by middle school students varied based on aerobic fitness classification. Middle school students ($N = 223$; 112 girls, 111 boys) were assigned to three aerobic fitness categories (HIGH, MOD, LOW) based on results of the FITNESSGRAM PACER test. Four weekdays of pedometer monitoring determined activity levels (steps/day). Boys accumulated significantly more steps/day than girls, $11,589 \pm 3,270$ and $10,232 \pm 2,517$ steps/day, respectively; $F(1, 219) = 16.0$, $p < .001$, $h^2 = .055$. There were no differences in steps/day between grades. HIGH fit participants accumulated significantly more steps/day, $F(2, 217) = 12.2$, $p < .001$, $h^2 = .101$, than moderately fit and low fit participants ($\approx 1,491$ and $\approx 2,867$ steps/day, respectively). Middle school students who participated in sports in addition to physical education (PE) accumulated significantly more steps/day ($\gg 980$ steps/day) than those participating in PE only, $F(1, 219) = 10.0$, $p < .01$, $h^2 = .044$. Although the relationship between physical activity and aerobic fitness was moderate (0.35 ; $p < .01$), these data demonstrated significant differences in accumulated steps/day among youth of varying aerobic fitness levels. Whether improved fitness levels were the result of additional activity or the cause of it remains to be determined. Regardless, the fittest middle school students were also the most active and accumulated a significant amount of steps/day through organized extracurricular physical activities.

Pathways Linking Perceived Athletic Competence and Parental Support at Age 9 Years to Girls' Physical Activity at Age 11 Years (pp. 23–31)

Kirsten Krahnstoever Davison, Danielle Symons Downs, and Leann L. Birch

Girls' perceived athletic competence and parental support of physical activity across the ages of 9 to 11 years were examined as predictors of girls' physical activity at age 11 years. Participants were 174 girls and their mothers and fathers who completed questionnaires when the girls were ages 9 and 11 years. Two alternative temporal pathways linking perceived competence, parental support, and physical activity were assessed using path analysis. Results provided evidence for the child elicitation pathway; higher perceived competence at the age of 9 years predicted higher parental support at age 11 years, which, in turn, predicted higher physical activity among girls. Findings highlight the importance of encouraging parents to make a special effort to support physical activity among girls who do not perceive themselves as being athletically competent.

Pedagogy

Teachers' Reports of Student Misbehavior in Physical Education (pp. 32–40)

Pamela Hodges Kulinna, Donetta J. Cothran, and Rey Regualos

Classroom management, and, more specifically, the management of student behavior, is an essential skill for and central concern of physical education teachers. Surprisingly little information is known, however, about the specific nature of student behaviors that might negatively affect the class environment. The purpose of this study was to examine teachers' reports of student behaviors that may create management issues in physical education classes. Over 300 teachers representing a range of grade levels and school contexts completed a survey related to the frequency of potentially negative student behaviors. Many types of misbehaviors were reported, but the most common were mild. Teachers' reports varied by sex, years of teaching experience, and school context.

Physiology

The Relationship Between Heart Rate Reserve and Oxygen Uptake Reserve in Children and Adolescents (pp. 41–49)

Stanley Sai-chuen Hui and Janus Wan-sze Chan

The purpose of the present study was to examine the relationship between oxygen uptake (VO_2) and heart rate (HR) responses during rest and exercise in Chinese children and youth and to evaluate the relationships between maximal heart rate (%HRmax), heart rate reserve (%HRR), peak oxygen uptake (% $\text{VO}_{2\text{peak}}$), and oxygen uptake reserve (% $\text{VO}_{2\text{R}}$) in Chinese children and youth. Forty-nine Chinese children and youth were studied at rest and during a graded maximal exercise test on treadmill. Resting, submaximal and peak HR and VO_2 were collected. Regression analyses were conducted to investigate the associations between the various forms of HR and VO_2 measures. The

equivalency between %HRR and %VO₂R for adults was examined for children using data obtained in this study. Results indicated that all regression lines between HR measures and VO₂ measures were significantly different from the line of identity ($p < .05$), except the regression line for %HRR versus %VO₂peak in boys. The equivalency between %VO₂R and %HRR for adults was not demonstrated in children and adolescents in this study. In contrast, %HRR was more closely equivalent to %VO₂peak. Because a strong linear relationship was found between HR and VO₂, HR measures, in terms of either %HRmax or %HRR, would still be a practical variable for prescribing appropriate exercise intensity for children and adolescents. Unlike results found for adults, a given %HRR in children and youth was not equivalent to its corresponding %VO₂R.

Perceived Submaximal Force Production in Young Adults (pp. 50–57)

Allen W. Jackson, Andrew W. Ludtke, Scott B. Martin, L. (Perry) Koziris, and Rod K. Dishman

The purpose of this investigation was to examine the force production patterns using perceived stimulus cues from 10% to 90% of maximal force. In Experiment 1, 54 men (age: 19–34 years) and 53 women (age: 18–37 years) performed leg extensions on a dynamometer at a speed of 60°/s. Participants produced actual forces perceived to be 10–90% of maximal force in 10% increments followed by a maximal force. A 2-min rest interval was maintained between each increment. Participants rested 5 min and repeated the protocol. Desired forces were calculated as the required percentage of the produced maximal force. In Experiment 2, 40 men (age: 18–30 years) followed the protocol of Experiment 1, but the submaximal stimuli were randomly presented. In Experiment 1, test-retest results indicated consistency between the trials for actual and maximal force ($r = .90$). The correlations between actual and desired forces were moderately high ($r > .76$). Actual forces trended above desired forces at 10% of maximal, with median errors ranging 33–40% for men and 60–73% for women. From 30% to 90% of maximal forces, actual trended below desired forces, with median errors ranging from a low of 1.5% to a high of 37%. A power function analysis relating the change in actual force with desired force stimuli produced exponents of 0.68 (.95 CI = 0.62–0.74) for men and 0.57 (.95 CI = 0.52–0.62) for women. Findings were similar in Experiment 2, indicating that individuals tended to overshoot and then undershoot desired force production through perceptual force ranges of 10–90% of maximal forces and that force production grew more slowly than perceptual stimulus cues. The results of the present study, along with findings from past research, indicate that production of submaximal force using perceptual cues or stimuli display a great deal of specificity. This specificity is related to type of contraction, amount of muscle mass involved, and number and types of stimuli.

Knee Extensor and Flexor Torque Development With Concentric and Eccentric Isokinetic Training (pp. 68–63)

Larry E. Miller, Lee M. Pierson, Sharon M. Nickols-Richardson, David F. Wootten, Serah E. Selmon, Warren K. Ramp, and William G. Herbert

This study assessed muscular torque and rate of torque development following concentric (CON) or eccentric (ECC) isokinetic training. Thirty-eight women were randomly assigned to either CON or ECC training groups. Training consisted of knee extension and flexion of the nondominant leg three times per week for 20 weeks (SD = 1). Eccentric training increased ECC knee extension and flexion peak torque more than CON training. The ECC group improved acceleration time and time to peak torque with ECC movements versus the CON group. Slow-velocity ECC isokinetic training yielded greater ECC and similar CON torque development gains versus CON training over the course of 20 weeks in young women.

Predicting Activity Energy Expenditure Using the Actical® Activity Monitor (pp. 64–80)
Daniel P. Heil

This study developed algorithms for predicting activity energy expenditure (AEE) in children (n = 24) and adults (n = 24) from the Actical® activity monitor. Each participant performed 10 activities (supine resting, three sitting, three house cleaning, and three locomotion) while wearing monitors on the ankle, hip, and wrist; AEE was computed from oxygen consumption. Regression analysis, used to create AEE prediction equations based on Actical® output, varied considerably for both children ($R^2 = .45-.75$; $p < .001$) and adults ($R^2 = .14-.85$; $p < .008$). Most of the resulting algorithms accurately predicted accumulated AEE and time within light, moderate, and vigorous intensity categories ($p > .05$). The Actical® monitor may be useful for predicting AEE and time variables at the ankle, hip, or wrist locations.

Psychology

Can Self-Reported Preference for Exercise Intensity Predict Physiologically Defined Self-Selected Exercise Intensity? (pp. 81–90)

Panteleimon Ekkekakis, Erik Lind, and Roxane R. Joens-Matre

Exercise prescription guidelines emphasize the importance of individual preferences for different intensities, but such preferences have not been studied systematically. This study examined the hypothesis that the preference scale of the Preference for and Tolerance of the Intensity of Exercise Questionnaire would predict self-selected exercise intensity. Twenty-three previously sedentary middle-aged women participated in a treadmill test and a 20-min session at a self-selected intensity. After controlling for age, body mass index, and peak oxygen uptake, the preference scale accounted for significant portions of the variance in the percentage of oxygen uptake associated with the ventilatory threshold at Minute 15 and Minute 20 of the session at self-selected intensity.

Youth Exercise Intention and Past Exercise Behavior: Examining the Moderating Influences of Sex and Meeting Exercise Recommendations (pp. 91–99)

Danielle Symons Downs, George M. Graham, Stephen Yang, Sandra Bargainnier, and Jay Vasil

The study purposes were to examine: (a) the determinants of exercise intention and past exercise behavior (PEB) using the theories of reasoned action and planned behavior, and (b) the moderating influences of sex and exercise group (meeting or not meeting exercise guidelines). Participants ($n = 676$ adolescents) completed self-reported measures of their exercise attitude, subjective norm, perceived behavioral control (PBC), intention, and PEB. We found that attitude, subjective norm, and PBC explained 55% of the variance in intention, and intention and PBC explained 51% of the variance in PEB. While we found sex and exercise group differences across the study measures, we did not find evidence of significant moderation. Thus, the theory constructs predicted intention and PEB similarly across sex and exercise groups.

Students' Motivational Processes and Their Relationship to Teacher Ratings in School Physical Education: A Self-Determination Theory Approach (pp. 100–110)

Martyn Standage, Joan L. Duda, and Nikos Ntoumanis

In the present study, we used a model of motivation grounded in self-determination theory (Deci & Ryan, 1985, 1991; Ryan & Deci, 2000a, 2000b, 2002) to examine the relationship between physical education (PE) students' motivational processes and ratings of their effort and persistence as provided by their PE teacher. Data were obtained from 394 British secondary school students (204 boys, 189 girls, 1 gender not specified; M age = 11.97 years; $SD = .89$; range = 11–14 years) who responded to a multisection inventory (tapping autonomy-support, autonomy, competence, relatedness, and self-determined motivation). The students' respective PE teachers subsequently provided ratings reflecting the effort and persistence each student exhibited in their PE classes. The hypothesized relationships among the study variables were examined via structural equation modeling analysis using latent factors. Results of maximum likelihood analysis using the bootstrapping method revealed the proposed model demonstrated a good fit to the data, $\chi^2(292) = 632.68$, $p < .001$; comparative fit index = .95; incremental fit index = .95, standardized root mean square residual = .077; root mean square error of approximation (RMSEA) = .054 (90% confidence interval of RMSEA = .049 - .060). Specifically, the model showed that students who perceived an autonomy supportive environment experienced greater levels of autonomy, competence, and relatedness and had higher scores on an index of self-determination. Student-reported levels of self-determined motivation positively predicted teacher ratings of effort and persistence in PE. The findings are discussed with regard to enhancing student motivation in PE settings.

Athletes' Evaluations of Their Head Coach's Coaching Competency (pp. 111–121)

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

This study provided initial validity evidence for multidimensional measures of coaching competency derived from the Coaching Competency Scale (CCS). Data were collected from intercollegiate men's (n = 8) and women's (n = 13) soccer and women's ice hockey teams (n = 11). The total number of athletes was 585. Within teams, a multidimensional internal model was retained in which motivation, game strategy, technique, and character building comprised the dimensions of coaching competency. Some redundancy among the dimensions was observed. Internal reliabilities ranged from very good to excellent. Practical recommendations for the CCS are given in the Discussion section.

Ratings of Perceived Exertion of ACSM Exercise Guidelines in Individuals Varying in Aerobic Fitness (pp. 122–130)

Christopher Kaufman, Kris Berg, John Noble, and James Thomas

The physiological responses of high (HF) and low fit (LF) individuals at given perceived exercise intensities were compared to ranges provided by the American College of Sports Medicine (ACSM). Participants were 7 LF and 8 HF men between the ages of 22 and 26 years. All participants performed a maximum oxygen uptake and lactate threshold test and two 15-min experimental runs in which they exercised at a constant perceived exercise intensity (RPE 13 and 17). The LF group exhibited significantly greater maximum oxygen uptake reserve (%VO₂R; $p < .05$) and velocity of lactate threshold ($p < .01$) values than HF at RPE 13 and 17. Both groups had significantly greater %VO₂R and maximum heart rate values at RPE 13 in comparison with the ACSM ranges, using the highest value for the given range ($p \leq .001$).

Research Notes

Revisiting the Development of Time Sharing Using a Dual Motor Task Performance (pp. 131–136)

Nancy Getchell and Priya Pabreja

Age and Function Differences in Shared Task Performance: Walking and Talking (pp. 137–141)

Kathleen Williams, Virginia A. Hinton, Tamara Bories, and Christopher R. Kovacs

Using Momentary Time Sampling to Estimate Minutes of Physical Activity in Physical Education: Validation of Scores for the System for Observing Fitness Instruction Time (pp. 142–146)

Edward M. Heath, Karen J. Coleman, Tera L. Lensegrav, and Jennifer A. Fallon