Effect of Negative Life Events on Visuomotor Performance and Injury Incidence
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BACKGROUND AND PURPOSE

• Previous research has demonstrated that athletes with negative life stress are 2-5 X more likely to sustain injury1-4:
  - Negative life events have been shown to decrease peripheral vision and prolong reaction time (RT)²
  - The Life Events Survey for Collegiate Athletes (LESCA) provides a mechanism to quantify life stress²
  - Negative LESC score represents number and perceived impact of negative events in previous 12 months
  - The Dynavision D2™ System provides a mechanism to quantify visuomotor RT during performance of various tasks
  - Targets arranged in concentric circles allow for assessment of performance in different visual fields
  - The purpose of this study was to assess the possible influences of negative life events on injury incidence and visuomotor RT associated with the peripheral field of view among collegiate athletes

RESULTS

• Negative LESC score ≥ 10 identified as optimal cut-point for discrimination of injured versus uninjured athletes
  - 1.6 X greater odds for injury occurrence (≥ 10 versus <10)
  - No significant group x ring interaction (F<sub>2,66</sub> = 0.79; p = .462) and no significant group difference (F<sub>2,66</sub> = 0.03; p = .963)
  - Significant difference among rings; increasing RT from 1-5 (F<sub>4,252</sub> = 282.55; p < .001)
  - Despite lack of statistically significant interaction, a different ring 1-5 pattern of change clearly evident (Figure 4)
  - Ring 5 RT ≥ 675 ms identified as optimal cut-point for discrimination of negative LESC score ≥ 10 versus <10
  - 3 X greater odds for high negative LESC score (≥ 675 ms versus < 675 ms)

• The Dynavision D2™ System (Dynavision International; West Chester, OH) used to measure visuomotor RT
  - Standing distance from board (cm) = arm-span (finger-tip-to-finger tip); arms elevated to horizontal) ± 0.22
  - Board height adjusted to position fachroscope (T-scope) at eye level (Figure 1)
  - 60-s “reactive” test (target illumination terminated if not touched within 1 s; minimum of 60 opportunities)
  - Target appearances (illumination) randomized across 4 quadrants and among 5 concentric rings (Figure 2)
  - Participant instructed to maintain visual focus on T-scope and to hit targets when illuminated
  - Single-digit number displayed on T-scope for 0.75 s, which participant was instructed to recite

• Receiver operating characteristic (ROC) analyses used to identify optimal cut-points for variable dichotomization
  - Repeated measures ANOVA used to assess high versus low negative LESC score group x D2 ring average RT

PARTICIPANTS AND PROCEDURES

• 65 NCAA Division I athletes (45 female; 20 male): women’s basketball, soccer, and volleyball; men’s wrestling
  - Age: 19.6 ± 1.3 years; Height: Male 175.4 ± 7.2 cm; Female 172.9 ± 9.3 cm
  - LESC administered prior to beginning of sport season; “negative” score calculated
  - Dynavision D2™ System (Dynavision International; West Chester, OH): used to measure visuomotor RT
  - Foot, Knee, Ankle, and Elbow injuries reported and the Dynavision D2™ T-scope was used for assessment of visual awareness
  - Fishers Exact One-Sided p = .028
  - Sensitivity = 68%; Specificity = 59%
  - Odds Ratio = 3.0 (90% CI: 1.28 – 7.04)

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• Repeated measures ANOVA used to assess high versus low negative LESC score group x D2 ring average RT

• Despite a relatively weak negative LESC association with injury occurrence, a clear cut-point was evident
  - Pychosocial stress caused by negative life events has previously been associated with elevated injury risk3-5
  - Despite lack of statistical significance, a difference in peripheral visuomotor performance appeared to exist
  - As little as 5-10 ms of delay in muscle activation may have a significant adverse effect on joint mechanics6

• Screening for psychosocial stress and impaired peripheral visuomotor RT may identify high-risk athletes
  - Injury risk reduction interventions might include counseling, social support, and visuomotor training
  - Utilization of the Dynavision D2™ T-scope during visuomotor training may be important for improvement of peripheral visual acuity, which may result in faster Ring 5 RT

REFERENCES