

Sleep Quality and Depression Effects on Reaction Time and Injury Risk in College Basketball Players

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BACKGROUND AND PURPOSE

- Reaction time (RT) appears to be a critical component of athletic performance and may relate to injury risk¹
 - Sleep deprivation can result in slower RT, while also negatively affecting mood and neurocognition²
- Extended sleep time has been associated with faster RT, improved mood, and improved athletic performance¹
 - Poor sleep quality and depression appear to be interrelated, both of which may adversely affect performance
- Limited evidence exists concerning the influence of poor sleep quality on visuomotor RT among college athletes
 - An unbalanced rest/activity cycle may increase susceptibility to a sprain or strain³
- The purpose of this study was to assess possible interrelationships among self-reported sleep quality, self-reported depression symptoms, visuomotor RT, and injury incidence among male and female college basketball players

PARTICIPANTS AND PROCEDURES

- NCAA Division-I basketball players; 13 male (20.8 ±1.7 years) and 12 female (19.8 ±1.5 years) basketball players
- Well-validated survey instruments used to quantify sleep quality and depression (total of 39 survey items)
 - Pittsburgh Sleep Quality Index (PSQI)⁴ and Center for Epidemiologic Studies depression scale (CES-D)⁵
- Dynavision D2™ System (Dynavision International; West Chester, OH) used to assess visuomotor RT
 - Board height adjusted to position tachistoscope (T-scope) at eye level (Figure 1, 2)
 - Participant instructed to maintain visual focus on T-scope and to hit targets when illuminated
 - A series of 3 practice trials (30 sec. each) preceded 3 test trials (60 sec. each) for both of 2 test modes
 - 1) Proactive: Targets remain illuminated (red) until hit; T-scope inactive
 - 2) Reactive: Targets illuminated (red) for 750ms; recitation of sentences displayed on T-scope
- Core or lower extremity (Core/LE) sprain or strain occurrences during practice sessions or games documented
 - Receiver operator characteristic (ROC) analyses performed to identify cut-points for dichotomous categorizations
 - Logistic regression analysis utilized to develop a prediction model for Core/LE sprain or strain

Figure 1



Figure 2



RESULTS

- Cross-tabulation analyses identified 2 factors strongly associated with Core/LE sprain or strain occurrence
 - 1) Proactive RT ≥.745ms : 50% sensitivity, 87% specificity (Table 1)
 - 2) Reactive RT ≥.715ms: 50% sensitivity, 80% specificity (Table 2)
 - Analysis of combined factors failed to yield better prediction than Proactive RT alone
- Cross-tabulation analyses identified 4 factors strongly associated with ankle sprain occurrence
 - 1) Proactive RT ≥.745ms: 60% sensitivity, 80% specificity (Table 3)
 - 2) Reactive RT ≥.715ms: 80% sensitivity, 65% specificity (Table 4)
 - 3) PSQI ≥ 6: 80% sensitivity, 60% specificity (Table 5)
 - 4) CES-D ≥ 11: 80% sensitivity, 60% specificity (Table 6)
 - Logistic regression analysis retained all 4 predictors for a multivariable ankle sprain prediction model
 - ROC analysis identified ≥ 3 factors as best model: 80% sensitivity, 90% specificity (Table 7, Figure 3)

Table 1 Proactive Reaction Time – Core/LE Injury		
Cut-Point	Injury	No Injury
≥ .745	5	2
< .745	5	13
Total	10	15

OR: 6.50 90% CI: 1.28 –33.04

Table 2 Reactive Reaction Time – Core/LE Injury		
Cut-Point	Injury	No Injury
≥ .715	5	3
< .715	5	12
Total	10	15

OR: 4.00 90% CI: 0.91 – 17.69

Table 3 Proactive Reaction Time – Ankle Sprain		
Cut-Point	Injury	No Injury
≥ .745	3	4
< .745	2	16
Total	5	20

OR: 6.00 90% CI: 1.03 – 34.90

Table 4 Reactive Reaction Time – Ankle Sprain		
Cut-Point	Injury	No Injury
≥ .715	3	5
< .715	2	15
Total	5	20

OR: 4.50 90% CI: 0.80– 25.26

Table 5 PSQI – Ankle Sprain		
Cut-Point	Injury	No Injury
≥ 6	4	8
< 6	1	12
Total	5	20

OR: 6.00 90% CI: 0.82 – 43.73

Table 6 CES-D – Ankle Sprain		
Cut-Point	Injury	No Injury
≥ 11	4	8
< 11	1	12
Total	5	20

OR: 6.00 90% CI: 0.82 – 43.73

Figure 3

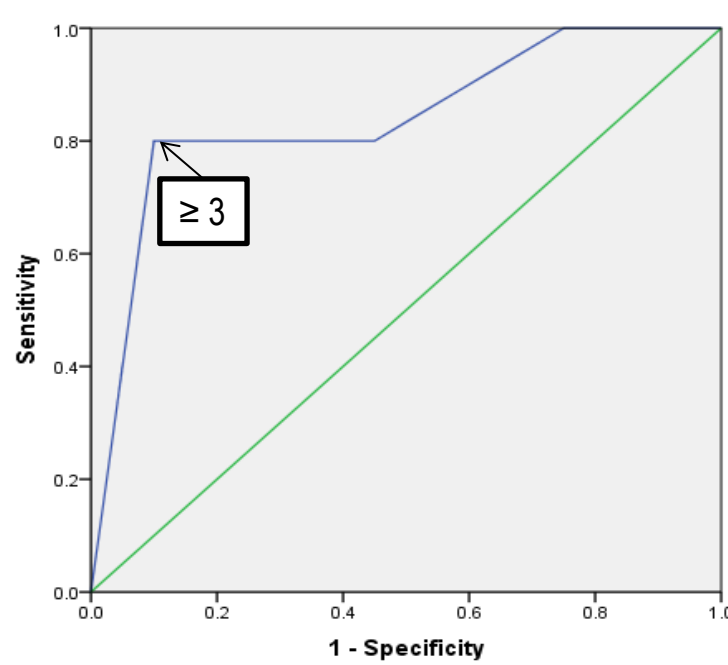


Table 7 4-Factor Ankle Sprain Prediction Model		
Factors +	Injury	No Injury
≥ 3	4	2
0, 1, or 2	1	18
Total	5	20

OR: 36.00 90% CI: 3.95 – 328.23

CLINICAL RELEVANCE

- Athletes who exhibited ≥3 factors are 36 times more likely to have an ankle sprain
- Slower proactive RT alone was just as good as a predictor of lower extremity or core injuries than a combined model of proactive and reactive RT
- Modifiable factors should all be addressed to reduce the risk for injury

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