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Validity of the Short Recovery and Stress Scale in Collegiate Weightlifters

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VALIDITY OF THE SHORT RECOVERY AND STRESS SCALE IN COLLEGIATE WEIGHTLIFTERS

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Abstract

INTRODUCTION: Monitoring an athlete's stress and recovery state across sequential training bouts can be used to gauge fitness and fatigue levels (i.e., preparedness). Previous studies have used jumping performance, biochemical markers, and questionnaires to estimate preparedness. However, self-report questionnaires are the most common due to economical and practical means. The Short Recovery and Stress Scale (SRSS) is an 8-item questionnaire ideal for monitoring; however, convergent validity of the SRSS with physiological and performance measures needs to be investigated. PURPOSE: Thus, the purpose of this study was to determine whether changes in collegiate weightlifter's training volume-load, biochemical markers, and jumping performance correlate to changes in the SRSS. METHODS: 12 collegiate weightlifters (8 males, 4 females) with >1yr of competition experience trained for 4 weeks and were tested at the beginning of each week (T1-T4). Training volume-load with displacement (VLd) was monitored weekly for all exercises. Testing was conducted following an overnight fast and included hydration, SRSS (0-6 scale with 6 indicating highest recovery and stress state), and blood draws (resting testosterone [T], cortisol [C], T:C ratio, creatine kinase [CK]) followed by unloaded (0kg) and loaded (20kg) squat jumps (SJ) on force platforms. Pearson correlation coefficients were calculated between the change in SRSS scores and all other variables from T1-T2, T1-T3, and T1-T4. Alpha level was set at $p<0.05$. RESULTS: Inverse relationships were observed between changes in recovery items and C ($r= -0.61$ to -0.72, $p<0.05$), and unloaded and loaded SJ height and relative peak power ($r= -0.59$ to -0.64, $p<0.05$) from T1 to T2, and T1 to T3. Similarly, positive relationships were observed between changes in stress items and C ($r=0.61$ to 0.72, $p<0.05$), and unloaded and loaded SJ height and relative peak power ($r=0.58$ to 0.84, $p<0.05$) across all time points. No significant relationships were observed between changes in SRSS items and VLd or T, T:C, CK. CONCLUSION: Relationships between changes in some SRSS items and C agree with previous findings highlighting C as an indicator of training stress. Nonetheless, the non-significant relationships between changes in SRSS items, VLd, and other biochemical markers disagrees with previous findings. This may partly be explained by the smaller undulations in VLd in the current study, which is characteristic of actual training. Further, relationships between changes in some SRSS items and jumping performance were opposite of what was expected indicating athlete's perception of their stress and recovery state does not always correspond with their ability to perform. PRACTICAL APPLICATION: These results provide some evidence for the convergent validity of the SRSS. Nonetheless, weightlifting coaches should be cautious in using results from a single test to estimate an athlete's preparedness. Thus, we recommend the SRSS be included as part of a multi-dimensional monitoring program for weightlifters.

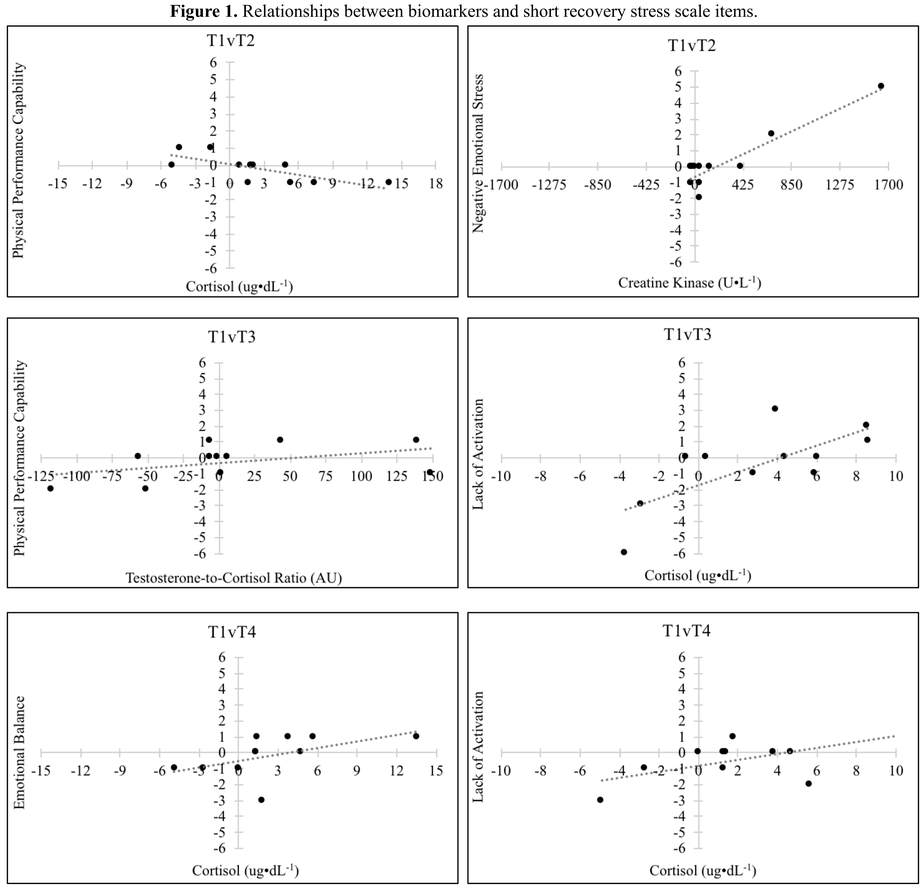
Introduction

- The goal of developing an annual training plan and subsequent programming is to enhance an athlete's performance.
- Monitoring an athlete's stress and recovery state across sequential training bouts can be used to gauge fitness and fatigue levels (i.e., preparedness).
- Previous studies have used jumping performance (1,2,13,26), biochemical markers (1,3,9,10,26), and questionnaires to estimate preparedness (3,17,25).
- However, self-report questionnaires are the most common due to economical and practical means (14).
- Early questionnaires used for athlete monitoring were too long to be repeated often enough for effective monitoring and did not necessarily reflect the athlete's current recovery-stress state (20,24).
- In response to these limitations both the Acute Recovery and Stress Scale (ARSS) and its abridged version, the 8-item Short Recovery and Stress Scale (SRSS) were conceived to provide a more streamlined measurement tool that estimates the current recovery-stress state of the athlete.
- While the scales for both the ARSS and the SRSS were correlated with the Recovery-Stress Questionnaire's (REST-Q) scales, the SRSS is the shortest and therefore best suited for continuous monitoring of athlete performance (18).
- However, convergent validity of the SRSS with physiological and performance measures needs to be investigated.
- Thus, the purpose of this study was to determine whether changes in collegiate weightlifter's training volume-load, biochemical markers, and jumping performance correlate to changes in the SRSS.

Methods

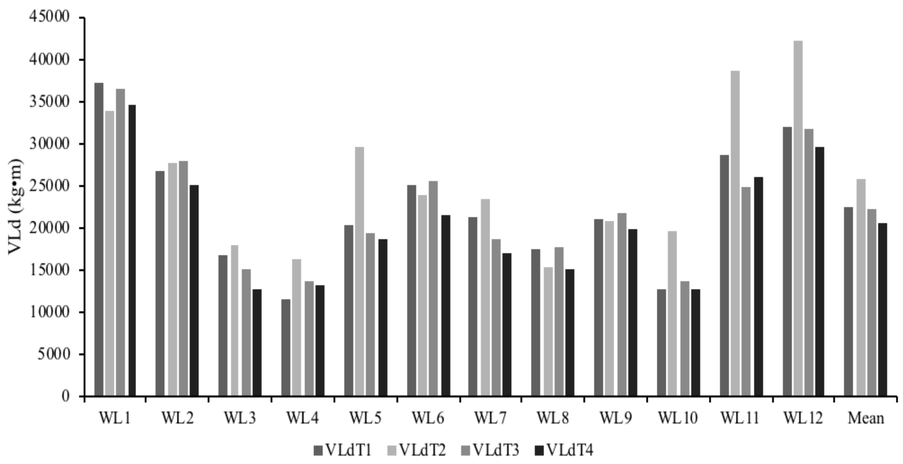
- 12 collegiate weightlifters (8 males, 4 females) with >1yr of competition experience trained for 4 weeks and were tested at the beginning of each week (T1-T4).
- Training volume-load with displacement (VLd) was monitored weekly for all exercises.
- Testing was conducted following an overnight fast and included hydration, SRSS (0-6 scale with 6 indicating highest recovery and stress state), and blood draws resting testosterone (T), cortisol (C), T:C, creatine kinase (CK)) followed by unloaded (0kg) and loaded (20kg) squat jumps (SJ) on force platforms.
- Pearson correlation coefficients were calculated between the change in SRSS scores and all other variables from T1-T2, T1-T3, and T1-T4. Alpha level was set at $p<0.05$.

Figure 1. Relationships between biomarkers and short recovery stress scale items.



Notes: T2vT3=Training week 3 changes relative to training week 2. T2vT4=Training week 4 changes relative to training week 2. T2vT5=Training week 5 changes relative to training week 2. Recovery Items: Physical Performance Capability (e.g., strong, physically capable, energetic, full of power; Emotional Balance (e.g., pleased, stable, in a good mood, having everything under control). Stress Items: Negative Emotional Stress (e.g., feeling down, stressed, annoyed, short-tempered); Lack of Activation (e.g., tired, worn-out, overloaded, physically exhausted). All short recovery stress scale scores are reported in arbitrary units.

Figure 2. Volume-Load Displacement



Notes: VLdT=Volume-Load displacement. WL=weightlifter. VLdT=Volume-Load displacement at specified time point.

Results

- Inverse relationships were observed between changes in recovery items and C ($r= -0.61$ to -0.72, $p<0.05$), and loaded SJ height and unloaded and loaded relative peak power ($r= -0.59$ to -0.64, $p<0.05$) from T1 to T2, and T1 to T3.
- Similarly, positive relationships were observed between changes in stress items and unloaded and loaded SJ height and unloaded and loaded relative peak power ($r=0.58$ to 0.84, $p<0.05$) across all time points.
- Positive relationships were also observed between changes in a recovery item and T:C from T1 to T3 and a stress item and CK from T1 to T2.
- No significant relationships were observed between changes in SRSS items and VLd or T.

Conclusions

- Relationships between changes in some SRSS items and C agree with previous findings that highlight C as an indicator of increased (5,6,8,10) and decreased (8,10) training stress (Figure 1).
- The direct relationship with the physical performance capability and T:C agrees with prior investigations that show T:C as an indicator of preparedness (8,10,11).
- The direct relationship with the negative emotional state item and CK concurs with previous findings that show CK as an indicator of muscle damage (4,15,16,19).
- Relationships between changes in some SRSS items and jumping performance during this study were opposite of what was expected (7,22,23,27) indicating athlete's perception of their stress and recovery state does not always correspond with their ability to perform.
- Non-significant relationships between changes in SRSS items and VLd disagrees with previous findings (12,21,28).
- Disagreements between previous research and training load may partly be explained by the smaller undulations in VLd in the current study, which is more characteristic of actual training (Figure 2).

Practical Applications

- These results provide some evidence for the convergent validity of the SRSS.
- Nonetheless, weightlifting coaches should be cautious in using results from a single test to estimate an athlete's preparedness.
- Thus, we recommend the SRSS be included as part of a multi-dimensional monitoring program for weightlifters.

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