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Section: Original Investigation

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ABSTRACT

Purpose: To investigate the effect of measurement timing and concurrent validity of session (sRPE) and differential (dRPE) ratings of perceived exertion as measures of internal training load (ITL) in adolescent distance runners. **Methods:** Fifteen adolescent distance runners (15.2 ± 1.6 y) performed a two-step incremental treadmill test for the assessment of maximal oxygen uptake, heart rate and the blood lactate responses. Participants were familiarised with RPE and dRPE during the treadmill test using Foster’s modified CR-10 Borg scale. Subsequently, each participant completed a regular two-week mesocycle of training. Participants wore a heart rate monitor for each exercise session and recorded their training in a logbook, including sRPE, dRPE leg exertion (dRPE-L) and breathlessness (dRPE-B) following session completion (0 min), 15 min post-session and 30 min post-session. **Results:** sRPE, dRPE-L and dRPE-B scores were all *most likely lower* when reported 30 min post-session, compared to scores 0 min post-session (% change $\pm 90\%$ confidence limits; sRPE, $-26.5\% \pm 5.5\%$; dRPE-L, $-20.5\% \pm 5.6\%$, dRPE-B, $-38.9\% \pm 7.4\%$). sRPE, dRPE-L and dRPE-B all maintained their largest correlations ($r = 0.74$ to 0.89) when reported at session completion (0 min), in comparison to each of the HR-based criteria measures. **Conclusion:** sRPE, whether reported 0 min, 15 min or 30 min post-session, provides a valid measure of ITL in adolescent distance runners. Also, dRPE-L and dRPE-B can be used in conjunction with sRPE, across all time-points (0, 15 and 30 min), in order to discriminate between central and peripheral exertion.

Key Words: RPE, heart rate, internal training load, youth, endurance training

sRPE has been validated within many different sports and study populations¹². However, less is known about dRPE-L and dRPE-B, in addition to whether these measures of ITL are valid in adolescent populations. While previous research has validated sRPE within many youth sport contexts (e.g. water polo and taekwondo), no studies have validated sRPE, dRPE-L and dRPE-B in adolescent distance runners. This needs addressing due to the popularity of distance running, throughout adolescence, whereby these measures cannot be applied based on the research conducted in adult populations¹³ and dissimilar youth sport contexts. Considering that distance running employs a variety of exercise intensities, typically prescribed via external training loads¹⁴ (i.e. number of intervals), it is essential that the ITL imposed on an adolescent athlete can be effectively monitored by coaches and practitioners.

Therefore, in a population of adolescent distance runners, the purpose of this study was to (1) investigate the effect of measurement timing on sRPE, dRPE-L and dRPE-B following exercise session completion, across three time-points (0, 15 and 30 min), and (2) to examine the concurrent validity of sRPE, dRPE-L and dRPE-B, as measures of ITL, when compared to three individualised HR-based criterion measures.

METHODS

Participants

Fifteen (three girls) adolescent distance runners (age 15.2 ± 1.6 y) volunteered to participate in this study. Each participant had to be a member of an England Athletics affiliated athletics club, aged 13 to 18 years and training for a specific middle distance running event, ranging from the 800 m through to the 3,000 m (including Steeplechase). A convenience-based sampling procedure was used, with each participant receiving verbal and written information of the study procedures. Parental consent and participant assent were obtained. Ethical approval

Table 5. Correlations between sRPE, dRPE-L, dRPE-B and each of the individualised heart rate-based methods of quantifying internal training load

	TRIMP _I			TRIMP _E			TRIMP _L		
	<i>r</i>	±90% CL	Qualitative Inference	<i>r</i>	±90% CL	Qualitative Inference	<i>r</i>	±90% CL	Qualitative Inference
sRPE₀	0.88	0.12	Most likely positive	0.78	0.20	Most likely positive	0.89	0.11	Most likely positive
sRPE₁₅	0.83	0.16	Most likely positive	0.78	0.20	Most likely positive	0.87	0.13	Most likely positive
sRPE₃₀	0.78	0.20	Most likely positive	0.74	0.22	Most likely positive	0.84	0.15	Most likely positive
dRPE-L₀	0.84	0.15	Most likely positive	0.74	0.22	Most likely positive	0.84	0.15	Most likely positive
dRPE-L₁₅	0.78	0.20	Most likely positive	0.72	0.24	Most likely positive	0.82	0.17	Most likely positive
dRPE-L₃₀	0.77	0.20	Most likely positive	0.72	0.24	Most likely positive	0.83	0.16	Most likely positive
dRPE-B₀	0.84	0.15	Most likely positive	0.75	0.22	Most likely positive	0.83	0.16	Most likely positive
dRPE-B₁₅	0.71	0.24	Most likely positive	0.67	0.27	Very likely positive	0.77	0.20	Most likely positive
dRPE-B₃₀	0.66	0.27	Very likely positive	0.61	0.30	Very likely positive	0.72	0.24	Most likely positive

Abbreviations: TRIMP_I, individualised training impulse; TRIMP_E, Edwards’ summated heart rate zone method; TRIMP_L, Lucia’s training impulse; CL, confidence limits; sRPE, session rating of perceived exertion; dRPE-L, differential rating of perceived exertion for leg exertion; dRPE-B, differential rating of perceived exertion for breathlessness; 0, time-point 0 min; 15, time-point 15 min; 30, time-point 30 min