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Overtraining or Burnout: A Training and Psycho-Behavioural Case Study

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ABSTRACT

The aim of this article is to present case study data that challenges the popular conception that athlete burnout represents the ultimate outcome of overtraining. A young male triathlete (22 yrs) completed a comprehensive training diary, along with the Athlete Burnout Questionnaire (ABQ) and the Multi-component Training Distress Scale (MTDS) weekly from the commencement of pre-season training, until the end of the competitive season 45 weeks later. Results were analysed retrospectively upon completion of the season and followed up with semi-structured interviews with the coach and athlete. These longitudinal observations are the first to document an athlete who appears to have simultaneously become overtrained and developed athlete burnout as measured by the ABQ. Thus we are advocating a need for future research to clarify differences between these two training-stress syndromes, specifically in relation to their aetiology, to avoid misdiagnosis and to ensure appropriate treatment for athletes experiencing these conditions is provided.

Key words: Athlete Burnout, Overtraining, Stress, Triathlon

INTRODUCTION

Stress and other emotional responses are part of a complex interplay of physiological, behavioural and psychological reactions to environmental and circumstantial stimuli. When an athlete engages in regular training, they actively challenge the natural homeostatic balance to elicit adaptations and performance gains. However, stressors outside of sport may also compromise an athlete's ability to maintain a homeostatic balance. Evidence demonstrates that psychological processes and emotional states influence the aetiology and progression of disease and resistance or vulnerability to illness [1]. In keeping, there is now a shifting trend towards a psychobiological approach to investigating the aetiology of overtraining (OT) [2, 3]. However, it is difficult to distinguish between OT and athlete

burnout, as literature cites both psychological and physiological stressors as antecedents of each state.

Traditionally grounded in a psychosocial framework, sport scientists have suggested that the negative, unmotivated and exhausted states sometimes described by athletes are a sport-related manifestation of the burnout syndrome [4]. While burnout is a commonly used term within the sporting community, there is much debate as to the definition and measurement of athlete burnout [5]. To date, three main operational definitions of athlete burnout have been presented. Firstly, a cognitive-affective model of athlete burnout, which emphasizes the effect of imbalances between the demands on an athlete, the resources they have to cope with the demands, and the cognitive appraisal of the perceived imbalance [6]. Secondly, athlete burnout as the endpoint of excessive physical training [7]. Thirdly, a physical withdrawal from sport following an intense investment of effort and high achievement in sport [8]. Current research trends have proposed a motivational approach to the study of burnout in elite athletes [9-11], while still using the original conceptualisation of burnout in professional health-care settings [12]. Therefore, athlete burnout represents a stress reaction syndrome comprised of three dimensions: (1) a reduced sense of accomplishment; (2) sport devaluation; and (3) feelings emotional/ physical exhaustion [13]. Thus grounded in a psychosocial framework, burnout refers to the process surrounding, and in response to, stress overload, where excessive physical stressors are possible, but not requisite antecedents.

Perhaps because of the complexity of the overtraining syndrome (OTS) and a poor understanding of its aetiology, considerable variation exists in the terms used to describe this phenomenon or group of related phenomena. Overreaching (OR), OT, OTS, staleness, overload, underperformance, under-recovery, short- and long-term OT, and more recently, the 'unexplained under-performance syndrome' [14] have all been used by different researchers. OS is defined as a chronic accumulation of training and non-training stressors, resulting in a decrement of performance capacity with prolonged maladaptation of several biological, neurochemical, hormonal and metabolic regulatory mechanisms [15]. However, it is important to acknowledge that there is a continuum from deliberate overload training or functional OR (F-OR) to non-functional OR (NF-OR; often referred to as OT) and finally OTS. At this stage, differentiation between NF-OR and OTS would be very difficult and would depend on the results of clinical diagnosis [15]. Indeed, F-OR can be a deliberate process resulting from periods of specific overload training stressors, such as during a training camp, for the purpose of eliciting performance gains [16]. However, it has been suggested that the lasting negative consequences occur when there is an imbalance between the psychobiological stressors imposed upon an athlete, and the athlete's ability to adapt to or cope with these stressors is hindered or compromised by inadequate recovery [17].

A stress response is more likely to manifest when an athlete perceives that it is important to succeed, but feels unable to meet the demands of the situation. As such, the psychological stress response is influenced by three main factors: 1) personality factors; 2) a history of stressors; and 3) coping resources available [6]. The original definition of athlete burnout will be adopted for the current discussion, where signs and symptoms of athlete burnout develop as a consequence of a perceived imbalance between the psychosocial stressors an athlete is exposed to and the coping strategies they have available [6], which is consistent with current research trends. As such, withdrawal from sport may be considered one of the many possible consequences, but not a necessary outcome. In comparison, NF-OR will be defined as a chronic accumulation of training and non-training stressors, resulting in a decrement of performance capacity with mal-adaptation of several physiological regulation mechanisms, consistent with the European Congress of Sport Sciences' definition [15]. As such, the

primary aim of the current case study is to determine whether NF-OR and burnout may co-exist. Our hypothesis is that these two states are independent of one another and may co-exist.

METHOD

PARTICIPANT

The participant was an up-and-coming talented young triathlete (male, 22 yrs), who was originally from a competitive swimming background. At the time of data collection, the participant had been competing in triathlons for two years, and was preparing to compete in the open division for the first time. He was a full-time undergraduate university student who also worked part time. Following institutional ethical approval and discussions with the coach, informed written consent was obtained from the athlete prior to commencing data collection.

INSTRUMENTS

Athlete Burnout Questionnaire (ABQ)

Developed to specifically assess athlete burnout, the Athlete Burnout Questionnaire (ABQ) [18] is composed of three 5-item subscales designed to measure: a) reduced sense of accomplishment, b) sport devaluation, and c) emotional/ physical exhaustion. Participants respond to items on a 5-point scale anchored by almost never (1), sometimes (3), and most of the time (5). Acceptable internal consistency, test-retest reliability, and construct validity have been previously reported [18].

The Multi-Component Training Distress Scale (MTDS)

Multi-Component Training Distress Scale (MTDS) is a multi-component assessment instrument for monitoring athlete psycho-behavioural responses to training stimuli [19]. Specifically developed to monitor an athlete's response to training stimuli during periods of overload training, this composite instrument consists of six discrete factors reflecting common psycho-behavioural signs and symptoms of NF-OR. The six MTDS factors measured were: Depression (F1), Vigour (F2), Physical Signs and Symptoms (F3), Sleep disturbances (F4), Perceived stress (F5) and Fatigue (F6). Evidence of reliability and criterion-related validity has been provided [19].

PROCEDURES

A comprehensive training diary has been cited as a crucial diagnostic aid in managing the 'tired' athlete in conjunction with other psychosocial factors [20]. The athlete completed a weekly training log recording the type of training, volume and intensity and time of day each session was undertaken and whether the session was performed under the supervision of a coach (Coached), in a training group (Group) or on his own (Individual). The athlete was also asked to indicate on a checklist any signs or symptoms of upper-respiratory tract infections (URTI's) and any injuries, or minor aches and pains experienced throughout the week. A record of races, time trials, and how happy the athlete was with these performances was also noted. In addition to the training log, the athlete completed the ABQ and the MTDS. Upon completion of the study, the researcher met individually with the athlete and the coach for a semi-structured discussion on the events of the past season. To check for content validity and control for researcher bias, traditional checking procedures were employed [21, 22].

DATA ANALYSIS

Training log data are presented for the five distinct nine-week training phases for each of the variables. Namely Phase 1: general preparation; Phase 2: specific preparation; Phase 3: early competition season; Phase 4: mid-competition season; and Phase 5: end of competition season. Training was also categorised by the time of day the sessions were completed each week (i.e., early training commenced before 8:00am; morning training commenced between 8:00am and 12:00pm; afternoon training commenced between 1:00pm and 4:00pm; evening training commenced from 5:00pm onwards). Cohen's *d* effect sizes were calculated to determine if changes noted between phases were meaningful for the data [23].

RESULTS

Across the course of the study, the athlete completed 480 training sessions, cycled over 12,000 km, and competed in 15 events. The details of the training log data are presented in Table 1, with the results averaged for each of the nine-week training phases. MTDS data indicated that his responses for depression, perceived stress, fatigue and physical signs and symptoms all peaked during phase 4. This was reflected in a concurrent marked decrease in vigour at this point which is indicated in Figure 1. These observed changes were consistent with the presentation of common symptoms of OTS that were noted by a Medical Doctor at the same time the MTDS data peaked, and he was classified as experiencing burnout as measured by the ABQ. Changes in the athletes MTDS and ABQ scores are presented in Figure 1 and Figure 2 respectively.

Table 1. Training Log - Average Values for Each Phase as Recorded by the Triathlete

	General preparation	Specific preparation	Start of competitive season	Main competitive phase	End of competitive season	
Phase #	P1 = 9 wks	P2 = 9 wks	P3 = 9 wks	P4 = 9 wks	P5 = 9 wks	
Average number of sessions /week	Early	4.1	4.0	4.7	3.9	3.6
	Morning	3.2	2.9	2.2	2.5	2.7
	Afternoon	2.6	3.1	2.3	1.6	1.4
	Evening	1.9	1.4	0.7	0.8	2.6
	Total	11.8	11.4	9.9	8.8	10.3
	Swim	2.6	3.3	3.2	2.7	2.5
	Ride	5.0	2.8	2.3	2.0	2.1
	Run	1.6	2.9	2.4	2.2	2.6
	Other	2.6	2.4	2.0	1.9	3.1
	Coached	5.1	4.1	3.8	3.2	2.2
	Group	1.3	2.3	1.6	1.6	2.1
	Individual	5.4	5.0	4.4	3.9	5.7
	Av. duration (hrs: min)	1:46	1:27	1:20	1:08	1:15
	Training volume (hrs/wk)	20.8	16.6	13.2	9.9	12.8

Anecdotal evidence was as follows. Throughout the initial nine week phase, the athlete perceived that he was “on track” with training, and he viewed any minor aches and pains to be a result of training. There was a slight reduction in training during phase 2 due to injury and illness, but by the commencement of phase 3 he was back on track. The competitive

season (Phase 3) commenced with shorter duration races; and as such, there was a general shift in training from long duration to short, high-intensity speed-focused sessions, with a decrease of 20% in training volume to an average 13.2 hr.wk⁻¹. The athlete indicated disappointment with his performances based on comparisons against his peers. Despite a heavy competition schedule, he maintained a high training volume load, and on one occasion, completed six sessions in one day. However, as time progressed he began to feel increasingly tired and flat and these changes were noted in his MTDS scores (Figure 1).

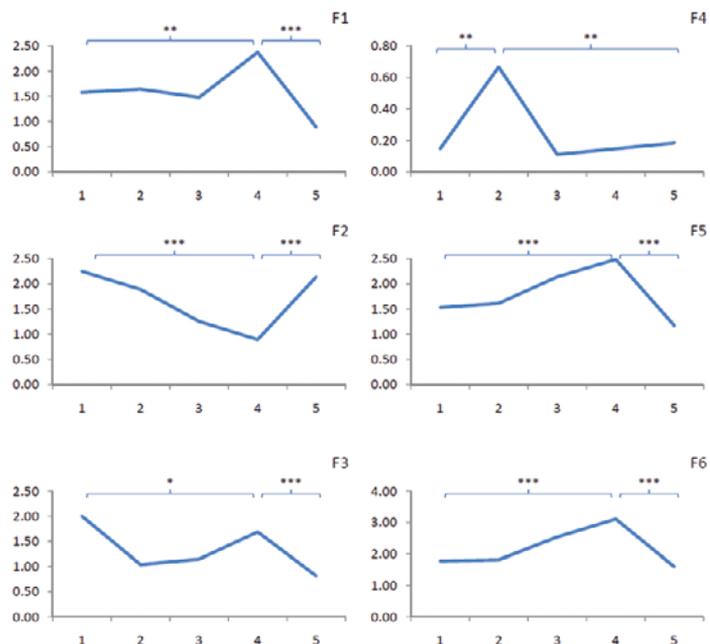


Figure 1. Changes in Mean Score of the Six MTDS Factors Over the Five Training Phases

Note: Changes over the five phases (1-5) for each of the six MTDS factors as measured on the self-report five point scale (0-4). **F1**: Depression; **F2**: Vigour; **F3**: Physical Signs and Symptoms; **F4**: Sleep disturbances; **F5**: Perceived stress; **F6**: Fatigue. Using Cohen's *d*, *** indicates a large effect size (ES); ** moderate ES; * small ES.

At the commencement of phase 4 he was diagnosed with an iron deficiency, and reduced his training for a week. However, in the fortnight following, he increased his training by 150%, from 10 to 15 sessions, which culminated in the second state series race. Four weeks into phase 4, he “knew something was not right”. That weekend he competed in two events, an invitational aquathlon (Friday) and on the Sunday, a 10 km open water swim. The following week he reportedly could not recover from a session, but he still competed in the State Olympic Distance Championships (1.5 km swim, a 40 km bike leg and a 10 km run). He began to present with significantly elevated resting heart rates, and a suppressed maximal heart rate. The following weekend, at the State Aquathlon Championships, he suffered from spatial disorientation in the water, and considered withdrawing during the race, which is something he has never done before.

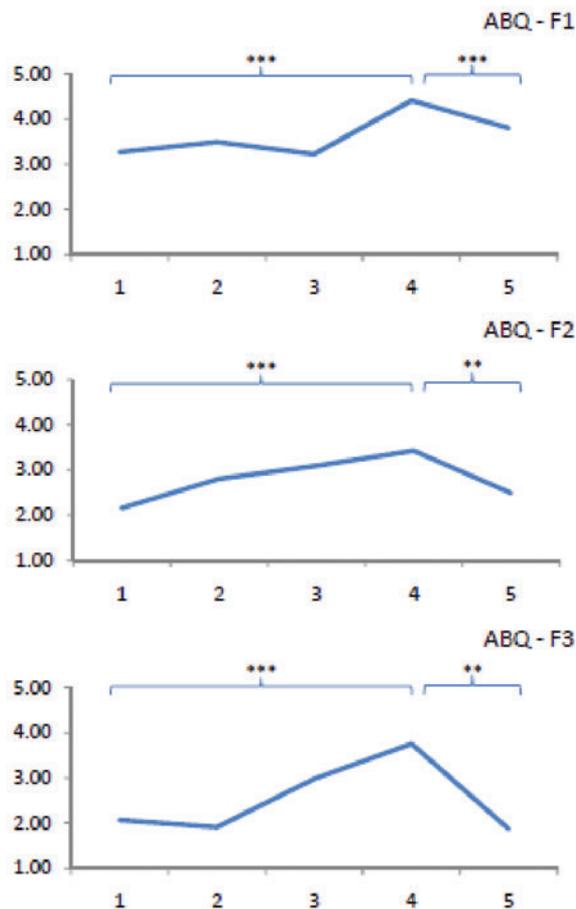


Figure 2. Changes in Mean Score of the Three ABQ Factors Over the Five Training Phases.

Note: Changes over the five phases (1-5). ABQ-F1: Reduced sense of accomplishment; ABQ-F2: Sport devaluation; ABQ-F3: Emotion and physical exhaustion. Using Cohens d , *** indicates a large effect size (ES); ** moderate ES; * small ES.

Following this event, the triathlete chose to end his competitive season prematurely. He took four weeks off, during which training was dramatically reduced. He exercised only when he felt like it, and did not cycle. While the athlete's NF-OR symptoms appeared to be resolved following a month of recovery; his feelings of low accomplishment, devaluing of his involvement in the sport and feelings of emotional exhaustion remained elevated compared to baseline (Phase 1). However, it is important to note that these values were not considered to be meaningful in terms of still experiencing burnout and it may be viewed that following the four weeks of reduced training he had recovered from a period in which he simultaneously experienced NF-OR and athlete burnout.

DISCUSSION

This case study is the first to present data where an athlete appears to have both overtrained (as deduced by comments in his training diary, responses on the MTDS, and consultation with a Sport Physician at that time) and simultaneously become burned out (as measured by the ABQ). Thus these results indicate that NF-OR and burnout may co-exist and that these two states are independent of one another; highlighting the need for further research, to better clarify or distinguish between these two states to avoid misdiagnosis and to ensure appropriate treatment is prescribed.

During the pre-season phases, the athlete frequently engaged in heavy overload training, often for prolonged periods with little recovery. The “clock-work regularity” with which the athlete experienced flu like symptoms during the first half of the season is reflective of an athlete who was engaging in overload training with inadequate recovery. In two independent review articles [24, 25], it was concluded that while overtrained athletes are not immune deficient by clinical standards, they are susceptible or at an increased risk of suffering from URTI's during periods of heavy training and during the 1-2 weeks following prolonged intense aerobic exercise training.

With regard to the development of athlete burnout, it is apparent that even from the start of the competitive phase, the athlete was devaluing his performances, and reinforcing a sense of low accomplishment as the season progressed. Despite finishing all races he entered, his comparisons of his race outcomes to his peers' results rather than on his own performance goals led to poor self assessment, and is reflected in his responses on the ABQ. As the competitive season progressed, he increasingly struggled with race performances and was unable to recover from training and racing, and his responses peaked on both psychological measures. These results argue against the sequential relationship previously proposed where athlete burnout represents the ultimate endpoint of OTS as both measures appeared to peak around the same time. As such, further research is required to better understand these two states and determine whether they are independent of one another or whether they are intrinsically interrelated.

A reduction in performance may be the result of a loss of motivation towards sport involvement, and the athlete may need some time to re-assess their goals or season objectives. With appropriate intervention, such as the opportunity to switch focus, pay more attention to motivational factors, or enhance perceived freedom of choice, such as was demonstrated with this case study, it is possible that an athlete may gradually recover from the symptoms of athlete burnout.

Conversely, a reduction in performance may also be indicative of the development of an NF-OR response, requiring a reduced training load or period of recovery. While an athlete struggling with NF-OR may benefit from re-assessing their season goals, greater benefit may be achieved through a reduction in training.

CONCLUSION

The current case study serves to highlight why athlete burnout and OT need to be clearly defined, to avoid misdiagnosis and to ensure that appropriate treatment is obtained for athletes suffering from burnout or NF-OR/OTS. It appears that until there is a clear working or conceptual definition for athlete burnout, the two phenomena will continue to be confused [26]. Until such time, it is important that athletes, coaches and support staff are aware of the possible signs and symptoms of training-stress syndromes and the interventions available to manage them.

REFERENCES

1. McEwen, B.S., Physiology and Neurobiology of Stress and Adaptation: Central Role of the Brain, *Physiological Reviews*, 2007, 87, 873-904.
2. Main, L.C., Dawson, B., Grove, J.R., Landers, G. and Goodman, C., Monitoring Training Distress: Changes in Perceived Stress and Inflammatory Cytokines, *Research in Sports Medicine*, 2009, 17, 121-132.
3. Main, L.C., Dawson, B., Heel, K., Grove, J.R., Landers, G. and Goodman, C., Relationship Between Inflammatory Cytokines and Self-report Measures of Training Overload, *Research in Sports Medicine*, 2010, 18, 1-13.
4. Gould, D., Tuffey, S., Udry, E. and Loehr, J., Burnout in Competitive Junior Tennis Players: III. Individual Differences in the Burnout Experience, *The Sport Psychologist*, 1997, 11, 257-276.
5. Raedeke T.D. and Smith, A.L., Development and Preliminary Validation of an Athlete Burnout Measure, *Journal of Sport and Exercise Psychology*, 2001, 23, 281-306.
6. Smith, R.E., Toward a Cognitive-Affective Model of Athletic Burnout, *Journal of Sport Psychology*, 1986, 8, 36-50.
7. Silva, J.M., An Analysis of the Training Stress Syndrome in Competitive Athletics, *Journal of Applied Sport Psychology*, 1990, 2, 5-20.
8. Coakley, J., Burnout Among Adolescent Athletes: A Personal Failure or Social Problem?, *Sociology of Sport Journal*, 1992, 9, 271-285.
9. Cresswell, S.L. and Eklund, R.C., Motivation and Burnout in Professional Rugby Players, *Research Quarterly for Exercise and Sport*, 2005, 76, 370-376.
10. Lemyre, P-N., Treasure, D.C. and Roberts, G.C., Influence of Variability in Motivation and Affect on Elite Athlete Burnout Susceptibility, *Journal of Sport and Exercise Psychology*, 2006, 28, 32-48.
11. Lemyre, P-N., Roberts, G.C. and Stray-Gundersen, J., Motivation, Overtraining, and Burnout: Can Self-Determined Motivation Predict Overtraining and Burnout in Elite Athletes?, *European Journal of Sport Science*, 2007, 7, 115-126.
12. Maslach, C.M. and Jackson, S.E., The Measurement of Experienced Burnout, *Journal of Organizational Behaviour*, 1981, 2, 99-113.
13. Raedeke, T.D., Lunney, K. and Venables, K. Understanding Athlete Burnout: Coach Perspectives, *Journal of Sport Behaviour*, 2002, 25, 181-206.
14. Budgett, R., Newsholme, E., Lehmann, M., Sharp, C., Jones, D.S., Peto, T. et al., Redefining the Overtraining Syndrome as the Unexplained Underperformance Syndrome, *British Journal of Sports Medicine*, 2000, 34, 67-68.
15. Meeusen, R., Duclos, M., Gleeson, M., Rietjens, G., Steinacker, J. M. and Urhausen, A., Prevention, Diagnosis and Treatment of the OT Syndrome. *European Journal of Sport Science*, 2006, 6, 1-14.
16. Steinacker, J.M. and Lehmann, M., Clinical Findings and Mechanisms of Stress and Recovery in Athletes, in: Kellmann, M., ed., *Enhancing Recovery: Preventing Underperformance in Athletes*, Human Kinetics, Champaign, IL, 2002, 103-118.
17. Kellmann, M., Psychological Assessment of Under Recovery, in: Kellmann, M., ed., *Enhancing Recovery: Preventing Underperformance in Athletes*, Human Kinetics, Champaign, IL, 2002, 37- 56.
18. Raedeke, T.D. and Smith, A.L., Development and Preliminary Validation of an Athlete Burnout Measure, *Journal of Sport and Exercise Psychology*, 2001, 23, 281-306.
19. Main, L.C. and Grove, R.J., A Multi-Component Assessment Model for Monitoring Training Distress Among Athletes, *European Journal of Sport Science*, 2009, 8, 191-198.
20. Brukner, P., Khan, K. and Holzer, K., The Tired Athlete, in: Brukner, P., and Khan, K. eds., *Clinical Sports Medicine*, 3rd edn., MacGraw Hill, Sydney, Australia, 2008, 875-887.
21. Hays, K., Maynard, I., Thomas, O. and Bawden, M., Sources and Types of Confidence Identified by World Class Sport Performers, *Journal of Applied Sport Psychology*, 2007, 19, 434-456.
22. Jones, G., Hanton, S. and Connaughton, D., What is This Thing Called Mental Toughness? An Investigation of Elite Sport Performers, *Journal of Applied Sport Psychology*, 2002, 14, 205-218.

23. Cohen, J., A Power Primer, *Psychological Bulletin*, 1992, 112, 155-159.
24. Mackinnon, L.T., Overtraining Effects on Immunity and Performance in Athletes, *Immunology and Cell Biology*, 2000, 78, 502-509.
25. Nieman, D.C., Nutrition, Exercise, and Immune System Function, *Clinics in Sports Medicine*, 1999, 18, 537-548.
26. Cresswell, S.L. and Eklund, R.C., Athlete Burnout: Conceptual Confusion, Current Research and Future Research Directions, in: Hanton, S., and Mellalieu, S.D., eds., *Literature Reviews in Sport Psychology*, Nova Science Publishers, Inc., New York, 2006, 91-126.

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