Total Athlete Management (Athlete Monitoring Perspective)

Managing an individual’s time and energy, their primary means of generating stress both good and bad, is as important as it ever has been if not more so; especially on the road to high-performance sport. In order to manage stress more effectively researchers, coaches, and athletes have all gone further in identifying and applying methods and techniques to monitor the processes of adaptation and recovery as they impact performance. Athlete monitoring has allowed them to improve this decision making by helping to better coordinate the interaction between internal and external training loads as they impact the process mechanically and energetically allowing for an effective “coopetition” strategy to emerge (1). However it is important that in doing so one does not “lose the forest for the trees.” How then does one remove barriers interfering with further improvements in physical performance and/or recovery while not at the same time creating new obstacles brought on by changes in a new performance environment?

Total Athlete Management (TAM) is the goal in both individual and team sports. As noted by Robert Newton and Marco Cardinale, “TAM is the ongoing process of ‘plan, do, review, improve’ common to management practice but applied equally effectively to athlete performance (2).” The process of athlete monitoring must go through the same changes that the athlete themselves must in order to break free from past limitations: checks and balances. In order to ensure this process maintains efficiency there must be changes that reflect better integration of “plan, do, review, improve”. In fact research from Ovallo & Sibony, in a review of over 1048 business decisions made in a five-year period, reveals that process trumps analysis by a factor of six (3). Creating an environment where good process is empowered is critical to maximizing what are sometimes very limited resources. This is an issue at the heart of any athlete monitoring discussion: are under-performing athletes unfit and poorly prepared because they are over-stressed or because the culture allows a less than excellent standard? This discussion goes beyond this paper but it is worth noting the critical relationship that culture plays in high-performance and as stated by Peter Drucker, “Culture eats strategy for breakfast.”

Rather than viewing culture and strategy or process and analysis as antagonists we should instead view them as complementary but with the understanding that performance enhancement requires pushing the envelope of any targeted physical performance. As sport scientist Michael Regan suggested in the lecture The Role of Data in S&C and Scouting the goal is “sensible overload”(4). Yet defining “sensible” requires significantly more context to adequately encompass the range of possibilities in human performance. For example what is sensible for an athlete in a return-to-sport program may be altogether inadequate for a healthy athlete with no musculoskeletal issues (6).

Further, one should not assume that this is a one-sided issue where athlete monitoring is the single factor generating potential interference. Periodization itself should be challenged to validate its role in human performance and the process of physical preparation. As noted by John Kiely in his paper Periodization Paradigms in the 21st Century: Evidence-Led or Tradition-Driven, “In essence, due to complicating logistical constraints, experimental designs have compared interventions regularly varying training parameters with interventions with minimal, or no, variation. Accordingly what such studies have demonstrated is that variation is a critical aspect of effective training, not that periodization methodologies are an optimal means of providing variation. (9)”

A common adage is, “a change is as good as a rest.” Indeed many training program improvements brought on by a supposed proper application of periodization principles are only validated against the
continuation of a program that may have already exhausted its ability to generate adaptation (9). This is not to suggest that periodization and planning are insignificant contributors to human performance, rather the intent here is to note that every aspect of the TAM process should be subject to review for its contribution and potential limitations both now and into the future. Again, “plan, do, review, improve” and as noted by President Dwight D. Eisenhower, “In preparing for battle I have always found that plans are useless, but planning is indispensable.” Taking this further in order to apply it directly to physical preparation John Kiely states, “Such reasoning suggests a shift from the historical ideal of preordained “best” training structures toward a philosophy characterized by an adaptive readiness to response to emerging ‘information’. (5)” Best planning practices are those that allow for such emergent information to be what dictates the process moving forward; and not what was believed to be the appropriate process some time ago.

Much is made of the biological dose-response relationship as it relates to the training process and adaptation (8). Coutts and Cormack state, “The aim of training is to provide a stimulus that is effective in improving performance. For positive adaptation to occur, a careful balance between training dose and recovery is required. (8)” Coaches and athletes can sometimes get lost in finding this balance and this is an area where effective athlete monitoring is key. Coutts and Reaburn cited research that demonstrated this difference, an imbalance between stress and recovery, where collegiate soccer players who were under-recovered and had demonstrated symptoms consistent with overreaching performed worse on tests for muscular strength, power, and speed (9). These qualities are in essence a primary focus of many team sport athletes and are likely the reason their coaches had these athletes training with such vigor in the first place.

Also notable is work with elite alpine skiers from strength & conditioning Coach Matt Jordan of The Canadian Sport Institute-Calgary and his colleagues of the Human Performance Laboratory at The University of Calgary, Alberta, Canada (6). Jordan et al. (2014) found that use of dual force place technology and DXA scans provided insight into lower-body asymmetry and its potential impact on physical preparation and the return to competitive high-performance sport. Jordan states, “The main finding of our study was the presence of a significantly greater CMJ and SJ phase-specific kinetic impulse AI in top-level ski racers with a history of ACL-R compared with uninjured ability-matched ski racers that remained despite a full return to activity. (6)” The increased AI (Asymmetry Indices) demonstrates a potential risk factor in the injured population versus their uninjured counterparts who were highly symmetrical across all phases of the SJ and CMJ tests (6). Monitoring the AI in elite alpine skiers, as well as other athletes with comparable demands on the lower body, could prove to be critical in both the injured and uninjured population collectively.

In his dissertation for the University of Kentucky School of Kinesiology and Health Promotion Christopher Morris examined 59 Division One American football athletes and their use of an Athlete Monitoring System (AMS) that examines Heart Rate Variability and Direct Current Brain Wave Potential Outcomes (7). Morris then used a “fluid periodization” model to make daily decisions regarding the amount of stress to impose upon the athletes based on their current physiological state and readiness. Morris states, “The results from this study confirmed our hypothesis that the use of objective physiological measures, provided by the AMS, produced significantly higher performance outcomes in vertical jump, vertical power, broad jump, and aerobic efficiency. Additionally, the results confirmed our second hypothesis that these performance outcomes were gained at a reduced physiological cost by significant reductions in both core and accessory resistance training volume. (7)” The potential benefits
of an athlete monitoring system that can help guide better decision making regarding what is the appropriate amount of stress to impose on athletes on a day to day basis, represented by the term “fluid periodization” here, warrants further discussion at the very least and potentially a paradigm shift.

Athlete monitoring should not be critiqued for what it is not. It is simply a part of the physical preparation process, that of TAM, and can be emphasized or de-emphasized according to a program, team, or individual athlete’s needs. In order to use athlete monitoring effectively the process should be consistent, valid/reliable, multi-faceted, individualized, and time sensitive. Coutts and Cormack state, “The ultimate value of monitoring training load and the fatigue response is when such monitoring informs decision making. For this to occur, the monitoring process needs to be part of the overall program approach. (8)” TAM should integrate athlete monitoring as a piece of the puzzle but with the understanding that athlete monitoring is only intended to better inform personnel on the decision making process. Atul Gawande speaks to the process of better effectively in his book Better: A Surgeon’s Notes on Performance, “Better is possible. It does not take genius. It takes diligence. It takes moral clarity. It takes ingenuity. Above all, it takes a willingness to try. (10)” Table 1 represents some suggestions on athlete monitoring and is adapted from John Kiely’s book chapter “Planning for Physical Performance: The Individual Perspective, planning, periodization, prediction; and why the future ain’t what it used to be!” (5)

<table>
<thead>
<tr>
<th>When</th>
<th>What</th>
<th>Who says</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Pre-training</td>
<td>• Subjective indicator of ‘general’ well-being, e.g. RESTQ, POMS, recovery-cue; abbreviated versions of same</td>
<td>Collins 2000, Kellmann 2002</td>
</tr>
<tr>
<td></td>
<td>• Objective measure Morning HR/HR variability</td>
<td></td>
</tr>
<tr>
<td>Pre-Training</td>
<td>• Subjective rating (Score 1–10) of key indicators, e.g. Mood sleep quality Readiness to train, Residual muscle soreness/fatigue Site specific soreness rating Perceived readiness rating</td>
<td>Collins 2000, Nurmekivi et al 2001, Rietjens et al 2005, Nederhof et al 2006, 2007</td>
</tr>
<tr>
<td></td>
<td>• Objective measure (readiness check)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychomotor speed/reaction time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measure system readiness, e.g. countermovement jump (height); drop jump (contact time/height)</td>
<td></td>
</tr>
<tr>
<td>In-training</td>
<td>• Prescriptive accuracy Rate desired intensity (how it should feel) Technical execution (required quality) Empirical range (load and repetition limits) • Recording detail Empirical descriptors RPE (per effort, set, or session)</td>
<td>Suzuki et al 2003, 2006</td>
</tr>
<tr>
<td>Post-training</td>
<td>• Post-session objective measure Repeat pre-session readiness check • Session RPE. Retrospectively calculate associated measures, e.g. Monotony (weekly average load/standard deviation), Strain (mean weekly load monotony), Training load (RPE training time) CPS (category ratio pain scale) TQR (total quality recovery) • Weekly training ‘stress’ assessment Daily and/or individual session RPE ¼ week total</td>
<td></td>
</tr>
</tbody>
</table>

*Adapted from Kiely, John “Planning for Performance: The Individual Perspective” book chapter

Table 1. Some Suggested Monitoring Methods

HR, heart rate; POMS, profile of mood state; RESTQ, recovery-stress questionnaire for athletes; RPE, rating of perceived exertion
Athlete monitoring and TAM need not be unnecessarily complicated for as Albert Einstein once said, “Make things as simple as possible, but not simpler.” Athletes are complex on many levels and as such they present with issues that will challenge coaches in many ways. Solutions to such problems should not further complicate these issues. John Kiely states here, “The functioning of complex biological systems is characterized by deeply entangled interdependencies between component subsystems, by sensitive dependence to initial conditions and subsequently introduced “noise,” and by the inherently unpredictable chain of consequences that may be initiated by any imposed action. (9)” For fear of noise or consequences athlete monitoring should not be dismissed. However it is important that it is given the opportunity for the same review process as every other component of TAM as there is not an unimportant part of athlete development. Better will always qualify as an improvement even if it never represents best.

REFERENCES