Editorial Manager(tm) for Adis, a Wolters Kluwer business
Manuscript Draft

Manuscript Number:

Title: Letter: Block Periodization: New horizon, or a false dawn?

Short Title: Block Periodization: New horizon, or a false dawn?

Article Type: Letter to the Editor

Section/Category: Sports Medicine

Keywords:

Corresponding Author: mr john kiely, HDip, BSc(Hons), MSc

Corresponding Author's Institution: UK Athletics

First Author: john kiely, HDip, BSc(Hons), MSc

Order of Authors: john kiely, HDip, BSc(Hons), MSc

Manuscript Region of Origin: UNITED KINGDOM

Abstract:

Block Periodization: New horizon, or a false dawn?

Professor Issurin's paper is to be commended on its insightful overview of the historical evolution of periodization planning theory, and the interesting general discussion. However, the paper's central contention, i.e., that block periodization represents a 'new horizon' in training planning is, I suggest, both premature and unsupported.

To substantiate this position; consider the rationale and evidence presented within the "New Horizons" paper promoting the superiority of block periodization in elite training contexts. Essentially the presented argument consists of two layers of rationale. The first layer is anecdotal, and consists solely of exemplar cases of athletes and coaches who have achieved high levels of success employing block training designs. However, within the elite sports environment it would seem readily apparent that high honours are commonly achieved using a variety of training approaches, reflecting distinct coaching philosophies, and differing planning models. Hence, while the offered examples are undoubtedly interesting and deserve consideration, they remain unconvincing as evidence, as they lack both contextual detail and critical comparisons. Selecting tailored examples to substantiate a certain stance is not a particularly persuasive, clinical, or impartial argument.

The second layer of supporting evidence refers to *"two contemporary scientific concepts"* that have been instrumental in the establishment of the block periodized model: namely; the cumulative training effect and the residual training effect. However, within the review the key citations for these concepts are not evidence-led scientific discussions but rather, self-referenced opinion pieces by the author and by well-known block periodization advocate Dr Anatoly Bondarchuk. In reality, acknowledging that the benefits of physical training gradually accumulate over time (the cumulative effect), and that these benefits persist for some period after training is terminated (the residual effect) are perhaps best described as self-evident truths, as opposed to scientific constructs. In fact, Matveyev (1981), the foremost formuliser of the traditional periodization model, discusses the cumulative training effect, and concepts corresponding to the residual training effect (although using a different terminology) in his influential *Fundamentals of Sports Training* (1981)[(1)]. What is not clear is how an awareness of such poorly understood concepts provides scientific support for block periodization principles. In order to discriminate between either traditional or block planning methods on the basis of these very broad concepts, specific knowledge would be required relating to; the projected time-frames for retention or decay of specific fitness attributes, an understanding of how on-going training interacts with previously conducted training to either accelerate or delay the erosion of previously developed fitness components, and an understanding of how these factors interact with a spectrum of individual-specific considerations, such as training histories and genetic predispositions. A knowledge base which clearly does not exist.

Consequently, while the proffered anecdotal examples and accompanying logic may be alluring, block periodization cannot be rightly framed as a scientifically-validated planning construct, any more than could Mateyev's seminal model, or the raft of subsequently proposed periodization derivations [(2,3,4,5)]. In essence, the presented argument is notional, rather than factual. Here, I hasten to add; experienced coach/scientist opinion is certainly not to be underestimated, devalued or dismissed. Likewise, a lack of evidence does not necessarily invalidate the model. However, before block periodization can rightly claim to be scientifically supported, an evidence-led, conceptually-valid chain of reasoning surely needs to be more coherently outlined.

As an additional concern; while there is an apparent dearth of evidence supporting the block periodization concept, there is existing evidence that would appear to strongly challenge its central premise, i.e. that *"each of these (fitness) targets requires specific physiological, morphological and psychological adaptation, and many of these workloads are not compatible, causing conflicting responses"*, and that hence *"high performance athletes enhance their preparedness and performance through large amounts of training stimuli that can hardly be obtained using multi-targeted mixed training"* (P 194).

Unravelling the interactions between multi-targeted mixed training modes is obviously a complex task to address empirically. However, it has been tangentially explored in studies investigating the effects of concurrent strength and endurance training. The training modes required to simultaneously develop enhanced strength or endurance appear diametrically opposed, and these attributes would appear prime candidates for exhibiting compromised training effects. As a brief recap of the literature; Hickson (1980) classically demonstrated an 'interference effect' between concurrent strength and endurance training resulting in compromised strength development in previously untrained subjects[6],with similar findings subsequently reported by several authors[7-10]. More recently, however, studies have demonstrated that concurrent training can be as effective in developing both strength and endurance as single attribute-focused interventions [11,12]. More pertinently, studies in a wide variety of sports, variously using well-trained, elite, and World class athletes, have established that simultaneously training both strength and endurance can bestow synergistic benefits to a variety of athletic performance measures, above and beyond the benefits realised by single modality training, and without inhibition of strength development [13-26]. Without doubt there is still much to be learned in relation to the intricacies of concurrent training, and key questions remain. However, it also appears clear from the spectrum of evidence that multi-modal training can be effective in enhancing specific performance attributes in already well-trained athletes, and that the potential exists for various training modes to interact synergistically and additively.

An apparently logical interpretation of the available evidence suggests that whether or not concurrent multi-mode training has an antagonistic, neutral, or synergistic effect is dependent on the interaction between training design considerations such as how training modes are blended, timed and sequenced, and athlete-specific variables, such as training histories, genetic predispositions, and transient biological states. As a relevant additional consideration; the potential benefits of regular training variation have been previously elucidated [27,28], as have the potential negative effects of monotonous, unremitting, uni-directional training [29-32].

This is certainly not to suggest that multi-modal training is always advisable and, in the interests of balance, it should be noted that a recent study has demonstrated an improvement in outcomes following an 11 day high intensity endurance training intervention in alpine skiers [33]. Although the design does not necessarily conform to the description of block periodization as outlined in the 'new horizon' paper, the study authors do suggest that this finding illustrates the potential superiority of block periodization. However, this may be an overly elaborated conclusion, and perhaps a more parsimonious perspective is that such a finding demonstrates the value of periodically interjecting novelty into habituated training patterns, hence potentially offsetting diminishing training returns, and facilitating a heightened adaptive response.

Reflecting on the evidence discussed it would appear pre-mature to herald block periodization as a "new horizon" in training planning; partly because of a fundamental lack of supporting evidence and clearly delineated rationale, and partly as contradictory evidence exists questioning its universal efficacy in elite contexts. What block periodization does positively contribute to current planning methodologies is a more formal description of a particular planning tactic that may be advantageously added to the elite coaches menu of potential planning options.

With reference to potential new horizons in training planning, it is interesting to note that all previous periodization incarnations have been based upon a common set of unexamined mechanistic assumptions that have become deeply engrained in training planning culture. Namely, that optimal future training patterns can be adequately predetermined, that the training process is best designed around a pre-formed template of discrete sequential training units (blocks, phases, or periods), and that there exist relatively stable, predictable time-frames for the realisation and decay of the various fitness attributes. In other words, the assumption that future elite training can be adequately pre-planned.

However, substantial evidence emanating from across the spectrum of biological sciences serves to illustrate that the human adaptive response to any set of imposed stressors vary widely on both inter-, and intra-, individual dimensions [34-37]. Accordingly, individuals are likely to respond uniquely to any given training session, and will similarly respond in an individually-specific manner to any given training organisational scheme [38,39]. So perhaps a universal limitation, shared by both traditional and block periodized models, is the paradoxical assumption that the future training of an inherently unpredictable and complex biological system, can be effectively pre-planned using a logic rooted in mechanistic assumptions and generalised rules.

Hence, perhaps the true new horizon in elite training planning lies not in devising additional idealised, rule-based, pre-planned training templates (as per the various periodization conceptions).

Perhaps, instead, the way forward lies in the design of sensitive and responsive self-organising training processes that guide the evolution of context-specific training solutions. Such training systems need not necessarily be based upon any single periodization ideology, but would facilitate the emergence of appropriate training systems as guided by the on-going triangulation of such factors as; training objectives, training readiness, and training responses. Trend analysis of this data could hence facilitate the consistent re-calibration and modulation of training to offset diminishing returns consequent to overly habituated training. The implementation of such organic, evolving training systems has historically been inhibited by the lack of sufficiently sensitive monitoring tools. However, this circumstance would appear to be rapidly changing.

Such a radical departure from traditional deterministic periodized planning paradigms would indeed herald a new horizon in sports training planning.

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