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Are rolling averages a good way to assess training load for injury prevention?

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MAIN TEXT

I read the letter 'Time to bin the term 'overuse' injury: is 'training load error' a more accurate term?' with great interest.[1] I agree with the authors that changes in training load (TL) could increase injury risk and I share their concern relating to periods of low/no loads. However, the terminology suggested by Drew and Purdam 'errors in training load prescription' may not be ideal. In fact, despite the potentially flawless TL prescription, some spikes in load may be due to variables that are out of control, such as variability in the demands of competitions,[2] and cannot be avoided. Also, the term "error" leads to the idea that a supposedly erroneous acute:chronic TL ratio causes injuries, instead of causing an increase in the injury risk. Furthermore, I would hope that in elite sports TL prescription is part of a carefully planned strategy rather than errors, which may actually include deliberately accepting an increased injury risk for performance benefits.[3] As such, I would recommend to avoid the misleading terminology "TL error".[1]

Additionally, I have some concern with the use of rolling averages to assess TL,[1, 4] since training adaptations and tissue conditioning don't fit averages. There are two main limitations with the 'average approach'. Firstly, averages overlook variations within the set period of time and obscure the overall TL patterns. Figure 1 exemplifies this limitation: fictitious Athlete 1, 2 and 3 have identical acute (last week) and chronic (last four weeks) average TLs, [1] despite very different daily variations and chronic TL patterns. The second limitation of averages is that they don't consider when a given stimulus happened within the set time-frame. The effect of a training stimulus declines over time;[5] however, the use of averages neglects this fundamental aspect. As an example, the chronic load calculated with a rolling average considers equally a training session done the day before the analysis and a session occurring four weeks before.

Since the publication of the Banister model in 1975,[6] advanced mathematical approaches have been extensively used to assess TL.[7-9] Training monotony has been used as injury risk index for more than a decade.[10, 11] For the above mentioned reasons, in order to better understand the relationship between TL and injury risk, caution should be taken with the use of rolling averages and instead other more appropriate TL modelling could be used in everyday practice and research. Despite the proven association between rolling-average TL and increased injury risk,[4] it is hypothesised that a non-linear TL model may be better suited to identifying injury risk, in particular in sports in which the TL does not follow weekly patterns. Further research is warranted in order to better understand injury risk and ideally make it more specific for different sports and individuals.

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FIGURE LEGEND

Figure 1. The daily training loads of Athlete 1, 2 and 3 are shown at the top, the weekly training loads are shown at the bottom. The acute (last week; 50 AU) and chronic (average of four weeks; 35 AU) training loads are identical, hence these three athletes present a theoretically identical injury risk (i.e. acute:chronic ratio = 1.43).