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Embedding the psychosocial biographies of Olympic medalists in a (meta-) theoretical model of dynamic networks

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Abstract

Based on in-depth interviews, Hardy et al. focused on the role of psychosocial factors in the development of elite and super-elite athletes. They reveal interesting differences and commonalities in the frequencies at which certain aspects related to life events, personality, contextual factors, etc. were reported. Here, we argue that insights in the development of (super-)elite athletes will advance if we go beyond explanations in the frequency-domain, and search for process explanations in the time-domain. This means that we should investigate how athletes develop from one time point to the next, and the next, etc., thereby examining how (psychosocial) factors change and combine across time, as well as how the timing of events can shape an athlete's further developmental trajectory. We therefore present a process-oriented dynamic network model of talent development, assuming that (super-)elite performance develops out of structures of dynamically interacting (psychosocial) factors, which we illustrate using the outcomes of Hardy et al.

Keywords

Complexity, Dynamical systems, Achievement motivation, Goals, Sport performance, Talent development

In the past decades, research on talent and excellence in sports has attempted to untangle the factors distinguishing between elite and sub- (or non-)elite athletes. Findings suggest that a variety of physical, psychological, and environmental factors are important for reaching the highest level in one's sport, including psychosocial factors such as goal commitment, resilience, and social support (e.g., Rees et al., 2016; Van Yperen, 2009). The target article written by Hardy and colleagues provides an

interesting contribution to the extant literature not only by discussing potential explanatory factors to attain the (super-)elite status but also by providing insights into idiosyncrasies, developmental trajectories, and the role of timing of critical factors and events during development. Indeed, the explanatory factors of athletic performance identified in previous research may not only change over time, the timing at which particular factors rise up (such as coaching support) may be critical as well. While reading the target article, we considered Hardy et al.'s qualitative work as an important springboard for theorizing about talent development. They primarily focus on commonalities and differences between the developmental biographies of super-elite and elite athletes at the group-level. In our view, the next step should be to examine how the explanatory factors underlying (super-)elite performance *combine across time* and how the *timing* of critical events can accelerate or dampen individual athletes' performance development.

Hardy et al. discuss several factors distinguishing super-elite athletes from elite athletes, in terms of personality, psychological, and environmental factors. Other factors that are likely related to the timing at which they occur, such as early negative life events plus positive sport events and career turning points, are also discussed as discriminating factors and are displayed as such in their figure. This means that Hardy et al. provide explanations in the *frequency*-domain (i.e., how often certain factors turn up), whereas the *time*-domain is not elaborated on (i.e., how athletes developed from one time point to the next, and the next, etc. in an ongoing process). We propose that further theoretical and practical progress can be made when taking a more critical look at process-oriented explanations for developing into an (super-) elite athlete, for which the dynamic network model provides a suitable framework (Den Hartigh et al., 2016). This dynamic network model should not be considered as (again) another specific model or framework. Rather, in line with the authors' intention to provide an integral overview of the underpinnings and developments of success of actual elite and super-elite athletes, the dynamic network model is a comprehensive (meta-)theory in which outcomes of the current study and future research may be embedded. Among other things, the model can account for athletes' idiosyncratic developmental trajectories.

A dynamic network perspective on talent development departs from the idea that (super-)elite performance develops out of structures of dynamically interacting (personal and environmental) factors or components, in the form of direct and indirect loops of reinforcement or diminishment. Referring to the target article, one could think of the interacting social components within the "culture of striving" that have (in)direct connections with the athlete's need to succeed, coping strategies, etc. in an ongoing pattern of dynamic reinforcement. Furthermore, a drop and rise in performance is not just determined by a single component or event, but by the timing at which such components or events appear or disappear and the network structure of the individual athlete. This entails that positive or negative events may sometimes have cascading influences that serve as a trigger for a positive (or negative) turning point. This event may be a brief "perturbation" that shakes up the network, and thereby triggers a boost or breakdown in the development of existing components

and/or a reconfiguration of connections between components. Such a scenario fits, for example, with the death of K-SE's father, which the coach describes as a "shake" after which the athlete went through a transformational phase, and the athlete himself notes that he was more focused, committed, and motivated to succeed after this serious event.

Another possibility is that a component appears or disappears from the network. A new component may establish dynamic relationships with other components in the network, thereby also spreading its influence and shaping the athlete's developmental trajectory. For instance, finding a significant (sporting) other may generate a pattern of positive network interactions, exemplified by several athletes such as D-SE, who also notes that he "may have been lost had he not found his future coach." In the same vein, a negative developmental pattern may be set in motion when a particular network-component disappears, such as in the case of B-E, who experienced a dramatic decline in performance when his coach was taken away. Note that, in terms of network dynamics, whether or not such positive or negative spirals are set in motion is not just determined by the event or (dis)appearing component, but by how this event or component *combines* with the athlete's network structure that has developed over time (Den Hartigh et al., 2016).

In line with the dynamic network perspective, at certain points Hardy et al. thus mention the dynamism of athlete characteristics that may or may not develop across time, in connection with events and components that may appear or disappear with time. Furthermore, a general point of the authors is that personality and behavior are shaped by childhood influences, and that critical events likely influence the development of attributes such as robustness, resilience, ruthlessness, and motivation. Following up on the study by Hardy and colleagues, a fruitful research avenue would therefore be to reconstruct the dynamic networks from which elite and super-elite athletes *develop*. This entails that the developmental aspect, and the role of timing, should *explicitly* be taken into account rather than just be considered as a possible explanatory factor independent of the developmental process. In other words, researchers should attempt to not only explain athletic development in the frequency-domain, but certainly also in the time-domain.

In line with the study by Hardy et al., we believe that research focused on individual trajectories to the (super-)elite status are highly relevant, and we argue that such research can greatly contribute to modeling these trajectories based on a generic (dynamic network) model. Biographical research such as the target article, in combination with computer simulation (Den Hartigh et al., 2016) and longitudinal research that lends itself to discover the dynamic connections that shape the development of individual athletes, would be a suitable research strategy to proceed with. Researchers in the domain of psychopathology have recently started to design methods to reveal individual networks of mental strengths and vulnerabilities in addition to studying cross-sectional results (e.g., Van Der Krieke et al., 2016), and major advances on understanding network dynamics have been made in the rapidly developing domain of complexity science (Barabási, 2016). Such advances also provide a welcome breeding ground to further explore questions such as: Which athlete

network-structures are most resilient to negative events? Why may positive and negative events have cascading influences at some times or for some athletes, but not at other times, or for other athletes? What is the role of the timing of events? And may particular components, such as motivation and commitment, guide the dynamics of the network (cf. Liu et al., 2011)? Ultimately, we may be in a better position to capture the complex process of individual athletic development (Den Hartigh et al., 2016), and understand why and how some make it whereas others do not (Van Yperen, 2009).

To conclude, embracing the complex interactions across factors related to the performer, environment, practice, and training, remains the most obvious future research direction (cf. Rees et al., 2016). Bringing the results of Hardy et al. and recent advances from complexity science together, a dynamic network perspective provides a fruitful framework to understand how athletes develop over time, as well as when and why some excel to exceptional levels of performance (Den Hartigh et al., 2016). The dynamic network model can be used as a general framework to study the population of athletes, but it can also be “individualized” to single cases of athletic development. The route to discover the dynamic networks underlying (super-)elite athletes is probably labor-intensive, but Hardy et al. have demonstrated that designing labor-intensive, in-depth research on athletic development is worth the investment.

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