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Eliminating the dichotomy between theory and practice in talent identification and development: considering the role of psychology

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It is acknowledged that appropriate support and training are essential if talented individuals are to fulfil their potential. The early identification of talented athletes is an increasingly important consideration for researchers and practitioners alike. Once talented individuals have been detected, crucial but limited support resources can be optimally deployed to ensure that their needs are met and that their gifts are developed. However, there is considerable disagreement among experts on what talent is, and which factors can reliably be used within talent identification processes. This paper explores prerequisites to success in sport, and the comparative efficacy of employing these prerequisites within talent identification schemes. It is proposed that talent needs to be reconceptualized so that talent identification and talent development processes are perceived to be dynamic and interrelated. Additionally, the need to place greater emphasis on the capacity of a child to develop in sport and the psychological factors that underpin this process is highlighted. To this end, it is advocated that talent identification and development schemes, while emphasizing the multidimensional nature of talent, need to recognize the essential role of psychology in the ability of individuals to fulfil their sporting potential.

Keywords: dynamic, multidimensional, psychology, talent identification and development.

Introduction

Identifying individuals with the greatest potential to excel in sport presents a major and relevant challenge for national governing bodies, coaches and funding agencies alike. With limited resources available to help athletes develop, effective talent identification and development processes are of paramount importance to minimize costly mistakes through dropout or failure to achieve. In establishing effective talent identification and development systems, funding agencies need to recognize the multidimensional and dynamic nature of sporting talent, and promote the range of factors that enable children to develop into successful mature performers.

Unfortunately, however, talent identification processes have typically focused on a limited range of variables and base selection of the 'talented' on one-off proficiency measures that fail to acknowledge that physical maturity and previous experiences can colour

performance (Abbott *et al.*, 2002). As we will argue later, a range of psychological behaviours appears to underpin a person's true potential for growth, but there has been insufficient consideration of these variables within traditional talent identification and development approaches. As a result, current talent identification and development processes are likely to exclude many 'talented' children from support programmes while rare resources are 'mis-invested' in others.

The dichotomy between theory and practice in talent identification

Both practitioners and researchers accept that sporting feats are governed by a multiplicity of biomechanical, physiological, physical and psychological factors. However, research that has looked to establish profiles of successful athletes as templates to both select and guide appropriately equipped young people towards particular sports has traditionally been unidimensional in nature (Abbott *et al.*, 2002). While unidimensional research continues to be conducted (e.g. Hoare and Warr, 2000;

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Grove, 2001; Staerck, 2003), an increasing number of researchers are now considering the interplay between multidimensional determinants of talent (e.g. Nieuwenhuis *et al.*, 2002; Reilly *et al.*, 2000). As well as recognizing that a range of factors impact on sporting performance, there is also a gradual recognition that talent is a dynamic concept and that not only do factors interact, but that they also change as a function of time (Simonton, 1999; Abbott *et al.*, in press).

The implication is that predictive models of talent that are based on profiles of successful athletes are likely to have limited success, as they employ a static conception of those variables perceived as key, rather than acknowledging that values are likely to alter over time. For example, while research has identified certain physical characteristics that are strongly related to high-level performance in specific sports, the problem of using immature values to identify future talent because of their unstable non-linear development has been highlighted (Williams and Reilly, 2000; Abbott *et al.*, 2002). Additionally, as talent is multidimensional, individuals may also compensate for disadvantages on one component (e.g. height) with strengths on another or range of other variables (e.g. power and commitment). This shift from unidimensional predictive models towards models that acknowledge the interactive and temporarily variant nature of key characteristics is apparent when comparing the chapter by Durand-Bush and Salmela (2001) on developing talent in sport with its original version (Regnier *et al.*, 1993).

Although an increasing number of researchers are advocating a move away from unidimensional predictive models of talent, implications for practitioners are complex and often lack clarity. For example, research has highlighted consistently that physical maturity and birth date distribution can have a considerable influence on the performance of children (Helsen *et al.*, 2000). The evidence is that practitioners do recognize these issues but are unclear how to allow for maturity status within their talent identification and development systems. For example, karate at various times has employed singly – or in combination – height, weight, age and grade to categorize participants. The competing forces of evidence-based science and sporting excellence may have partly contributed to this dichotomy between research and practice. For example, as it is difficult to secure funding for longitudinal research, many potential solutions are only explored in short-term projects (which cannot be validated). Consequently, such studies are unlikely to be accepted for publication in leading sports science journals and, in the current academic climate of assessment via publications, many researchers choose not to carry out applied research. On a positive note, practical guidelines to account for maturity and seasonal birth date

issues have recently been published (Helsen *et al.*, 2000).

Practitioners also show an awareness of the multidimensional nature of talent and accept that talent goes beyond the physical (Thomas and Thomas, 1999). For instance, Morris (2000) reported that those involved in the selection of junior elite talent in soccer recognize that psychological issues such as ‘attitudes’ and ‘mental preparation’ are important in the conversion of potential to achievement. However, ‘there was no clearly defined, objective basis for the psychological component of the process of selecting talented performers’ (p. 721), suggesting that practitioners were unclear of the precise psychological mechanisms that contribute to the attainment of talent. Furthermore, no consideration appears to be given to the extent that psychological factors affect performance.

Acknowledging the multidimensional and dynamic nature of talent, in the next section we consider the role that psychology may have in the conversion of potential to achievement. A greater understanding of the specific role of psychological factors should help facilitate the inclusion of psychological issues within the talent identification and development process and reduce the dichotomy between theory and practice within talent identification and development.

Psychological determinants of performance

Preliminary studies that sought to identify psychological factors associated with high-level athletic success were conducted in the 1950s and a substantial body of research on the personality characteristics of successful athletes was amassed from the 1950s to the 1970s. Nevertheless, this body of research was inconclusive and personality profiles could not be identified for elite athletes. The focus of this research on personality characteristics may have failed to consider the psychological issues that are important in the conversion of potential to achievement. It is apparent that individuals with very different personalities can excel at the elite level within the same sport. For instance, contrast John McEnroe and Bjorn Borg, who were both major tennis players of their time but who clearly had very different personalities. Within women’s tennis, differences in the personality of Monica Selles and Mary Pierce are apparent. In football, Paul Gascoigne and Alan Shearer are very different types of people but have been highly successful players. This tenuous and fragile link between personality and success is highlighted through different research that has produced ambiguous and unusable findings for many years (e.g. Vealey, 1992).

However, subsequent research that has focused on the use of psychological skills (e.g. goal setting,

imagery) as opposed to personality variables (e.g. introversion, extroversion) has successfully identified psychological determinants of performance (Mahoney *et al.*, 1987; Smith and Christensen, 1995; Smith, 1997; Thomas *et al.*, 1999). Indeed, psychological characteristics such as goal setting, realistic performance evaluation, imagery and commitment have been identified as factors that are able to discriminate between medal and non-medal winners (e.g. Orlick *et al.*, 1979; Gould *et al.*, 1992a,b). Research suggests that such psychological skills are highly amenable to specialized training as opposed to personality traits, which are to a greater extent inherited (Williams and Reilly, 2000). While Morris (2000) highlights the problems of employing transient variables for use in talent identification, the move away from predictive models of talent will hopefully lead to greater emphasis on all determinants of potential and performance regardless of their transient nature. Indeed, the limitation of talent identification and development models is apparent, as little or no consideration is given to performance determinants due to their developmental and, therefore, non-predictable nature.

In support of the influence of psychological factors on sporting performance, Smith and Christensen (1995) found the Athletic Coping Skills Inventory (ASCI-28), which was designed to assess seven psychological skill items that athletes use to manage their sports performance, to be a much better predictor of athletic success for professional baseball pitchers than an assessment of physical skills. The seven psychological skills assessed were: coping with adversity, coachability, concentration, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure and freedom from worry. Additionally, Thomas *et al.* (1999) found that both male and female international athletes use a wider range of psychological skills (goal setting, imagery, activation, self-talk, emotional control, negative thinking and relaxation) in training and competition than those of a lower standard. In the present context, this research could be usefully progressed to consider the extent to which successful athletes employ psychological skills in training to gain proficiency in their use and to what extent to facilitate the learning process.

Further evidence of the important role that psychology has in sporting excellence is apparent in research that has looked to distinguish between athletes who are able to consistently produce at the top of their sport and those that are unable to retain their level of success. Indeed, it is often considered that a mark of a true champion is their ability to retain excellence. Starkes *et al.* (1999) highlighted that 'sport psychology has traditionally focused on what it takes to become an expert athlete. There should be equal concern over

what it takes to retain that expertise' (p. 284). Kreiner-Phillips and Orlick (1992) did focus on maintenance of expertise and found that, out of 17 athletes who had won major international titles in a range of sports, only seven continued to maintain their level of performance. The remaining athletes either experienced prolonged performance slumps ($n=6$) or were never able to reproduce comparative performances ($n=4$). It is apparent that the physique of an individual who excels on the world stage on one occasion does not prohibit success. Instead, research has found that a range of psychological factors underpins this ability to consistently produce world-class performances (Kreiner-Phillips and Orlick, 1992; Gould *et al.*, 1993; Jackson *et al.*, 1998). For example, Kreiner-Phillips and Orlick (1992) found that only psychological factors were able to distinguish between consistent performers, those who experienced prolonged performance slumps and those who failed to reproduce comparative performances. Specifically, Olympic champions who continued to win at the highest level were able to handle the demands associated with the increased personal and external expectations and to focus effectively rather than being caught up in distractions. Additionally, Starkes *et al.* (1999) found that a decline in commitment and motivation in Master athletes (due to other pressures) accentuated performance decreases with age, providing evidence that performance decline may be mediated by the amount of ongoing practice; a factor largely controlled by, and thus a characteristic of, each athlete.

In summary, multiple determinants of performance exist and a combination of anthropometric, physical and psychological factors influence the sporting success that an athlete achieves. However, while physical characteristics have been found to discriminate between athletes in different sporting events, only psychological factors are able to explain the performances of athletes who are looking to maintain their success. Consequently, greater emphasis on psychological factors would appear to be required within talent identification and development processes as opposed to relying on physical and anthropometric indicators of talent. However, as it typically takes 10 years of dedicated practice to achieve excellence (Ericsson *et al.*, 1993), not only does an athlete require the capacity to perform, but also both the capacity and the motivation to acquire and refine skills, and to develop within a specific sporting setting with its inherent psychosocial complexity. Coaches and teachers can provide many examples of young children who appear to have possessed all the capacities to be successful within sport, but fail to progress. Accordingly, the following section looks at relevant research in this crucial but neglected (from a talent identification perspective) area.

Prerequisites for learning and development

Although it has been recognized that certain prerequisites are at least desirable for achieving success in different sporting domains (e.g. height for basketball), the capacity to develop may be more important, especially at an early stage. For instance, an individual may be very successful within rugby during adolescence, since they are more physically advanced than their peers. Unfortunately, however, conventional measures of talent do not acknowledge that a child's performance is likely to be affected by a range of variables such as past experiences, physical maturity, test-taking skills and parental support. Therefore, this section considers whether instead of quantifying the existing set of attributes of an individual and viewing them as a basis for predicting children's subsequent sporting performance, there is a method of quantifying a child's *potential* to learn and develop into a successful adult performer.

As Freeman (2000) highlighted, distinguishing high-level potential as distinct from measurable production is particularly difficult because the true potential of children who are not performing above average is easily missed. As an example, Gardner (1993, 1997), in his investigations into great people of the twentieth century such as Freud, Einstein and Virginia Woolf, found that only Picasso's success could have been predicted through considering their work production at the age of 20 years. However, although performance appears to be a weak indicator of potential within all performance domains, it has been shown that individuals who are the most successful in an area of life appear to think and learn differently compared with their less successful peers (Czeschlik and Rost, 1988; Flynn, 1991; Zha, 1993; Simonton, 1994). Consequently, by understanding these subtle processes, we can begin to predict which individuals will respond most favourably to the developmental opportunities available and therefore those who have the greatest capacity to develop.

Research that explores the behaviours and characteristics of individuals who have the capacity to develop in sport is limited. However, research across other performance domains (e.g. academia, music, art) that has attempted to research the concept of underachievement and excellence may provide a valuable insight. Although difficult to define, McCall *et al.* (1992) refer to underachievement as the 'discrepancy between actual and expected performance' (p. 2). Researchers interested in the concept of underachievement and excellence have identified key psychological behaviours (meta-activities) that refer to both appropriate attitudes and the adoption of effective strategies within the learning environment as key to the development

process. For example, Freeman (2000, p. 238) stated that:

The degrees to which talent can be strengthened and mobilised depend on the acquisition of the meta-activities needed for autonomy in learning. This not only means involving metacognitive 'overview' and the direction of one's own thought processes, but also encouraging the mixture of attitudes, including curiosity, persistence, and confidence, as well as the efficient use of learning strategies, such as planning, monitoring, and evaluation.

Below we consider how attitudes and meta-cognitive strategies may influence the extent that an individual fulfils their potential in their achievement setting.

The impact of attitudes on achieving potential

High attainment is increasingly being attributed to an interaction between unusual talent and high motivation (Heller and Viek, 2000; Ziegler and Raul, 2000). In repeated observations – initially by Meij (unpublished data) and then by Meij *et al.* (1995) – it was found that high-achieving individuals in the area of mental development exhibited, without exception, higher competence motivation and were clearly and significantly more persistent and enthusiastic than less successful individuals. Thus, the level of an individual's motivation will determine the frequency and persistence of their interactions with the relevant environment and thereby will influence their development.

The crucial role of motivation is apparent when considering research into deliberate practice. In their classic study of chess expertise, Simon and Chase (1973) suggested that quantity and quality of training could explain inter-individual variation in performance. The '10-year rule' stipulates that a 10-year commitment to high levels of training is the minimum requirement to become an expert. This rule has been applied successfully in many domains, including music (Sosniak, 1985; Ericsson *et al.*, 1993), mathematics (Gustin, 1985), swimming (Kalinowski, 1985), middle- and long-distance running (Wallingford, 1975; Young and Salmela, 2002), figure skating (Starkes *et al.*, 1996; Helsen *et al.*, 1998), field hockey (Helsen *et al.*, 1998), wrestling (Hodges and Starkes, 1996) and tennis (Monsaas, 1985). Ericsson *et al.* (1993) presented the deliberate practice framework, which highlights that future experts need to 'perform training that develops required skills under continuously evolving conditions where training stress and recovery are optimally balanced so that maximal training adaptations occur and training plateaus are minimized' (Baker, 2003, p. 87). In their studies of expert field hockey and soccer players, respectively, Helsen *et al.* (1998) and Baker *et*

al. (2003) highlight that athletes who become experts make the decision to invest significantly more time and effort into training after around 9 years of training or after about 18 years of age. Clearly, the motivation to commit to high training loads over an extended period is a (if not 'the') crucial determining factor in acquiring and maintaining expertise. Therefore, while performance itself can be a false indicator of potential, especially in sport where maturational status can play such a significant role, the child's own interests appear to be an excellent, but often neglected, indicator of adult attainment (Hany, 1996; Milgram and Hong, 1997).

Although motivation is an important precursor to development, as Ericsson *et al.* (1993) highlight within their deliberate practice framework, to maximize skill acquisition and development, motivated behaviour also needs to be appropriately focused to produce quality practice. Indeed, research has highlighted that individuals who achieve the greatest success, as well as being highly motivated, consistently employ strategies (meta-cognitive strategies) that optimize focus and learning (Kunst and Florescu, 1971; Freeman, 2000). Meta-cognitive strategies are defined as 'strategies that reflect on cognitive processes' (Flavell, 1987). Examples of meta-cognitive strategies are the self-regulatory learning strategies of goal setting and imagery. Within sport, these strategies are normally referred to as psychological behaviours or psycho-behaviours.

The use of meta-cognitive strategies to fulfil potential

Researchers across disciplines (e.g. education, surgery, sport) have shown that meta-cognitive strategies can enhance achievement (Schunk, 1990; Kreiner-Phillips and Orlick, 1992; McDonald and Orlick, 1994; McDonald *et al.*, 1995). Within education, Zha (1993) reported that high achievers use self-regulatory learning strategies more often and more effectively than low achievers. For example, Morrone and Pintrich (1997) reported that high achievers set goals frequently and consistently across tasks more often than low achievers. Conversely, dropouts and underachievers have been found to have difficulty with establishing and working towards long-range goals and rewards (Citizens for Better Schools, 1995). Indeed, McCall *et al.* (2000) reported that underachievers (defined as 'children who perform more poorly in school than one would expect on the basis of their abilities', p. 785) had unrealistic standards and low aspiration and persistence. Such factors could likely be improved by employing a combination of effective learning strategies such as goal setting, planning and performance evaluation.

Research that has looked at the individuals who achieve success within sport has also highlighted the role of self-regulatory learning strategies (Orlick and Partington, 1988; Kreiner-Phillips and Orlick, 1992). Orlick (1996) highlighted that psychological skills (e.g. goal setting, planning and performance evaluation) can help athletes improve maximally from practice. Similarly, research has also established the effectiveness of employing psychological skills (e.g. imagery and goal setting) when learning a sports skill (Boyce, 1992; Waskiewicz and Zajac, 2001). Crucially, as well as being key determinants of developmental capacity, psychological skills have also been established as significant pre-event and in-event behaviours for obtaining (Gould *et al.*, 1992a,b) and producing consistent performances within sport (Kreiner-Phillips and Orlick, 1992). However, while several practical and scientific articles have been published on the psychology of performance (e.g. Loehr and Gullikson, 2001; Taylor and Shaw, 2002), less emphasis has been placed on their impact in the development process (Lippman and Rushall, 1993).

Summary

The need to distinguish between performance and the capacity to develop has been emphasized within this section. Performance at a young age has been shown to be a poor indicator of eventual attainment across domains. However, motivation and appropriate learning strategies appear to be important determinants of developmental capacity and characterize individuals who obtain the greatest success within sport and other performance domains. For individuals to reach their full potential, they must possess and exhibit the motivation and learning strategies to interact effectively with the developmental opportunities offered by the environment. This concept is formulated on the belief that talented individuals will only maximize their potential (innate capacities) when provided with appropriately stimulating developmental conditions (e.g. facilities, parental support, effective coaching) *and* when exhibiting high motivation and adopting effective learning strategies. Put simply, certain internal dispositions are advantageous and often essential for exceptional attainment within sport (e.g. fast-twitch fibres for sprinting). However, the notion that internal dispositions do not automatically translate into high performance, but are dependent on specific individual and environmental factors, is rapidly obtaining increased support (cf. Howe *et al.*, 1998; Ridley, 2003). Consequently, talent identification and development processes need to consider the interplay between determinants of performance (physical, anthropometric and psychological), the environment (opportunities,

parental support) and determinants that underpin the capacity to exploit the opportunities available and to develop within a sport (self-regulatory learning strategies/psycho-behaviours). The extent that existing theoretical models of talent identification and development acknowledge the interplay of these variables is considered in the next section.

Multidimensional and dynamic approaches to talent identification and development

Over the years, many models of talent identification and development have been proposed (e.g. Gimbel, 1976; Harre, 1982; Havlicek *et al.*, 1982; Bompa, 1985). Unfortunately, the theoretical justification for many of these models is not clear and they have typically only considered how to identify innate determinants of talent with limited recognition that talent normally emerges over time. However, notable exceptions to this shortcoming are the models proposed by Ziegler and Perleth (1997) and Simonton (1999). A consideration of internal dispositions and the capacity of an individual to develop theoretically drive both these models. While neither of these models was developed specific to sport, they are worth considering as they are built on a multidimensional and dynamic concept of talent.

Importantly, and uniquely, both Ziegler and Perleth's (1997) and Simonton's (1999) models of talent identification and development distinguish between determinants of performance and the capacity that an individual has to develop. Simonton (1999) recognizes that differences in standards of excellence can only be partly attributed to innate factors. This position is similar to that proposed by Ziegler and Perleth (1997), who advocate that actualization of an individual's internal talent factors requires the existence of favourable environmental conditions and active learning processes that are supported through one's internal motivational and learning strategies. Simonton (1999) stated, 'it is extremely likely that the environmental factors, including deliberate practice, account for far more variance in performance than does innate capacity in every salient talent domain' (p. 454). Additionally, Simonton proposes that multiple components contribute to the existence of talent within any domain, and that these components interact in a multiplicative rather than in an additive manner. Accordingly, he identifies four direct implications of a multiplicative model of talent for talent identification and development:

1. The domain in which an individual displays talent will not be determined by any highly specialized component but rather by 'the specific weighted

multiplicative integration of the contributing innate components' (Simonton, 1999, p. 438).

2. Individuals talented within the same domain will all have some value of each necessary component, since a multiplicative model implies that the absence of any component will mean an individual 'cannot possibly display any talent potential'. However, individuals' values on these components will vary. Consequently, there are an infinite number of formulas for talents within any domain. Unidimensional models are unable to account for this diversity.
3. Exceptional talent within any domain will be extremely rare. Many individuals will not have any talent potential due to the absence of one of the components. Therefore, there are likely to be many children who score very highly on one talent component (e.g. strength) but who are not talented due to the total absence of a different talent component within the specific performance domain (e.g. commitment to train). The unidimensional models of talent identification and development that continue to prevail in sport today will be unable to make this crucial distinction.
4. The number of innate components essential for performance will vary from domain to domain. Some domains will be complex with a large number of essential components; for instance, contrast closed and open skilled sports.

A number of considerations for talent identification and development can be inferred from the multiplicative model presented by Simonton. First, an individual who scores highly on any one particular component will not necessarily have talent, since actual progress and attainment will depend upon the multiplicative profile of all the components essential to excellence within the domain. For example, even if someone displays a high level of speed, their potential within a sport will also depend upon the other determinants of success, such as power, determination and coping skills. Additionally, children can display disparate scores on the determinants but be equally talented. Consequently, this model implies that predictability of talent is low if component scores (as is typical of current practice) rather than multiplicative effects are considered. Additionally, research that attempts to correlate success in a domain with individual components will be unsuccessful, since those who excel will inevitably display a range of levels on each component.

A second feature of Simonton's model is the recognition that component values change with maturation:

The static conception of talent is plainly wrong. Talent development must instead entail some form of epigenesis. That is, starting with a relatively undifferentiated

state, the various traits slowly appear and differentiate over time . . . Infancy, adolescence, and even adulthood will see the latent components undergoing various transformations (Simonton, 1999, p. 442).

This dynamic conception of talent provides an explanation for both early bloomers (e.g. Picasso, Tiger Woods and ladies' tennis player Martina Hingis) and late developers (e.g. Einstein, former 100-m world record holder Pietro Mennea and former tennis player Virginia Wade) within performance domains. The early bloomer will be the individual who has adequate values of all components of talent at an early age. However, late developers may still possess the full range of necessary characteristics, but have one or more components that do not begin development until much later. Simonton (1999) stated, 'Just because a trait claims a genetic foundation does not automatically mean that the trait appears all at once. On the contrary, many characteristics, even if under demonstrably genetic control, take many years, even decades, to emerge' (p. 449).

The epigenetic part of Simonton's (1999) model can also account for those individuals who show promise but never realize their potential. For example, the Scottish under-16 boys' football team was the losing finalists in the 1989 World Cup, yet only two of these players subsequently earned full international honours (McLeish and Collins, 2001). 'Loss' of talent, as displayed by many of the individuals within the Scottish under-16 football team, can be due to a relatively slower rate of increase in the multiplicative value of the required components of talent compared with other individuals, or because an individual possesses a surreptitious set of components that happens to suit them for a particular sport at a particular time. For example, individuals may excel in rugby at an early age due to their size and strength, but this does not mean that they have the range of components required to excel as adult players. Of course, loss of talent also can be accounted for by an absolute loss in the value of the potential talent (e.g. due to injury). Finally, since the combination of components required within a performance domain may be similar to those required in another, 'not only may the composition of a given talent change as a person ages, but the optimal talent domain may change as well' (Simonton, 1999, p. 445). In fact, this domain change by individuals has been identified already as an important component within British sport (Moore *et al.*, 1998).

Importantly, the epigenetic part of Simonton's (1999) model conceptualizes why it is difficult to identify early signs of talent. If a child does not display a component, this may be because the component is absent or because it will not develop or emerge until later. Thelen (1995) highlights how behaviours 'wait in

the wings' and only emerge when the supporting subsystems and processes are ready. Consequently, the comparative delay of one component may act as a 'rate limiter', preventing the cooperative self-organization of the other component. Therefore, the desired behaviour can emerge quite suddenly when (or if) all the components reach critical functioning and the context is appropriate. Due to this late emergence of components, as age increases the number (and accuracy) of identified 'potentially talented' individuals will increase. Clearly, therefore, the earlier a talent identification procedure is employed, the more potentially talented individuals will be eliminated.

While both Ziegler and Perleth (1997) and Simonton (1999) have produced excellent talent identification and development models, they offer less guidance on how support systems should be designed and deployed to initiate and maintain development. Research within sport highlights that individuals have to move through various stages of development, and therefore effective support must be used to enable these transitions. For example, Bloom (1985) and Côté (1999) identified three key stages that athletes pass through on the path to obtaining excellence. Within each of these stages, the performance focus of the athlete will change and so, consequently, will their support needs. The final section identifies key elements that need to be incorporated into talent identification and development processes in sport and considers how these factors should be combined within a talent identification and development model.

Concepts to be considered within a multidimensional and dynamic model of talent identification and development in sport

The aim of this section is to present the issues that need to be considered when employing a multidimensional and dynamic talent identification and development model in sport. In particular, the role of psychology in actualizing an individual's potential is emphasized.

Performance and developmental dispositions

Multidimensional and dynamic talent identification and development models need to reflect both performance dispositions and the capacity of an individual to develop. Practitioners need to consider that the key problem is not so much identifying the best performer at that moment, but rather identifying over time which factors may be limiting talent development. As psycho-behaviours (self-regulatory learning strategies) characterize the means by which an individual interacts with the environment, and therefore the extent that they

make the most of the opportunities that they are given, there should be an early emphasis on these key developmental attributes. In other words, practitioners need to recognize the key role psycho-behaviours can have in positively facilitating the interaction of an individual with their environment and enabling successful negotiation of the path to excellence (or fulfilling one's potential!) (Freeman, 2000).

Of course, key motor (e.g. balance), cognitive (e.g. decision making) and physical skills (e.g. power) are advantageous and sometimes essential to achieve excellence in a chosen sport. For example, Schmidt and Wrisberg (2000) identified movement, perceptual and conceptual elements that transfer across sports. Baker (2003) also includes 'physical conditioning' as a transferable element. Consequently, it may be appropriate that early motor experiences should look to promote a range of these transferable 'elements'. Starkes and Allard (1993) have highlighted the frustration felt by young basketball players, whose cognitive capacity to 'read' a game was ahead of their motor capacity to implement their intentions. Accordingly, it would appear that young athletes will require a basic 'movement vocabulary', which they can use as the basis for subsequent sport-specific development. Programmes aimed at young children that promote 'transferable' elements may overcome many of the problems associated with early specialization in sport (see Baker, 2003). Such programmes could precede or complement a child's involvement in a programme where specific adaptations to the unique constraints of a chosen sport are promoted.

The involvement of children in a diversified range of activities would not appear to limit the capacity to excel in sport (Stevenson, 1990). In contrast, considerable evidence exists to show that many elite athletes experienced early diversification, which, rather than prohibiting development, may have facilitated their development (Barynina and Vaitsekhovskii, 1992; Moore *et al.*, 1998; Baker, 2003). For instance, Barynina and Vaitsekhovskii's study of elite swimmers indicated that individuals who specialized early spent less time on the national team and ended their sports careers earlier than athletes who specialized later. Additionally, in a recent study of experts from the sports of basketball, netball and field hockey, Baker (2003) reported that participation during early phases of development in other relevant activities (e.g. where dynamic decision making was necessary) augmented the physical and cognitive skills necessary in the primary sport. Although research is still required to tease out the exact volumes of generic components that optimally facilitate these essential sport-specific factors, there is reasonable evidence that they are necessary.

Therefore, within a multidimensional and dynamic talent identification and development model, the early focus should be towards developmental aspects (i.e. psycho-behaviours and transferable skills) rather than early identification. As an individual matures and develops within their chosen sport, the emphasis will gradually shift from determinants of potential (e.g. transferable perceptual elements) to determinants of performance (e.g. specific adaptations to the unique perceptual constraints of their chosen sports; Williams, 2000). However, considerable emphasis will still be required on psycho-behavioural factors if an individual is to successfully negotiate the pathway to excellence in their chosen sport and maintain expertise once achieved. These principles are highlighted in Fig. 1.

Pathway to excellence

The path to excellence within any sport is a complex one, as athletes progress through various stages of development and the requirements of individuals adjust as they progress through these stages. Bloom (1985) identified three stages of development (initiation stage, development stage and mastery stage) from his work with US athletes highlighting the need to provide appropriate support within each of the stages.

More recently, Côté (1999) presented the 'stages of sport participation' model, which looked at involvement in sport up to the age of 18 years and also

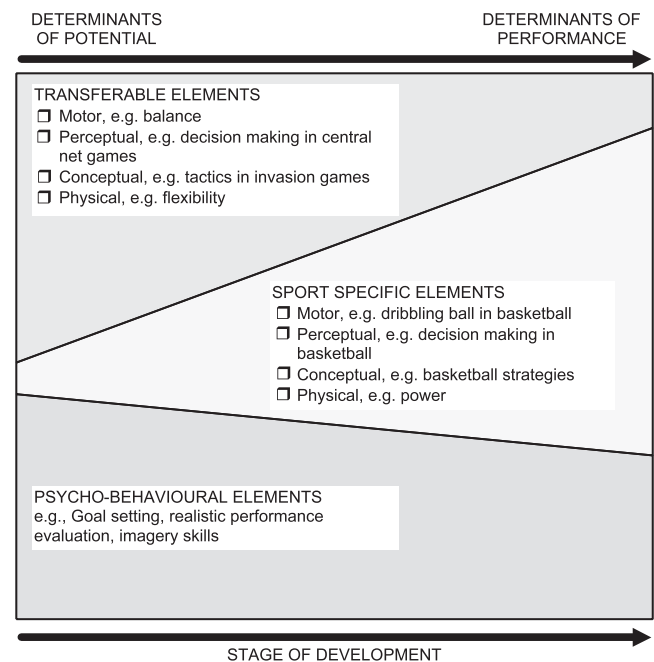


Fig. 1. Proposed contribution of motor, perceptual, conceptual, physical and psychological elements to the development and performance of an athlete.

identified the 'sampling', the 'specializing' and the 'investment' years:

In general, the sampling years are characterized by a lower frequency of deliberate practice and a higher frequency of deliberate play; the specializing years are marked by more equal amounts of deliberate play and deliberate practice; and the investment years are characterized by a higher frequency of deliberate practice and a lower frequency of deliberate play (Côté, 1999, p. 413).

Côté also highlighted that there was likely to be a fourth stage of development typified by the maintenance and perfection of skills. This is consistent with work by Kreiner-Phillips and Orlick (1992) that highlighted the distinction between 'getting there' (producing a world-class performance) and 'staying there' (consistently producing world-class performances). Similarly, Durand-Bush (2000) referred to the 'maintenance years'. This stage emphasized the need for increased quality of training, avoiding 'being copied by competitors' and the need for more support to deal with the additional stress of elite competitive sport (Ollis, 2002).

Although further research is required to establish the generality of these four stages of development, the important message is that unique favourable environmental conditions will exist and required support will differ as athletes progress through the various stages of development. Additionally, while athletes would appear to progress through at least four macro-stages of development, the successful athlete will also encounter many micro- and meso-stages of development (e.g. coping with injury or a technique change), making development and the support required highly idiosyncratic (Ollis, 2002).

This awareness of the complex pathway to excellence that athletes must negotiate also highlights that performers must make several transitions in their careers to progress to the highest standards. For example, Fig. 2 proposes that for an individual to make the transition to the mastery stage of development, increased technical coaching and financial support will be required. Therefore, the ability of an athlete to initiate and/or commit to these changes is key to his or her successful transition to the next stage of development. Within his work, Bloom (1985) acknowledges the importance of providing support to athletes to facilitate the transition between the stages of development. We now discuss the factors that are likely to impact on this process.

Successful transition from one stage of development to another

As discussed, athletes will pass through many stages of development (micro, meso and macro) as they progress

from initial involvement in sport to a successful mature competitor (Ollis, 2002). Therefore, irrespective of the performance dispositions displayed and the environmental opportunities afforded, an individual only displays true potential when they are able to successfully transfer from one stage of development to another in order to eventually achieve consistent performance as a world-class athlete. Research has shown that this ability to successfully transfer between stages of development is facilitated, and indeed characterized, by an individual developing and applying a range of psycho-behaviours (self-regulatory learning strategies). For example, psycho-behaviours (e.g. goal setting, imagery, self-talk) have been found to facilitate the ability to maintain focus while resisting the interference of distracting information (Moran, 1996). Previous research has also highlighted how psycho-behaviours (e.g. goal setting and imagery) can help an individual to progress through micro- and meso-stages of development (e.g. injury) (Ievleva and Orlick, 1991; Rose and Jevne, 1993).

Therefore, it is important that talent identification and development processes place early and continual emphasis on the development and application of key psycho-behavioural (self-regulatory learning) strategies, as they will play a crucial role in facilitating the successful negotiation of developmental transitions (macro, meso and micro) (see Fig. 2). Without this ability to negotiate successfully from one stage of development to the next, and to negotiate micro and meso transitions encountered within a development stage, an individual talent will at best remain a potential. Unfortunately, however, talent identification and development models typically place minimal, if any, emphasis on psychological factors (Morris, 2000; Abbott and Collins, 2002). It should be acknowledged that the capacity that an individual has to make the transition to the next stage of development may also be facilitated or inhibited by their motor, perceptual and physical performance dispositions.

Conclusions

To address the current dichotomy between theory and practice, talent identification and development processes need to recognize the evolutionary nature of talent and therefore the need to combine talent identification and talent development processes. While the identification process is typically seen as a precursor to the talent development process, we advocate the need to initially place less emphasis on the identification process and greater emphasis on providing children with the opportunity to develop factors that underpin successful development. As such, we advocate *continual* monitoring and development of *all* components that

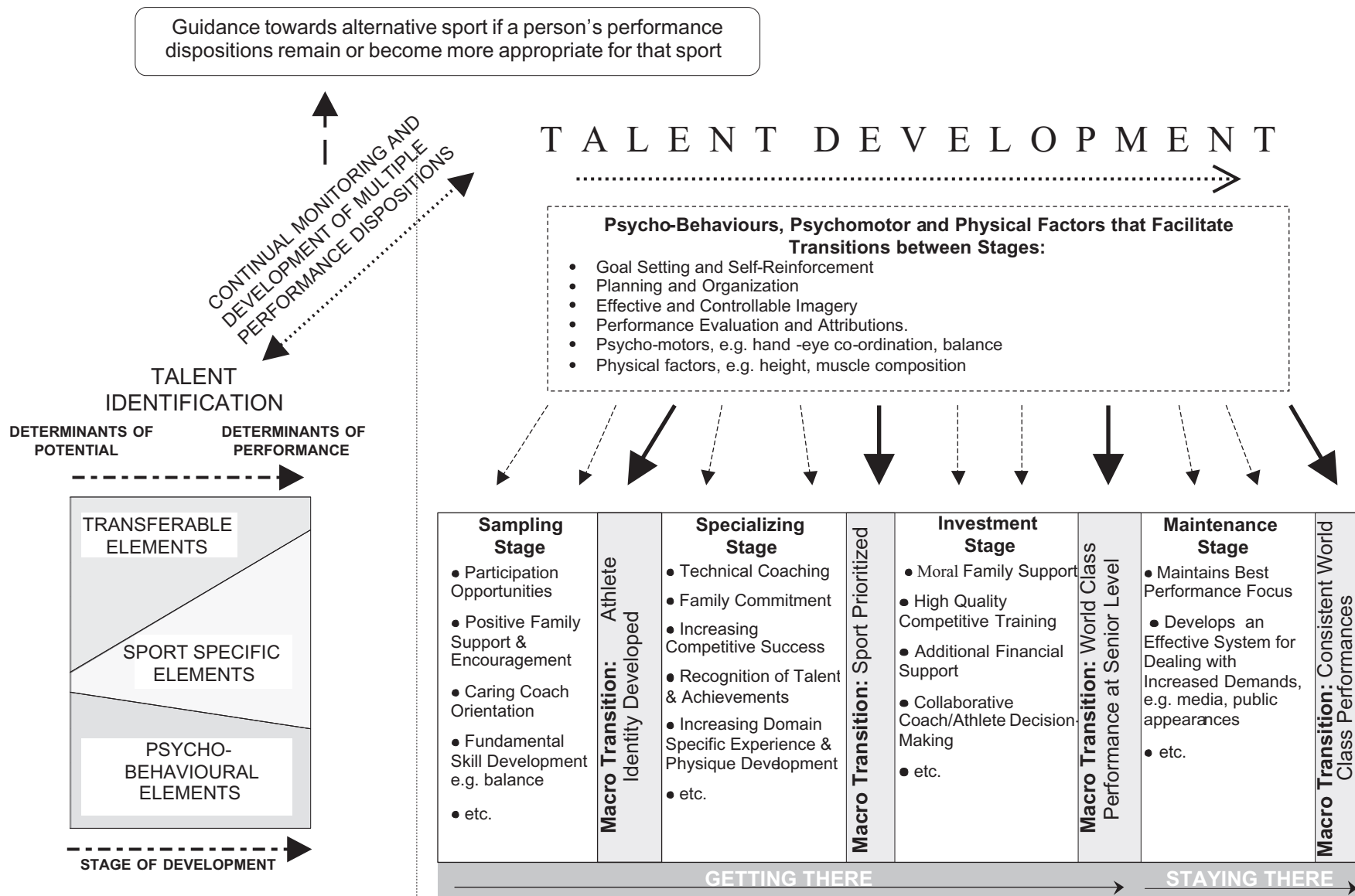


Fig. 2. The role of psycho-behaviours in facilitating the successful negotiation of developmental transitions within a multidimensional and dynamic concept of talent.

may influence the fulfilment of an individual's talent, as opposed to the traditional approach of identifying the 'talented' based on 'one-off' performance observations (e.g. scouting in football). This approach recognizes that multiple interactive and compensatory processes take place within and between innate capabilities, environmental conditions and psycho-behaviours. Therefore, individuals should not be identified or deselected on any one component (e.g. height), since an advantage on another component, or a combination of other components (speed and commitment), may compensate for a weakness.

Crucially, an increased emphasis on development should also help guide the support provided to the athlete at different stages of their development and not just serve a selection agenda. In other words, copying both jargon and approach from higher education, coaches and scientists should increasingly adopt a formative as opposed to a summative assessment approach in their talent identification and development efforts. Therefore, selection processes should consider a child's progress and behaviour (e.g. commitment) during a development programme as opposed to purely considering standards of performance. For example, consider an early maturer in rugby who consistently scores tries due to their physical advantage. A key question should be whether the individual successfully learns motor elements (e.g. passing) and perceptual elements (e.g. decision making) during the development phase and whether they show a commitment to their development, especially when faced with adversity. This is in contrast to an approach whereby selection is based on the performance of an individual, although their superior performance may purely be due to a reliance on their early physical advantage.

To ensure an appropriate emphasis of pertinent factors, the distinction between determinants of performance and determinants of potential needs to be acknowledged. As psycho-behaviours characterize the means by which individuals interact with the environment, and therefore the extent those individuals make the most of the opportunities that they are given, considerable emphasis on the development of psychological attributes would appear important. Consequently, recognition of this distinction should lead to greater emphasis on psycho-behaviours within talent identification and development processes and less emphasis, at least initially, on physique and performance. Of course, the transition from one stage of development to the next will also be constrained by motor and physical factors. As such, an individual may have or develop performance dispositions that are better suited to an alternative sport and a domain change may be required if they are to excel. This domain change is likely to be facilitated by the early promotion of

transferable elements (motor, perceptual, conceptual and physical) (e.g. coordination) and psycho-behavioural performance dispositions (e.g. goal setting). The proposed interaction of performance dispositions (motor, perceptual, conceptual, psycho-behavioural and physical) and environmental conditions on the development of an individual in sport is illustrated in Fig. 2.

We are currently piloting and evolving a talent identification and development model based on the principles highlighted in this paper in partnership with **sportscotland**. The impact of the model will be reported in a subsequent paper.

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