

CHAPTER 35

Competence Motivation in the Physical Domain: The Relevance of Self-Theories in Sport and Physical Education

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Research into competence and motivation in the physical domain has truly burgeoned over the past 40 years. Investigators have adopted various perspectives during this time to understand achievement motivation in contexts where competence is highly visible and in which challenges and threats to the acquisition and demonstration of competence are common. The ‘physical’ domain is taken to comprise sport, structured physical activity (exercise), and physical education (PE) at school and university. Along with theory and research have come evidence-based recommendations for coaches and teachers to adopt behaviours that purportedly optimize motivational processes among individuals participating in these settings. Attempting to synthesize this body of work within a single chapter on competence motivation would likely fail to do justice to the progress that has been made in theory development, knowledge acquisition, and application to professional practice.

Consequently, in this chapter I want to focus on self-theories of ability (also referred to as implicit beliefs / mindsets / theories of change / conceptions of ability), with a primary focus on youth sport and PE (see also Dweck, Chapter 8, this volume). Following a review of how research in sport and PE has complemented and diverged from research in other domains, I highlight some concerns that require our consideration and proffer a number of avenues for further research. Subsequently, in the spirit of the second edition of the *Handbook*, I turn attention to the application of self-theories research for practitioners, and outline the challenges often faced by coaches and teachers in influencing motivation and competence in physical settings. I hope the chapter serves to inform readers and stimulate continued efforts to learn and apply our knowledge of self-theories in sport and physical education.

SELF-THEORIES IN SPORT AND PHYSICAL EDUCATION

Beliefs about the nature of human attributes centre on an individual’s view (or theory) of whether such qualities are fixed and stable, or whether they are malleable and potentially

changeable. In the scientific literature, the former belief has been termed an entity theory, whereas the latter belief has been labelled an incremental theory (Dweck & Leggett, 1988, Dweck, 1999). In more colloquial terms, these theories have often been referred to as growth (incremental) and fixed (entity) mindsets (Dweck, 2006). As we have seen in Chapter 8 (this volume), these beliefs about competence have received extensive attention from researchers working in diverse contexts such as education, occupations, health, and relationships. Initial work in sport drew heavily from Dweck's research into children's beliefs about intelligence and their links with the adoption of achievement goals and ensuing mastery and helpless responses to challenging tasks (Dweck, 1986; Dweck & Bempechat, 1983; Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988). Indeed, over the past twenty years or so, implicit beliefs research in sport, physical activity, and PE has continued to focus predominantly on young people at school and university (Vella, Braithwaite, Gardner, & Spray, 2015). The reason for this attention on formal education contexts is not clear, but most likely it reflects enduring interests of investigators and more significant restrictions encountered in accessing elite sporting populations. In the remainder of this section, the network of motivational variables (*meaning systems*) encompassing self-theories will be examined briefly.

Subsequently I will address measurement and manipulation considerations pertaining to studies of implicit beliefs in the physical domain, drawing comparisons with research in other contexts where possible.

Meaning Systems

Individuals holding an entity perspective will be more likely to adopt ego or performance achievement goals in order to demonstrate and validate their ability, whereas those who espouse incremental views will tend to adopt task or mastery goals in order to acquire and increase the attribute in question (see Dweck & Molden, 2005; Dweck, Chapter 8, this volume). Thus, beliefs and goals combine to influence how individuals interpret competence-

based settings and the perceptual lens adopted leads to important consequences. Early work in youth sport and PE found support for these propositions with respect to dichotomous (approach) achievement goals (e.g., Biddle, Wang, Chatzisarantis, & Spray, 2003; Ommundsen, 2001a, 2001b, 2003; Wang, Chatzisarantis, Spray, & Biddle, 2002). Following the emergence of the trichotomous and 2 x 2 approach-avoidance achievement goal frameworks in academic settings (Elliot, 1999; Elliot & Church, 1997; Elliot & McGregor, 2001; Elliot & Hulleman, Chapter 4, this volume), studies in sport and PE have examined the links between self-theories and mastery and performance goals, differentiated by definition (self/task vs. other-related competence) *and* valence (approaching positive vs. avoiding negative outcomes) (e.g., Wang, Liu, Lochbaum, & Stevenson, 2009, Warburton & Spray, 2008). To my knowledge, researchers have yet to examine associations between beliefs and goals in the 3 x 2 framework (Elliot, Murayama, & Pekrun, 2011) within physical settings. It has yet to be determined, for example, whether incremental beliefs are differentially associated with intrapersonal- and task-based mastery goals. Moreover, little attention has been devoted to how implicit beliefs work in concert with other important intra-individual constructs such as fear of failure and perceived competence, as well as environmental factors in sport and PE, to determine achievement goal adoption and associated outcomes.

Measuring and Manipulating Self-Theories in Sport and Physical Education

The majority of cross-sectional and longitudinal studies measuring athletic ability beliefs have utilized the Conceptions of the Nature of Athletic Ability Questionnaire (CNAAQ; Sarrazin et al., 1996) or its successor, the CNAAQ-2 (Biddle et al., 2003; Wang, Liu, Biddle, & Spray, 2005). This approach to measurement has varied from work in alternative domains that has typically utilized a single scale to label study participants as entity *or* incremental theorists. The CNAAQ-2 (and the CNAAQ) assesses incremental and entity beliefs as distinct higher-order constructs underpinned by more specific beliefs that sport ability can be

learned, and therefore is increasable, and that sport ability is stable and an innate gift. This approach permits the calculation of separate scores for each belief, along with the ability to determine the association of the scores obtained, and the potential to examine within-person permutations of beliefs. The majority of studies have focussed on the predictive utility of the higher-order incremental and entity beliefs rather than effects of the more specific beliefs. Moreover, there has been a relative dearth of studies examining change processes, and these longitudinal investigations have focussed solely on young people in schools either during a short unit of work in PE, across the primary-secondary school transition, or across one year in secondary school (Warburton & Spray, 2008, 2009, 2013).

Few investigators have attempted to temporarily manipulate participants' self-theories in order to examine how the different meaning systems lead to positive or negative outcomes in sport. In our systematic review (Vella et al., 2015), we identified seven experimental studies of self-theories in sport and related contexts, conducted between 1996 and 2010. Searches revealed no published studies since 2010. This state of affairs is somewhat disappointing given the opportunity these types of investigation afford in designing potentially compelling belief messages to infer causal effects on outcomes of interest. One study, carried out with school students performing a golf putting task, illustrated the difficulties in creating conditions that reliably produced distinct 'high' and 'low' incremental groups. While an 'entity' message read by participants reliably distinguished groups on entity scores, the 'incremental' message failed to distinguish the incremental and control groups on incremental scores (Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006). Nevertheless, students in the incremental condition were less inclined to make failure attributions to lack of ability than members of the entity group. A second school-based investigation revealed that an incremental beliefs' manipulation in PE led to higher levels of intrinsic motivation among students (Moreno, Gonzalez-Cutre, Martin-Albo, & Cervello, 2010). Vella and colleagues

argued for more compelling ways to manipulate beliefs in sport to be developed and tested (Vella et al., 2015).

Particularly in the education context, investigators have attempted to design longer term self-theory interventions in school classrooms (e.g., Blackwell, Trzesniewski, & Dweck, 2007). Strategies to induce incremental beliefs have centred on instilling in children the notion of growing connections in the brain to improve intelligence. No studies in sport-related settings have sought to highlight the potential for connections between muscles and the brain to improve motor co-ordination, or developing fast-twitch muscle fibres to improve speed and power, or stretching muscles to improve ability in activities requiring flexibility. There have been no published investigations with sports coaches and PE teachers that put in place a carefully designed mindset intervention with athletes and students to promote theories of change and to buffer the effects of entity beliefs. Later in this chapter, I will address the application of self-theory research to professional practice in physical settings in greater detail.

KEY FINDINGS IN SPORT AND PHYSICAL EDUCATION

Following trends in other domains, implicit beliefs research in the physical domain has largely adopted quantitative methods. Very few studies have employed interviews, focus groups, or other forms of qualitative inquiry. Recently, Vella and co-workers (2015) conducted a systematic review and meta-analysis of published research in sport, physical activity, and PE. Studies were eligible for inclusion in the review if a valid and reliable quantitative measure of self-theories was employed. We identified 43 studies conducted between 1991 and 2014 that employed cross-sectional, longitudinal, or experimental designs. Findings showed that incremental beliefs were more strongly associated with theoretically-derived correlates than entity beliefs. Not surprisingly, given the origins of work on implicit

theories, the most frequently studied correlates of ability beliefs were achievement goals (conceptualized and measured in either dichotomous or approach-avoidance terms) and motivational climate. Across settings, incremental beliefs about change were positively linked with task orientation, mastery-approach and mastery-avoidance goals, and mastery climate, but negatively correlated with performance climate. On the other hand, entity beliefs about stability positively predicted the adoption of ego orientation, performance-approach and performance-avoidance goals, and performance climate. Moreover, entity beliefs negatively predicted perceptions of mastery climate. These findings are in accordance with theoretical predictions and evidence from other life domains of the meaning systems that individuals adopt (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013). Importantly, incremental beliefs were also linked with more self-determined forms of motivation and perceived competence. In contrast, entity beliefs were negatively associated with autonomous (vs. controlled) motivation and unrelated to perceived competence. More generally, entity beliefs were more weakly associated with outcomes than incremental beliefs.

Notably, the empirical yield of self-theory research in the physical domain is mainly informed by cross-sectional, snapshot studies. There is a need for more, and higher quality, experimental and field-based studies testing a greater range of outcomes (e.g., learning strategies, coping strategies, self-esteem, and achievement). In addition to the outcomes outlined above, implicit beliefs have been associated with self-efficacy, beliefs about success, motor learning, skill acquisition, desired future vs. present reality focus, and positive and negative affect (e.g., Drews, Chiviacowsky, & Wulf, 2013; Jourden, Bandura, & Banfield, 1991; Kasimatis, Miller, & Marcussen, 1996; Sevincer, Kluge, & Oettingen, 2014; Van-Yperen & Duda, 1999). We could begin to look more closely at the influence of key moderators in the beliefs->goals->outcomes sequence, something which our systematic review was unable to reveal because of the disparate nature of empirical endeavors to date.

For example, Stenling and colleagues have recently identified gender to be an important moderator (Stenling, Hassmen, & Holmstrom, 2014), but we also need to investigate age, physical context (including elite and recreational sport), motivational climate, need supportive and thwarting coaching styles, as well as intrapersonal variables such as perceived competence and fear of failure.

In addition to quantitative approaches, the utilization of a range of qualitative methods would help to enrich our knowledge of the development and ramifications of self-theories in sport and related settings. Two studies with elite golfers and track-and-field athletes speak to the importance of self-theories in sport. In the first study, eight high-level golfers were interviewed about their self-theories of ability and a grounded theory approach was adopted to articulate some of the complexities surrounding self-theories in golf (Slater, Spray, & Smith, 2012). Three dimensions emerged: ‘acquirable ability’, ‘stable ability’, and ‘developing natural attributes’, reflecting the co-existence of both types of implicit beliefs. A number of golfing attributes were perceived to be innate and stable such as co-ordination and touch, whereas there also emerged the view that natural attributes act as foundations that can be built upon through practice. Interestingly, this study tapped golfers’ views of psychological attributes important for success in elite sport. Passion, persistence, and staying in the moment, for example, were considered stable qualities and difficult to develop. Clearly, these findings imply there is a job to be done by coaches and sport psychologists wishing to cultivate incremental theories of psychological skills among players. More broadly, however, the study revealed the central role played by coaches, other social agents, golf culture, and observations of high profile professional players in the socialization of self-theories of golf ability. Moreover, the concept of a ‘ceiling effect’ was evident among responses. Some golfers considered that there is always room for improvement and that certain events (e.g., competitive success) can serve to raise the ceiling, whereas other players

endorsed the view that their current level represented the maximum level of competence they would ever attain.

Many of the findings with golfers also emerged in interviews with track-and-field athletes competing in sprinting and throwing events (Jowett & Spray, 2013). At the time of the study, these athletes were hopeful of selection for the 2012 Olympic Games. Again, implicit theories were seen to be intertwined, with participants believing that a combination of innate qualities and sheer hard work and persistence leads to performance improvements and competitive success (building on natural ability). Ceiling effects were observed, although these appeared confined to physical attributes; psychological attributes were viewed as more malleable. Also in accordance with Slater et al.'s (2012) findings were the reported influences on the development of athletes' implicit beliefs: upbringing, career transitions, motivational climate, coaches and fellow athletes, and initial success as a junior. Importantly, and very much in line with theoretical propositions (Dweck, 1999), incremental theories were shown to be essential in overcoming setbacks, taking personal responsibility for successes and failures (controllable attributions), setting approach-focussed goals, and overcoming setbacks.

In sum, these two studies show that in elite sport, athletes access both types of self-theories. They recognise that sporting performance is made up of a multitude of specific skills, some of which may be viewed in fixed terms, others in more malleable terms. Performance-enhancing psychological skills, as well as physical attributes, are likely to be considered in both fixed and growth forms. In addition, socialization factors play a key role in individuals' theory development. More qualitative studies would be beneficial, especially with children and adolescents. Results emerging from our recent studies with gymnasts and swimmers are reinforcing many of the points raised by Slater et al. (2012) and Jowett and Spray (2013), and attest to the relevance and complexity of self-theories in sport. In the

sections that follow, I outline some key conceptual and empirical issues facing researchers in the physical domain (and, no doubt, in other domains), provide suggestions for research questions that appear worthy of our attention, and then close the chapter by focussing on the application of research to practice more closely.

CURRENT RESEARCH ISSUES IN SPORT AND PHYSICAL EDUCATION

Given the disparate nature of the extant research base in the physical domain, how can investigators bring greater coherence to empirical endeavors and enhance their impact on professional practice?

Measurement of Beliefs

Self-theories of change and stability are conceived as knowledge structures and individuals have access to both types of beliefs. Individuals' beliefs can differ across and within broad domains such as personality, relationships, health, education, and sport (Dweck, 2005; Dweck & Molden, Poon & Koehler, 2006; Yeager & Dweck, 2012). A good deal of research has assumed that people tend to chronically endorse one theory over the other. Early measures tapped only one belief, with the assumption that low scores, or disagreement, denoted the endorsement of the other belief (Dweck, 1999). More recently, in many domains, implicit beliefs have been assessed with a short continuous scale containing both fixed and growth items in which high scores reflect a particular dominant belief. Based on mean scores, participants are classified as 'entity *or* incremental theorists', reflecting a dominant chronic view. The beliefs are viewed as dichotomous theories (i.e., entity and incremental meaning systems), although measured using one continuous scale (see Leith et al., 2014).

As mentioned earlier, researchers have tended to adopt more comprehensive measurement scales in the physical domain (i.e., the CNAAQ or CNAAQ-2) that permit scores to be derived for both beliefs. Correlations between entity and incremental beliefs (and

between the corresponding lower-order beliefs) are typically low-to-moderate and negative, suggesting they do not represent opposite ends of the same continuum (Biddle, Soos, & Chatzisarantis, 1999; Lintunen, Valkonen, Leskinen, & Biddle, 1999; Ommundsen, 2001a, 2001b, 2003; Sarrazin et al., 1996; Wang & Biddle, 2003). Using the CNAAQ-2 enables the examination of within-person belief profiles. For example, an individual can believe that certain elements of sport ability are fixed whereas other contributory qualities (referents; see Nicholls, 1992) are malleable – a high-high or ambivalent profile. Wang and Biddle (2001) demonstrated, with reference to sport, the existence of five motivational profiles among youth, each containing combinations of entity and incremental beliefs. These clusters were differentially linked with a range of outcomes (see also Biddle & Wang, 2003; Wang, Liu, & Biddle, 2003). Using two short sets of items to measure implicit beliefs about mental toughness, Gucciardi and colleagues found two clusters of beliefs among adolescent athletes – an incremental theory (high incremental-low entity scores) and an ambivalent theory (moderate scores on both beliefs). A dominant entity beliefs cluster did not emerge (Gucciardi, Jackson, Hodge, Anthony, & Brooke, 2015). Our qualitative work with elite athletes has also demonstrated the complexities surrounding implicit beliefs. Athletes conceptualize their sporting attainment as a consequence of many attributes, some of which they view as fixed, others they consider more susceptible to change through sheer hard work (Jowett & Spray, 2013; Slater et al., 2012). In sum, there appears much to be gleaned from analysing separate scores for the two implicit theories.

Fluidity of Self-Theories

Arguably, too much research in physical settings utilizing the CNAAQ(-2) has focussed on beliefs about general ‘sport’ ability, either in cross-sectional or longitudinal studies, without identifying the conditions which lead to the adoption or active selection of one belief over the other. Recent work by Leith et al. (2014), for instance, has helped to illuminate situational

factors that trigger the adoption of one type of implicit belief over the other and has thus highlighted the potential fluidity of self-theories. Individuals can selectively shift their implicit beliefs to reach desired conclusions about themselves or protect themselves and liked others. Identifying the circumstances in which athletes regulate their self-theories (i.e., strategically endorse incremental and resist entity views) offers researchers in the physical domain exciting avenues of inquiry.

Manipulation of Beliefs in Experimental Studies

The relatively few experimental studies in the physical domain have either asked participants to read a passage of text espousing one theory or the other or relevant instructions have been read aloud (e.g., Drews et al., 2013; Jourden et al., 1991; Kasimatis et al., 1996; Spray et al., 2006; Wulf & Lewthwaite, 2009). Typically, 'evidence' is presented to provide credibility for the view that ability is either acquired or innate, or a high profile athlete is described as exemplifying either of the self-theories. Results have generally been supportive of theoretical predictions. Nevertheless, challenges remain, notably reducing the all-too-appealing nature of incremental belief items to distinguish experimental groups (Dweck, 1999; Spray et al., 2006). We must develop more creative and compelling incremental messages in both lab and school settings. These manipulations will likely necessitate inventive use of new technologies and multi-media formats to engage participants. Moreover, researchers and practitioners will need to concurrently deploy powerful and realistic 'anti-entity' messages.

Urda and Turner (2005) presented some general arguments for why laboratory-based findings, usually obtained with school or university students, may fail to translate to real-world settings in which numerous situational and cultural factors affect students, coaches, and teachers. These kinds of influences are likely to also operate in physical settings. Thus, we need more varied field-based studies to discover 'what works' in PE and sport. Cluster

randomized controlled trials are absent from extant research in physical contexts. Moreover, I am unaware of the use of ethnographic techniques or reports of action research studies.

Contextual Nuances

Do the effects of self-theories and their associated meaning systems play out in subtly different ways in elite versus recreational sport, school and university settings, and in the exercise domain? There is generally a dearth of studies on self-theories in physical activity settings where participants are more concerned with maintaining health and fitness than achieving competitive success (see, for example, Burnette, 2010; Lyons, Kaufman, & Rima, 2015).

Beliefs About What?

Vella and co-workers raise the interesting question of whether young people in sport distinguish between relatively general fundamental movement abilities and more specific sport-related skills when responding to implicit belief measures (Vella et al., 2014). The development of the CNAAQ was to some extent influenced by such thinking, with the creation of general and specific sub-scales (Sarrazin et al., 1996). These two variables were later removed in the validation of the CNAAQ-2 (Biddle et al., 2003; Wang et al., 2005). However, we need to know more about individuals' beliefs about the fixed nature of specific skills and fundamental abilities, especially those that underpin a general entity view.

FUTURE RESEARCH DIRECTIONS

Given the current empirical yield, there remains much work to do in physical contexts to establish and manipulate self-theories of ability. Researchers in other domains, notably educational and social psychology, are asking nuanced questions that investigators in the physical domain, where challenging demands, setbacks, threatening transitions, and potential for public displays of incompetence are ubiquitous, would be wise to prioritize (Burnette et

al., 2013; Job, Walton, Bernecker, & Dweck, 2015; Leith et al., 2014; Snyder, Malin, Dent, & Linnenbrink-Garcia, 2013; Yeager et al., 2014; Yeager, Trzesniewski, Tirri, Nokelainen, & Dweck, 2011). I offer below a number of avenues of inquiry which I believe would strengthen the field.

1) Socialization of Self-Theories

The development of self-theories of physical ability in young people remains understudied. Where do the beliefs come from and who might be more important in imparting growth and fixed messages across various settings? Some young people may be particularly sensitive to the influence of gender and race stereotypes attached to sporting activities and more readily succumb to entity beliefs following early failure experiences. The role of friendships also deserves our attention. Children and adolescents often identify with a ‘best friend’ in sport and PE (Smith, 2003). Might a desire to be like friends or particular classmates/teammates provide a means by which incremental messages espoused by adults can be reinforced by such peers?

2) Resistance to Entity Beliefs in the Face of Failure

Why might some children and adolescents appear to show resistance to endorsing entity beliefs following failure? How are relationships between beliefs and outcomes mediated or moderated by the extant motivational climate, value attached to PE, teacher-student relationship quality, social comparison frames of reference and motives for comparison in sport/PE?

3) Triggers That Shift Self-Theories

Given recent studies pointing toward the potential for individuals to exercise greater self-regulation of beliefs than previously thought (Leith et al., 2014), which circumstances stimulate increased fluidity and susceptibility of implicit beliefs in sport and PE? Candidates

for attention include new environments encountered through transitions (new friendships, coaches/teachers) and maturational factors.

4) Beliefs about Psychological Attributes

To date, research in the physical domain has centred on notions of the fixedness or malleability of athletic (physical) ability. Our qualitative research has, nevertheless, flagged the existence of implicit beliefs about psychological attributes in sport and alluded to their determinants and consequences (Jowett & Spray, 2013; Slater et al., 2012; see also Gucciardi et al.'s, 2015 study of self-theories of mental toughness operating across occupational, sport, and education achievement contexts). Stand-out candidates for attention include passion and resilience. My colleagues and I have also begun to examine children and adolescents' implicit beliefs about five characteristics – commitment, confidence, communication, control, and concentration – as they pertain to sport and PE (the 5Cs; Harwood, 2008; Harwood & Anderson, in press). We are currently designing interventions aimed at developing effective ways to promote growth-oriented beliefs about these qualities, particularly around important sport and educational transitions.

5) Organizational Policies and Practices

Self-theories are particularly important when individuals (teachers, coaches, selectors) are asked to judge the performances and achievements of others and possibly make decisions about their futures (Butler, 2000; Dweck & Molden, 2005). Adults who themselves hold dominant entity beliefs may make rash judgments and selection decisions about young people based on current demonstrated sport competence. Interestingly, in our on-going studies, we are finding that successful elite athletes report being 'rejected' at talent identification events as juniors and that those performers 'selected' at the time did not go on to enjoy success in their sport and were no longer competing. We need research into potentially 'institutionalized' fixed beliefs about young people's competence in sport and their

implications for the policies and practices of National Governing Bodies (e.g., publication of junior rankings, talent ID programmes) and professional development opportunities for coaches.

Continued research into coaching and organizational practices will help to re-enforce the applied significance and potential impact of self-theories research in sport and education settings. In order to focus more closely on the application of research to practice, in the next section, I discuss several broad recommendations for promoting incremental beliefs in youth sport. Subsequently, I offer some thoughts for sports coaches and teachers as to how the typical practices in which they engage may impact on the accessibility of implicit beliefs among young people.

APPLYING THEORY AND RESEARCH FINDINGS IN SPORT AND PHYSICAL EDUCATION

Based on theory and empirical findings, researchers have stressed the importance of promoting incremental beliefs in sport. Chase (2010) documented the benefits to coaches of viewing their leadership abilities in incremental terms, and called upon coach education and leadership programs to assist coaches in developing a growth mindset toward their own leadership qualities. Specific coaching behaviors included monitoring communication with individuals and teams, praising effort, providing constructive criticism, and setting and maintaining high expectations. The important point made by Chase is that these behaviors can be learned and improved.

With respect to working in the youth sport context specifically, Vella and colleagues proposed six interdependent instructional strategies to promote an incremental belief system (Vella, Cliff, Okely, Weintraub, & Robinson, 2014):

1. *Focussing on effort and persistence.* Focussing on praise for effort and continued engagement, rather than talent, encourages the view that improvement is under personal control, particularly following setbacks.
2. *Facilitating challenge.* The difficulty of tasks and activities should be matched to individuals' current abilities so that goals for improvement are personally challenging; making mistakes in both training and competition is viewed as an inevitable and necessary part of progressing in sport.
3. *Promoting the value of failure.* Linked with the above, young people's failures in sport can be emphasized to be of value by adults and used to provide specific feedback that otherwise may not have been thought appropriate or relevant. Elements to consider include increased effort at appropriate times, training and competitive strategies, and seeking help (see also Yeager & Dweck, 2012).
4. *Defining success as effort.* Success in sport and other achievement contexts may be perceived from putting forth high effort levels and a sense of personal investment in the activity (Nicholls, 1989). High incremental beliefs promote engagement in the task at hand rather than attention on external outcomes.
5. *Promoting learning.* Incremental beliefs are more likely to flourish within a prevailing mastery-based climate that foregrounds individual and team improvement (Ames, 1992). Learning is placed at the heart of the system.
6. *Providing high expectations.* Coaches should hold high expectations for what young people can control – their cognitive and physical engagement in tasks, drills, games, and activities. Depending on the context (e.g., long established member of a team, arrival at a new school or club), high expectations will likely have greater impact once professionally caring and sensitive relationships between youth and adults have been forged.

Vella et al. proposed that these strategies facilitate adaptive outcomes for young people in terms of high quality motivation, positive affect, and behavioral engagement in sport. One can readily see the inter-dependencies of these six strategies and it is evident that these broad-based practical recommendations do not stem exclusively from implicit beliefs theory and research. Indeed, components overlap with recommendations emanating from other motivation frameworks (cf. Urdan & Turner's, 2005 discussion of common classroom-based recommendations arising from multiple theories).

Despite the appeal of these evidence-based instructional strategies, sports coaches and teachers may not feel sufficiently empowered to put these behaviors into operation and the reasons may be philosophical and/or efficacy-based. For example, broader organisational and cultural factors may serve to dissuade coaches from de-emphasizing winning and facilitating a growth mindset (Vella et al., 2014). Other practitioners may not buy-in to the principles based on their education and experiences – ‘this just won't work in my class/team’ or ‘you need to get in the real-world, I'd like to see you do it!’ Yet others may want to promote a growth mindset but feel they lack the subject expertise to do so. This situation may typically apply in primary schools in the UK, for example, where PE is often taught by teachers who are not trained PE specialists and have had little opportunity to undertake relevant continuing professional development opportunities in their careers.

In an effort to provide further illustration of the relevance of self-theories in sport and school PE, I have summarized in Table 1 several pedagogical activities undertaken by coaches and teachers and tried to determine how knowledge of self-theories can inform practice. Potential barriers, and suggested ways to overcome them, are also included. This list of behaviors is not intended to be exhaustive, but the practices do represent identifiable components of the coaching and teaching process. There is a danger that coaching and educating young people is seen as an overly mechanistic process – which it is not.

Nevertheless, by breaking down and presenting typical tasks, it becomes easier to highlight the relevance of self-theories at a more specific level and consequently facilitate more precise suggestions for behavior change in coaches and teachers.

1. Planning
2. Activities, tasks, drills
3. Demonstrating
4. Grouping
5. Observation
6. Feedback (evaluation and recognition)
7. Recapping lesson / training session
8. Reporting to parents, head coaches, academy directors

INSERT TABLE 1 ABOUT HERE

Effective application of theory to practice is not easy. In the first edition of the *Handbook*, Urdan and Turner eloquently highlighted some of the difficulties encountered by teachers in school classrooms, along with several reasons why recommendations resulting from theory and research may not ‘work’ as effectively as we hope (Urdan & Turner, 2005). These issues are certainly recognizable in sport and PE settings. Implementation of principles is multifaceted and complicated, and thus challenging for practitioners often faced with delivering to large groups. Notions of *competence, meaning, interest, challenge, attributions, achievement emotions, autonomy, control, goals* (and the *reasons* held by individuals for adopting them) present a ‘heady mix’ for the practitioner and may be overwhelming if we do

not carefully design our interventions and workshops. Considered recognition of coaches or teachers' needs and local contexts is called for. We need to help practitioners create and sustain growth motivational systems in their achievement settings in ways that do not engender resistance to, or boredom with, the 'message' among young people. How can the sorts of growth-focussed messages, carefully composed for participants undertaking discrete tasks in experimental studies, be expanded and infused effectively over a prolonged period of time? Perhaps a starting point is to discuss with teachers and coaches their professional 'philosophies'. "Why did they enter their profession, what do they wish to achieve, and what do they believe are appropriate ways to go about it?" Then, we can begin to introduce the psychology of competence and motivation and how it may gel or jar with their personal philosophies and the organizational opportunities and constraints impacting upon them. One example might be: What is their policy for selection to teams – current normative ability?; commitment to training? What is their approach toward giving all players 'game-time', particularly those youngsters displaying a growth mindset, demonstrating personal improvement, yet not normatively the most talented? How will parents be persuaded of the positives to this approach? These are important yet sensitive issues to address.

CONCLUDING REMARKS

In this chapter, I have articulated the theoretical, empirical and applied relevance of self-theories of ability in the physical domain. A discussion of some of the issues surrounding definition, measurement, and manipulation of self-theories was followed by an overview of research findings to date. Key challenges facing researchers were then addressed, before offering several directions for future work. Attention subsequently centered on applied implications of the work in this field, including both fairly broad-based and more specific recommendations for practice. A limitation of the review is its primary focus on young

people in sport and school-based PE. And self-theories, as central constructs within competence motivation research, by no means stand alone in this respect. We need to extend our reach more fully into the world of elite sport and health/exercise settings. Are the practical recommendations stemming from theory and evidence likely to play out similarly in diverse physical contexts? Or do we need to be a bit more creative and nuanced in how we advise practitioners to utilize their knowledge and skills to develop growth-oriented motivational systems? I suspect the latter will be more palatable for coaches and teachers, yet more challenging to undertake.

Where does the field go from this point? Undoubtedly, there is a need to bring coherence and more programmatic efforts to the design of our studies (Vella et al., 2015). I would single out the need to design compelling, psychologically precise interventions that sustain growth mindset messages and persistently challenge unproductive fixed mindsets (Yeager & Dweck, 2012). As mentioned before, local factors will need to be considered. That said, self-theories represent an intuitively appealing, elegant, and parsimonious explanatory concept for both the scientist and lay person (Roberts, 2012). Consequently, I look forward to engaging in, and reading about, future studies that have impact on both professional practice and the motivation of countless numbers of athletes and students. These studies, I hope, will feature in the next edition of the *Handbook*.

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Table 1 Implications of Self-theories for Teaching and Coaching Behaviors in Sport and Physical Education

Teaching/Coaching Behaviors	Implications from a self-theories' perspective	Barriers	Overcoming Barriers
1. Planning	What is the focus of the session and can I infuse an incremental message? What might competence and success look like in incremental belief terms?	Lack of knowledge and time to consider carefully and prepare a script or other resources e.g., YouTube clip, examples of high profile role models	Self-theories workshop (CPD) How can improvement be demonstrated? Faster, farther, longer, smoother, more accurate, more consistent, better understanding
2. Activities, tasks, drills	Challenging but not too difficult, varied, fun, appropriate time to move on	Difficult to be aware of, and implement, individually-tailored activities and tasks in many school and sport contexts Operationalizing notions of challenge, meaning and relevance	Subject-specific CPD (content based)

among diverse learners

3. Demonstrating	Who demonstrates and for what purpose?	Lack of confidence from the teacher	Showcase pupils who have improved at different absolute levels
		Lack of knowledge to draw out key points of student demonstration	Doesn't have to be whole class but within groups
			How should we utilize social comparison to best effect when watching demonstrators and team/classmates performing skills and activities?
4. Grouping	Composition of working groups When should this be a decision for the adult leader or athletes?	Children want to work with their friends, refuse to work with certain teammates/classmates	Provide a rationale for group selection e.g., random, friendships, ability, size/weight, gender

Groupings will often determine social comparison purposes

5. Observation	<p>Watch, listen for, and challenge attributions to theories of stability from individuals (“I’ll never be able to do this”) and their peers who may experience initial and easy mastery (“It’s so easy!”)</p>	<p>Difficult for teachers to be aware of individual pupil's psychological characteristics such as attributions, self-efficacy in a team or class context</p>	<p>Is the task appropriate? If it’s inappropriate, change it</p>
6. Feedback (evaluation and recognition)	<p>Present and future focussed – related to strategy and effort Avoid comments such as “you really showed them”, “you’ve nailed that easily”, “you’re a quick learner”, you’re a natural/seriously talented”, “what took you so long?”, “you either have it or you don’t”</p>	<p>Lack of expertise to identify difficulties and task progressions Difficult to give individuals equal attention and feedback during activities</p>	<p>Praise engagement with the task “How can you make this easier or more difficult?” Consider space, time, equipment, rules, number of components / opponents Use “not yet” where possible “Nothing worth achieving starts off</p>

Avoid comforting statements implying 'it's ok' not to make progress (low future expectations from the teacher) and "you're just one of those students for whom it doesn't come easy"

easy"
"Everything is hard before it's easy"
"Be mindful of your mistakes"

7. Recapping lesson or training session

Reinforce incremental message of the session
"Who feels they've improved and in what ways? If not, why not?"

Time to interact with all students, players individually
Some performers may perceive no improvement despite high physical effort and 'cognitive investment' in the session

Value of making mistakes (thoughts of failure as learning opportunities)
Convey high expectations of engagement, persistence, and effort in the next lesson
"Why do you think it's not working at the moment?"
"What do you think you need to work on?"
"How can we change things?"

8. Reporting to parents, head coaches, academy directors	<p>Highlight improvements made, referring to both absolute and potential intrapersonal criteria</p> <p>Avoid “sports come easily to Jonny as he is a natural who rarely has to exert himself – he will do well at his next school”</p> <p>Emphasize and reinforce young people’s positive approach to overcoming difficulties and learning from mistakes</p>	<p>Parents often want to know where their child ranks in the class or team</p> <p>Coaches under pressure to select the current ‘best’ athletes</p>	<p>Parent education</p> <p>Examine talent ID programmes for implicit entity assumptions</p> <p>underpinning practices</p> <p>Grading practices on absolute not normative outcomes</p> <p>Employ combination of <i>current</i> ability plus effort grades</p>
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