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Abstract

15 We describe how we used the newly developed Performance Demand Model
16 (PDM) with a canoe slalom coach and three junior athletes, preparing for the Junior
17 World Championships. The PDM encourages athletes to think of performance as a
18 process, and identifies the psychological demands that must be met before, during and
19 after competition. It focuses on four Psychological Fundamentals: Mastery
20 Motivation; Decision Making; Execution, and, Teamwork, each grounded in Reversal
21 Theory (Apter, 2001). This article discusses how coaches and athletes applied and
22 benefitted from using the PDM and offers lessons learned for its future use by
23 practitioners.

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34 Applied sport psychologists require a working model of the relationship between
35 mental state and sports performance (Poczwardowski, Sherman, & Ravizza, 2004).
36 Ideally, this will be based on a robust theoretical underpinning and be easily
37 understood by coaches and athletes. The Performance Demand Model (PDM: see
38 Males, 2013, 2014) encourages athletes and coaches to view psychological
39 development as a natural process of learning and adaptation (Balish, Eys, & Schulte-
40 Hostedde, 2013), and avoids any sense that the athlete is being “treated” for a deficit.
41 Two key elements facilitate this adaptation. First the athlete and coach identify the
42 specific psychological demands that a competitor must face, and successfully
43 overcome, through the pre-event, competition and post-event stages of competition.
44 Rather than identifying a single or ideal state of mind for optimal sport performance
45 (e.g., Hanin, 2000), this approach recognises that peak or flow states are not
46 consistently experienced (Swann, Keegan, Piggott, & Crust, 2012) and may not be
47 necessary at all stages of competition. For example, a cricket batsman waiting to
48 come on (pre-event) may not benefit from, or be able to maintain, a flow state for
49 many hours. This state of mind is however essential in the moment the batsman faces
50 a fast bowler (competition). Likewise, a flow state is unlikely to be necessary for a
51 post-event team review, that instead requires reflection and analysis. A process –
52 oriented approach encourages athletes and coaches to develop their own solutions to a
53 commonly understood and contextualised set of challenges across all stages of their
54 event, rather than learn psychological skills out of context.

55 Second, the PDM approach defines four core psychological capabilities (Mastery
56 Motivation, Decision Making, Execution, Teamwork) performers must draw upon to
57 meet the identified performance demands. These are termed Psychological

58 Fundamentals (Males, 2013), and their full development will be reported elsewhere.

59 All are grounded in Reversal Theory (RT: Apter, 2001), a comprehensive model of
60 personality, motivation and emotion that has been used in a range of sport psychology
61 research and applied settings (Hudson, Males, & Kerr, 2017). Each Fundamental is
62 defined by Positive Indicators providing evidence that an individual can access the
63 capability. In contrast, Negative Indicators identify behaviours that suggest that the
64 athlete is not able to reliably access the Fundamental.

65 *Mastery Motivation* shows through a positive, professional and goal-oriented
66 attitude to both training and competition. Athletes will actively seek out competition
67 and look forward to it as a challenge rather than with any sense of fear or threat. The
68 focus on defining competence in terms of mastery, rather than performance, combined
69 with an orientation towards achieving competence rather than avoiding incompetence,
70 enhances intrinsic motivation. This is consistent with Conroy, Elliot, and Coatsworth
71 (2007) who developed a hierarchical model that integrated achievement motivation
72 with self-determination theory. Positive Indicators include enjoying pre-competition
73 emotions and attending to all aspects of performance such as nutrition, stretching,
74 adequate rest and recovery. Negative Indicators include a lack of self-efficacy, low
75 competitiveness in training, being overly concerned about being liked by others, or
76 failing to challenge oneself. *Decision Making* is the ability to gather and manage
77 information, analyse the demands of the event or competitors, set goals and for teams
78 to agree on tactics. It is relevant post-event when athletes must systematically review
79 their performance and take forward the lessons learned. This is especially relevant in
80 open, dynamic team sports (Kaya, 2014), and our definition also includes the use of
81 mental imagery as a planning aid (e.g., MacIntyre, Moran, Collet, Guillot, Campbell,

82 **Mathews, Mahoney & Lowther, 2013**). Positive Indicators include feeling confident
83 and well equipped to make tactical choices and manage risk appropriately. Negative
84 Indicators include making poor or rushed tactical choices or repeating patterns of
85 errors from one event to another. *Execution* is the capacity to be ‘in the moment’,
86 totally focused on the task at hand, able to make fast responses under pressure **despite**
87 **any distractions**. Finely honed skills or tactics are delivered almost automatically with
88 minimal or no cognitive interference (Gardner & Moore, 2006). **This is equivalent to**
89 **flow states (e.g., Csikszentmihalyi & Csikszentmihalyi, 1988; Houge Mackenzie,**
90 **Hodge, & Boyes, 2011)**. Positive Indicators include remaining focused and committed
91 throughout the duration of the event. Negative Indicators include excessive efforts to
92 concentrate and analyse leading to “paralysis through analysis”, and performing better
93 in training than competition. *Teamwork* is the ability to build and maintain
94 relationships, offer and receive support from teammates, and contribute to an effective
95 team environment. It requires giving and receiving honest feedback. **These**
96 **capabilities are consistent with definitions of emotional intelligence, which has been**
97 **identified as an important component of successful performance in many domains**
98 **(e.g., Goleman, 1999)**. Positive Indicators include putting the team’s needs above
99 one’s own when necessary. Negative Indicators include being dismissive or
100 disrespectful towards coaches or support staff.

101 **Context**

102 **Canoe slalom is a time trial that requires the competitor to paddle their canoe**
103 **(kneeling with a single blade paddler) or kayak (seated with a double blade paddle)**
104 **down a 300 m stretch of white-water, through a course marked by up to 20 gates**
105 **suspended above the river. A two second penalty is added to the paddler’s score for**

106 hitting a gate, and a 50 second penalty is added for any missed gates. Slalom is
107 predominately an individual sport, although major championships include a team
108 event in which three boats complete the course together.

109 The participants in this study were a 52-year-old male coach and three junior
110 athletes; athlete A, a 17-year-old male canoe and kayak paddler, athlete B, a 17-year-
111 old male canoe and kayak paddler, and athlete C, a 17-year-old female canoe paddler.

112 The coach had been working with the group in a voluntary capacity for
113 approximately three years, and had extensive experience as a competitor but limited
114 formal coach education. He wanted to develop his own understanding of the
115 psychological processes of the sport and to be able to access a common framework or
116 language for himself and his squad. The main contact was between the coach and first
117 author, rather than between athlete and psychologist, both because of logistical
118 reasons and because we believe that psychological interventions are more powerful
119 when integrated with regular coaching input (Harwood & Steptoe, 2013). The
120 intervention took place over five months and focused on the squad's preparation for
121 the Junior World Slalom Championships.

122 Intervention

123 We sent the coach definitions of the Psychological Fundamentals and a slalom
124 Performance Demand Model (PDM) previously developed with a highly experienced
125 international slalom coach (Males, 2013). We wanted to ensure that the language was
126 suitable for teenage athletes and so invited and incorporated the coach's feedback (see
127 PDM; Figure 1).

128 The first author introduced the PDM and explanatory materials to the athletes over
129 the course of two group meetings. We clarified questions from the athletes and
130 elaborated on the definitions of the Psychological Fundamentals to draw out concrete
131 examples to ensure that the athletes understood each component. Specifically, the
132 athletes noted that Mastery Motivation was about “doing my best,” “enjoying racing
133 rather than feeling it was something you had to do,” and “seeing challenges rather
134 than problems.” They also explored the risk awareness component of Decision
135 Making, clarifying that in the context of canoe slalom it didn’t necessarily mean being
136 conservative, rather it pointed to the need to “race smart.”

137 The group agreed to explore how the Psychological Fundamentals applied in
138 training sessions and to maintain their own reflections in training diaries. The coach
139 then arranged individual meetings with each of the athletes, to identify each athlete’s
140 priority areas by using a colour coded three point rating scale for each behavioural
141 descriptor on the PDM. The rating scale was depicted as: Green means “I
142 consistently display this, it’s a real strength,” Amber means “I sometimes display this,
143 it needs work” and Red means “I rarely display this, it’s a barrier to my performance.”
144 Each athlete completed ratings independently then discussed them with the coach.
145 This draws on principles of Performance Profiling (Butler & Hardy, 1992), however it
146 differs from conventional performance profiling in several ways. The PDM adopts a
147 dynamic view of competition and the required capabilities at different competition
148 phases. The capabilities are well defined and understood by coach and athlete, and
149 they are based on a comprehensive psychological theory.

150 The remainder of the intervention over three months comprised of email and
151 **video-conference** exchanges between the first author and the coach. The coach shared

152 observations and questions about applying the PDM and Psychological Fundamentals
153 in training, issues with specific athletes, and team preparation for the upcoming trip to
154 the Junior World Championships. We gave the coach additional background reading
155 and used RT to provide additional insights into the motivational and emotional states
156 experienced by the athletes.

157 The coach and athletes were already familiar with mental rehearsal and goal
158 setting. The athlete – coach meetings showed that all the athletes rated aspects of
159 Execution amber or red, so we decided to introduce mindfulness practice (e.g., Kabat-
160 Zinn, 2004; Williams & Penman, 2011). Gardner and Moore (2007) showed how
161 mindfulness enhances the capacity for habitual meta-cognitive self-monitoring, self-
162 evaluation and corrective action, which does not involve heightened cognitive activity
163 that attempts to control or modify internal experiences (Carver & Scheier, 1988).

164 We explained mindfulness to the coach and provided example exercises adapted
165 from Gardner and Moore (2007), suggesting that the coach try these himself then
166 introduce them to the athletes. One of the athlete’s parents was a qualified
167 hypnotherapist with a degree in Psychology and offered to assist by leading a group
168 session. We briefed him and he went on to introduce simple awareness techniques to
169 the athletes in a group workshop. **Given the squad ethos in which parents provided a
170 range of ‘hands on’ support, we considered this an ethical intervention.**

171 **Evaluation**

172 The Junior World Championships was the main competitive focus and afterwards
173 we sought evaluative feedback from the coach and each of the three athletes.

174 Feedback was based on a common set of questions that were intended to test for

175 respondent validity (does this approach make sense to you?), consensual validity (do
176 you agree?) and test for deviant cases (what's missing?). We sent the questions to
177 participants in advance of a **video-conference** call with each one. Interviews were
178 recorded and transcribed.

179 **Coach feedback**

180 The coach had explicitly sought a simple psychological framework to support his
181 coaching input. He reported the value of having a shared language with which to
182 address the psychological elements of racing:

183 When I was at the World Champs I could stop on the riverbank as the paddlers
184 were going back up to do another run in training and ask them, “How is your
185 focus?” and they knew what I meant, if I said that to them prior to doing this
186 project it could have meant anything, I might not even have asked the question.

187 When asked about whether the four Psychological Fundamentals described the
188 core components of mental performance in his sport, the coach could relate the detail
189 to his own competitive experience and to his observations of other athletes. Some of
190 the language was new and, “that took a lot of learning, but as we broke it down and
191 worked through it I could see the application to all of those things to high level
192 performance in both training and competition.” He expressed a desire for more
193 “homework” or practical exercises that would help athletes and coaches develop their
194 skills. For example, he liked the use of the mindfulness exercises to foster Execution
195 and wanted more of this type of resource.

196 The coach's responses raised the need for the materials and approach to be as
197 simple as possible, especially when used with teenage athletes – “we are non-
198 psychologists so the simpler and chunkier it is the better.” When asked whether
199 anything was missing, he replied “No, not missing. There's a lot in there, if anything I
200 might say there's too much in there, but nothing missing, no.”

201 The coach believed that the PDM described the competitive challenges accurately,
202 but in hindsight this aspect was not fully exploited, because there were no races
203 during the intervention other than the Junior World Champs. He saw much greater
204 opportunity to refine and apply this approach in the approaching summer domestic
205 season.

206 **Athlete feedback**

207 All the athletes mentioned Mastery Motivation as being particularly important in
208 training because it seemed to help them adopt a disciplined and serious attitude. For
209 example, Athlete A said “Mastery motivation ... was the one that had the most impact
210 on my thinking, you could just approach training and ask what am I getting better at
211 and why do I want to get better at it.” They also started to evaluate their training
212 performance less in terms of comparisons with each other, and more in terms of
213 seeking to be “the best I can,” as Athlete A explained:

214 Sometimes I got a little bit focused on beating my team-mates, and then I
215 almost got a bit complacent, like I'm beating them so that's all good, then I'd
216 see someone do something really well and I started thinking I should be able
217 to do that, to execute to the best of my ability rather than just looking at the
218 scoreboard.

219 Athlete B reported that “I focused on Execution a lot in training especially coming
220 up to Worlds and it definitely helped me with my focus and racing.” Athlete A cited
221 how mindfulness practice helped with Decision Making in the pre-event period:

222 When I went to look at the course with lots of hustle and bustle going on
223 sometimes I’d try and do a visualization and my mind would run off at a
224 tangent so I’d come back and do some mindfulness and slow myself down
225 and by doing that it’s more efficient.

226 Athlete C had previously engaged in NLP (Neuro Linguistic Programming, e.g.,
227 Dilts, Hallbom, & Smith, 1993) based training, and noted that “(the PDM materials)
228 were so much more specific to me and my sport and all the processes I go through in
229 the race and thinking on the start line.”

230 Athletes A and B suggested that Teamwork was the least important of the four
231 Psychological Fundamentals, although their comments also reflect a strong
232 appreciation of effective team communication. It seemed that this was due to the
233 efforts that the coaches and team manager invested in preparation for the Junior
234 Worlds, because as Athlete A noted, “If something had gone wrong it would have
235 been more important. We had such a good team there were no social support issues it
236 all went really smoothly.”

237 Athlete A pointed out that the PDM didn’t account for the additional fatigue
238 caused by competing in multiple events at a major championship. The impact of extra
239 events appears to have made it more difficult for this athlete to sustain a positive
240 Mastery Motivation:

241 To begin with you're kind of excited, and you feel like you can paddle fast,
242 by the end it had worn off and it was becoming more of a chore than going
243 out and enjoying the feeling, so maybe the overall load could be included (in
244 the PDM).

245 **Conclusions**

246 We have described how we used the PDM to support a practical sport psychology
247 intervention with a coach and three young slalom canoeists. The core definitions of
248 the Psychological Fundamentals were relevant to the sport and applicable in training
249 and competition environments. The feedback on the need to keep the materials as
250 simple as possible is important, and is a reminder of how easy it is for practitioners to
251 take for granted a pre-existing level of psychological knowledge or sophistication
252 (Foster, Maynard, Butt, & Hays, 2015).

253 Although the participants could identify with and use the Psychological
254 Fundamentals, we are less convinced that they fully appreciated the learning and
255 adaptation principles of the PDM (Balish et al., 2013). **Our intention was to help**
256 **athletes identify the specific intra-personal, inter-personal and environmental**
257 **challenges throughout competition, and ensure that they could successfully meet and**
258 **overcome them by applying the Psychological Fundamentals. The athletes interpreted**
259 **the language of performance 'demands' as 'problems' and for example, suggested**
260 **that Teamwork was not important because there was no conflict when they trained**
261 **and travelled together. The absence of conflict might also indicate that the squad was**
262 **able to successfully demonstrate Teamwork**, evidenced by Positive Indicators like "I
263 maintain an honest and open relationship with coaches and support staff." As

264 principles of positive psychology become more prevalent in sport psychology
265 (Wagstaff & Leach, 2015), these athletes' responses show that it is important to help
266 athletes recognize and build on their strengths as much as identify areas of
267 development.

268 While the athletes adapted the Psychological Fundamentals into their race-day
269 routine, we missed the opportunity to use the PDM as a framework to address the
270 unfamiliar demands of racing at the Junior World Championships. In future
271 applications athletes and coaches should build up the PDM from first principles to
272 increase their ownership and capture the novel demands of a specific competition.

273 The intervention met the coach's need for a common language that would allow
274 him to integrate psychology into training and competition. It was useful for the
275 athletes who benefited from developing simple and practical skills that had contextual
276 and personal meaning based on their appraisals of themselves in relation to the
277 Psychological Fundamentals. We learned that the PDM approach has promise and
278 that it would benefit from simplification and a 'ground up' approach for specific
279 situations. The Psychological Fundamentals were validated as a user-friendly
280 description of relevant psychological factors underpinned by RT, a theoretical
281 framework that provided explanatory insight into athlete motivation and behaviour.
282 The PDM speaks to the phenomenological base of RT as it helps athletes to make
283 sense of their own personal experiences within a framework from which to develop
284 practical applications. The PDM is a new approach in the early stages of development
285 that shows considerable promise for use by athletes and coaches. Other research in
286 squash, men's and women's hockey, target shooting and track and field athletics has
287 been completed and several research publications describing this work are

288 forthcoming. We encourage others to use it and hence develop it further, and offer the
289 following guidelines:

290 Invite your athletes to map their competition as a process, and identify the pre-
291 event, competition and post-event phases. When does each phase start and end? What
292 marks each transition? How is this affected by different venues, or different
293 competition formats?

294 Next, ask your athletes to consider the different performance demands they face at
295 each phase. For example, the pre-event phase often requires the ability to decide on a
296 game-plan, to physically and mentally warm up, and to manage high emotions. Use
297 the language of your specific sport.

298 Finally, introduce and define the Psychological Fundamentals. Explore with your
299 athletes what these mean in your sport, and how each will help their performance
300 throughout each phase of competition. Look for ways to highlight and develop the
301 Psychological Fundamentals as part of regular training sessions.

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APPLICATION OF A PERFORMANCE DEMAND MODEL



Slalom Performance Model	Name:	Date:
<i>Pre Race</i>		
Mastery Motivation		
I have a positive attitude to competition – I see racing as a challenge not a threat.		
I feel confident and comfortable in the race-day environment.		
I feel confident in my knowledge and experience of key technical challenges on a course, developed through quality preparation and training		
Decision Making		
I can assess the specific technical challenges presented by the course design.		
I can develop a race plan to 'solve the problems' posed by the course designers.		
I remain open to late information from coaches about the course and can integrate it into my race plan.		
Teamship		
I maintain an honest and open relationship with coaches and support staff.		
I contribute to a supportive team environment.		
<i>Competition – during the run</i>		
Mastery Motivation		
I am motivated to deliver my best possible performance at this moment in time		
I have a confident and positive attitude, focused on my strengths not my weaknesses.		
Execution		
I focus on the here and now; my next stroke <i>not</i> on the race outcome		
I trust in my chosen plan and my technical skills to meet the course's challenges.		
I am fearless and willing to take risks without 'defending a position'.		
I am adaptable to move to alternative tactics and paddle reactively when necessary		
I maintain a steady emotional state.		
<i>After the race</i>		
Mastery Motivation		
I manage my immediate emotional response to the outcome, whether good or bad.		
Decision Making		
I rationally reflect and evaluate my performance to identify learning to take into the next run or event.		
Teamship		
I maintain an honest and open relationship with coaches and support staff.		
I contribute to a supportive team environment		

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360 Figure 1. Performance Demand Model