Accepted Manuscript

Adopting a helicopter-perspective towards motivating and demotivating coaching: A circumplex approach

Jochen Delrue, Bart Reynders, Gert Vande Broek, Nathalie Aelterman, Maarten De Backer, Steven Decroos, Gert-Jan De Muynck, Johnny Fontaine, Katrien Fransen, Leen Haerens, Stef van Puyenbroeck, Maarten Vansteenkiste
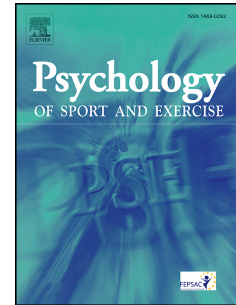
1   Running head: A Refined Insight in Coaching Behavior

2

3   **Adopting a Helicopter-perspective towards Motivating and Demotivating Coaching:**

4   **A Circumplex Approach**

5   Jochen Delrue*[1]

6   Bart Reynders*[2]

7   Gert Vande Broek[2]

8   Nathalie Aelterman[1]

9   Maarten De Backer[2]

10   Steven Decroos[2]

11   Gert-Jan De Muynck[1]

12   Johnny Fontaine[3]

13   Katrien Fransen[2]

14   Leen Haerens[4]

15   Stef van Puyenbroeck[2]

16   Maarten Vansteenkiste[1]

17

19

20   *Equal contribution

21   [1]Ghent University, Department of Developmental, Personality & Social Psychology

22   Henri Dunantlaan 2, 9000 Ghent, Belgium

23   [2]KU Leuven, Department of Kinesiology,

24   Tervuursevest 101, 3001 Leuven, Belgium

25   [3]Ghent University, Department of Personnel Management, Work and Organizational

26   Psychology

1   Henri Dunantlaan 2, 9000 Ghent, Belgium

2   [4]Ghent University, Department of Movement and Sport Science

3   Watersportlaan 2, 9000 Ghent, Belgium

1

2

3   Running head: A Helicopter-perspective towards Motivating Coaching Behavior

4

5

6   **Adopting a Helicopter-perspective Towards Motivating and Demotivating Coaching:**

7   **A Circumplex Approach**

8

9

10

11

12

13

1

14   **Abstract**

15   Based on Self-Determination Theory, the present study adopts a helicopter-perspective

16   towards motivating (i.e., autonomy support, structure) and demotivating coaching (i.e.,

17   control, chaos). Among five independent samples, consisting of individual and team sport

18   coaches ($N = 893$; Mage $= 37.83$ years) and athletes ($N = 377$; Mage $= 17.46$ years),

19   Multidimensional Scaling (MDS) analyses were used to examine how a variety of coaching

20   practices reflective of four different coaching styles (i.e., autonomy support, control,

21   structure, and chaos), assessed with a new vignette-based instrument, related to one another.

22   Findings revealed that the (de)motivating practices could be graphically presented within a

23   two-dimensional circumplex, with the horizontal axis representing the level of need-

24   supportive coaching behavior and the vertical axis representing the level of coach

25   directiveness. Moreover, the four coaching styles could be segmented in eight more specific

26   approaches (i.e. clarifying, guiding, attuning, participative, awaiting, abandoning,

27   domineering, and demanding), which formed an ordered sinusoid pattern of correlations, both

28   among each other and in relation to a variety of critical outcomes (e.g. coach need

29   satisfaction, athletes' motivation). It is discussed how a circumplex approach produces both a

30   more integrative and more fine-grained insight regarding (de)motivating coaching behaviour,

31   with resulting implications for practice.

32   *Keywords*: need support; multidimensional scaling; athletes; self-determination theory;

33   coaching behavior.

34

35

36

37   Youth athletes' quality of sport motivation is essential for their enduring engagement,

38 well-being, and performance (Gillet, Vallerand, Amoura, & Baldes, 2010; Podlog et al., 2015;

39 Vallerand & Losier, 1999). A few dozen studies, grounded in Self-Determination Theory

40 (SDT; Deci & Ryan, 2000; Ryan & Deci, 2017), a broad theory on human motivation and

41 well-being, have shown that high quality motivation flourishes when coaches rely on an

42 autonomy-supportive and structuring style, while the opposite is true if coaches hold a more

43 chaotic or controlling style (Vansteenkiste, Niemiec, & Soenens, 2010). Coaches who adopt

44 an autonomy-supportive style try to maximize athletes' sense of volition and psychological

45 freedom by adopting a curious and accepting attitude (Mageau & Vallerand, 2003;

46 Vansteenkiste & Soenens, 2015). When relying on a structuring style coaches aim to foster

47 athletes' sense of effectiveness and mastery by adopting a process-oriented attitude (Curran,

48 Hill, & Niemiec, 2013; Soenens & Vansteenkiste, 2010). In the case of coach control, coaches

49 force athletes to think, feel, and behave in a prescribed way at the expense of athletes' sense

50 of volition and psychological freedom (Bartholomew, Ntmoumanis, Thøgersen-Ntoumani,

51 2009; 2010). When coaches adopt a chaotic coaching style their behavior is unpredictable,

52 inconsistent, or indifferent, thereby confusing their athletes about what they should do and

53 even hindering athletes in their skill-development (Mageau & Vallerand, 2003; Skinner,

54 Johnson, & Snyder, 2005).

55   In spite of its well-documented benefits (Mageau & Vallerand, 2003), some sport

56 coaches fear that a highly autonomy-supportive style will turn into a chaotic or laissez-fair

57 style. Similarly, too much structure may also have its downside, if it turns into rigid control

58 and pressure. Recently, in the educational domain, Aelterman et al. (in press) provided a

59 helicopter-perspective on these (de)motivating behaviors by combining the four teaching

60 styles of autonomy support, structure, control and chaos within one circular structure. As can

61 be noticed in Figure 1, each teaching style (e.g., autonomy support) could be segmented into

62 two more specific approaches (e.g., participative and attuning), each consisting of multiple

63 teaching practices. Although research in sport has begun to systematically study the interplay

64 between two motivating (i.e. autonomy support and structure) and two demotivating (i.e.

65 control and chaos) coaching styles (e.g., Curran et al., 2013), what is lacking to date is a

66 helicopter view that allows one to see how these styles relate to one another. Such a helicopter

67 viewpoint may shed light on some of the pitfalls associated with the autonomy-supportive and

68 structuring style, as echoed by coaches.

69   The primary aim of the current study was to build on previous work by examining

70 whether motivating and demotivating coaching styles could equally be organized according to

71 such a circumplex model. This was deemed important because a circumplex model allows

72 both for greater integration, as multiple coaching styles are brought together in a broader

73 picture, and for greater refinement, as these styles get subdivided in different approaches,

74 which are systematically related to a host of desirable (e.g., autonomous motivation, need

75 satisfaction) and undesirable (e.g., controlled motivation and need frustration) outcomes

76 among both athletes and coaches. Two secondary aims involved examining whether mean

77 level differences between identified coaching styles and approaches emerged as function of

78 sport type and addressing coach-athlete convergence in the identified coaching styles and

79 approaches.

Motivating and Demotivating Coaching

81   When athletes are autonomously motivated, and hence act with a sense of volition and

82 psychological freedom (e.g., personal significance or fun), they will thrive (e.g., Pelletier et

83 al., 2001; Podlog et al., 2015). Contrary, when controlled motivated, and therefore act under

84 influence of internal (e.g., guilt or shame) or external pressures (e.g., rewards or

85 punishments), athletes' development and emotional experience will suffer (e.g.,

86 Vansteenkiste, Niemiec, & Soenens, 2010). Within SDT, the psychological needs for

4

87 autonomy, competence, and relatedness are considered essential nutriments for the quality of

88 athletes' motivation (Deci & Ryan, 2000). That is, whether athletes enjoy their sport, persist,

89 and excel (i.e., autonomous motivation) or instead need to drag themselves to the sport club,

90 and perhaps drop-out (i.e., controlled motivation) depends on, respectively, the satisfaction

91 and frustration of these basic psychological needs. Specifically, when satisfied, athletes

92 experience a sense of psychological freedom and volition (i.e., autonomy), effectiveness (i.e.,

93 competence) and connection and warmth (i.e., relatedness) during their sport participation.

94 When frustrated, however, athletes feel coerced and pressured (i.e., autonomy), ineffective

95 and like a failure (i.e., competence), and isolated and excluded (i.e., relatedness). Importantly,

96 need frustration does not denote the mere absence or lack of need satisfaction as the

97 psychological needs must be actively thwarted or undermined for need frustration to occur

98 (Bartholomew et al., 2011; Haerens, Aelterman, Vansteenkiste, Soenens & Van Petegem,

99 2015; Vansteenkiste & Ryan, 2013).

100 **Need-supportive coaching styles**

101 Given the manifold benefits associated with need satisfaction, considerable attention

102 has been devoted to the coaching style that is need-supportive. Athletes' needs are supported

103 when coaches adopt an autonomy-supportive style (Adie, Duda, & Ntoumanis, 2012; Conroy

104 & Coatsworth, 2007; Rocchi, Pelletier, & Couture, 2013). Autonomy support involves a

105 variety of practices, which in the circumplex identified by Aelterman et al. (in press), were

106 found to fall apart into a participative and attuning approach. Specifically, practices such as

107 offering choice, asking for athletes' input and welcoming their suggestions were part of a

108 *participative* approach, as these practices allow for individuals to have a say and to participate

109 in a joint decision process. Autonomy-supportive practices such as nurturing athletes'

110 personal interests, acknowledging their negative affect and resistance, and offering a

111 meaningful rationale (Mageau & Vallerand, 2003) fell in an *attuning* approach because when

112   relying on these practices, coaches are trying to attune to the athletes' perspective in these

113   instances. The benefits of coach autonomy support for athletes' motivation (e.g., Amorose &

114   Anderson-Butcher, 2007; Reynolds and McDonough, 2015), enjoyment (e.g., Quested, 2013),

115   perseverance (e.g., De Muynck et al., 2017; Pelletier, Fortier, Vallerand, & Brière., 2001), and

116   well-being (e.g., Adie et al., 2012; Gagné, Ryan, & Bargmann, 2003), have been well-

117   documented during the past decades.

118   Much like coach autonomy support, the provision of structure is also said to be need-

119   conducive and involves a number of key practices that belong to two approaches in the

120   circumplex, that is, a *guiding* and *clarifying* approach (Aelterman et al., 2018). When

121   clarifying, coaches set clear expectations and goals and follow-up on them in a consistent

122   way, thereby monitoring athletes' progress (Curran et al., 2013). When guiding, coaches

123   express confidence in the athletes' capacity, they encourage their athletes in a constructive

124   way and they offer adjusted and helpful information and suggestions (e.g. feedback) as to

125   support athletes' progress (Curran, 2013; Fransen, Boen, Vansteenkiste, Mertens, & Vande

126   Broek, 2018). When coaches are highly structured, athletes perceive the environment to be

127   predictable, safe, and focused on their progress such they benefit in terms of competence,

128   behavioral engagement, and well-being (Black & Weiss, 1992; Carpentier & Mageau, 2013,

129   Curran et al., 2013).

130   **Need thwarting coaching styles**

131   Because coaches can not only help their athletes actualizing their potential, but may

132   also actively interfere with their development and growth, the notion of need-thwarting

133   coaching has received increasing attention (Bartholomew et al., 2011; Haerens et al., 2018).

134   Specifically, in the case of coach control, coaches actively undermine athletes' volitional

135   functioning through the use of a multitude of strategies that fell either in the *demanding* or

136   *domineering* approach in the circumplex (Aelterman et al., in press). When demanding,

6

137 coaches point to athletes' duties and responsibilities, thereby using forceful language, threats

138 of sanctions, or the contingent use of rewards (Bartholomew et al., 2011). When domineering,

139 coaches are experienced as highly intrusive and manipulative as the target involves the athlete

140 as a person instead of the athlete's behavior. Domineering coaching involves the use of

141 power-assertive practices such as excessive personal control, intimidation, guilt-induction and

142 shaming (Bartholomew et al., 2010). Controlling coaching has been found to be uniquely

143 predictive of low quality motivation (i.e. controlled motivation), and even a lack of

144 motivation (i.e. amotivation) (Pelletier et al., 2001), burn-out among young adolescent soccer

145 players (Balaguer et al., 2012), and moral disengagement and antisocial behavior (Delrue, et

146 al., 2017; Hodge & Lonsdale, 2011).

147   A second need-thwarting style involves the use of chaos, which denotes more than the

148 absence of structure (Skinner et al., 2005; Vansteenkiste & Ryan, 2013). That is, when

149 coaches are chaotic, they act in an inconsistent and unpredictable way, which creates

150 confusion and may interfere with athletes' skill-development and their achievement of desired

151 outcomes. The question that coach chaos represents a separate style that comes with a cost has

152 largely been neglected in the SDT-literature. In their circumplex model, Aelterman et al.

153 (2018) found teacher chaos to be subdivided into an *abandoning* and *awaiting* approach.

154 Extrapolating from this work, in the case of an abandoning approach, athletes have the

155 experience to be left to their own devices as, after repeatedly intervening, their coach has

156 given up. In the case of an awaiting approach, the coach does not plan too much and instead

157 awaits how things unfold and whether athletes will take initiative themselves.

A Helicopter-perspective: The Circumplex Model

159   To obtain a helicopter-perspective on how different motivating (i.e., autonomy

160 support, structure) and demotivating (i.e., control, chaos) teaching styles relate to each other,

161 Aelterman et al. (2018) made use of Multidimensional scaling (MDS; Borg, Groenen, &

162   Mair, 2013). This explorative statistical technique graphically visualizes the relation between

163   different (de)motivating practices by plotting inter-item distances in a geometrical space.

164   Three key findings emerged from their analyses, involving two large samples of secondary

165   school teachers and students.

166   First, as can be noticed in Figure 1, a two-dimensional circumplex structure was

167   identified, which allowed for a more integrative insight into the variety of teaching practices.

168   Specifically, the horizontal dimension (i.e., x-axis) reflects the degree to which the teacher

169   supports, relative to thwarts, students' psychological needs, with autonomy support and

170   structure yielding positive coordinates, and control and chaos yielding negative coordinates.

171   The vertical dimension (i.e., y-axis) concerned the extent to which the teacher is directive and

172   taking the lead in the interaction, with structure and control yielding positive coordinates and

173   chaos and autonomy support yielding negative coordinates. Second, the circumplex produced

174   more refined insight as eight specific subareas (i.e., clarifying, guiding, attuning, participative,

175   awaiting, abandoning, domineering, and demanding) were identified. These eight subareas

176   were not a priori imposed, but naturally emerged from the data, with teaching practices within

177   a given subarea forming a coherent cluster (i.e., an approach). Third, consistent with the

178   assumptions of a circumplex, these identified approaches correlated in an ordered way with

179   adjacent approaches being positively correlated (being indicative of their compatible nature),

180   and correlations becoming weaker and even negative (being indicative of their more

181   conflictual nature) when moving along the circular structure. To illustrate, whereas the

182   guiding approach correlated positively with the adjacent attuning and clarifying approach, it

183   yielded a negative correlation with the abandoning approach. Importantly, this ordered pattern

184   of correlates, representing a sinusoid structure, was also found in relation to external

185   outcomes. To illustrate, students' ratings of teacher's quality systematically correlated with

186   the distinguished approaches (Aelterman et al., 2018), with the correlations peaking and being

187   strongly positive for the guiding and attuning approach, while being strongly negative for the

188   domineering and abandoning approach.

189   In light of these findings, it appears both illuminating and fruitful to describe coaches'

190   behavior in a more holistic and meaningful way via a circumplex structure. That is, instead of

191   treating autonomy support, control, structure, and chaos as distinct styles that should yield

192   unique correlates, Aelterman et al. (in press) argued that the ordered pattern of correlates

193   warrants a gradual instead of a categorical perspective. That is, the different motivating and

194   demotivating approaches do not differ from each other in a black-white fashion. Instead, the

195   differences are more gradual and these differences get reflected by the degree to which each

196   identified approach in the circumplex is need-supportive relative to need-thwarting and high

197   relative to low in directiveness. For example, although the guiding and attuning approach are

198   both high on need support, they differ in their degree of directiveness, and although the

199   clarifying and demanding approach are both high on directiveness, they differ in the degree to

200   which they are need supportive rather than need thwarting.

201   Such a gradual perspective could make a meaningful contribution to the existing

202   coaching literature and practice. That is, some coaches may be concerned that the use of

203   autonomy support may result in chaos. Such concerns are legitimate and a gradual perspective

204   may indicate which autonomy-supportive strategies exactly (e.g., asking input from athletes)

205   may lean closer to an awaiting approach. Furthermore, by examining coaching from a gradual

206   instead of a categorical perspective, the ordered pattern provides a first indication of how

207   coaches may shift from one approach to another along the circumplex as a function of

208   encountered obstacles or facilitating factors. Finally, the more differentiated assessment of

209   motivating approaches will allow for a more detailed examination of mean level differences

210   between individual and team sports. Past research indicated that athletes in team, relative to

211   individual sports perceive their coach to display more autocratic and less democratic behavior

212 (Hollembeak & Amorose, 2005; Terry, 1984). Whereas coaches of team sports may act in a

213 more controlling way to maintain discipline, the one-on-one relationship characteristic of

214 individual sports may allow for a more autonomy-supportive style in general and a more

215 athlete-attuned and participative approach in particular (van de Pol, Kavussanu, & Kompier,

216 2015).

Present Study

218   Although past research has focused on the role of coach autonomy support in

219 combination with either coach control (e.g., Amorose & Anderson-Butcher, 2015;

220 Bartholomew et al., 2011; Haerens et al., 2017) or coach structure (Curran et al., 2013), to the

221 best of our knowledge, no single study within the SDT literature on sport coaching has

222 conducted an in-depth investigation of how autonomy-supportive, structuring, controlling and

223 chaotic coaching styles, when considered simultaneously, relate to each other. Therefore,

224 following Aelterman et al. (in press), the primary objective of the present study was to adopt a

225 helicopter-perspective to gain both a more integrative and fine-grained insight in how a broad

226 variety of need-supportive (i.e., autonomy support, structure) and need-thwarting (i.e.,

227 control, chaos) coaching styles relate to each other as well as to external outcomes.

228   To achieve this goal, a new vignette-based instrument was developed, which contained

229 specific situations that depict the way how sport coaches act during training, during

230 competitive games as well as when they take up a pedagogical role, thereby introducing and

231 monitoring guidelines for desirable behavior. Although there exist several validated coaching

232 style instruments (e.g., Bartholomew et al., 2011), the items used are rather generic in nature

233 as they are not tied to a concrete situation and they are often incomplete because the chaotic

234 coaching style is not assessed. To overcome these two shortcomings and to obtain a more

235 encompassing instrument involving a variety of coaching styles and constituting approaches,

236 a new vignette-based instrument was developed. The developed vignettes were highly

237   ecologically valid as they represent frequently occurring and specifically described coach-

238   athlete interactions. In response to each of these vignettes, four different reactions were

239   formulated corresponding to the theoretical aspects of coach autonomy support, control,

240   structure and chaos.

241   Consistent with the work in the educational domain (Aelterman et al., 2018), we

242   expected that the variety of assessed (de)motivating coaching practices could be organized

243   along a clearly interpretable two-dimensional circumplex (see Figure 1). That is, four broader

244   areas, reflecting each of the four assessed coaching styles (i.e., autonomy support, control,

245   structure, and chaos), would be retained, which would be represented by a dimension

246   denoting the degree of need-supportive (i.e. autonomy support, structure), relative to need-

247   thwarting coaching (i.e. control, chaos) and a dimension denoting the level of high coach

248   directiveness (i.e., structure, control) relative to low coach directiveness (i.e., autonomy

249   support, chaos) (Hypothesis 1a). To gain confidence in the stability of this two-dimensional

250   circumplex, we examined whether a similar structure would emerge in both coaches and

251   athletes (Hypothesis 1b).

252   Further, given the assessment of a broad variety of practices, we expected that,

253   congruent with the model obtained in the educational domain (Aelterman et al., in press),

254   each of the four coaching styles (i.e., autonomy support, structure, control, chaos) would get

255   segmented into two approaches, each reflecting a more circumscribed cluster of practices (see

256   Figure 1; Hypothesis 2a). Further, in line with the assumptions underlying a circumplex

257   model, testifying to the internal validity of the model, we expected the correlations between

258   two adjacent approaches to be positive, while the correlations would become increasingly less

259   positive and even negative as one moves along the circle away from a specific subarea, being

260   reflective of a sinusoid pattern (Hypothesis 2b).

261   A similar ordered pattern of correlates was hypothesized between the identified

262   approaches and commonly used coaching measures in the literature (CCBS, Bartholomew et

263   al., 2010; TASCQ, Belmont, Skinner, Wellborn, & Connell, 1988; SCQ, Williams, Grow,

264   Freedman, Ryan, & Deci, 1996). That is, we expected the correlation between a specific

265   subarea (e.g., attuning) and a corresponding coaching style measure in the literature (e.g.,

266   coach autonomy support) to be most pronounced, with these correlations becoming

267   decreasingly positive and even negative as one gradually moves from one subarea to another

268   along the circumplex (Hypothesis 3).

269   To further examine the external validity of the proposed circumplex, we examined the

270   pattern of correlates between the identified coaching styles and approaches and a variety of

271   external outcomes, as assessed among both coaches (i.e. need-based experiences) and athletes

272   (i.e., need-based experiences, motivation, rated coach evaluation). Given that past work found

273   coach need satisfaction to enable coaches to adopt a more autonomy-supportive stance

274   towards their athletes (Stebbings, Tayler, Spray, & Ntoumanis, 2012), we expected the

275   correlates between coach need satisfaction and the need-supportive coaching approaches (i.e.,

276   attuning, guiding) to be most pronounced positive, while coaches' experiences of need

277   frustration would relate to the more need-thwarting approaches (i.e., abandoning,

278   domineering). Along similar lines, the most need-supportive approaches were hypothesized to

279   yield the strongest positive correlates with athletes' experienced need satisfaction,

280   autonomous sport motivation, and the rated quality of the coach, while the most need-

281   thwarting approaches would yield the strongest positive correlates with athlete need-

282   frustration, controlled motivation, and amotivation (Hypothesis 4) (Aelterman et al., in press;

283   Amorose & Anderson-Butcher, 2007).

284   Supplementary to our main objective to adopt a helicopter-perspective towards

285   (de)motivating coaching, we had two ancillary aims. First, given the paucity of past studies

286   that focused on coaches and athletes simultaneously, we sought to directly compare the

287   responses of coaches and athletes by examining their correspondence (i.e., to what extent do

288   coach and athlete responses relate to each other?) and their discrepancy (i.e., to what extent

289   are there mean-level differences between coaches and athletes?) (Korelitz & Garber, 2016).

290   Past research has shown that such correspondence is rather modest (Smith, et al., 2016),

291   possibly because athletes form their own idiosyncratic viewpoints of their coach (Macquet &

292   Stanton, 2014) or because coaches have an overly positive view of their own coaching

293   behavior due to biased interpretations or social desirable answering. If the latter tendencies

294   are operative, mean level discrepancies may be found such that coaches score themselves

295   relative higher on need-supportive and lower on need-thwarting approaches compared to

296   athletes (Hypothesis 5). A second ancillary objective involved the examination of the role of

297   sport type (i.e., team vs. individual sport). As previous research (e.g., Hollembeak &

298   Amorose, 2005; Terry, 1984; van de Pol et al., 2015) found coaches in team sports to display

299   different behavior compared to coaches in individual sports types, we explored whether any

300   mean-level differences in the coaching styles and their approaches would be found as a

301   function of sport type.

302   **Method**

303   **Participants and Procedure**

304   For the present study, data were collected among four independent coach samples, and

305   a mixed sample of coaches and athletes. As can be noticed in Table 1, different aims were

306   addressed in different samples, depending on the type of measures being included. Table 2

307   describes the basic socio-demographic characteristics for each sample. Across all samples, a

308   total of 893 coaches and 377 athletes participated. Both male (72.3%) and female coaches

309   (27.7%) from a variety of individual (41.4%) and team sports (58.6%) participated. Coaches

310   were on average 37.83 (SD = 12.73) years old and had 10.40 (SD = 9.32) years of experience

13

311   in coaching. Athletes (43.5% female) were on average 17.46 (*SD* = 2.77) years old, and most

312   of them came from team sports (68.2%). Sample 1 and 2 were collected in the context of a

313   series of workshops for youth coaches on how to adopt a more motivating style. Online

314   questionnaires were completed as part of a baseline assessment before youth coaches began

315   the training. Undergraduate psychology students of Ghent University collected samples 3 and

316   4 of coaches in return for course credits. By ways of an information session about the

317   recruitment procedure, it was assured that participants would be recruited in a standardized

318   way. Finally, sample 5 involved a mixed sample of 41 coaches and their 377 athletes, who

319   were invited via e-mail to complete an online version of the questionnaires. In each sample,

320   an active informed consent form explaining the purposes of the study preceded the survey,

321   and was signed by athletes who were sixteen years or older. When athletes were under the age

322   of sixteen, parents signed the informed consent. Participation in the study was voluntary and

323   confidential and participants could drop out at any time for any reason. The study was

324   conducted in line with the ethical guidelines of the first authors' Universities. Specifically,

325   ethical approval was granted for the collection of data in underaged athletes.

326   **Measures**

327   To obtain scores for each of the measured constructs, an aggregated score was

328   calculated by averaging the items of the construct at hand.

329   **Common coach and athlete reports**

330   *Coaching style.* As noted, a new vignette-based instrument was developed for the

331   present study. To generate vignettes, the validated Situation-in-School questionnaire

332   (Aelterman et al., 2018) served a source of inspiration. Further, specific to the contexts of

333   sports, three categories of vignettes were created, referring to the training context, the

334   competition context, and the pedagogical role of coaches. As for the response items, different

335   sources of information were relied upon. First, items were generated based on conceptual

336   grounds, thereby ensuring that as many practices, being part of classic definitions of

337   autonomy support, structure, control and chaos, would be covered in the items (Reeve, 2009;

338   Ryan & Deci, 2017; Soenens & Vansteenkiste, 2010). Specifically, for each coaching style

339   (e.g., autonomy support), the items covered practices belonging to one of both approaches

340   (e.g., participative and attuning) identified by Aelterman et al. (2018). To assure that

341   generated vignettes and its responses had high ecological and face validity (e.g., that they

342   would occur in reality, be easily recognizable, and be perceived as believable), sport

343   psychologists and coaches of youth athletes were consulted. Prior to collecting the five

344   samples reported in this contribution, two large pilot samples of youth coaches (N= 599) and

345   athletes (N= 334) were collected, which helped to adjust and optimize the instrument[1].

346   The newly developed Situations-in-Sport Questionnaire[1] presents 5 vignettes per role

347   (i.e., during training, during competition and in a pedagogical role), resulting in a total of 15

348   situational vignettes (see Appendix 2). The presented vignettes either concern a problem

349   situation, which requires an intervention and remedial action from the coach (e.g., "An athlete

350   displays anxiety before the game. You…"), or a non-problematic situation in which the coach

351   takes a more proactive role (e.g., "You give a hard and difficult exercise, which asks for an

352   extra effort from your athletes. You…"). For each of the 15 vignettes coaches were provided

353   with four different behavioral responses corresponding to the overarching autonomy-

354   supportive, structuring, controlling and chaotic styles. Coaches were asked to rate on a 7-

355   point Likert scale from 1 (*does not describe me at all)* to 7 (*describes me extremely well*) to

356   which degree each of the four reactions described themselves. For example: 'You notice that

357   an athlete is not satisfied with the fact that he is not selected for the team for the upcoming

358   competitive event. How do you respond?': (a) 'You have a conversation with him/her and

359   acknowledge his/her frustration, and give a meaningful explanation for the non-selection'

360   (i.e., autonomy support), (b) 'You do not give any explanation and leave it like that' (i.e.,

361   chaos), (c) 'You say: "You need to learn to accept this. It is my decision after all".' (i.e.,

362   control), (d) 'You do not give any explanation and leave it like that' (i.e., chaos), (a) 'You do

363   not give any explanation and leave it like that' (i.e., chaos).

364   Athletes answered the same 15 vignettes, although the vignettes and responses were

365   slightly adapted to represent the athlete rather than the coach perspective. Where necessary,

366   the language of the vignettes and responses was simplified, as to make sure athletes aged 14

367   and older would be able to understand and complete the questionnaire. Athletes were asked to

368   rate on a 7-point Likert scale from 1 (*does not describe my coach at all)* to 7 (*describes my*

369   *coach extremely well*) the extent to which the items correspond to their coach's behavior.

370   ***Construct validation measures.*** Coaches completed adapted versions of the Sport

371   Climate Questionnaire (SCQ; SDT website: http://www.psych.rochester.edu/ SDT/), the

372   Teacher as Social Context Questionnaire – Teacher version (TASCQ; Belmont et al., 1988)

373   and the Controlling Coaching Behavior Scale (CCBS; Bartholomew et al., 2010). Adaptations

374   primarily concerned changes in the perspective of the items, as all original scales assessed the

375   athlete perspective on coaching behaviors, or changes in the domain specificity of the scale in

376   case of the TASCQ, which was originally developed to assess the motivating styles of

377   teachers. The SCQ provided six items for autonomy support (e.g., "I try to understand how

378   my athletes see things before suggesting a new way to do things, $\alpha = .85$). The TASCQ

379   provided eight items for structure (e.g., "I talk with my athletes about my expectations for

380   them", $\alpha = .81$) and 11 for involvement (e.g., "I spend time with all athletes in my group"; $\alpha = $

381   .76). Further, the CCBS provided 15 items for controlling coaching (e.g., "I try to motivate

382   my athletes by promising a reward when they do well", $\alpha = .83$).

383   In a similar way, athletes answered to the translated original items of the SCQ,

384   TASCQ and CCBS to measure athlete's perceptions of autonomy-supportive, structuring and

385   controlling coaching behavior. Cronbach's alpha reliabilities were satisfactory and ranged

16

386   from .71 to .86. Both coaches and athletes answered on a 7-point Likert scale ranging from 1

387   (*I completely disagree*) to 7 (*I completely agree*).

388   ***Need-based experiences.*** Coaches' and athletes' need satisfaction and frustration were

389   measured with an adapted version of the Basic Psychological Need Satisfaction Need

390   Frustration Scale (BPNSNF; Chen et al., 2015). The items were adapted by making them

391   amendable for the sport context and the scale was shortened to 12 items, which has proven

392   valid in previous studies (e.g., Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, &

393   Mouratidis, in press). An explorative factor analysis on the coach and athlete data indicated

394   that two factors could be retained, explaining 44% and 49% of the variance in total, with the

395   need satisfaction and need frustration items loading on different factors. Internal consistencies

396   were acceptable for both need satisfaction (six items, e.g., "During coaching, I feel a strong

397   connection with people who are important to me"; $\alpha_{coach} = .71$; $\alpha_{athlete} = .79$) and need

398   frustration (six items, e.g., "I feel I have no other choice but to coach athletes"; $\alpha_{coach} = .74$;

399    $\alpha_{athlete} = .78$). Items were rated on a 7-point Likert scale ranging between 1 (*completely*

400   *disagree*) and 7 (*completely agree*).

401   **Unique coach reports**

402   ***Social desirability.*** Across samples 1 and 2, a total of 547 coaches completed a 10-

403   item social desirability scale derived from Crowne & Marlowe (1960). This scale assessed the

404   extent to which coaches tend to answer in a social desirable way (e.g., "I have never said

405   something to someone to deliberately hurt his/her feelings"; $\alpha = .58$). Items were

406   dichotomously answered with "true" or "false".

407   **Unique athlete reports**

408   ***Motivation.*** To assess athletes' motivation, we made used of the Behavioral

409   Regulation in Sport Questionnaire (BRSQ: Lonsdale, Hodge, & Rose, 2008), which has been

410   adapted by Assor, Vansteenkiste, and Kaplan (2009). Specifically, of the original 36 items of

411   the BRSQ, only the items tapping into intrinsic motivation (n = 4) at a more general level

412   were included, while items tapping into specific facets of intrinsic motivation (i.e., motivation

413   to know, motivation to accomplish and motivation to experience stimulation) were left out. In

414   line with Assor et al. (2009), we added four new introjection-approach motivation items (e.g.,

415   "I participate in my sport because I feel proud of myself if I persist") because the original

416   BRSQ only includes 3 introjection-avoidance items and 1 rather general introjection

417   motivation item. In a similar way, four newly created external-approach items were added

418   (e.g., "I participate in my sport because I would be appreciated by others") in the present

419   study. As can be noticed in Assor et al. (2009; Study 3), strong evidence for an ordered

420   pattern of correlates between the different subtypes along the self-determination continuum

421   was obtained. As a result, 32 items measuring three subtypes of autonomous motivation (i.e.,

422   intrinsic motivation, integrated regulation, and identified regulation; $\alpha = .85$) and four

423   subtypes of controlled motivation (i.e., introjection-approach regulation, introjection-

424   avoidance regulation, external- approach regulation, and external-avoidance regulation $\alpha =$

425   .90) as well as amotivation ($\alpha = .88$) were used.

426   *Coach evaluation.* To tap into coach evaluation, an 8-item scale used in prior work in

427   the educational domain (Aelterman et al., 2018) was slightly adjusted to the coaching context.

428   Athletes rated the quality of their coach by indicating whether they (a) wanted to be coached

429   another season by this coach (e.g., "Next seasons, I would like to have the same coach"; 3

430   items), (b) found their coach's training clear and easy to execute (e.g., "The training of my

431   coach was easy to execute"; 2 items), (c) would recommend their coach to other athletes (e.g.,

432   "I would recommend this coach to other athletes"; 2 items) and (d) would evaluate their coach

433   as an excellent coach ("My coach is an excellent coach"; 1 item). All items were answered on

434   a 7-point Likert scale ranging from 1 (*I completely disagree*) to 7 (*I completely agree*). To

435   justify the inclusion of all 8 items, an exploratory factor analysis was performed, thereby

436   retaining one single factor explaining 56% of the variance. After removing one item with a

437   low loading, the remaining seven items, which all yielded a minimal loading of .50, were

438   averaged to create a composite score ($\alpha = .90$).

439   **Plan of Analysis**

440   To address the aims of this study we always used the maximum amount of data

441   available. As different measures were collected across samples (see Table 1), the number of

442   included participants somewhat varied across the examined aims and hypotheses. To address

443   our primary aim, that is, obtaining a helicopter perspective towards (de)motivating coaching,

444   we conducted a multidimensional scaling analysis (MDS; Borg et al., 2013) on the 60 items

445   (4 responses by 15 vignettes) to examine the dimensional structure of the SISQ-sport items.

446   Specifically, MDS provides a graphical representation of (dis)similarities between items as

447   distances between points in a geometrical space, with high and low correlations between

448   items being, respectively, represented by small and large distances[2] between points in the

449   geometrical space. That is, practices tapping into the same coaching approach are clustering

450   together within a given subarea in the geometrical representation[3]. Depending on their

451   location in the circumplex, adjacent approaches should correlate positively, suggesting that

452   both approaches are compatible, while approaches in direct opposition to one another should

453   correlate negatively, suggesting that both approaches are more conflictual in nature. We used

454   the PROXSCAL MDS procedure of SPSS to compute the configuration with non-metrical

455   MDS. We performed this procedure once with all the coach data (Samples 1-5) combined in

456   one larger sample ($N = 893$) to obtain a coach configuration and a second time to obtain an

457   athlete configuration (Sample 5, $N = 377$). To test the stability of the dimensional structure

458   across coaches and athletes, we subjected the obtained coach and athlete configurations to

459   Generalized Procrustes Analysis (GPA; Borg et al., 2013; Borg & Groenen; 1997;

460   Commandeur, 1991). GPA calculates the coach and athlete configurations in such a way that

461 they correspond as closely as possible, without affecting the relative distances between items

462 within each configuration. Based on this consensus configuration, we identified critical areas

463 and subareas representing a specific coaching approach.

464   In a next step, to provide formal evidence for the differentiation between identified

465 approaches, a series of confirmatory factor analyses were conducted. Specifically, for each

466 pair of adjacent approaches, a differentiated two-factor solution was compared against a non-

467 differentiated single-factor solution, through the calculation of a chi² change statistic. Then,

468 mean scores were calculated for each identified (sub)areas by averaging the respective items

469 belonging to an identified (sub)area, before calculating the Pearson zero order correlations

470 between the identified (sub)areas.

471   With respect to the assessed external outcomes, Pearson zero order correlations were

472 run to investigate whether the identified (sub)areas in the dimensional configuration would

473 meaningfully relate to construct validation measures (i.e. autonomy support, structure and

474 control) among both coaches and athletes. Before calculating these correlations, mean scores

475 were created for each validation measure and identified approach by averaging the items of

476 each validation measure and approach. Further, we examined the correlations of the identified

477 (sub)areas in the dimensional configuration with both coach (i.e., need satisfaction /

478 frustration) and athlete outcomes (e.g., need satisfaction / frustration, motivation and coach

479 evaluation).

480   To address our first ancillary aim, that is, examining the correspondence between

481 athletes' and coaches' reports on (de)motivating coaching, we made use of Sample 5 only.

482 Given the hierarchical structure of that sample, with 377 athletes nested in 41 teams, each

483 associated with one coach, we made use of multilevel regression analyses. Specifically, in

484 separate regression models, the coach-reports were entered as a single predictor of the

485 corresponding athlete-reports. In addition, Multivariate Anova-analyses, we examined mean-

486 level discrepancies between coach- and athlete-reports. Finally, to address our second

487 ancillary aim, that is, considering the role of sport type, we used Multivariate Anova-analyses

488 to examine mean-level differences in the identified (sub)areas as a function of sport type (i.e.,

489 individual vs. team).

<div align="center">

Results

</div>

Primary Analyses

492   **Dimensionality.** To investigate whether the variety of assessed coaching practices

493 were organized along two dimensions (i.e., Hypothesis 1a), we evaluated several

494 configurations ranging from a one-dimensional up to a six-dimensional solution produced by

495 non-metric MDS analyses for both coaches ($N = 893$) and athletes ($N = 377$) separately. We

496 opted for a two-dimensional instead of single-dimensional solution because it yielded a stress

497 loss of .040 and .036 for coaches and athletes, respectively, and because the further reduction

498 in stress in the case of the three-dimensional solution was minimal (i.e., 006 for both coaches

499 and athletes). Further, in both cases, the scree-test confirmed this choice by pointing towards

500 a two-dimensional representation, thereby confirming Hypothesis 1. The first dimension of

501 the circular pattern (i.e., the X-axis in Figure 2) can be interpreted as need thwarting, relative

502 to need-supportive coaching with the control items (lower left quadrant) and chaos (higher

503 left quadrant) items having negative coordinates and the autonomy support (higher right

504 quadrant) and structure (lower right quadrant) items having positive coordinates on this

505 dimension. The second dimension (i.e., Y-axis) can be interpreted in terms of the level of

506 coach directiveness. All chaos items and all autonomy support items (except for one) have

507 positive coordinates on this dimension. Contrary, all control items and the majority of the

508 structure items (i.e., 67% or $n = 10$) have negative coordinates on this dimension. To

509 summarize, all four a priori identified coaching styles (i.e., autonomy support, control,

510 structure, chaos) could largely be represented in different areas by the circumplex, which

511 were most parsimoniously captured by two overarching dimensions. All four coaching styles

512 also showed good internal consistencies with Cronbach alpha values ranging between .78 and

513 .87 (see Table 3), in both coach and athlete samples.

514   **Stability of the circumplex**. As both coach and athlete data pointed towards a two-

515 dimensional circumplex model, we examined whether the obtained solution would be similar

516 across informants by applying GPA to the sample-specific configurations (i.e., Hypothesis

517 1b). In total 97% of the (squared) distances in the two sample-specific configurations could be

518 represented in a single consensus configuration, indicating that the spatial representations of

519 the individual SISQ-sport items are highly comparable between coaches and athletes.

520 Furthermore, we correlated the coordinates of the items on both dimensions in the consensus

521 configuration with the coordinates of the items in the separate athlete and coach

522 configurations. The correlations appeared all significant and very high. Specifically, the need

523 support dimension of the consensus configuration correlated, respectively, .99 and .97 with

524 the corresponding dimension in the separate coach and athlete configurations. Next, the

525 directiveness dimension yielded a correlation of, respectively, .99 and .97 with the

526 corresponding dimension in the coach and athlete configuration. Together, these results

527 indicate that the two-dimensional structure is stable across informants (i.e., coaches and

528 athletes), which justifies further analyses with the consensus configuration. Figure 2 shows

529 this two-dimensional consensus representation of the SISQ-sport items across samples based

530 on the matrix of centroids.

531   **Differentiation into approaches.** Closer inspection of the position of each item in the

532 circumplex structure and its content revealed that each of the four coaching styles (i.e.,

533 autonomy support, control, structure, chaos) fell apart into two meaningful approaches.

534 Similar to the SISQ-education (Aelterman et al., in press), six autonomy support items that

535 refer to offering choice and stimulating input among athletes fell in the *participative* approach

536   (α_{coach} = .69; $\alpha_{athlete}$ = .63), while nine other autonomy support items fell in the *attuning*

537   approach and tapped into coaches' tendency to take athletes' perspective, accept their

538   feelings, foster enjoyment and provide a meaningful rationale (α_{coach} = .80; $\alpha_{athlete}$ = .82). Six

539   practices referring to setting and monitoring expectations grouped together in the *clarifying*

540   approach (α_{coach} = .71; $\alpha_{athlete}$ = .70), while nine other structure items, which assessed coaches'

541   offer of help, feedback, and encouragement, but also adjusting exercises and providing a

542   helpful strategy fell in the *guiding* approach (α_{coach} = .85; $\alpha_{athlete}$ = .85). Further, ten control

543   items involving insisting firmly on or pushing for compliance, activating athletes' ego and

544   expressing disappointment in athletes' behavior fell in the *demanding* approach (α_{coach} = .81;

545     $\alpha_{athlete}$ = .78), while five items referring to, shaming, guilt- and anxiety-induction, intimidation

546   or exerting power of athletes' perspective fell into a *domineering* approach (α_{coach} = .71;

547     $\alpha_{athlete}$ = .68). Similarly, also chaotic items got divided in two approaches: nine items

548   involving coaches' indifference and lack of intervention or ignoring the situation when a

549   reaction was called for fell in the *abandoning* approach (α_{coach} = .74; $\alpha_{athlete}$ = .81)*,* whereas

550   six items involving a lack of planning of the coach and letting the situation unfold itself (i.e.,

551   wing it) fell in the *awaiting* approach (α_{coach} = .61; $\alpha_{athlete}$ = .66).

552   To provide more formal evidence for the identification of these eight approaches, a

553   series of confirmatory factor analyses were conducted, thereby contrasting a two- versus a

554   one-factor solution for each pair of adjacent approaches (Hypothesis 2b). Among coaches, χ^2

555   change tests pointed out that a 2-factor solution appeared to yield a better fit for each of the

556   eight pairs of adjacent approaches compared to a non-differentiated single factor solution,

557   with $\Delta\chi^2(1)$ ranging from 6.35 to 385.19, all *p-values* ≤ .012. Also in the case of athletes, the

558   more differentiated solution yielded a better fit compared to the non-differentiated solution in

559   seven of the eight comparisons, with $\Delta\chi^2(1)$ ranging from 4.81 to 152.91, all *p-values* ≤ .028,

560   with the exception of the guiding – attuning comparison ($\Delta\chi^2(1)$ = 0.01, *p* = .975). In this

561 case, the one-factor solution appeared to be more parsimonious. Yet, given that this non-

562 differentiated solution was not systematically obtained across informants and deviates from

563 the findings obtained in the educational domain, we chose to present the correlates of both

564 approaches separately among athletes as well. Possible reasons for this coach-athlete

565 discrepancy are provided in the discussion.

566   **Correlational Pattern.** As can be noticed in Table 3, autonomy support was

567 positively correlated with structure among both coaches and athletes. In contrast, it correlated

568 negatively with control in coaches, but showed a null correlation with control in athletes.

569 Finally, structure was unrelated to control among athletes, while being positively associated

570 with control among coaches, while being negatively correlated with chaos in both the coach

571 and athlete samples.

572   Further, the correlations between the eight approaches are congruent with and provide

573 further evidence for the circumplex structure (Hypothesis 2b). Specifically, as hypothesized,

574 the correlations between the eight approaches followed a clear sinusoid pattern, both among

575 coaches as well as athletes. More precisely, each coaching approach correlated most strongly

576 with the adjacent approaches and the correlations became decreasingly positive and

577 increasingly negative as one moves away from a specific approach. In the athlete sample, for

578 instance, the attuning approach correlated most strongly with the participative and the guiding

579 approach, with the correlation dropping to zero (demanding approach) and becoming slightly

580 negative (awaiting and domineering) and even strongly negative (abandoning) as one moves

581 along the circumplex. A similar pattern was observed in coaches.

582   **External outcomes.** Next, we examined whether the four coaching styles and the

583 eight identified coaching approaches were meaningfully associated with other measures of

584 autonomy support, structure and control (i.e., construct validity; cfr. Hypothesis 3). Three

585 observable patterns of correlations supported the construct validity of our newly developed

586 measurement. First, Tables 4 and 5 show that the four coaching styles most strongly

587 correlated with the corresponding coaching style measure in both coach and athlete samples.

588 The structuring coaching style in athletes counts as one exception, as it correlated most

589 strongly with autonomy support (SCQ; $r = .74$), closely followed by the construct validation

590 measure of structure (TASCQ; $r = .64$). Second, Table 4 and 5 clearly show that the eight

591 coaching approaches primarily correlated with the corresponding measures, and this in both

592 coach and athlete samples. For example, autonomy support (SCQ) correlated most strongly

593 with the participative approach and the attuning approach. The same pattern of correlations

594 was apparent concerning the construct validation measures of structure (TASCQ) and control

595 (CCBS). Interestingly, involvement (TASCQ) was positively correlated with the autonomy

596 supportive and structuring style as well as with all need-supportive approaches (i.e.,

597 participative, attuning, guiding, and clarifying), while being negatively correlated with the

598 chaotic style as well as with the need-thwarting approaches (domineering, abandoning, and

599 awaiting).

600   Concerning the coach reports social desirability showed modest positive correlations

601 with the autonomy-supportive and structuring style, while negative associations were found

602 with the controlling and chaotic styles. Roughly the same pattern was evident concerning the

603 eight coaching approaches, with social desirability being positively correlated with the

604 participative, attuning, and guiding approach, but negatively with the demanding,

605 domineering, and abandoning approach (see Table 4).

606   Next, we tested whether the four coaching styles and the eight coaching approaches

607 logically correlated with both coach and athlete outcomes. Given the high correlations

608 between the coaching approaches and coaches' reports on social desirability, we controlled

609 for the latter in the coach samples by calculating partial correlations. As expected, Table 4

610 shows that coaches' need satisfaction was positively correlated with autonomy support and

611   structure but unrelated to control and chaos. Further, coaches' need satisfaction appeared most

612   strongly positively related to the attuning and guiding approach, followed by the participative

613   and clarifying approach. In contrast, coach need frustration was positively correlated with the

614   controlling and chaotic styles, but negatively with the autonomy-supportive and structuring

615   styles. Furthermore, the strongest positive correlation was observed for the abandoning

616   approach, closely followed by domineering, demanding, and awaiting approach. Further

617   moving along the circumplex, coach need frustration appeared unrelated to the demanding

618   and participative approach, but negatively correlated with the attuning and guiding approach.

619   Concerning the athlete outcomes, the expected pattern of results was evident (see

620   Table 5). Athletes' need satisfaction correlated positively with both athletes' perceived

621   autonomy-supportive and structuring coaching styles, but negatively with the perceived

622   chaotic style. Further, the strongest positive correlation with need satisfaction was observed

623   for the attuning and guiding approach, followed by the participative and clarifying approach.

624   The strongest negative associations with need satisfaction emerged for the abandoning

625   approach, followed by the domineering and awaiting approach. In general, a similar pattern

626   was found for athletes' autonomous motivation (Figure 3b) and for coach evaluation.

627   Contrary, athletes' need frustration was positively correlated with athletes' perceived control

628   and chaos, but negatively with structure. Further, the strongest positive associations were

629   observed for the abandoning and domineering approach, followed by the demanding and

630   awaiting approach. A similar pattern emerged for controlled motivation and amotivation.

631   **Ancillary Analyses**

632   **Coach-athlete convergence.** In a series of ancillary analyses in Sample 5, we

633   examined whether athlete and coach reports would correspond to one another. Multilevel

634   regression analyses resulted in significant correspondence between coach and athlete reports

635   for the controlling coaching style ($\beta = .39$, $\chi^2(1) = 14.754$, $p < .001$), but not for the

636   autonomy-supportive (β = .26, $\chi^2(1)$ = 2.580, p = .108), structuring (β = .32, $\chi^2(1)$ = 2.452, p =

637   .117), nor the chaotic coaching style (β = -.04, $\chi^2(1)$ = 0.091, p = .763). As for the identified

638   coaching approaches, correspondence was found for the demanding (β = .32, $\chi^2(1)$ = 11.439, p

639   < .001), domineering (β = .39, $\chi^2(1)$ = 10.020, p = .002), guiding (β = .51, $\chi^2(1)$ = 5.825, p =

640   .016) and attuning approach (β = .46, $\chi^2(1)$ = 6.432, p = .011), but not for the clarifying (β =

641   .05, $\chi^2(1)$ = 0.079, p = .779), participative (β = .06, $\chi^2(1)$ = 0.204, p = .652), awaiting (β = -

642   .13, $\chi^2(1)$ = 1.076, p = .300) and abandoning approach (β = .04, $\chi^2(1)$ = 0.146, p = .702).

643   Further, a multivariate ANOVA-analysis indicated that, across all four coaching styles

644   and the eight identified coaching approaches, a significant mean-level difference was found,

645   Wilk's Lambda = .498, $F(12,285.00)$ = 23.897, p < 001; SE = 0.502. Follow-up univariate

646   ANOVA-analyses with Bonferroni correction pointed to coach-athlete discrepancies for all

647   four coaching styles with coaches perceiving themselves to use a more autonomy-supportive

648   and structuring and a less controlling and chaotic style than they were rated by their athletes

649   (all F-values ps < .002). Further, the same pattern was evident concerning six out of the eight

650   coaching approaches: coaches reported themselves to score significantly higher on the

651   participative, attuning, guiding, and clarifying approach (significant F-values ps < .002) and

652   significantly lower on the domineering and abandoning approach (significant F-values ps <

653   .001) compared to their athletes, while no differences were found for the demanding and

654   awaiting approach.

655   **Difference between Type of Sport.** In a second series of ancillary analyses, we

656   considered the role of type of sport in greater detail. Specifically, mean-level differences were

657   examined through multivariate ANOVA analyses. In the coach data, an overall multivariate

658   effect, Wilk's Lambda = .845, $F(12,844.00)$ = 12.897, p < 001; SE = 0.155, was found. After

659   taking into account Bonferroni correction, coaches of individual sports reported higher use of

660   autonomy support and lower use of control than their colleagues in team sports (see Table 6).

661   At the approach level, coaches in individual sports reported greater use of the participative,

662   but less use of the clarifying approach than coaches in team sports. Meanwhile, the latter

663   scored higher on the demanding and domineering approach but lower on the awaiting

664   approach than their colleagues in individual sports.

665   Likewise, in the athlete sample, an overall multivariate effect, Wilk's Lambda = .696,

666    $F(12,364.00) = 13.231$, $p < 001$; SE = 0.304, was found. After Bonferroni correction,

667   individual sport athletes perceived their coach as more autonomy-supportive, more

668   structuring, less controlling, and less chaotic than the athletes in team sports (Table 6).

669   Concerning the eight approaches, athletes of individual sports perceived their coach as more

670   participative, attuning, and guiding than their counterparts in team sports. The latter however,

671   reported their coach higher on the demanding, domineering and abandoning approaches[4,5].

Discussion

673   The topic of (de)motivating sport coaching has been heavily researched over the past

674   few decades (e.g., Adie et al., 2012; Amorose & Anderson-Butcher, 2007; Bartholomew et

675   al., 2010; Delrue et al., 2017). Much of this work has been grounded in Self-Determination

676   Theory, especially focused on the notion of coach autonomy support. However, to date

677   research within SDT lacks a helicopter perspective shedding light on the way how different

678   motivating (i.e., autonomy support, structure) and demotivating (i.e., control, chaos) coaching

679   styles relate to each other. To achieve this global aim, the current study, involving two large

680   samples of sport coaches and athletes, made use of multidimensional scaling analyses. A

681   circumplex model emerged among both coaches and athletes, which helped to provide both

682   more integrative and refined insight in the variety of (de)motivating coaching practices.

Towards Increased Integrative and Refined Insight

684   As hypothesized, the broad array of motivating and demotivating coach practices

685   could best be summarized according to a circumplex pattern consisting of two dimensions. A

686   first dimension denotes the extent to which coaching practices are supportive of, relative to

687   undermining athletes' basic psychological needs for autonomy, competence, and relatedness.

688   As shown in Figure 2, the left pole of this axis involves the controlling and chaotic practices,

689   whereas the right pole of this axis compromises a mix of autonomy-supportive and structuring

690   practices. The second dimension denotes the degree of coach directiveness, with either the

691   coach or the athlete being more in charge. In the case of high directiveness, coaches typically

692   rely on a mix of controlling or structuring practices, whereas the use of autonomy-supportive

693   and chaotic practices leaves relatively more room for athletes to take the lead. Taken together,

694   the two-dimensional structure divides the assessed coaching practices into four quadrants,

695   mainly representing the four overarching coaching styles (i.e., autonomy support, structure,

696   control and chaos).

697   These findings are in line with previous work in the educational domain (Aelterman et

698   al., in press), in which evidence was found for the same two-dimensional structure. Further,

699   the obtained circumplex structure appeared stable across informants (i.e., coach vs. athlete).

700   More precisely, both coach and athlete reports of the same (de)motivating practices point

701   towards the same two-dimensional circumplex. Such high consensus among informants

702   suggests that the exact location of the assessed coaching practices was very similar across

703   coaches and athletes.

704   The resulting circumplex does not only produce an integrative picture, it also provides

705   a more refined insight in how different coaching practices cluster together as both the need-

706   supportive (i.e. autonomy support and structure) and need-thwarting styles (i.e. chaos and

707   control) could be further divided into different approaches. Each of these approaches, eight in

708   total, involve a variety of co-occurring coaching practices. Moreover, the coaching

709   approaches related in a sinusoid way to each other across the circumplex, supporting a

710   gradual perspective towards coaching. That is, the difference between a specific approach and

711   the adjacent ones is not abrupt but instead more gradual, with the differences being

712   characterized by the extent to which a specific approach is either need-supportive or need-

713   thwarting and the coach is high or low in directiveness. Importantly, an analogous ordered

714   pattern of results was found when the relations between the distinguished coaching

715   approaches and the construct validation measures as well as the external outcomes were

716   considered (see Figure 3a and 3b).

717   **Moving around the Circle**

718   One of the key features of autonomy-supportive coaching involves the provision of

719   choice and the creation of sufficient room for athletes to take initiative and to provide input

720   and suggestions (Mageau & Vallerand, 2003). These practices fell in a distinct autonomy-

721   supportive approach in the circumplex labelled the *participative* approach. Interestingly, both

722   coaches and athletes of individual, relative to those from team sports scored higher on this

723   approach. Presumably, in individual sports the one-to-one relation allows coaches to adopt a

724   more individualized approach (van de Pol et al., 2015), leaving more room for athletes to

725   voice their opinion, to make choices, and to take initiative. In contrast, for a coach of a team

726   sport it may be more time-consuming and difficult to provide choice and input to meet the

727   preferences of all team members (Chelladurai and Turner, 2006; Rhind, Jowett, & Yang,

728   2012).

729   Some coaches may be reluctant to use participative practices as they are concerned to

730   lose grip on their athletes and to end up with a laissez-faire style (Cushion, Ford, & Williams,

731   2012; Ntoumanis & Mallet, 2014). The present findings suggest that this concern is legitimate

732   as the participative approach is situated next to the *awaiting* approach, which is part of the

733   chaotic style. Especially coaches of individual sports said adopting a more awaiting approach,

734   presumably because they are more participative as well. When awaiting, coaches do not

735   foresee a lot of planning and they refrain from intervening instead letting things unfold

736   themselves. Whereas the participative approach was positively related to adaptive outcomes

737   among athletes (e.g., need satisfaction), the awaiting approach was negatively correlated with

738   adaptive outcomes (e.g., rated coach evaluation) and positively with maladaptive outcomes

739   (e.g., amotivation). The awaiting approach may involve too little guidance and expectation

740   setting, which helps to explain why the awaiting approach related to higher need frustration

741   and even a sense of helplessness and indifference (cf. amotivation) among athletes.

742   Moving along the circle to the other side of the participative approach, a variety of

743   autonomy-supportive practices, such as taking the athletes' perspective, providing meaningful

744   rationales and building in interesting and enjoyable exercises were found to cluster together in

745   the *attuning* approach. For rationales to be perceived as meaningful and tasks to be interest-

746   provoking, they are best attuned, that is, matched with athletes' personal values, convictions,

747   and preferences. Next to the attuning approach, the *guiding approach* involves a variety of

748   structuring practices, which are meant to guide athletes' competence development, such as the

749   provision of feedback and help, encouragement, and scaffolding of tasks. As can be noticed in

750   Figure 2, these two approaches are situated closely to each other and may often go hand-in-

751   hand at the far end of the need-supportive dimension (Curran et al., 2013). In sport settings,

752   these two approaches strongly cohere as feedback and providing help (i.e., guiding) are often

753   attuned to the developmental pace of athletes, and matched with what athletes' wishes (i.e.,

754   attuning). Similarly, giving a meaningful rationale is often linked with feedback (e.g., to

755   indicate why a technique should be used in a different way). Due to their strong need-

756   supportive nature, the attuning and guiding approach correlated most strongly with desirable

757   athletes' outcomes, such as need satisfaction, autonomous motivation, and the evaluation of

758   the coach.

759   Much like the autonomy-supportive coaching style got differentiated into two

760   approaches (i.e. participative and attuning), the structuring coaching style also involves a

31

761 second approach, which reflects the *clarifying* approach. When clarifying, coaches are clear

762 about what they expect from their athletes and monitor athletes' adherence to these

763 expectations. Coaches of team sports indicated using this approach more frequently than those

764 of individual sports. Apparently, coaches of team sports provide a clear framework, thereby

765 being transparent about their expectations and guidelines and also monitoring athletes'

766 behavior more intensively compared to coaches of individual athletes. The way how coaches

767 set expectations and monitor progress can vary considerably though (Curran et al., 2013;

768 Grolnick, 2012; Vansteenkiste et al., 2012). That is, when setting expectations in a unilateral

769 fashion, thereby pointing towards athletes' duties, and when subsequently monitoring

770 expectations and guidelines by threatening with sanctions in case of non-compliance, coaches

771 may be perceived as rather *demanding* (Bartholomew, Ntmoumanis, Thøgersen-Ntoumani,

772 2009).

773   From a conceptual perspective, the circumplex structure suggests that, more than the

774 guiding approach, it is the clarifying approach which most easily covaries with a demanding

775 approach, thereby pointing to a potential pitfall of clarification and monitoring. In spite of the

776 fact that coaches are directive and thus take the lead when they are either clarifying or

777 demanding, the associated pattern of correlates was clearly different. Among athletes, the

778 clarifying approach was positively related to the coach evaluations. In contrast, to the extent

779 athletes perceived their coach to be demanding, they evaluated them less positively.

780 Interestingly, also coaches' own experiences of need frustration were found to underlie

781 coaches' reliance on a demanding approach, while experiences of need satisfaction related

782 positively to the clarifying approach. Future longitudinal work may want to examine whether

783 need frustration, especially when accumulated over time, increases coaches' risk of slipping

784 from a clarifying into a demanding approach.

785   When experiences of need frustration persist, coaches may further increase the

786   pressure onto their athletes, thereby relying on a *domineering* approach (Bartholomew,

787   Ntmoumanis, Thøgersen-Ntoumani, 2009; Stebbings et al., 2012). When domineering, a

788   coach may rely on a variety of practices such as, expressing disappointment, shaming, guilt-

789   and anxiety-induction and intimidation, which are especially applied in situations where

790   athletes may not have complete control over the outcome of their behavior (e.g., 'When

791   athletes display anxiety before the game'). Although positively correlated to the demanding

792   approach, the domineering approach appears to yield more maladaptive outcomes, as manifest

793   through its more pronounced positive relation with maladaptive outcomes (e.g., athlete need

794   frustration) and its negative association with adaptive outcomes (e.g., ratings of coach

795   evaluation). One reason for the more pronounced cost associated with the domineering

796   approach might be that, while the primary target of a demanding coach is the athletes'

797   behavior, the athlete as a person is targeted in the case of a domineering approach

798   (Bartholomew, Ntmoumanis, Thøgersen-Ntoumani, 2009; Vansteenkiste, Aelterman,

799   Haerens, & Soenens, 2018).

800   Completing the circle, a second chaotic approach, reflecting an abandoning approach,

801   was found. As the term suggests, coaches have in this case given up on their athletes, leaving

802   them to their own devices at moments when an intervention is called for the most. The

803   abandoning approach yielded the strongest positive correlates with maladaptive outcomes and

804   the strongest negative correlates with adaptive outcomes, effects which appeared to be

805   stronger than those observed for the domineering approach (see Table 4 and 5). From an

806   applied perspective, it is sensible that coaches go back and forth between acting domineering

807   and abandoning, such that they are dynamically related to each other. That is, the use of harsh

808   domineering practices may often be the last "resort" for coaches before giving up all together,

809   especially if they find out that their domineering approach does not produce desired

810   outcomes. Especially coaches of team sports seem be most vulnerable to these need-thwarting

811   approaches as they reported themselves to be more demanding and domineering. Congruent

812   with this interpretation, athletes of team sports, relative to those of individual sports, felt that

813   their coach made significantly more use of a demotivating cocktail being demanding,

814   domineering and abandoning.

815   Finally, the abandoning approach also differs from the other chaotic approach (i.e.,

816   awaiting). The abandoning approach did not only yield stronger associations with negative

817   outcomes, but, when considering the vignettes of the newly developed questionnaire, also

818   seems to occur in different situations compared to the awaiting approach. The abandoning

819   approach especially emerges in situations of repeated failed attempts to motivate athletes to

820   alter their behavior. In contrast, the practices that are part of the awaiting approach especially

821   emerge in situations that coaches encounter for the first time and which they adopt a more

822   explorative approach, while in fact more guidance may be called for in the eyes of the

823   athletes.

Additional findings

825   Besides our main objective to adopt a helicopter-perspective on (de)motivating

826   coaching, some additional findings deserve being mentioned. First, as both athletes and

827   coaches were administered in this study, we investigated the degree of convergence between

828   the obtained circumplex across coaches and athletes. The fact that the obtained circumplex

829   model as such is stable across informants (i.e., coach vs. athlete) does not imply that athletes

830   share the opinion of their coach. Indeed, coach-reported autonomy support, structure, and

831   chaos corresponded only minimally with the same athlete-perceived reports. Only for the

832   controlling coaching style in general and the two constituting approaches significant

833   convergence was found, presumably because controlling practices are most visible (e.g.,

834   commanding and shouting can be easily noticed; see also De Meyer et al., 2014). Such a low

835   correspondence has been reported in previous studies in the sport literature (Macquet &

836   Stanton, 2014) and is in line with previous research using the same vignette-methodology in

837   the educational domain (Aelterman et al., in press). Furthermore, in terms of mean-level

838   discrepancies, coaches scored higher on the need-supportive styles and lower on the need-

839   thwarting styles compared to athletes. It is unclear whether coaches are overly optimistic

840   about their motivating role or whether athletes are too critical for their coaches, an issue that

841   could be sorted out through observational research which allows the integration of three

842   sources of information (e.g., Aelterman, Vansteenkiste, Van den Berghe, De Meyer, &

843   Haerens, 2014). Overall, the current results support the idea that athletes form an idiosyncratic

844   image of coach behaviors which only minimally relates to how coaches perceive themselves

845   (Macquet & Stanton, 2014).

846   Second, the obtained circumplex may create the impression that coaches' need

847   supportive (e.g., autonomy) and need thwarting (e.g., control) behavior are to be considered

848   as direct opposites of each other, which would be in contrast with previous work that

849   conceptualized and studied need-supportive and need-thwarting coaching as separate

850   dimensions (Bartholomew et al., 2011; Haerens et al., 2017; Vansteenkiste & Ryan, 2013).

851   However, it must be noted that MDS (Borg et al., 2013) plots the relative and not the absolute

852   distances between different coaching practices. In fact, while autonomy-supportive and

853   controlling practices are graphically most distant from each other (relative to the other

854   practices included), both were found to be unrelated (athletes) or only slightly negatively

855   correlated (coaches) at the correlational level. Such findings imply that, across training and

856   competitive context, as studied through the vignettes herein, coaches can rely on a mix of

857   autonomy-supportive and controlling strategies. Indeed, the lack of autonomy support by

858   coaches does not by definition imply that they are controlling as a more active thwarting of

859   athletes' psychological needs is required in the latter case (Aelterman et al., 2017;

35

860 Bartholomew et al., 2010; Haerens et al., 2015; 2017). Likewise, the absence of coach control

861 does not mean that coaches are actively supporting their athletes' autonomy (Vansteenkiste &

862 Ryan, 2013).

Theoretical and Practical Reflections and Implications

864   Given the novelty of the circumplex approach used herein, the theoretical implications

865 and the added practical value of this approach are discussed more deeply. Overall, the

866 circumplex provides a more integrative picture as a variety of critical coaching styles are

867 graphically placed in relation to each other, while simultaneously producing more refined

868 insights as critical coaching styles get partitioned in approaches.

869   While different critical coaching styles have been treated as fairly distinct categories

870 in past work, the circumplex structure suggests that a more *gradual* perspective instead of a

871 categorical perspective to (de)motivating coaching is warranted. The idea of a gradual

872 perspective is that not all coaching practices and approaches are equally need-supportive or

873 need-thwarting. Specifically, some approaches of autonomy support (i.e., attuning) and

874 structure (i.e., guiding) seem to support athletes' psychological needs more directly, which

875 also explains their high correlation herein. Yet, different from these more direct need-

876 supportive approaches, other autonomy-supportive (i.e., participative) and structuring (i.e.,

877 clarifying) approaches may foster need satisfaction in a more indirect way. That is, such more

878 need-enabling approaches create the optimal conditions under which athletes can get their

879 psychological needs met (Aelterman et al., in press). On the other hand, as some of the

880 specified approaches actively thwart athletes' needs and therefore can be seen as directly

881 need-thwarting (e.g., abandoning, domineering), other more need-depriving approaches (e.g.,

882 awaiting, demanding) may neither support nor thwart one's needs or motivation

883 straightforward, but rather hinder possible need support.

884   Next, the study of Aelterman and colleagues (in press) in the educational domain is the

885   only precedent of the current study and, although conducted in different domains, the results

886   of both are remarkably parallel. That is, the circumplex pattern identified by Aelterman et al.

887   (2018) involved the same two dimensions and the same four overarching coaching styles,

888   involving the same eight approaches. In both domains, the findings point to the strong

889   complementary nature of the attuning and guiding approach. Moreover, in the current athlete

890   sample, the attuning and guiding approach could not even be differentiated into two factors.

891   Presumably, as pointed out above, both set of practices are often exerted in tandem because a

892   similar basic attitude underlies both (Aelterman et al., 2017; Vansteenkiste & Soenens, 2015),

893   that is, one where the coach is trying to optimally connect to the athlete in terms of interests,

894   preference, and perspective (attuning) or skill-level and competencies (guiding). Although

895   some readers may question the lack of discrimination between both approaches, given that

896   different key practices of both autonomy support and structure were carefully operationalized,

897   we suggest that this high correlation is a finding in and of itself. Although attuning and

898   guiding practices can be conceptually differentiated, in practice, they co-occur. Note that this

899   high intercorrelation between these two autonomy supportive and structuring approaches does

900   not apply to all approaches, as the participative and clarifying approach could be clearly

901   differentiated. When considered from a circumplex model, what is especially important is the

902   gradual pattern of correlates between identified approaches themselves and external

903   outcomes. Having said this, the gradual perspective on (de)motivating coaching is still in its

904   infancy, such that future research within sport contexts is needed to substantiate the obtained

905   circumplex and to sort out whether this configuration of approaches gets replicated.

906   Further, the circumplex provides deeper insights in what *motivational tailoring* looks

907   like. That is, the beauty of motivating coaching is that coaches are capable of selecting those

908   need-supportive strategies that fit well with both the athlete to be motivated as well as the

909   situation at hand. To illustrate, whereas in some situations and in front of some athletes

910   coaches may involve athletes in the decision process (cf. participative approach), in other

911   situations or with different types of athletes, the provision of choice may yield less desirable

912   correlates and it may suffice to give a meaningful rationale (cf. attuning approach) for an

913   assigned task or introduced guideline. Future work would do well to examine whether the

914   effectiveness of certain need-supportive practices depends on athlete characteristics (e.g., age,

915   competence of the athlete; e.g., De Meyer et al., 2016), situational features (e.g., training vs.

916   competition; time constraints; e.g., Delrue et al., 2018) or even coach characteristics (e.g.,

917   experienced vs. non-experienced coaches). Along similar lines, the exact impact of need-

918   thwarting practices may also depend on these three features. An important note is that such

919   motivational tailoring does not equal a relativistic perspective on motivating practices

920   (Soenens, Vansteenkiste, & Van Petegem, 2015). Indeed, it is unlikely that any athlete will

921   experience an abandoning approach as motivating, presumably because it involves a need

922   thwart for every athlete in any situation.

923   From an applied perspective, the availability of both a coach and athlete version of the

924   SISQ-sport is interesting in two ways. First, it allows coaches to gauge the perceptions of the

925   athletes concerning their coaching style and consequently compare both obtained profiles to

926   detect any differences or similarities regarding their perspectives. This information may serve

927   as a basis to start a dialogue and accustom their coaching behavior in practice. In line with

928   this, also future work may rely on this circumplex model by observing coaches' behavior with

929   the help of this circumplex and scoring each specific approach. Second, along the way, the

930   current contribution provided evidence for the validity of a newly developed instrument. That

931   is, besides its associations with existing measures of autonomy support, structure and control

932   (i.e., construct validity) and relevant outcomes such as need satisfaction/frustration and

933   motivation (i.e., external validity), it is one of the first within the sport context to include the

934 often neglected chaotic coaching style. Moreover, by using vignettes instead of more generic

935 items, coaching styles are assessed in a more situation- and sport-specific and, hence, more

936 ecologically valid way. Because coaches may easily identify themselves with these situations,

937 the obtained measures might better align with their actual coaching behavior in practice. As a

938 result, intervention studies on need-supportive coaching (Cheon, Reeve, Lee, & Lee, 2015)

939 may use the SISQ-sport as a diagnostic or (self) reflection tool. After the intervention

940 program, both self and athletes' reports may be used to identify any improvement.

941 **Limitations**

942 The present study has several limitations. First, given that the current study solely

943 relied on self-report measures, future studies may complement these self-reports with

944 observational measures. Such multi-informant research (e.g., Haerens et al. 2013; Smith et al.,

945 2016) would be useful to directly compare athletes' and coaches' self-report to the ratings of

946 an independent, third observer. Second, herein we focused on the coaching styles of

947 autonomy support, structure, control and chaos, thereby failing to address the role of coach

948 relational support and neglect (see Amorose & Anderson-Butcher, 2007). Based on the

949 observed correlations with involvement (see Table 4), it is well possible that items tapping

950 into these two styles may be characterized by, respectively, a high level of need-

951 supportiveness and a high level of need-thwarting. In terms of their more exact position in the

952 circumplex, it is possible that further differentiation in the circumplex would be warranted or

953 that the items would fall in the most need-supportive subareas (i.e., guiding and attuning) and

954 most need-thwarting subareas (i.e., domineering-abandoning) Third, the used correlational

955 approach prevents one from drawing directional conclusions. Although an autonomy-

956 supportive coaching style may be rooted in coaches' experiences of need-satisfaction, the

957 opposite may also be true. Although coaches who experience greater need satisfaction may be

958 more psychologically available to support their athletes' needs (Stebbings et al., 2012),

959   enhanced need-based experiences may also result from adopting an autonomy-supportive

960   approach towards others (Cheon, Reeve, Yu, & Jang, 2014; Deci, La Guardia, Moller,

961   Scheiner, & Ryan, 2006). Fourth, the current study investigated mostly proximal outcomes of

962   perceived coaching behavior such as athlete need satisfaction/frustration and motivation.

963   Future research may consider examining the association between the eight identified coach

964   approaches and more distal outcomes such as athlete engagement, disengagement, progress

965   and performance.

966   **Conclusion**

967   In the last two decades, research within the context of Self-Determination Theory in

968   sport (Aelterman et al., 2017; Bartholomew et al., 2010; Mageau & Vallerand, 2003) has

969   studied distinct (de)motivating styles. The identification of a circumplex in the present study

970   draws both a more refined and integrative picture as it becomes clear how different

971   (de)motivating styles get divided in approaches and how these approaches are located in a

972   more holistic structure. Consistent with a circumplex structure, the eight approaches, differing

973   in their level of coach need support and coach directiveness, showed a systematic sinusoid

974   pattern of correlates with critical external outcomes among both coaches and athletes. These

975   finding suggest that a gradual approach towards (de)motivating coaching is warranted, with

976   coaching approaches differing from one another in more graded instead of a black-white

977   fashion.

References

978

979   1. Adie, J. W., Duda, J. L., & Ntoumanis, N. (2012). Perceived coach-autonomy support, basic

980   need satisfaction and the well- and ill-being of elite youth soccer players: A longitudinal

981   investigation. *Psychology of Sport and Exercise, 13,* 51-59.

982   2. Aelterman, N*. Vansteenkiste, M.*, Soenens, B., Fontaine, J., Haerens, L., & Reeve, J. (in

983   press). Towards a fine-grained understanding of need-supportive and need-thwarting

984   teaching: The merits of a gradual approach. *Journal of Educational Psychology (*equal*

985   *contributions).*

986   3. Aelterman, N., Vansteenkiste, M., Van den Berghe, L., De Meyer, J., & Haerens, L.

987   (2014). Fostering a need-supportive teaching style: intervention effects on physical

988   education teachers' beliefs and teaching behaviors. *Journal of Sport & Exercise*

989   *Psychology, 36*, 595-609.

990   4. Amorose, A.J., & Anderson-Butcher, D. (2007). Autonomy-supportive coaching and self-

991   determined motivation in high school and college athletes: A test of self-determination

992   theory. *Psychology of Sport & Exercise, 8*, 654-670.

993   5. Amorose, A. J., & Anderson-Butcher, D. (2015). Exploring the independent and interactive

994   effects of autonomy-supportive and controlling coaching behaviors on adolescent

995   athletes' motivation for *sport. Sport, Exercise, and Performance Psychology, 4*, 206-218.

996   6. Assor, A., Vansteenkiste M., & Kaplan, A. (2009). Identified versus introjected-approach

997   and introjected-avoidance motivations in school and in sports: The limited benefits of

998   self-worth strivings. *Journal of Educational Psychology, 101*, 482-497.

999   7. Balaguer, I., Gonzalez, L., Fabra, P., Castillo, I., Merce, J., & Duda, J. L. (2012). Coaches'

1000   interpersonal style, basic psychological needs and the well- and ill-being of young

1001   soccer players: A longitudinal analysis. *Journal of Sports Sciences, 30*, 1619-1629.

1002   8. Bartholomew, K.J., Ntoumanis, N., Ryan, R.M., Bosch, J.A., & Thogersen- Ntoumani, C.

1003 (2011). Self-determination theory and diminished functioning: The role of interpersonal

1004 control and psychological need thwarting. *Personality & Social Psychology Bulletin, 37,*

1005 1459-1473.

1006 9.Bartholomew, K.J., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2009). A review of

1007 controlling motivational strategies from a self-determination theory perspective:

1008 Implications for sports coaches. *International Review of Sport and Exercise Psychology*,

1009 *2*, 215-233.

1010 10.Bartholomew, K. J., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). The controlling

1011 interpersonal style in a coaching context: development and initial validation of a

1012 psychometric scale. *Journal of Sport & Exercise Psychology, 32*, 193–216.

1013 11.Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1988). Teacher as social context: A

1014 measure of student perceptions of teacher provision of involvement, structure, and

1015 autonomy support (Tech. Rep. No. 102). University of Rochester, Rochester, NY.

1016 12.Black, S. J., & Weiss, M. R. (1992). The relationship among perceived coaching

1017 behaviors, perceptions of ability, and motivation in competitive age-group swimmers.

1018 *Journal of Sport & Exercise Psychology, 14,* 309-325.

1019 13.Borg, I., & Groenen, P. J. F. (1997). *Modern Multidimensional Scaling: Theory*

1020 *and Applications.* New York: Springer.

1021 14.Borg, I., Groenen, P., J., F., & Mair, P. (2013). *Applied Multidimensional Scaling*. New

1022 York: Springer.

1023 15.Carpentier, J., & Mageau, G. A. (2013). When change-oriented feedback enhances

1024 motivation, well-being and performance: A look at autonomy-supportive feedback in

1025 sport. *Psychology of Sport and Exercise*, *14*, 423-435.

1026 16.Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E., Kaap-Deeder, J., Duriez, B.,

1027 Lens, W., Matos, L., Mouratidis, A., Ryan, R., Sheldon, K., Soenens, B., Petegem, S., &

1028   Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need

1029   strength across four cultures. *Motivation and Emotion, 39*, 216-236.

1030   17. Chelladurai, P., and Turner, B. (2006). Styles of decision making in coaching, in

1031   Williams, J. (Ed.), *Applied sport psychology: Personal growth to peak performance* (5th

1032   ed., pp. 140-154). Boston: McGraw-Hill.

1033   18.Cheon, S.H., Reeve, J., Lee, J., & Lee, Y. (2015). Giving and receiving autonomy support

1034   in a high-stakes sport context: A field-based experiment during the 2012 London

1035   Paralympic Games. *Psychology of Sport & Exercise, 19,* 59-69.

1036   19.Cheon S.H., Reeve J., Yu T.H., & Jang H.R. (2014). The teacher benefits from giving

1037   autonomy support during physical education instruction. *Journal of Sport & Exercise

1038   Psychology, 36,* 331-346.

1039   20.Commandeur, J.J.F. (1991). *Matching configurations*. Leiden, the Netherlands: DSWO

1040   Press.

1041   21.Conroy, D. E., & Coatsworth, J. D. (2007). Assessing autonomy-supportive coaching

1042   strategies in youth sport. *Psychology of Sport and Exercise, 8*, 671-684.

1043   22.Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of

1044   psychopathology. *Journal of Consulting Psychology, 24*, 349-354. doi:

1045   10.1037/h0047358

1046   23.Curran T., Hill A. P., & Niemiec C. P. (2013). A conditional process model of children's

1047   behavioral engagement and behavioral disaffection in sport based on self-determination

1048   theory. *Journal of Sport and Exercise Psychology, 35,* 30–43.

1049   24.Cushion, C., Ford, P. R., & Williams, A. M. (2012). Coach behaviours and practice

1050   structures in youth soccer: Implications for talent development. *Journal of Sports

1051   Sciences, 30*, 1631-1641.

1052   25.Deci, E.L., La Guardia, J., Moller, A., Scheiner, M., & Ryan, R. (2006). On the Benefits of

1053   Giving as Well as Receiving Autonomy Support: Mutuality in Close Friendships.

1054   *Personality and Social Psychology Bulletin, 32*, .313-327

1055 26.Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs

1056   and the self-determination of behavior. *Psychological Inquiry, 11*, 227-268.

1057 27.Delrue, J., Haerens, L. Mouratidis, A., Gevaert, K., Vande Broek, G., & Vansteenkiste, M.

1058   (2017). A game-to-game investigation in the relation between need-supportive and need-

1059   thwarting coaching and moral behavior in soccer. *Psychology of Sport and Exercise, 31,*

1060   1-10. https://doi.org/10.1016/j.psychsport.2017.03.010

1061 28.De Meyer, J., Soenens, B., Vansteenkiste, M., Aelterman, N., Van Petegem, S., &

1062   Haerens, L. (2016). Do students with different motives for physical education respond

1063   differently to autonomy-supportive and controlling teaching? *Psychology of Sport and*

1064   *Exercise, 22,* 72-82.

1065 29.De Meyer, J., Tallir, I., Soenens, B., Vansteenkiste, M., Aelterman, N., Van den Berghe,

1066   L., Speleers, L., & Haerens, L. (2014). Does observed controlling teaching behavior

1067   relate to students' motivation in physical education? *Journal of Educational Psychology,*

1068   *106,* 541-554.

1069 30.De Muynck, G.J., Vansteenkiste M., Delrue, J., Aelterman, N., Haerens, L., & Soenens, B.

1070   (2017). The effects of feedback valence and style on need satisfaction, self-talk and

1071   perseverance among tennis players: An experimental study. *Journal of Sport & Exercise,*

1072   *39,* 67-80*. Doi:* 10.1123/jsep.2015-0326

1073 31.Fransen K., Boen F., Vansteenkiste M., Mertens N., & Vande Broek G. (2018). The power

1074   of competence support: The impact of coaches and athlete leaders on intrinsic motivation

1075   and performance. *Scandinavian Journal of Medicine & Science in Sports, 28*, 725-745.

1076 32.Gagné, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need satisfaction

1077   in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology*, *15*,

1078   372-390.

1079   33.Gillet, N., Vallerand, R. J., Amoura, S., & Baldes, B. (2010). Influence of coaches'

1080   autonomy support on athletes' motivation and sport performance: A test of the

1081   hierarchical model of intrinsic and extrinsic motivation. *Psychology of Sport and*

1082   *Exercise, 11*, 155-161.

1083   34.Grolnick, W. (2012). The relations among parental power assertion, control, and structure.

1084   Commentary on Baumrind. *Human Development, 55,* 57-64.

1085   35.Haerens, L., Aelterman, N., Van den Berghe, L., De Meyer, J., Soenens, B., &

1086   Vansteenkiste, M. (2013). Observing physical education teachers' need-supportive

1087   interactions in classroom settings. *Journal of Sport & Exercise Psychology, 35*, 3–17.

1088   36.Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015).

1089   Do perceived autonomy-supportive and controlling teaching relate to physical education

1090   students' motivational experiences through unique pathways? Distinguishing between

1091   the bright and dark side of motivation. *Psychology of Sport and Exercise,16* , 26-36.

1092   https://doi.org/10.1016/j.psychsport.2014.08.013

1093   37.Haerens, L., Vansteenkiste, M., De Meester, A., Delrue, J., Tallir, I., Vande Broek, G.,

1094   Goris, W. & Aelterman, N. (2017). Different combinations of perceived autonomy

1095   support and control: identifying the most optimal motivating style, *Physical Education*

1096   *and Sport Pedagogy*, DOI: 10.1080/17408989.2017.1346070

1097   38.Hodge, K., & Lonsdale, C. (2011). Prosocial and antisocial behavior in sport: The role of

1098   coaching style, autonomous vs. controlled motivation, and moral disengagement.

1099   *Journal of Sport & Exercise Psychology*, *33*, 527-547.

1100   39.Hollembeak, J. & Amorose A.J. (2005). Perceived coaching behaviors and college

1101   athletes' intrinsic motivation: A test of self-determination theory. *Journal of Applied*

1102   *Sport Psychology, 17*, 20-36

1103   40.Korelitz, K.E., & Garber, J. (2016). Congruence parents' and children's perceptions of

1104   parenting: A meta-analysis. *Journal of Youth and Adolescence, 10,* 1973-1995.

1105   41. Lonsdale, C., Hodge, K., & Rose, E. A. (2008). The Behavioral Regulation in Sport

1106   Questionnaire (BRSQ): Instrument development and initial validityevidence. *Journal of*

1107   *Sport & Exercise Psychology,30,*323–355.

1108   42.Mabbe, E., Soenens, B., Vansteenkiste, M., Van der Kaap-Deeder, J., & Mouratidis, A.

1109   (2018). Day-to-day variation in autonomy-supportive and psychologically controlling

1110   parenting: The role of parents' daily experiences of need satisfaction and need

1111   frustration. *Parenting: Science and Practice, 18,* 86-98.

1112   43.Macquet, A., & Stanton, N. (2014). Do the coach and athlete have the same "picture" of

1113   the situation? Distributed situation awareness in an elite sport context. *Applied*

1114   *Ergonomics, 45*, 724-733.

1115   44.Mageau, G. A., & Vallerand, R. J. (2003). The coach-athlete relationship: A motivational

1116   model. *Journal of Sports Science*, *21*, 883-904.

1117   45. Ntoumanis, N., & Mallet, C. (2014). Motivation in sport: A self-determination theory

1118   perspective. In Papaioannou, A. & Hackfort, D., (Eds.). *Routledge Companion to Sport*

1119   *and Exercise Psychology: Global perspectives and fundamental concepts*. Taylor and

1120   Francis.

1121   46.Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations

1122   among perceived autonomy support, forms of self-regulation, and persistence: A

1123   prospective study. *Motivation and Emotion*, *25*, 279-306.

1124   47.Podlog, L., Gustafsson, H., Skoog, T., Gao, Z., Westin, M., Werner, S., & Alricsson, M.

1125   (2015). Need Satisfaction, motivation, and engagement among high performance youth

1126   athletes: A multiple mediation analysis. *International Journal of Sport and Exercise*

1127   *Psychology, 13,* 415-433.

1128   48.Quested, E., Ntoumanis, N., Viladrich, C., Haug, E., Ommundsen, Y., Van Hoye, A.,

1129   Mercé, J., Hall, H., Zourbanos, N., & Duda, J. (2013). Intentions to drop-out of youth

1130   soccer: A test of the basic needs theory among European youth from five countries.

1131   *International Journal of Sport and Exercise Psychology, 11*, 395-407.

1132   49. Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and

1133   how they can become more autonomy-supportive. *Educational Psychologist*, *44*, 159 —

1134   175.

1135   50.Reinboth, M., Duda, J. L., & Ntoumanis, N. (2004). Dimensions of coaching behavior,

1136   need satisfaction, and the psychological and physical welfare of young athletes.

1137   *Motivation and Emotion, 8,* 297-313.

1138   51.Reynolds, A.J., & McDonough, M.H. (2015). Moderated and mediated effects of coach

1139   autonomy support, coach involvement, and psychological need satisfaction on

1140   motivation in youth soccer. *The Sport Psychologist, 29,* 51-61.

1141   52. Rhind, D., Jowett, S. & Yang, S. (2012). A comparison of athletes' perceptions of

1142   the coach-athlete relationship in team and individual sports. *Journal of Sport Behavior,*

1143   *35,* 433-452.

1144   53.Rocchi, M., Pelletier, L., & Couture, A.L. (2013). Determinants of coach motivation and

1145   autonomy-supportive coaching behaviours. *Psychology of Sport & Exercise*, *14*, 852-

1146   859.

1147   54.Ryan, R.M., & Deci, E.L. (2017). *Self-Determination Theory: Basic psychological needs

1148   in motivation, development, and wellness (1st ed.).* New York: Guilford Press.

1149   55.Skinner E., Johnson S., & Snyder T. (2005). Six dimensions of parenting: A motivational

1150   model. *Parenting: Science and Practice, 5*, 175–235.

1151   56.Smith N., Tessier D., Tzioumakis Y., Fabra, P., Quested, E., Appleton, P., Sarrazin, P.,

1152   Pappaioannou, A., Balaguer, I., & Duda, J. (2016). The relationship between observed

1153   and perceived assessments of the coach-created motivational environment and links to

1154   athlete motivation. *Psychology of Sport and Exercise, 23,* 51-63.

1155   https://doi.org/10.1016/j.psychsport.2015.11.001

1156   57.Soenens, B. & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental

1157   psychological control: Proposing new insights on the basis of Self-Determination

1158   Theory. *Developmental Review, 30,* 74-99.

1159   58.Soenens, B., Vansteenkiste, M., & Van Petegem, S. (2015). Let's not throw out the baby

1160   with the bathwater: Applying the principle of 'universalism without uniformity' to

1161   autonomy-supportive and controlling parenting. *Child Development Perspectives, 9,* 44-

1162   49. doi: 10.1111/cdep.12103

1163   59.Stebbings, J., Taylor, I.M., Spray, C.M., & Ntoumanis, N. (2012). Antecedents of

1164   Perceived coach interpersonal behaviors: The coaching environment and coach

1165   psychological well- and ill-being. *Journal of Sport & Exercise Psychology, 34*, 481-

1166   502.

1167   60.Terry, P. (1984). The coaching preferences of elite athletes competing at Universiade '83.

1168   *Canadian Journal of Applied Sport Sciences, 9,* 201-208.

1169   61.Vallerand, R. J., & Losier, G. F. (1999). An integrative analysis of intrinsic and extrinsic

1170   motivation in sport. *Journal of Applied Sport Psychology*, *11*, 142-169.

1171   62.van de Pol, P. K., Kavussanu, M., & Kompier M. (2015). Autonomy support and

1172   motivational responses across training and competition in individual and team sports.

1173   *Journal of Applied Social Psychology, 45,* 697–710.

1174   63.Vansteenkiste, M., Niemiec, C., & Soenens, B. (2010).The development of the five mini-

1175   theories of Self-Determination Theory: An historical overview, emerging trends, and

1176   future directions. In T. Urdan & S. Karabenick (Eds.). *Advances in Motivation and*

1177   *Achievement, vol. 16: The Decade Ahead.* Bingley, UK: Emerald Publishing.

1178 64. Vansteenkiste, M., Sierens, E., Soenens, B., Goossens, L., Dochy, F., Aelterman, N.,

1179   Haerens, L., Mouratidis, A., & Beyers, W. (2012). Identifying configurations of

1180   perceived teacher autonomy support and structure: Associations with self-regulated

1181   learning, motivation and problem behavior. *Learning and Instruction, 22,* 431-439.

1182 65. Vansteenkiste, M., and B. Soenens. 2015. *Vitamines voor groei: Ontwikkeling voeden*

1183   *vanuit de Zelf-Determinatie Theorie.* Leuven: Acco.

1184 66. Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability:

1185   Basic psychological need satisfaction and need frustration as a unifying principle.

1186   *Journal of Psychotherapy Integration, 23*, 263–280. DOI: 10.1037/a0032359

1187 67. Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996).

1188   Motivational predictors of weight loss and weight-loss maintenance. *Journal of*

1189   *Personality and Social Psychology, 70,* 115-126.

1190

Table 1

Overview of the Assessed Variables across the Five Samples

Sample	1	2	3	4	5	
	Coaches	Coaches	Coaches	Coaches	Coaches	Athletes
N	406	157	183	106	41	377
Coaching style						
SIS questionnaire	X	X	X	X	X	X
Autonomy support (SCQ)	X		X		X	X
Structure (TASCQ)	X		X		X	X
Control (CCBS)	X		X		X	X
Involvement (TASCQ)	X	X		X		
External outcomes						
Motivation (BRSQ)						X
Psychological needs (BPNSNF)	X	X			X	X
Coach evaluation						X

Note: SIS = Situation in Sport Questionnaire: SCQ = Sport Climate Questionnaire; TASCQ =

Teacher as Social Context Questionnaire; CCBS = Controlling Coach Behaviors Scale ;

BRSQ = Behavioral Regulations in Sports Questionnaire: BPNSNF = Basic Psychological

Need Satisfaction and Need Frustration scale

Table 2

Demographic Characteristics of Participants of Five Samples

Sample		1	2	3	4	5	
Target group		Coaches	Coaches	Coaches	Coaches	Coaches	Athletes
N		406	157	183	106	41	377
Sex	Male	71.2%	71.9%	70.5%	81.1%	70.7%	55.8%
	Female	28.8%	28.1%	29.5%	18.9%	29.3%	44.2%
Type of sport	Individual	45.6	51.6%	39.3%	42%	41.5%	30.6%
	Team	54.4	48.4%	60.7%	58%	58.5%	69.4%
Age	Range	16 – 73	17 – 78	17 - 65	17 – 67	20 – 66	12 – 24
	Mean	38.96	38.89	34.36	36.85	40.61	17.46
	SD	12.59	12.34	12.36	12.85	14.25	2.77
Coach experience	Range	0 – 57	0 – 42	1 – 40	1 – 40	1 – 40	-
	Mean	10.07	10.61	9.66	11.14	14.23	-
	SD	9.82	9.64	7.98	8.21	10.55	-
Level	Low level	67.0%	65.6%	54.1%	26.4%	32.5%	34.2%
	High level	33.0%	34.4%	45.9%	73.6%	67.5%	65.8%
Age group	Under 12y	45.3%	51.6%	45.9%	-	-	-
	12-18y	43.1%	38.9%	33.3%	-	80.5%	67.9%
	Over 18y	11.6%	9.6%	20.8%	-	19.5%	31.0%

A Helicopter Perspective towards Motivating Coaching Behavior

Table 3

Means, Standard Deviations, Reliabilities, and Correlations between Coaching Styles and Approaches among Coaches (below diagonal) and

Athletes (above diagonal).

	Mean	SD	α	1	2	3	4	5	6	7	8	9	10	11	12
Mean				4.22	4.82	3.70	2.93	3.99	4.37	4.68	5.02	3.97	3.14	3.00	2.82
SD				0.93	0.89	0.94	0.90	1.01	1.03	1.05	0.91	0.99	1.13	1.06	0.89
α				.86	.87	.84	.85	.63	.82	.85	.70	.78	.68	.83	.60
Styles															
1.Autonomy support	5.13	0.78	.83	-	.79**	-.01	-.40**	.87**	.95**	.83**	.51**	.05	-.12*	-.49**	-.13*
2.Structure	5.64	0.68	.86	.68**	.-	.09	-.54**	.58**	.82**	.95**	.82**	.21**	-.14**	-.57**	-.36**
3.Control	3.02	0.96	.86	-.11**	.11**	-	.32**	-.05	.01	-.05	.33**	.95**	.84**	.34**	.19**
4.Chaos	2.29	0.68	.78	-.22**	-.39**	.34**	-	-.19**	-.48**	-.54**	-.40**	.18**	.49**	.95**	.82**
Approaches															
5.Participative	4.49	1.03	.69	.87**	.41**	-.10**	.01	-	.66**	.65**	.30**	-.02	-.07	-.30**	.06
6.Attuning	5.56	0.78	.80	.90**	.77**	-.10**	-.37**	.56**	-	.83**	.57**	.09	-.14**	-.55**	-.24**
7.Guiding	5.72	0.73	.85	.74**	.92**	-.08*	-.42**	.48**	.81**	-	.59**	.04	-.22**	-.59**	-.30**
8.Clarifying	5.51	0.81	.71	.43**	.84**	.34**	-.25**	.21**	.52**	.56**	-	.46**	.02	-.37**	-.34**
9.Demanding	3.42	1.06	.81	-.09**	.16**	.97**	.27**	-.10**	-.06	-.04	.38**	-	.63**	.21**	.07
10.Domineering	2.23	0.97	.71	-.14**	-.03	.84**	.43**	-.07*	-.16**	-.17**	.16**	.69**	-	.49**	.36**
11.Abandoning	2.09	0.76	.76	-.35**	-.42**	.40**	.91**	-.14**	-.46**	-.49**	-.21**	.33**	.46**	-	.61**
12.Awaiting	258	0.83	.54	.03	-.23**	.16**	.81**	.21**	-.13**	-.19**	-.22**	.10**	.26**	.49**	-

*Note: **p < .01, ***p < .001*

Table 4

Pattern of Correlations of the Four Overarching Coaching Styles and the Eight Identified Approaches with Outcomes among Coaches

		Styles				Approaches							
						Autonomy support		Structure		Control		Chaos	
		Autonomy Support	Structure	Control	Chaos	Participa-tive	Attuning	Guiding	Clarifying	Demanding	Domineering	Abandoning	Awaiting
Construct Validity	*N*												
Autonomy support	605	.48**	.40**	-.08*	-.17**	.43**	.42**	.45**	.22*	-.08	-.07	-.23**	-.03
Control	605	-.15**	-.10*	.51*	.33**	-.09	-.18**	-.19**	.05	.50**	.44**	.38**	.17**
Structure	605	.31**	.41**	.04	-.18**	.19**	.34**	.41**	.30*	.05	-.01	-.19**	-.12**
Involvement	582	.38**	.46**	-.09	-.35**	.22**	.44**	.49**	.30*	-.07	-.11*	-.38**	-.21**
Social desirability	547	.18**	.12**	-.15*	-.18**	.14**	.17**	.20**	-.02	-.14**	-.13*	-.25**	-.01
Predictive validity⁺													
Need satisfaction	544	.26**	.24***	.04	.03	.21***	.25***	.25***	.16**	.03	.04	-.03	.10*
Need frustration	544	-.15**	-.19***	.22**	.31**	-.01	-.23***	-.23***	-.08	.21**	.20**	.32**	.21**

**p < .01, ***p < .001. ⁺Partial correlations were calculated, examining the relation between a coaching style or approach and need-based functioning, controlling for social desirability

53

A Helicopter Perspective towards Motivating Coaching Behavior

Table 5

	N	Styles				Approaches							
						Autonomy support		Structure		Control		Chaos	
		Autonomy Support	Structure	Control	Chaos	Participative	Attuning	Guiding	Clarifying	Demanding	Domineering	Abandoning	Awaiting
Construct Validity	*N*												
Autonomy support	*241*	.78**	.74**	-.05	-.38**	.67**	.76**	.78**	.44**	.02	-.16*	-.46**	-.15**
Control	*241*	.05	-.06	.64**	.51**	.09	.01	-.12	.08	.55**	.65**	.48**	.43**
Structure	*241*	.64**	.67**	.08	-.33**	.56**	.62**	.70**	.44**	.14*	-.07	-.37**	-.16**
Predictive Validity													
Need-experiences													
Satisfaction	*374*	.40**	.46**	-.10	-.27**	.35**	.38**	.47**	.30**	-.04	-.19**	-.29**	-.15**
Frustration	*474*	-.09	-.17**	.36**	.45**	-.02	-.13*	-.21**	-.05	.30**	.40**	.45**	.33**
Motivation													
Autonomous	*374*	.20**	.30**	-.10*	-.19**	.13*	.21**	.29**	.24**	-.05	-.17**	-.19**	-.14**
Controlled	*374*	.12*	.03	.32**	.29**	.18**	.07	.03	.04	.28**	.31**	.25**	.28**
Amotivation	*374*	-.02	-.13*	.32**	.40**	.05	-.05	-.13*	-.09	.23**	.41**	.37**	.34**
Coach evaluation	*238*	.58**	.66**	-.24**	-.54**	.46**	.59**	.70**	.41**	-.14*	-.38**	-.60**	-.30**

Pattern of Correlations of the Four Overarching Coaching Styles and the Eight Identified Approaches with Outcomes among Athletes

*Note: *p <, **p < .01, ***p < .001*

54

Table 6

Results of Multivariate ANOVA-analyses involving Type of Sport as Predictors among Coaches (left) and Athletes (right)

	Coaches					Athletes				
	Individual sport		Team sport			Individual		Team		
	M	*SD*	*M*	*SD*	*F*(1,855)	*M*	*SD*	*M*	*SD*	*F*(1,375)
Styles										
Autonomy Support	5.24	0.78	5.05	0.77	13.10***	4.61	0.87	4.04	0.91	32.56***
Structure	5.60	0.70	5.65	0.67	1.43	5.03	0.84	4.72	0.90	10.57**
Control	2.78	0.91	3.17	0.95	36.63***	3.13	0.85	3.96	0.87	75.06***
Chaos	2.32	0.73	2.25	0.65	2.07	2.65	0.85	3.06	0.89	17.24***
Approaches										
Participative	4.70	0.98	4.34	1.03	26.29***	4.50	0.93	3.75	0.96	50.60***
Attuning	5.60	0.79	5.52	0.78	2.37	4.67	0.96	4.23	1.03	15.69***
Guiding	5.78	0.72	5.66	0.75	5.55	5.09	1.03	4.49	1.00	29.28***
Clarifying	5.32	0.85	5.64	0.77	33.55***	4.94	0.78	5.06	0.97	1.37
Demanding	3.12	1.00	3.61	1.05	46.03***	3.39	0.91	4.24	0.91	70.57***
Domineering	2.10	0.92	2.31	0.99	9.80**	2.59	0.98	3.39	1.11	46.85***
Abandoning	2.03	0.78	2.13	0.75	3.49	2.58	1.00	3.19	1.03	29.16***
Awaiting	2.75	0.88	2.43	0.77	31.72***	2.76	0.88	2.85	0.90	0.80

**p < .004, ***p < .001. Bonferroni corrected alpha value of .004

Figure 1

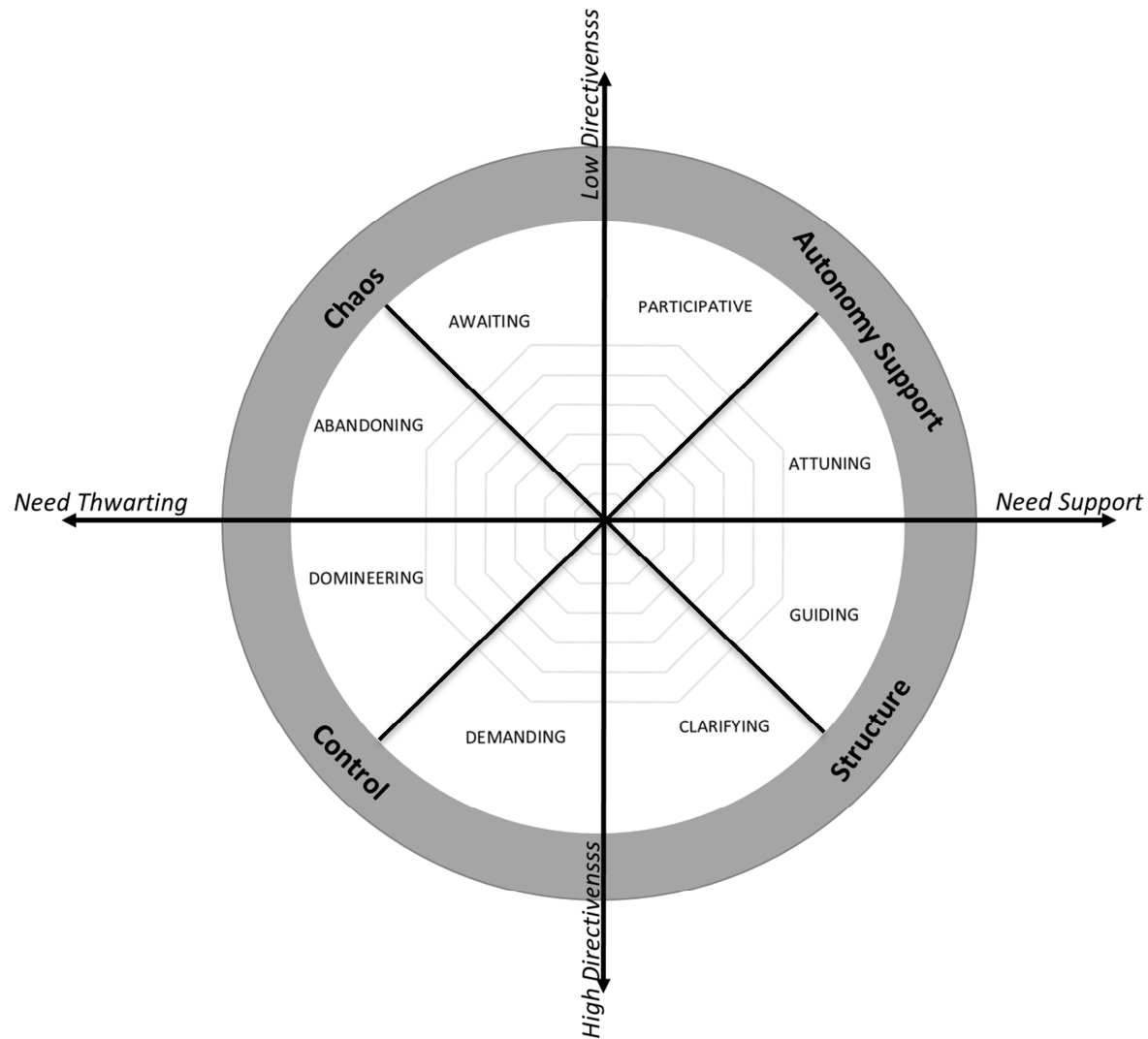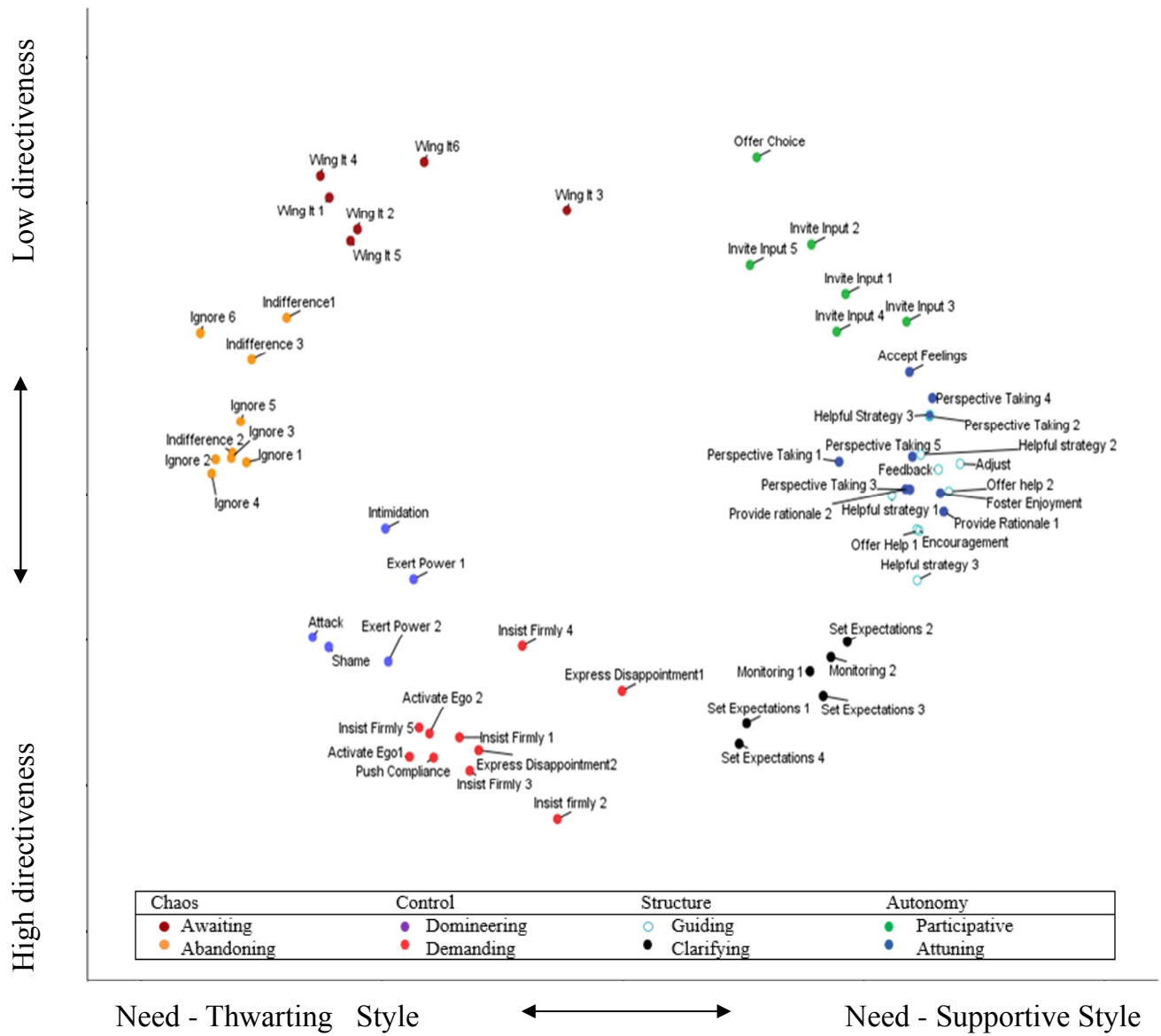*Theoretical Representation of the Gradual Approach to Coaching*

Figure 2

Two-Dimensional Consensus Representation of the SISQ-sport Items

Figure 3a

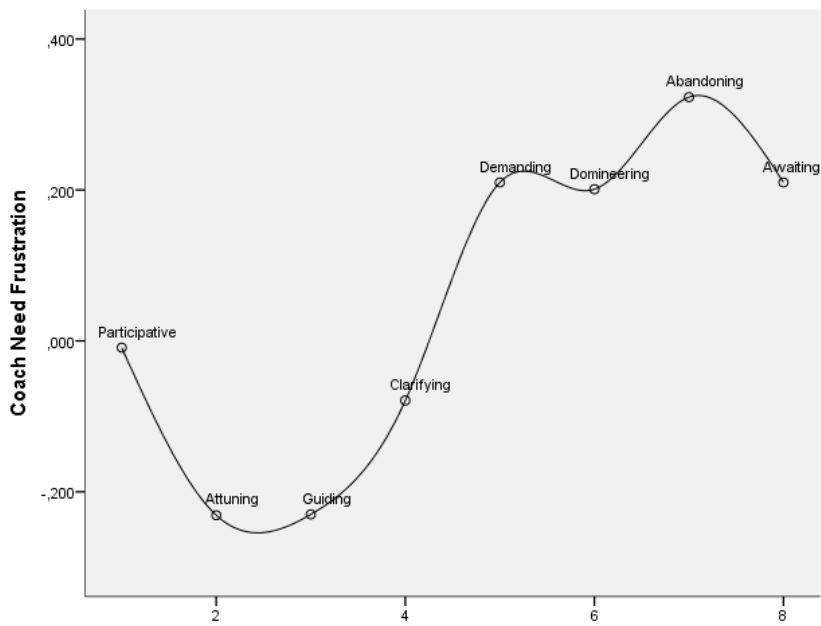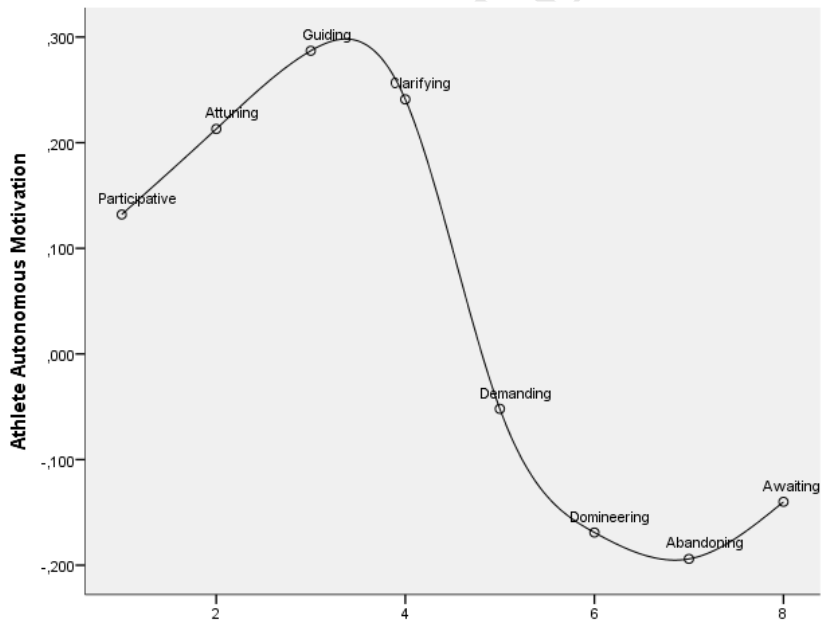*Example of Sinusoid Relations between the Eight Subareas and Coach Outcomes*

Figure 3b:

Example of Sinusoid Relations between the Eight Subareas and Athlete Outcomes

Note 1

A team of researchers and sport psychologists working in practice with athletes brainstormed multiple times about the content of vignettes and appropriate responses. A pilot version of the initial Situation-in-Sport Questionnaire, which contained 19 vignettes, was tested in sample of 599 coaches (*Mean age* = 38.35; *SD* = 12.65) and 334 athletes (*Mean age* = 15.89; *SD* = 2.07). Multidimensional scaling analyses provided promising initial evidence for the circumplex model, yet certain approaches appeared underrepresented, some vignettes and items required slight adaptations and the number of vignettes was reduced to 15 to make the questionnaire more suitable for research purposes. Vignettes were removed to obtain a balanced number of situations (i.e., 5) across the three roles of youth coaches. Further, in a small sample of 10 youth coaches, with an average of 14.20 (SD = 7.81) years of coaching experience, we assessed the extent to the vignettes were perceived as realistic. Average realism scores across vignettes ranged from 5.40 to 6.60 on a scale from 1 (not realistic at all) to 7 (very realistic), indicating that the selected vignettes fit with the daily coaching reality.

Note 2

Using Euclidean distances as association measures – rather than the more common Pearson correlations, which provide the same information – has the advantage that distances can also serve as input for metrical multidimensional scaling that assumes an interval-level association.

Note 3

While the term subarea is more technical in nature, denoting the different items that fall within a given region, the term approach is used in a more content-based way, thereby denoting the way how coaches interact with their athletes.

Note 4

MANOVA analyses concerning gender in coach reports ($N = 875$, 72% male) on the 4 coaching styles and 8 coach approaches resulted in four out of 12 significant differences (F-values ranging from 0.01 to 73.03). Male coaches reported higher on the controlling style, the demanding, domineering, and clarifying approach then female coaches. The same MANOVA analyses concerning athletes' ($N = 373$, 56% male) perceptions of coaching styles and approaches resulted in six out of 12 significant differences (F-values ranging from 0.04 to 28.05). Male athletes reported higher on the controlling and chaotic style, the demanding, domineering, abandoning, and awaiting approach than female athletes.

Note 5

In a more explorative way, it was also investigated whether the correspondence between coach-athlete ratings was moderated by the type of sport as the athlete-coach correspondence may be more elevated among athletes of individual sports. Relying on multilevel modeling, for each athlete-reported approach separately, the interaction between the respective coach-reported approach and sport type was entered as a predictor into the regression model. None of the interactions were found significant (Chi²-values ranged from 0.003 to 1.800, all ps > .179).

APPENDIX 1

Description of the four coaching styles and eight motivational approaches based on Aelterman et al. (in press)

Coaching style	Conceptual Definition	Subarea	Description
Autonomy support	The coach's instructional goal and interpersonal tone of *understanding*: the coach seeks to maximally identify and nurture athletes' interests, opinions and feelings, so that they can voluntarily engage in activities.	Participative	A *participative* coach identifies athletes' personal interests by engaging in a dialogue with athletes and inviting them to provide input and suggestions. In addition, where possible, the coach tries to offer (meaningful) choices in how athletes deal with activities and optimally follows their pace.
		Attuning	An *attuning* coach nurtures athletes' personal interests by trying to find ways to make the exercises more interesting and enjoyable, accepting athletes' expressions of negative affect and trying to understand athletes' perspective. The coach provides explanatory rationales that are meaningful in the eyes of athletes.
Structure	The coach's instructional goal and interpersonal tone of *guidance*: starting from the capabilities and abilities of athletes the coach provides help and assistance, so that athletes feel competent to master skills.	Guiding	A *guiding* coach nurtures athletes' progress by providing appropriate help and assistance as and when needed. The coach goes through the steps that are necessary to complete a task, so that athletes can continue independently and, if necessary, can ask questions.
		Clarifying	A *clarifying* coach communicates expectations to athletes in a clear and transparent way and the coach monitors athletes' progress in meeting the communicated expectations.
Control	The coach's instructional goal and interpersonal tone of *pressure*: the coach forces athletes to think, feel, and behave in a prescribed way and imposes his/her own agenda and requirements to athletes, irrespective of what athletes	Demanding	A *demanding* coach requires discipline from the athletes by using powerful and commanding language. The coach points athletes to their obligations, tolerates no contradiction, and threatens with sanctions if athletes don't comply.
		Domineering	A *domineering* coach exerts power to athletes to make them comply with his/her requests. The coach suppresses athletes by inducing feelings of guilt, shame and anxiety.

think.

| Chaos | The coach's instructional goal and interpersonal tone of *laissez faire*: the coach lets athletes on their own, making it confusing for athletes what they should do, how they should behave, and how they can develop their skills. | Abandoning | After repeated interventions, an ***abandoning*** coach gives up on athletes. The coach allows athletes to just do their own thing and no longer pokes athletes to put effort, because eventually athletes have to learn to take responsibility for their own behavior. |
| | | Awaiting | An ***awaiting*** coach offers a laissez-faire climate where the initiative fully lies with the athletes. The coach tends to wait to see how things evolve, doesn't plan too much and rather let things take their course. |

APPENDIX 2

SITUATIONS-IN-SPORT QUESTIONNAIRE

In what follows 15 different situations, that often arise when coaching, are described. Underneath each situation four possible ways in which a coach might respond to each situation are listed. There are no right or wrong answers.

Please indicate which response most reflects how you reacted to similar situations throughout the season. Each of these four responses may describe what you did during competition, training sessions, during competition, or when taking up a pedagogical role. If the response listed describes what you did, circle a number close to 7. If response listed does not describe what you did, circle a number close to 1. If the response listed sort of describes what you did, circle a number close to 4.

Note: In the descriptions of the situations we refer to athletes. Feel free to interpret this in singular form (athlete), if you coach an individual sport. When a situation either never or hardly ever occurs in your sport, then we ask you to imagine how you would handle the situation if it were to occur. Please indicate which of the responses would most closely reflect your way of coaching, even if you have never actually encountered the situation personally.

SITUATION 1: An athlete is dissatisfied because of not being selected to play

You notice that an athlete is dissatisfied because s/he is not selected to play in a competition. How do you respond?

1 Describes me not at all	2	3	4	5	6	7 Describes me very well

Item	*Approach*	*Label*
1. You do not provide an explanation and leave him/her to it.	**Abandoning**	**Ignore 1**
2. You have a conversation with him/her and acknowledge his/her frustration, and give a meaningful explanation for the non-selection.	**Attuning**	**Provide Rationale 1**
3. You say: 'You need to learn to accept this. This is my decision'	**Domineering**	**Exert Power 1**
4. You indicate which steps s/he needs to take in order to be selected in the future.	**Guiding**	**Helpful Strategy 1**

SITUATION 2: An Athlete is anxious

An athlete is suffering from performance anxiety in the run-up to a competition. How do you respond?

1. You go over the steps that s/he needs to execute in order to perform well	**Guiding**	**Helpful Strategy 2**
2. You don't talk to the athlete about it. It will be gone by the competition.	**Abandoning**	**Ignore 2**
3. You ask if s/he is stressed and if they would like to talk about it.	**Attuning**	**Accept Feelings 1**
4. You say: 'You have to learn to cope with the stress. If you don't, the competition will be a disaster.'	**Domineering**	**Intimidation**

SITUATION 3: Competition warm-up

The warm up before the competition proceeds in the following way:

1. You don't get involved in the warm-up. They know the exercises well enough from the training sessions.	**Awaiting**	**Wing It 1**
2. You tell them that you expect everyone to warm up well and be sharp.	**Clarifying**	**Set Expectatioins 1**
3. You let the athletes choose some of the warm-up exercises themselves and leave room for personal preference.	**Participative**	**Offer Choice 1**
4. You warn the athletes that they need to warm up well otherwise the competition will go badly.	**Demanding**	**Insist Firmly 1**

SITUATION 4: During a break in the competition

In the first part of the competition your athletes did not play at the level that you expected them to. During the break…

1. ...you don't say much, they know what they need to do to get back into the competition.	**Awaiting**	**Wing It 2**
2. … you give them a stern talking to: 'It's up to you now to set this right and show what you're worth'.	**Demanding**	**Activate Ego 1**
3. ... you ask their opinion and after you give them your instructions for the rest of the competition.	**Participative**	**Invite Input 1**
4. … you remind them of the exercises you had them perform before the competition.	**Clarifying**	**Monitoring 1**

SITUATION 5: After the competition

In the run-up to an important competition you and your athletes prepare together. Although these preparations went according to plan, the competition did not go as you expected. The result you wanted was not achieved at all.

1. You say: 'We can do all the preparation we want, but if you don't do what I say then it will only end in disaster'.	**Domineering**	**Shame 1**
2. You ask your athlete why s/he thinks it didn't go so well.	**Attuning**	**Perspective Taking 1**
3. You wait to see if your athlete comes up with a solution and reacts resiliently.	**Awaiting**	**Wing It 3**
4. You tell them what you think went wrong and give suggestions for how to prevent this from happening in the future.	**Clarifying**	**Monitoring 2**

SITUATION 6: Beginning of a training session

The training session begins. You…

1. … don't plan too much. You wait and take things as they come.	**Awaiting**	**Wing It 4**
2. … are interested to hear which specific skill your athletes would like to practice and you provide the necessary space for them to do so	**Participative**	**Invite Input 2**
3. … take a strong stance that the athletes need to learn what you bring to the training session. It is your duty to give the training and it is their duty to do their best.	**Demanding**	**Insist Firmly 2**
4. ... provide a clear and easy to follow structure and you communicate the goals of the training.	**Guiding**	**Helpful Strategy 3**

SITUATION 7: Nonchalant attitude during training

A few athletes are acting indifferent during a very easy exercise and are throwing others off. What do you do in this situation to get them to put effort in.

1. You tell them what your expectations are with respect to the effort you expect them to put in during the training session.	**Clarifying**	**Set Expectations 2**
2. You explain why the exercise is important and how it contributes to their development.	**Attuning**	**Provide Rationale 2**
3. You begin another exercise in the hope that their attitude will improve.	**Awaiting**	**Wing It 5**
4. You make it clear that you are disappointed and tell them that good athletes also do things they don't feel like doing.	**Demanding**	**Express Disappointment 1**

65

SITUATION 8: Difficulty with a new technique

Despite repeatedly providing instructions during the past few weeks, one of your athletes still hasn't mastered a new technique. During training s/he keeps making the same technical mistake.

1. You make it clear that it's time s/he finally picks up the instructions that you have been explaining for weeks, otherwise s/he will never make it far.	**Domineering**	**Attack**
2. You ask what s/he finds difficult about the technique.	**Attuning**	**Perspective Taking 2**
3. You add in a new intermediate step to provide a way to learn the technique differently and explain that, if executed step by step, it will work.	**Guiding**	**Adjust 1**
4. You don't spend any more time on it. Enough energy has already been wasted.	**Abandoning**	**Ignore 3**

SITUATION 9: Motivating athletes to put extra effort in

You ask your athletes to perform a difficult exercise that requires extra effort.

1. You search for a new and more interesting way to explain the exercise to your athletes.	**Attuning**	**Foster Enjoyment**
2. You don't concern yourself with it too much. It's up to the athletes to decide how much effort to put in.	**Abandoning**	**Indifference 1**
3. You order them: 'There is a time to play and a time to work. Now is the time to prove what you are worth!'	**Demanding**	**Activate Ego 2**
4. You provide feedback and extra tips to make it clear to the athletes how to perform the exercise well.	**Guiding**	**Feedback 1**

SITUATION 10: An athlete is complaining during the training session

During a difficult moment in the training session an athlete begins to complain. You...

1. ... assure him/her that you are open to input and suggestions.	**Participative**	**Invite Input 3**
2. ... give him/her a helpful strategy to solve the problem step by step.	**Guiding**	**Helpful Strategy 4**
3. ... ignore the moaning and continue on as if nothing has happened.	**Abandoning**	**Ignore 4**
4. ... insist that s/he stays attentive and focused. S/he has to complete the exercise for his/her own good.	**Demanding**	**Insist Firmly 3**

SITUATION 11: A new season starts

A new season is about to begin. You are thinking about putting together some guidelines for a good cooperation. You ….

1. ... give your athletes a list of rules of conduct and possible sanctions.	**Demanding**	**Push Compliance**
2. ... do not concern yourself with rules and guidelines. You intervene when problems arise.	**Awaiting**	**Wing It 6**
3.... clearly explain the norms and expectations you have for a good cooperation.	**Clarifying**	**Set Expectations 3**
4. ... ask your athletes for their suggestions and ideas for guidelines.	**Participative**	**Invite Input 4**

SITUATION 12: Injury and rehabilitation

An athlete is injured and is undergoing rehabilitation, but it's not going smoothly. Even though you have already encouraged him/her to continue, you discover that s/he is not sticking closely enough to the rehabilitation schedule. How do you handle this?

1. You tell him/her that returning to sport after an injury is a step-by-step process and you encourage the athlete to keep it up.	**Guiding**	**Encouragement**
2. You don't get involved. S/he needs to experience the ups and downs of rehabilitation.	**Abandoning**	**Indifference 2**
3. You demand that the rehabilitation schedule is adhered to with strong discipline.	**Domineering**	**Exert Power 2**
4. You give the athlete a say in his/her rehabilitation schedule.	**Participative**	**Invite Input 5**

SITUATION 13: Argument between athletes during the training session

You notice that difficulties are forming between a few of your athletes.

1. You don't get involved. The athletes need to learn to cope with it themselves.	**Abandoning**	**Indifference 3**
2. You take the athletes in question aside and ask how they perceive the situation. You ask them to propose some possible solutions.	**Attuning**	**Perspective Taking 3**
3. You explain that co-operation within the team is important and you give them tips to solve it.	**Guiding**	**Offer Help 1**
4. You make clear that it is their duty to behave well, just like it is your duty to coach them.	**Demanding**	**Insist Firmly 4**

67

SITUATIE 14: Poor performance

An athlete has been underperforming for a few weeks. You have already discussed this with him/her. After another poor performance, you …

1.... point out that another poor performance is not acceptable. You tell him/her that s/he has to perform better the next time.	**Demanding**	**Insist Firmly 5**
2. ... don't waste any more time on it. S/he needs to get him/herself back to performance standard.	**Abandoning**	**Ignore 5**
3... give him/her some tips on how to improve his/her performance and say that you trust that s/he will improve.	**Guiding**	**Offer Help 2**
4... listen to how the athlete perceives his or her own performance and ask what s/he thinks s/he could do to improve.	**Attuning**	**Perspective Taking 4**

SITUATION 15: Arriving to training too late

An athlete arrives too late to training for the second time in a row and acts absentmindedly. What do you do?

1. After the training you take the athlete aside and ask if something is bothering him/her.	**Attuning**	**Perspective Taking 5**
2. You don't say anything about it and focus on the training instead.	**Abandoning**	**Ignore 6**
3. You make it clear in front of everyone that you are disappointed in him/her, because it is the second time that s/he came too late.	**Demanding**	**Express Disappointment 2**
4. You point out that arriving on time is important to you.	**Clarifying**	**Set Expectations 4**

General overview of components per style and approach (with vignette number)

Style	Autonomy Support		Structure		Control		Chaos	
Approach	**Participative**	**Attuning**	**Guiding**	**Clarifying**	**Demanding**	**Domineering**	**Abandoning**	**Awaiting**
Components	Offer Choice	Provide Rationale1	Helpful Strategy1	Set Expectations1	Insist Firmly1	Exert Power1	Ignore1	Wing It1
	Invite Input1	Accept Feelings	Helpful strategy2	Monitoring1	Activate Ego1	Intimidation	Ignore2	Wing It2
	Invite Input2	Perspective Taking1	Helpful Strategy3	Monitoring2	Insist Firmly2	Shame	Ignore3	Wing It3
	Invite Input3	Provide Rationale 2	Adjust	Set Expectations2	Express Disappoint-ment1	Attack	Indifference1	Wing It4
	Invite Input4	Perspective Taking 2	Feedback	Set Expectations3	Activate Ego2	Exert Power2	Ignore4	Wing It5
	Invite Input5	Foster Enjoyment	Helpful strategy4	Set Expectations4	Insist Firmly3		Indifference2	Wing It6
		Perspective Taking3	Encouragement		Push Compliance		Indifference3	
		Perspective Taking4	Offer help1		Insist Firmly4		Ignore5	
		Perspective Taking5	Offer help2		Insist Firmly5		Ignore6	
					Express Disappoint-ment2			
	N = 6 items	N = 9 items	N = 9 items	N = 6 items	N = 10 items	N = 5 items	N = 9 items	N = 6 items

- A new integrative measure of need-supportive and need-thwarting coaching.
- A circumplex pattern of eight coach approaches containing a variety of coaching practices.
- The gradual approach provides a fine-grained understanding of need-supportive and need-thwarting coaching behaviors.
- The eight coach approaches relate logically to concurrent measures and both coaches' and athletes' outcomes.