

1 **A Review of Observational Instruments to Assess the Motivational**  
2 **Environment in Sport and Physical Education Settings**

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19 **A Review of Observational Instruments to Assess the Motivational**  
20 **Environment in Sport and Physical Education Settings**

21 **Abstract**

22 To date, the majority of research grounded in Achievement Goal frameworks (AGT) and  
23 Self-determination Theory (SDT), which has examined the coach-created motivational  
24 environment and its correlates, has relied exclusively on athletes' self-reported perceptions.  
25 This limits progress in the field as objective data on real-life events could be used to further  
26 identify what coaches and teachers do and say to 'motivate' their athletes and students to  
27 influence their skill development, performance and well-being. Such information may help  
28 inform how coaches and teachers should be trained to create more motivationally adaptive  
29 environments and could help extend results derived from self-report measures. This review  
30 outlines the observational systems that are currently available and the research related to  
31 AGT and/or SDT-based objective assessments of motivational dimensions of the coaching  
32 and physical education (PE) environment. Future research could utilise information in this  
33 review to employ and/or amend one of the available observation systems to address important  
34 questions related to the observed motivational environment in sport and PE.

35 **Keywords:** Achievement Goal, Self-determination, Observation, Coach, Teacher

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### 43 **Introduction**

44           Observation is considered to be a valuable methodology for obtaining objective data  
45 on real life events (McCall, 1984). Observation is a process by which a trained individual  
46 “follows stated guidelines and procedures to observe, record, and analyse interactions”  
47 (Darst, Zakrajsek & Mancini 1989). For those observations to be considered reliable, it is  
48 expected that other trained observers, who view the same events, will agree with the recorded  
49 ratings. Since growing in popularity during the 1970’s, observation has been employed in a  
50 variety of ways to examine the behaviour and interactional styles of coaches and teachers in  
51 sport and physical education contexts (Cushion, Harvey, Muir & Nelson, 2012; Darst et al.,  
52 1989; Smith & Smoll, 2007).

53           Two major social-cognitive theories of motivation that place importance on the type  
54 of environment created by a significant other e.g., a coach or teacher, and the behaviours  
55 elicited by that person, are achievement goal theory (AGT; Ames, 1992; Nicholls, 1989) and  
56 self-determination theory (SDT; Deci & Ryan, 2000). During the past two decades,  
57 researchers conducting studies based in AGT and/or SDT frameworks have consistently  
58 called for the development of observational measures to objectively assess the motivational  
59 environment operating in sport and physical education (PE) contexts (Duda, 2001; Duda &  
60 Balaguer, 2007; Ntoumanis, 2012). Such measurement instruments could be used to tackle  
61 issues of common method variance, be used to train individuals to create more motivationally  
62 adaptive environments, and/or be utilised in the evaluation of intervention programmes (Duda  
63 & Balaguer, 2007; Ntoumanis, 2012).

64           In this paper, we first provide a brief overview of AGT, SDT and identify key features  
65 of the social environment relevant to the two theoretical perspectives. We then provide a  
66 review of the observational systems that are currently available to researchers interested in

67 observing motivationally relevant dimensions of the social environment in sport and PE  
68 settings.

69         While we acknowledge there are contextual differences between sport and PE  
70 (discussed later in the paper), both are achievement settings where individuals seek to  
71 demonstrate competence and require motivation to fulfil their potential (Roberts, 2001;  
72 2012). In addition, the roles and behaviours of a PE teacher and coach have considerable  
73 overlap where both figures aim to educate and engage their students and athletes in an  
74 attempt to promote skill development, knowledge accrual and optimise performance. From a  
75 theoretical perspective, the principles of adaptive and maladaptive motivational  
76 environments, as highlighted by AGT and SDT, are considered to be applicable to both sport  
77 and PE contexts (see Roberts & Treasure, 2012). Sport and PE-based research, grounded in  
78 AGT or SDT frameworks, has typically focused on a number of key dimensions of the  
79 perceived motivational environment and these environmental dimensions have been studied  
80 within different age groups, across countries and at varying competitive levels (Mageau &  
81 Vallerand, 2003; Ntoumanis & Biddle, 1999; Reeve & Jang, 2006). The environmental  
82 dimensions relevant to AGT and SDT will be reviewed later in the paper. Given the overlap  
83 between the types of environment likely to promote or undermine motivation in both sport  
84 and PE contexts, observational systems developed in both settings were included in this  
85 review. After identifying the AGT and SDT-based observational measures currently available  
86 to researchers working in sport and PE contexts, considerations for future observational  
87 research are discussed and directions for potentially fruitful avenues of research provided.

### 88 **Achievement Goal Theory**

89         According to AGT (Nicholls, 1989; Roberts, 2001) there are at least two major goal  
90 states that reflect how an athlete construes and defines his/her competence. More specifically,  
91 an individual could define their competence according to a task- and/or ego-involved goal.

92 When an individual is task-involved, competence is self-referenced and perceptions of  
93 success relate to exerting effort, mastering skills and meeting the demands of a task. If an  
94 individual is ego-involved, he or she focuses on other-referenced criteria for success such as  
95 outperforming other athletes, demonstrating superior ability and being superior by exerting  
96 minimal effort (Duda, 2001).

97 The extent to which an individual is task- and/or ego-involved in a specific activity is  
98 believed to be dependent on two factors; 1) the person's goal orientation, which reflects  
99 dispositional tendencies in how success is judged and competence construed, and 2) the goal  
100 perspectives emphasised by the motivational climate at hand, which is created by a  
101 significant other (Ames, 1992; Duda & Balaguer, 2007; Dweck & Leggett, 1988). The term  
102 'motivational climate' refers to the way the psychological environment created by a leader  
103 could encourage individuals to become more or less task- and/or ego-involved in an activity  
104 by emphasising task- (mastery-focused) or ego-involving (performance-focused) cues (see  
105 table 1 for climate definitions) (Ames, 1992).

106 Perceptions of the motivational climate in sport have been assessed using a variety of  
107 self-report measures. In sport, the Perceived Motivational Climate in Sport Questionnaire  
108 (PMCSQ; Seifrez, Duda & Chi, 1992) and the Perceived Motivational Climate in Sport  
109 Questionnaire-2 (PMCSQ-2; Newton, Duda, & Yin, 2000) have been popular measurement  
110 instruments used to assess task- and ego-involving dimensions of the motivational climate  
111 Within PE settings, researchers have used measures such as the Learning and Performance  
112 Orientations in Physical Education Classes Questionnaire (LAPOPECQ; Marsh,  
113 Papaioannou, Martin, & Theodorakis, 2006; Papaioannou, 1994) and the Patterns of Adaptive  
114 Learning Survey (PALS; Midgley et al., 1996; Midgley et al., 2000) to assess students'  
115 perceptions of the motivational climate. Similar to the PMCSQ-2, both the LAPOPECQ and  
116 PALS tap into mastery and performance dimensions of the teacher-created motivational

117 climate. For an earlier review of motivational climate research and measures used in sport  
118 and physical education contexts readers should refer to Biddle and Ntoumanis (1999).

119 A considerable number of studies have examined the relationship between perceived  
120 task- (i.e., mastery) and ego-involving (i.e., performance) motivational climates and athlete or  
121 students responses to sport and PE (see Duda, 2005). Based on the plethora of research  
122 conducted researchers have repeatedly emphasised that, regardless of context, a task-  
123 involving (or mastery-focused) environment is associated with more adaptive responses and  
124 ego-involving (or performance-focused) environments linked to more maladaptive  
125 motivational responses (Ntoumanis & Biddle, 1999; Roberts, 2012).

126 Although AGT-based research has tended to rely on athletes' self-reports of the  
127 motivational climate, a number of observational systems have been developed to provide a  
128 more objective assessment of the task- and ego-involving facets of the motivational climate  
129 created by coaches and teachers (Boyce, Gano-Overway, & Campbell, 2009; Morgan,  
130 Sproule, Weigand & Carpenter, 2005; Tessier et al., 2013). Compared to self-reported  
131 assessments, these observational measures vary in how they have been operationalised and  
132 are reviewed later in the manuscript.

### 133 **Self-determination Theory**

134 SDT is a social-cognitive theory of motivation that explains how and why individuals  
135 are motivated when engaging in a particular context (Deci & Ryan, 2000). According to  
136 SDT, the implications of the social environment, created by one or more significant others,  
137 for the quality of an individual's motivation and optimal functioning is not direct. Rather, it is  
138 assumed to occur as a result of the satisfaction or thwarting of the basic psychological needs  
139 for autonomy, competence and relatedness (Ryan & Deci, 2000). Autonomy refers to the  
140 extent to which individuals perceive they are the origin of their decisions and are acting  
141 according to their own interests and preferences (Deci & Ryan, 1985). Competence is

142 fulfilled when individuals perceive themselves to be effective and experience a sense of  
143 mastery (Deci & Ryan, 1985). Finally relatedness is realised when individuals' experience  
144 security and attachment, and a sense of being respected and cared for by others (Deci &  
145 Ryan, 1985).

146         Traditionally, SDT-based researchers focused heavily on the extent to which the  
147 social environment created by a significant other, such as a coach, supported individuals'  
148 basic psychological need satisfaction by being autonomy-supportive (see table 1 for climate  
149 definitions) (Amorose, 2007; Bartholomew, Ntoumanis & Thogersen-Ntoumani, 2009;  
150 Haggart, Chatzisarantis, Culverhouse & Biddle, 2003; Mageau & Vallerand, 2003; Standage,  
151 Gillison & Treasure, 2007), Autonomy supportive environments have associated with a  
152 variety of positive responses, such as increased enjoyment and satisfaction with the sport and  
153 PE experience (see Ntoumanis, 2012; Standage et al., 2007 for summaries).

154         Although SDT based research on the social environment in sport and PE settings has  
155 tended to focus more on autonomy support (Amorose, 2007; Bartholomew et al., 2009),  
156 additional dimensions of the environment have been identified that are associated with  
157 athletes' and students' perceptions of autonomy, competence and relatedness satisfaction  
158 (Mageau & Vallerand, 2003; Reeve, Jang, Carrell, Jeon & Barch, 2004; Reinboth, Duda &  
159 Ntoumanis, 2004; Skinner & Belmont, 1993). The extent to which the environment is  
160 'structured' and 'interpersonally involving' (or relatedness supportive) has been linked to  
161 athletes' and students' psychological need satisfaction (Curran, Hill & Niemiec, 2012; Reeve  
162 et al., 2004; Reinboth et al., 2004) and adaptive motivational responses such as engagement  
163 in the learning process (Skinner & Belmont, 1993).

164         In addition to need supportive dimensions of the environment, SDT also asserts that  
165 certain types of social environments are likely to thwart the basic psychological needs. Such  
166 environments contribute to the active blocking or diminishing of an individuals' sense of

167 autonomy, competence and relatedness and are associated with a variety of maladaptive  
168 responses (Bartholomew, Ntoumanis, Ryan & Thogersen-Ntoumani, 2011). These include  
169 the extent to which the coach or teacher is controlling, hostile and creates a chaotic  
170 environment (see table 1 for a description of each dimension) (Skinner & Edge, 2002).

171 Not dissimilar to AGT, sport and PE-based studies examining dimensions of the  
172 social environment and their concomitants as emphasised within SDT have relied almost  
173 exclusively on self-report measures. In both sport and PE settings, researchers have often  
174 adapted items from the Health Care Climate Questionnaire (HCCQ; Williams, Grow,  
175 Freedman, Ryan & Deci, 1996) and the Teacher as Social Context Questionnaire (TASCQ;  
176 Wellborn, Connell, Skinner & Pierson, 1988) to provide ratings of autonomy support. A  
177 variety of other self-report measures have been used to assess autonomy support in sport and  
178 physical settings and these are included in table 1.

179 Within PE, the TASCQ (Wellborn et al., 1988) has also been used to provide ratings  
180 of interpersonal involvement. Whilst in sport contexts, the Social Support Questionnaire  
181 (SSQ6; Sarason, Sarason, Shearin, & Pierce, 1987) and Caring Climate Questionnaire (CCQ)  
182 have been used to tap into the concept of relatedness support (Fry & Gano-Overway, 2010;  
183 Reinboth et al., 2004). In terms of athletes' and students' perceptions of structure, the  
184 Teacher as Social Context Questionnaire (Wellborn et al., 1988) has been used and modified  
185 for application in sport (Curran et al., 2012). In contrast to examining need-supportive  
186 features of the coaching or teaching environment, Bartholomew and colleagues  
187 (Bartholomew, Ntoumanis & Thogersen-Ntoumani, 2010; Barthomolew et al., 2011)  
188 developed and employed the Controlling Coaching Behaviour Scale (CCBS) in a series of  
189 studies to assess the controlling dimensions of coach behaviour, finding positive relationships  
190 with psychological need thwarting and outcomes such as burnout and negative affect. In PE,  
191 the Psychologically Controlling Teaching (PCT; Soenens, Sierens, Vansteenkiste, Dochy &



192 Goossens, 2012) scale has also been developed and used to provide rating of controlling  
193 teacher behaviour. At present there has been no attempt to directly examine dimensions of  
194 hostility and chaotic coaching/teaching using self-report scales.

195 In terms of observational assessment, 2 studies have rated SDT-based coach  
196 behaviours in sport (e.g., Webster, Wellborn, Hunt, LaFleche, Cribbs & Lineberger, 2013;  
197 Mahoney, Ntoumanis, Gucciardi, Mallet & Stebbings, 2015). A number of attempts have  
198 been made to observe SDT-based dimensions of teacher behaviour in classroom and PE  
199 settings (e.g., Reeve et al., 2004; Sarrazin, Tessier, Pelletier, Trouilloud & Chanal, 2006).  
200 Interestingly and unlike the self-report research conducted to date, ratings of chaos and  
201 hostility have been taken using observational measures of coach/teacher behaviour (e.g.,  
202 Haerens et al., 2013; Smith et al., 2015).

### 203 **Observing Motivationally-Relevant Dimensions of Coach and Teacher Behaviour**

204 In the past, and outside of AGT and SDT research, there have been many attempts to  
205 observe and rate the behaviour of both coaches (Cushion et al., 2012; Darst et al., 1989;  
206 Erickson, Cote, Hollenstein & Deakin, 2011; Kahan, 1999) and PE teachers (Darst et al.,  
207 1989). The aim of this narrative review was not to discuss all of the observational research  
208 conducted within sport and PE settings. Instead the focus was on those observational systems  
209 that have been developed and used to rate the coach and teacher-created environment  
210 drawing from AGT and SDT perspectives. Commensurate with the growing popularity of  
211 both AGT and SDT and their application to the study of sport and exercise (Roberts &  
212 Treasure, 2012), there have been several attempts to develop observational measures of the  
213 coach or teacher-created motivational environment drawing from AGT or SDTs. Given the  
214 availability of these different observational measures, it is important to synthesise the  
215 literature and review the systems that are currently available. This will help inform  
216 developments or adaptations needed to existing measures, as well as identify areas for

217 consideration in future research. The different motivation theory based observational systems  
218 used to assess the motivational relevant facets of the environment created by coaches and  
219 teachers in sport and PE settings are discussed in the following sections.

### 220 **Literature Search Methodology**

221 Databases (MEDLINE, Web of Science) were used to identify published research  
222 articles regarding AGT and SDT-based observation in sport and PE. Specific terms that were  
223 used were ‘observation’/’observed’ AND ‘motivational environment’/’motivational  
224 climate’/’need support’/’need thwarting’ AND ‘self-determination’/’achievement  
225 goal’/’physical education’/’sport’/’teacher’/’coach’. Articles were included in the review if  
226 they fulfilled the following criteria: (a) employed observation to measure coach/teacher  
227 behaviour; (b) grounded in AGT/SDT or both frameworks, and (c) observational system has  
228 been used to examine coach/teacher behaviour in sport and/or PE settings. Reference lists of  
229 the retrieved articles were also scrutinised to identify relevant research papers. These  
230 procedures are consistent with guidelines for preparing and writing a narrative review of  
231 research (Gasparyan, Ayvazyan, Blackmore & Kitas, 2011).

232 The focus of this review was on observational measurement of coach and PE teacher  
233 behaviour specifically focusing on research grounded in AGT and SDT frameworks. The  
234 theories of AGT and SDT were selected due to their prolific application in research on  
235 coaching and teaching environments during the past 20 years. To our knowledge, we have  
236 included all of the published AGT and SDT-based observational measurement systems that  
237 have been used to examine the coach or PE-teacher created environment (see table 2 for  
238 measures included). Based on the literature search and examination of reference lists, 35  
239 papers were identified. After removing duplicates, and on a further screening of titles and  
240 abstracts, 19 papers fulfilled the criteria and were included in the review; 5 in sport and 14 in  
241 PE (see Figure 1 for overview of the review process). Following article identification, two

242 reviewers independently assessed the suitability and quality of the 19 articles. Reviewers  
243 agreed to retain all articles within the review. The different observational systems identified  
244 are now discussed and similarities and differences between the measures are articulated.

### 245 **Observation from an AGT Perspective**

246         Within sport settings, there has been a limited attempt to observe and rate AGT-based  
247 dimensions of the coaching environment in sport. Research by Boyce et al., (2009) represents  
248 a laudable step in assessing task- and ego-involving dimensions of the motivational climate in  
249 school-sport athletes by using a novel observation checklist approach.

250         Within PE settings, there have been several attempts to develop and employ  
251 observational measures of the motivational teaching environment (Curtner-Smith &  
252 Todorovich, 2002; Morgan et al., 2005). Curtner-Smith and Todorovich (2002) developed the  
253 Physical Education Climate Assessment Instrument (PECAI) and subsequently used the  
254 PECAI to rate the environment created by PE teachers in two follow-on studies (Todorovich  
255 & Curtner-Smith, 2003). Morgan et al., (2005) also developed an observational measure of  
256 PE teacher behaviour drawing from an AGT perspective. The computer-based observational  
257 measure of TARGET behaviour was initially employed to rate the frequency and duration of  
258 different teacher behaviours and create a profile of the motivational climate created by PE  
259 teachers (Morgan et al., 2005). Since its inception the measure developed by Morgan et al.,  
260 (2005) has also been used as a self-reflection tool to support teachers in creating more  
261 mastery-focused environments (Morgan & Kingston, 2010).

262         Consistent across all three of the AGT-based observational systems identified, is the  
263 reliance on the TARGET (Task, Authority, Recognition, Grouping, Evaluation, & Time)  
264 framework proposed by Epstein (1989). The TARGET framework was initially developed to  
265 support teachers or coaches to create more mastery-focused (or task-involving) teaching  
266 environments. While TARGET is useful as a guide, it is important to also remember that the

267 extent to which an environment is task-involving (mastery-focused) and ego-involving  
268 (performance-focused) relies on several important appraisals. Duda and Balaguer (2007)  
269 suggest that the extent to which the motivational climate is more or less task- or ego-  
270 involving is based on 1) how is success defined by the creator of the climate? 2) what aspects  
271 of performance are reinforced? 3) how individuals are evaluated in that setting with regard to  
272 the criteria of success? and 4) the basis of recognition?. It is this focus on how a leader  
273 defines success and judges competence that has underpinned the development of popular self-  
274 report assessments of the motivational climate (e.g., the PMCSQ-2) and should also be  
275 considered when developing AGT-based observation rating systems of coach or teacher  
276 behaviour.

### 277 **Observation from a SDT Perspective**

278 Not dissimilar to research grounded in AGT; to date there has been a relative dearth  
279 of studies employing observation methods to rate SDT-based dimensions of coach behaviour  
280 in sport. In a notable first attempt, Webster et al., (2013) developed the MPOWER autonomy  
281 support observation system that specifically focuses on several distinct autonomy supportive  
282 behaviours used by coaches in sport. In a recent extension, researchers have observed SDT-  
283 based coaching behaviour using a measurement system initially developed by Reeve et al.,  
284 (2004) in classroom setting (Mahoney et al., 2015).

285 In PE contexts, multiple SDT-based studies have been conducted employing  
286 observational measures of teacher behaviour. As previously mentioned, Reeve and colleagues  
287 (Reeve et al., 2004; Jang, Reeve & Deci, 2010) drew from a SDT perspective to develop an  
288 observation rating system to assess the extent to which a teacher is autonomy supportive  
289 versus controlling, interpersonally involved versus hostile, and provides structure versus  
290 chaos (see table 2 for list of strategies). Since being developed, 2 studies have employed the

291 qualitative rating scale in PE settings (Cheon, Reeve & Moon, 2012; Tessier, Sarrazin &  
292 Ntoumanis, 2010).

293 Taking a slightly different approach to Reeve et al., (2004), Sarrazin et al., (2006)  
294 developed an observation instrument grounded in SDT to assess both the type and nature of  
295 teacher-student interactions. For each verbal interaction, observers identified the type of  
296 behaviour used by the teacher (e.g., organisational communication, technical and tactical  
297 hints, and questions) as well as the nature of the behaviour (i.e., was it autonomy supportive  
298 vs. controlling vs. neutral). Following development, the measure was modified and used by  
299 Tessier, Sarrazin and Ntoumanis (2008) to assess autonomy supportive, neutral and  
300 controlling teacher behaviours in PE settings before and after a teacher-training intervention.

301 In a recent development in the literature, which pulls specifically from Basic Needs  
302 Theory (Deci & Ryan, 2000), a sub-theory within the SDT framework, Haerens et al., (2013)  
303 and Van den Berghe et al., (2013) have developed an observational instrument to examine the  
304 need-supportive and need-thwarting behaviours used by teachers in PE settings. Their  
305 observational measure of teacher behaviour includes separate dimensions for autonomy  
306 supportive, interpersonal involving, structure before, structure during the learning process,  
307 controlling, cold and chaotic teaching behaviours.

308 There is evidence of diversity in the SDT-based observational systems developed and  
309 used in sport and PE-settings. While several measures focus on specific dimensions of the  
310 motivational coaching environment (Webster et al., 2013), others adopt a broader perspective  
311 and consider multiple dimensions of the social environment emphasised within SDT (Reeve  
312 et al., 2004; Van den Berghe et al., 2013).

### 313 **Observation from an Integrated AGT & SDT Perspective**

314 A recent study published by Smith et al., (2015) reports the development and  
315 validation of the Multidimensional Motivational Climate Observation System (MMCOS),

316 which draws from an integrated AGT and SDT perspective (Duda, 2013). Unlike previous  
317 measures, the MMCOS includes features of the environment from both theories resulting in 2  
318 higher order factors (i.e., empowering and disempowering), 7 environmental dimensions  
319 (autonomy support, controlling, task-involving, ego-involving, relatedness support,  
320 relatedness thwart and structure), and 32 lower-order behavioural strategies that are believed  
321 to hold implications for athlete need satisfaction/thwarting, motivation and related outcomes.

### 322 **Considerations for Future Research**

323         Although all grounded within the motivational theories of AGT and SDT, the  
324 observational measures introduced in the previous section are varied in nature (e.g., Boyce et  
325 al., 2009; Reeve et al., 2004; Sarrazin et al., 2006) and have been employed in a variety of  
326 different ways (e.g., Cheon et al., 2012; Morgan & Kingston, 2010). Consequently, attempts  
327 to observe and rate motivational features of the coaching and teaching environment have  
328 raised a number of questions and offer interesting avenues for future research. Considerations  
329 for observational research conducted in sport and PE settings grounded in AGT and SDT  
330 frameworks will now be discussed.

### 331 ***Motivational Environment as a Group or Individual Construct***

332         An interesting question arising from observational research in sport and PE settings is  
333 whether the motivational environment should be considered a group or individual level  
334 construct (Duda, 2001; Papaioannou, Marsh & Theodorakis, 2004). Typically teachers and  
335 coaches are observed and coded while delivering to a whole cohort of students or athletes.  
336 This results in what can be considered a group-level rating i.e., one teacher/coach rating for  
337 the whole class/team. The most appropriate approach for analysing observational data, rated  
338 at a group-level, alongside individuals' perceptions, such as reports of the motivational  
339 environment, is still not clear. Haerens et al., (2013) observed and rated teachers' need  
340 supportive behaviours (autonomy support, relatedness support, structure before during

341 structure during PE) and used a multi-level analysis approach to predict students' reports of  
342 the same environment. While a number of significant associations emerged between the  
343 group level observations and student reports of the environment, these remained relatively  
344 weak in magnitude. When summarising the findings, Haerens et al., (2013) indicated that the  
345 majority of variance in students' reports of the motivational teaching environment was  
346 situated at the individual rather than class (or group) level. This finding was also replicated in  
347 a PE-based study conducted by De Meyer et al., (2013). As a result, it was suggested that  
348 rating the individual teacher-student interactions might lead to stronger associations between  
349 the two reports of the environment. In sport settings, Smith et al., (2015) offer a similar  
350 finding when using ratings made with the MMCOS to predict athletes' psychological need  
351 satisfaction. Smith and colleagues found that the majority of variance in athletes' reports of  
352 need satisfaction was situated at the individual level and a very small amount of variance was  
353 associated to the grouping of athletes in teams. Given the majority of variance in athletes'  
354 reports of different motivational variables appears to be at the individual rather than class or  
355 team level, it is not surprising that a group-based rating such as a teacher or coach  
356 observation results in relatively weak predictive utility.

357         In contrast to the aforementioned findings, Boyce et al., (2009) adopted a different  
358 approach when associating observations made with their checklist to coaches' and athletes'  
359 perceptions of the motivational climate. They found that there was a good degree of  
360 agreement between athletes in each of the teams, as calculated by the within group inter-rater  
361 agreement (*r<sub>wg</sub>*) (James, 1982). As a result, athletes' reports on each team were aggregated to  
362 the group level and correlations were used to examine the relationships between observations,  
363 coaches' and athletes' perceptions of task-involving and ego-involving dimensions of the  
364 environment. Adopting this approach resulted in moderate positive associations between  
365 coaches' and observers' reports on task-involving ( $r = 0.39$ ) and ego-involving ( $r = 0.46$ )

366 dimensions, and moderate positive association between observers' and athletes' reports of a  
367 task-involving ( $r = 0.38$ ) but no association for the ego-involving dimension ( $r = 0.11$ ).

368 From a methodological perspective, Papaioannou et al., (2004) suggest that the  
369 motivational climate is inherently a group-based variable and as such multi-level analyses  
370 should almost always be applied to data that include individuals nested within groups i.e.,  
371 students in PE classes or athletes within sports teams. Furthermore, Hox (2010) suggests that  
372 it is appropriate to employ a multi-level approach when the variance attributed to the  
373 grouping of individuals exceeds an intra-class correlation coefficient of 5%. Therefore, even  
374 when the majority of variance in students' or athletes' reports of motivation-related variables  
375 such as the motivational environment are at the individual level, a multi-level approach  
376 would still be appropriate. However, the reality of conducting observational research and the  
377 time consuming nature of coding hours of video footage (Kavussanu, 2008) does not always  
378 offer the quantity of data needed to run sophisticated statistical models. Therefore,  
379 understanding alternative ways of analysing observational data, such as the approach used by  
380 Boyce et al., (2009) is useful.

381 To gain a better understanding of how to rate and then analyse observational data to  
382 provide meaningful information it may be necessary to compare different rating procedures.  
383 When the resources are available, observational measures could be employed to rate both the  
384 overall environment created by the teacher or coach (i.e., group level), as well as individual  
385 interactions (i.e., individual level). The predictive utility of ratings made at the individual and  
386 group level could then be compared utilising a multi-level approach. This would contribute to  
387 a better understanding of what a coach or teachers is observed to say and do, and how that  
388 impacts upon the larger group as well as the individuals within that group.

389 *Content of Observational Measures*



390 Another important consideration for researchers aiming to conduct observational  
391 research in AGT and SDT, are the dimensions included within the different observational  
392 systems. Of course, the measure that is ultimately selected will be dependent on the aims of  
393 the research. However, it is important to consider that certain observational systems will offer  
394 different information and a well-informed selection is important.

395 Consistent with literature on the motivational climate, observational measures  
396 developed from an AGT perspective have included assessments of both task- and ego-  
397 involving behaviours (Boyce et al., 2009; Morgan et al., 2005). The checklist developed by  
398 Boyce et al., (2009) adopts a simpler rating procedure compared to the systems developed by  
399 Morgan et al., (2005) and Curtner-Smith and Todorovich (2002). This rating process may  
400 make it more appealing to prospective researchers interested in conducting observational  
401 research from an AGT standpoint. In addition, the MMCOS (Smith et al., 2015) offers a  
402 rating of both task- and ego-involving dimensions of the environment, which closely aligns to  
403 the dimensions within the widely used PMCSQ-2.

404 Within SDT frameworks, there has been more variety in terms of the dimensions  
405 included as well as how these have been operationalised. The MPOWER (Webster et al.,  
406 2013), specifically focuses on autonomy supportive coaching and identifies six types of  
407 behaviours representative of an autonomy supportive climate. Within education settings,  
408 Sarrazin et al., (2006) focused specifically on autonomy supportive and controlling teaching  
409 and the pedagogical behaviours used by those leading sessions in the classroom and in PE.  
410 Taking a broader approach, Reeve et al., (2004) included the six key dimensions of the social  
411 environment relevant to SDT-based work (Skinner & Edge, 2002). The observational rating  
412 system developed by Reeve et al., (2004) included autonomy support and controlling,  
413 interpersonal involvement and hostility, and structure and chaos. However, the three pairs of  
414 environment dimensions were situated at opposite ends of continuum, and therefore a high

415 score on autonomy support precludes a high score on controlling teaching. Developments in  
416 the SDT literature suggest that the dimensions of the environment are not considered opposite  
417 and should be seen as independent constructs (Bartholomew et al., 2009; 2010). In line with  
418 this view, Haerens et al., (2013) and Van den Berghe et al., (2013) developed an  
419 observational measure of PE teacher behaviour that includes seven dimensions, autonomy  
420 support, controlling, relatedness support, hostile, structure before, structure during and chaos.  
421 A particular advantage of this approach is that a more holistic understanding of the  
422 environment created and behaviours used by coaches or teachers in sport and PE can be  
423 gained.

424 In general, when analysing observational data with the aforementioned measures,  
425 researchers tend to aggregate scores from a series of individual behavioural strategies to  
426 create an overall score for broader dimensions of the environment e.g., autonomy support,  
427 controlling and so on. To inform future intervention research and understand where efforts  
428 could be made to promote more adaptive motivational environments, it would be useful if  
429 researchers reported on both the types of behavioural strategies teachers or coaches used as  
430 well as the overall environment created.

### 431 *Observation Recording Process*

432 A variety of rating procedures have been employed to observe and code the  
433 motivational environment created by coaches or teachers in sport and PE. Not surprisingly,  
434 an event-recording, or frequency based rating approach has proved popular (Curtner-Smith &  
435 Todorovich, 2002; Morgan et al., 2005; Webster et al., 2013) and has been used to provide  
436 descriptive information on the motivational environment created by coaches and teachers.  
437 This is perhaps the most objective rating approach where coders are provided with rigid and  
438 well-defined behavioural categories and asked to rate each time a behavioural strategy is  
439 observed.

440           Although also representing an assessment of frequency, Haerens and colleagues (De  
441 Meyer et al., 2013; Haerens et al., 2013; Van den Berghe et al., 2013) used a different  
442 approach and applied a rating scale to indicate the extent to which a motivational behaviours  
443 within SDT were used ‘not at all’ or ‘all of the time’. These observational reports of teacher  
444 behaviour have since been used to examine the relationship with students’ perceptions of the  
445 environment (Haerens et al., 2013), motivation to participate in PE (De Meyer et al., 2013)  
446 and teachers’ own motivation (Van den Berghe et al., 2013). Reeve et al., (2004) opted for a  
447 similar rating scale when measuring key dimensions of the environment relevant to SDT and  
448 has repeatedly used the measure to examine relationships with other motivational variables  
449 (Jang et al., 2010) and test the effectiveness of teacher-intervention programmes (Cheon et  
450 al., 2012). In a recent development in sport, Smith et al., (2015) used a potency rating scale to  
451 capture the psychological meaning of the environment created by coaches working with  
452 young athletes and predict athletes’ psychological need satisfaction. This differs from a  
453 frequency-type assessment of behaviour in that a high potency score can be achieved when  
454 behaviour is used infrequently, but is emphasised to a high intensity. This approach offers a  
455 novel assessment of the overt motivational environment from an AGT and SDT-based  
456 perspective.

457           There are still many questions that remain to be answered with regards to the best  
458 type of rating approach. While it seems to be a popular option for observational research in  
459 general (Darst et al., 1989; Lacy & Darst, 1984; Smith et al., 1977), a frequency rating of  
460 leader behaviour may not be the most appropriate assessment of the environment rated in  
461 AGT and SDT. Frequency ratings suggest that more behaviour reflects higher quality.  
462 However both AGT and SDT would propose that it is the quality of the environment and  
463 message delivered by a coach or teacher that is important (Duda, 2001; Smith et al., 2015)  
464 not necessarily how many times a behaviour is used. However if researchers choose to

465 employ a rating-scale system, they should be prepared to discuss issues of objectivity.  
466 Although coders tend to follow standardised training packages (e.g., Smith et al., 2015) and  
467 are given detailed marking guidelines, it is inevitable that they will rely on their own  
468 experiences and perceptions when rating on a scale system. This may explain why lower  
469 levels of reliability are sometimes reported when employing this more subjective rating  
470 approach (e.g., Haerens et al., 2013). In future studies, researchers may choose to examine  
471 the personal characteristics (e.g., motivation, goal orientation) of coders and examine the  
472 impact this has on the type of ratings given. This will prove useful when selecting individuals  
473 to rate observational data using these types of measures. Ultimately, within AGT and SDT-  
474 based research, the degree to which the different type of rating approach are predictive of  
475 athlete or student outcomes should determine the type of rating method that is most suitable.

#### 476 *Relationship between Observed and Perceived Measures*

477 A persistent finding in many observational studies is the lack of association between  
478 observed and perceived reports of the environment (Curtis et al., 1979; Haerens et al., 2013;  
479 Smith et al., 2015). Clearly this warrants further attention and is important if observations are  
480 to be used to test principles embedded within AGT and SDT frameworks. There are a number  
481 of ways in which researchers could examine this issue further. Within their study on PE  
482 teachers, Haerens et al., (2013) highlight the importance of ensuring observational reports  
483 and perceptions are considered within the same time frame. Ensuring that both the  
484 observations and perceptions are referenced to the same point in time will help avoid a  
485 context by measurement confound (Lorenz, Melby, Conger & Xu, 2007), and should improve  
486 the likelihood of finding agreement between the different ratings.

487 However, even when matched to the same level researchers (Haerens et al., 2013; Van  
488 den Berghe et al., 2013) have still found relatively weak associations between observations of  
489 the motivational environment and perceptual responses. It is possible that students or athletes

490 are more 'in tune' to particular parts of a sport session or PE class (e.g., the very beginning or  
491 end), and that their perceptions of the environment are informed by critical parts of the  
492 session. Within the context of AGT or SDT, there has been a limited attempt to examine  
493 variability of the environment created during the different phases of a training session or PE  
494 class. In a notable approach, Haerens et al., (2013) examined observed autonomy support,  
495 relatedness support and structure according to the beginning, middle and end of PE classes.  
496 Associating temporal observations with individuals' perceptions of the environment would  
497 provide further information on whether individuals' reports of the environment are influenced  
498 by key moments in that session. An alternative suggestion is that when reporting on the  
499 situational motivational environment, individuals continue to refer to more general  
500 perceptions of the environment created (Haerens et al., 2013; Smith et al., 2015). Collecting  
501 observations and perceptions from teachers/coaches and students/athletes during a series of  
502 repeated assessments would enable this proposition to be explored further.

503         An interesting and consistent finding from previous observational studies is the  
504 convergence between observational ratings and perceptual responses on more maladaptive  
505 dimensions of coach or teacher behaviour (Curtis et al., 1979; De Meyer et al., 2013; Smith et  
506 al., 2015). It has been suggested that individuals monitor and pay more attention to negative  
507 feedback (Gottman & Krokoff, 1989; Graziano, Brothen, & Berscheid, 1980) and are  
508 therefore more likely to report when this happens. For positive dimensions of leader  
509 behaviour, these are likely to become established over time. As a result, individuals may pay  
510 less attention to such positive behaviours thereby relying on more general reports of the  
511 environment. Adopting an event-by-event analysis and coding key behavioural events,  
512 similar to the approach used by Curtner-Smith and Todorovich (2002), would help explore  
513 this issue further.

514 A final consideration related to the recording process is how the different dimensions  
515 of the motivational environment interact (Treasure, 2001). When discussing the motivational  
516 climate in AGT, Ames (1992) posed the question as to whether the task- and ego-involving  
517 dimensions of the motivational environment interact in an additive or multiplicative manner.  
518 If dimensions are additive then these would complement one another and this means that a  
519 compensatory effect can take place. For example, if a coach uses controlling strategies they  
520 could still overcome this by being highly autonomy supportive. However, this compensation  
521 would not be able to take place if the dimensions of the environment interacted in a  
522 multiplicative way. At present, research would suggest that dimensions of coach and teacher  
523 behaviour interact in an additive manner (Morgan et al., 2005). Indeed, Smith et al., (2015)  
524 found that empowering and disempowering environment dimensions of the motivational  
525 environment positively and negative predicted athletes' psychological needs respectively  
526 when included in the same model. This is consistent with suggestions that dimensions of the  
527 motivational environment should be considered as independent constructs (Bartholomew et  
528 al., 2009; 2010). However, the relationship between different dimensions of the environment  
529 needs to be explored further. Similar to research using self-reports (Curran et al., 2013; Jang  
530 et al., 2010; Sierens et al., 2009), it may prove fruitful to examine the interaction between  
531 different dimensions of the observed environment and the resulting impact on athlete or  
532 student responses.

### 533 *Contextual Differences in Sport and PE*

534 Whilst there are a number of similarities between sport and PE contexts, and  
535 measurement systems are often adapted to be used in both settings (e.g., checklist developed  
536 by Reeve et al., 2004), there are also important distinctions that need to be made. Within  
537 education contexts, teachers are employed by the school and are generally working towards  
538 an established curriculum with the expectation of meeting defined targets. However in sport

539 settings the context is incredibly varied. Although coaching is becoming more  
540 professionalised (Gray, 2011), there are still many coaches working part time or as  
541 volunteers. It has been suggested that the context teachers/coaches are operating in will  
542 influence the type of environment they create (Mageau & Vallerand, 2003). Indeed, Van den  
543 Berghe et al., (2013) examined PE teachers' perceptions of their own motivational orientation  
544 in relation to their observed teaching practices. They found that when a teacher reported a  
545 more controlled motivational orientation, perhaps due to contextual pressures placed upon  
546 them, they engaged in more controlling teaching behaviour. Given the possibility that  
547 coaches' motivation and the pressures experienced (Mahoney et al., 2015; Stebbings et al.,  
548 2011) are likely to be different to that of teachers, it would be valuable to observe the types of  
549 behaviour utilised by coaches whilst considering their own motivations as well as the context  
550 they are operating in. For example, Smith, Appleton, Quested and Duda, (2012) observed the  
551 type of strategies employed by youth sport coaches in both training and competitive settings.  
552 The findings suggest that under the pressure of competition coaches created a more  
553 disempowering and less empowering motivational environment, thereby highlighting the  
554 importance of considering contextual factors.

555         In addition to coach/teacher differences, athletes/students in PE and sport settings are  
556 likely to be marked by different reasons for participating. Typically PE is a compulsory  
557 subject and therefore the motivation of the young people taking part would be expected to  
558 range from those who are more amotivated to those who are self-determined in their motives  
559 (Taylor & Ntoumanis, 2007). In sport, athletes tend to be relatively volitional and whilst they  
560 are still influenced by extrinsic factors, reports of amotivation tend to be lower (Gillet,  
561 Vallerand, Amoura & Baldes, 2011; Lonsdale, Hodge & Rose, 2011). Given the difference  
562 in the audience coaches and teachers are working with, the types of strategies they use and  
563 the effectiveness of these strategies at maintaining and promoting quality forms of motivation

564 may differ. Observational approaches such as the interactional analysis used by Erickson et  
565 al., (2011) could be adopted to examine how the lower-order strategies employed by coaches  
566 and teachers relate to athletes' and students' psychological need satisfaction (and thwarting),  
567 and whether the effectiveness of these strategies is dependent on factors such as motivational  
568 and goal orientation. Utilising this type of approach and observing one-on-one scenarios will  
569 provide detailed information on the type and combination of motivational strategies used by  
570 both coaches and teachers. This information will prove valuable when designing context-  
571 specific intervention programmes to help foster quality motivation via the leader-created  
572 environment.

### 573 *Theoretical Advancements*

574         Since the evolution of several of the observational measures discussed in this review,  
575 there have been theoretical advances to both AGT and SDT. One key development has been  
576 the expansion of traditional achievement goal frameworks, initially to trichotomous and 2 x 2  
577 model (Elliot & Thrash, 2001), and later to a 3 x 2 achievement framework (Elliot,  
578 Murayama & Pekrun, 2011). Although there is debate in the literature regarding these  
579 developments (Papaioannou, Zourbanos, Krommidas & Ampatzoglou, 2012), the promotion  
580 of mastery- and performance-avoidance goals has received a considerable degree of attention  
581 (Roberts, Treasure & Conroy, 2007). At present, there has been a limited attempt to examine  
582 the specific motivational strategies that are likely to promote the different types of approach  
583 or avoidance goals. It is possible that observational ratings of coach or teacher behaviour can  
584 be used to disentangle the relationship between particular motivational strategies and  
585 athletes' or students' goal adoption. For example, within the PMCSQ-2 punishing mistakes is  
586 considered to be an ego-involving motivational strategy (Newton et al., 2000) and would be  
587 expected to contribute to an ego-involved goal focus. However, it might be expected that  
588 punishing mistakes would promote the adoption of a performance-avoidance rather than



589 performance-approach goal. Using an observational system such as the MMCOS would allow  
590 researchers to further examine the link between specific motivational strategies and  
591 individuals' goal adoption, offering a more detailed understanding of the motivational climate  
592 in AGT.

593         There have also been a number of developments within SDT frameworks and  
594 understanding the types of coaching or teaching strategy that constitute a need-supportive and  
595 need-thwarting environment should be studied further. In particular, the behaviours that  
596 represent competence thwarting and hostile (or relatedness thwarting) dimensions of the  
597 environment are deserving of attention (Haerens et al., 2013; Smith et al., 2015; Van den  
598 Berghe et al., 2013).

#### 599 *Establishing the Validity and Reliability of Observational Measurement Systems*

600         Schutz and Park (2004) emphasised the importance of establishing validity and  
601 suggested that to determine the “value, applicability and generalizability” (p. 78) of research  
602 findings, it is critical that measures be valid. Brewer and Jones (2002) proposed a set of  
603 criteria to establish validity and reliability when using observational measurement systems,  
604 which includes (a) training observers, (b) amending an instrument to be context specific, (c)  
605 establishing face validity, (d) establishing inter-observer reliability, and (e) confirming intra-  
606 observer reliability. Although the steps proposed by Brewer and Jones (2002) have been  
607 employed by different sport-based researchers (e.g., Cushion et al., 2012; Webster et al.,  
608 2013), there are a number of additional procedures that can be taken to psychometrically  
609 evaluate the validity of data collected using observational measures. Yoder and Symons  
610 (2010) provide an explanation on the types of validation specifically focusing on observation-  
611 based research. In total, 5 types of validation were identified dependent on the purpose and  
612 use of the observational measure in question. Typically these procedures mirror the generic  
613 validation steps used to establish the psychometric properties of self-report scales in sport and

614 exercise psychology research (Duda, 1998; Schutz & Park, 2004). The validation steps  
615 include establishing (a) content validity, (b) sensitivity to change, (c) treatment utility, (d)  
616 criterion related, and (e) construct validity.

617         In brief, content validity refers to whether the definitions and scale descriptors are  
618 representative of the variable(s) being observed. Sensitivity to change is related to the extent  
619 to which a measure changes following the administration of a treatment or intervention.  
620 Similarly, treatment utility deals with the extent to which a measure taps change in an  
621 assessed variable. However, compared to sensitivity to change, treatment utility provides  
622 information on whether a targeted outcome changes over and above other assessed variables  
623 e.g., in an intervention designed to enhance autonomy supportive coaching, coach autonomy  
624 support should demonstrate greater change when compared to other assessed dimensions of  
625 the coaching environment (e.g., structure). Criterion-related validity is established by  
626 comparing the association between one variable and a known gold standard. Evidence for  
627 criterion-related validity can be either concurrent (measured at the same time) or predictive  
628 (measured at different times). Finally, construct validity is established using correlational  
629 (nomological) or experimental (discriminative) methods to test relationships based on  
630 theoretical assumptions (Cronbach & Meehl, 1955).

631         Information on the validity of each of the observational measures discussed is  
632 included in table 2. All of the observational measures reviewed demonstrate a degree of  
633 content validity as they were developed based on solid theoretical foundations. Several of the  
634 instruments have been used to rate the motivational environment before and after  
635 interventions (Curtner-Smith & Todorovich, 2002; Morgan et al., 2005; Reeve et al., 2004)  
636 and demonstrate sensitivity to change. Perhaps most importantly for future research in the  
637 context of AGT and SDT, is that observational measures demonstrate good criterion-related  
638 and predictive validity. At present, there have been relatively few studies linking observations

639 of the motivational environment with different perceptual measures (Boyce et al., 2009; De  
640 Meyer et al., 2013; Jang et al., 2010; Smith et al., 2015). Of those studies that have, the  
641 findings have been varied. More research linking observations with different perceptual  
642 responses is needed to evaluate the validity of existing and newly developed observational  
643 systems to assess the motivational environment.

644         Questions of reliability for more objective measures of the environment typically  
645 relate to the extent to which inter- and intra-observer reliability can be demonstrated. Inter-  
646 observer reliability is established by comparing the ratings made by 2 or more coders. In  
647 contrast, intra-observer reliability relates to whether an individual can rate reliably over time.  
648 This is usually determined by asking an observer to code the same footage on 2 separate  
649 occasions with a time-lag between ratings (Brewer & Jones, 2002). A number of different  
650 statistics are used to determine the extent to which 2 or more ratings are reliable. The most  
651 popular tests include examining percentage agreement (Siedentop, 1977) or using coefficients  
652 such as Cohen's Kappa (Dijkstra, 2014) or an Intraclass Correlation Coefficient (Portney &  
653 Watkins, 2009).

654         Within observational research, it is often reported that coders worked independently  
655 and then came together to discuss ratings (Morgan et al., 2005; Webster et al., 2013). This  
656 inevitably leads to agreement of 100% but is not necessarily reflective of how the behaviour  
657 was initially observed and coded. Indeed, when this discussion does not take place reports of  
658 the environment observed and coded do not always surpass what is considered an acceptable  
659 level (Edmunds et al., 2008; Haerens et al., 2013). In the future more rigorous training  
660 procedures and detail on how and where coding took place is needed. It would also be  
661 appropriate for researchers to report on the initial levels of reliability before coders met to  
662 discuss ratings and come to a consensus.

663 ***Directions for Future Research***

664 Throughout the previous section a number of directions for future research were  
665 signposted. In general, more research examining the relationship between observational  
666 reports of behaviour and athletes' (students') or coaches' (teachers') perceptions of different  
667 motivational processes such as need satisfaction/thwarting and achievement goal adoption is  
668 needed. This would provide information on the extent to which individuals identify and code  
669 specific dimensions of the environment and internalise those behaviours into responses when  
670 completing perceptual measures. Using observational measurement systems to code the  
671 environment at the interactional level (i.e., one-to-one), and comparing these reports to  
672 individuals' perceptions of the environments, would offer more information on the agreement  
673 between observed and perceived reports. Perhaps focusing on an individual sporting context  
674 such as golf or tennis would be a good first step in this regard.

675 Studies that compare the psychometric properties, such as the construct validity and  
676 predictive capabilities, of the different observational measures would also be valuable as  
677 AGT and SDT-based research moves forward. These types of studies would ensure that  
678 researchers are well informed when selecting measurement instruments to use in future  
679 observational and mixed-methodological studies.

680 Overall, providing more detail on the specific overt behavioural strategies used and  
681 the dimensions of the environment emphasised by coaches and teachers working in sport and  
682 PE, would be useful in the development and delivery of intervention programmes aimed at  
683 optimising the motivational environment for all involved.

## 684 **Conclusions**

685 The aim of this paper was to review the measurement instruments and research  
686 literature based on observing motivational dimensions of the coaching and teaching  
687 environment in sport and PE settings. A descriptive overview of dimensions of the  
688 environment relevant to AGT and SDT research was given and the observation systems that

689 have been used to observe dimensions of the coaching and PE teaching environment relevant  
690 to AGT and/or SDT were identified and discussed (e.g., Boyce et al., 2009; Tessier et al.,  
691 2013; Webster et al., 2013). Considerations for future research employing observational  
692 measures of the motivational environment were then provided.

693           In summary, there are a number of potential options for researchers who are  
694 interested in observing features of the coaching or teaching environment relevant to AGT  
695 and/or SDT in sport and PE. In upcoming research, it will continue to be important to adopt  
696 observational methods to address key research questions relevant to the study of the  
697 motivational environment in the distinct contexts of sport and PE. Of course, establishing the  
698 validity and reliability of observational systems will contribute to addressing the  
699 considerations outlined earlier in the paper. Although directions for future research were  
700 provided, there are many other interesting and valuable research questions that can be  
701 assessed using observational methodologies. As the number of motivation-based intervention  
702 studies grow (Roberts, 2012), the application of observation systems will become ever more  
703 important and provide another way of evaluating the effectiveness of intervention  
704 programmes that seek to impact upon athletes or students by encouraging coaches or teachers  
705 to create more adaptive motivational environments.

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1000 Table 1

1001 Questionnaires to assess AGT and SDT-based dimensions of the motivational environment in sport and PE

	Climate Dimension	Subcomponents	Questionnaires Used	Key Reference(s)
	Task-involving (Mastery-focused)	Emphasis on effort/improvement Focus on cooperative learning Task-referenced feedback Explaining role importance	Perceived Motivational Climate in Sport Questionnaire (PMCSQ); Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2); Empowering and Disempowering Motivational Climate Questionnaire-Coach (EDMCQ-C); Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ); Patterns of Adaptive Learning Survey (PALS)	Newton, Duda, & Yin, 2000; Seifrez, Duda & Chi, 1992; Appleton et al., 2015; Marsh, Papaioannou, Martin, & Theodorakis, 2006; Papaioannou, 1994
Achievement Goal Theory	Ego-involving (Performance focused)	Emphasis on inferiority/superiority Encourages inter-/intra-team rivalry Punishes mistakes	Perceived Motivational Climate in Sport Questionnaire (PMCSQ); Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2); Empowering and Disempowering Motivational Climate Questionnaire-Coach (EDMCQ-C); Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ); Patterns of Adaptive Learning Survey (PALS)	Newton, Duda, & Yin, 2000; Seifrez, Duda & Chi, 1992; Appleton et al., 2015; Marsh, Papaioannou, Martin, & Theodorakis, 2006; Papaioannou, 1994 Midgley et al., 1996

Self-determination Theory	Autonomy Support	Provides meaningful choices Explains decisions (offers rationale) Encourages initiative taking Asks for input Values intrinsic interests Acknowledges perspective	Health Care Climate Questionnaire (HCCQ); Teacher as Social Context Questionnaire (TASCQ); Sport Climate Questionnaire (SCQ); Perceived Autonomy Support for Exercise Settings Scale (PASES); Autonomy Supportive Coaching Questionnaire (ASCQ)	Williams, Grow, Freedman, Ryan & Deci, 1996; Wellborn, Connell, Skinner & Pierson, 1988; Hagger, Chatzisarantis, Culverhouse & Biddle, 2003; Hagger, Chatzisarantis, Hein et al., 2007; Conroy & Coatsworth, 2007
	Interpersonal Involvement (Relatedness Support)	Creates a ‘warm’ environment Is close to students/athletes Shows care and concern Invests personal resources Seems to know students/athletes	Teacher as Social Context Questionnaire (TASCQ); Social Support Questionnaire (SSQ6) Caring Climate Questionnaire (CCQ)	Wellborn et al., 1988 Sarason, Sarason, Shearin, & Pierce, 1987; Fry and Gano-Overway, 2010
	Structure	Provides clear instructions and organisation Displays strong leadership Provides a challenging environment Scaffolds information appropriately Provides information, skill-building feedback	Teacher as Social Context Questionnaire (TASCQ);	Wellborn et al., 1988
	Controlling	Use of tangible rewards Controlling language Excessive personal control Intimidation behaviours Promotion of ego-involvement Use of conditional regard	Controlling Coaching Behaviour Scale (CCBS); Psychologically Controlling Teaching (PCT)	Bartholomew et al., 2010; 2011 Soenens et al., 2012

Hostility	Cold and critical Withholds attention and time Physically distant Does not know students/athletes Belittles students/athletes Shows a lack of care and concern	None used in sport/PE	
Chaos	Confusing and unclear direction Low challenge Little or no scaffolding to support learning None or ambiguous feedback Poor leadership	None used in sport/PE	-

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1012 Table 2

1013 Observation systems used to assess AGT and SDT-based dimensions of the environment in sport and PE

Measure Name	Context	Theoretical Perspective	Content of the Measure	Reliability Evidence	Validity Evidence	Research Published
Observational Checklist of the Motivational Climate	Sport	Achievement Goal Theory	5 categories based on TARGET structure (task, authority, recognition/evaluation, grouping, time) 28 yes/no behavioural strategies across the 5 TARGET categories	Inter-observer Intra-observer	Content Criterion-related	Boyce et al., 2009
MPOWER Autonomy Support Observation System	Sport	Self-determination Theory	6 autonomy supportive coaching strategies moves decision making; prompts for questions and feelings; opts to use player idea; withholds information to guide response; empathises with negative affect; rationalises)	Inter-observer Intra-observer	Content	Webster et al., 2013
Multidimensional Motivational Climate Observation System (MMCOS)	Sport	Achievement Goal Theory & Self-determination Theory	2 higher order factors (empowering & disempowering) 7 environmental dimensions (autonomy support, task-involving, relatedness support, structure, controlling, ego-involving, relatedness thwarting) 32 lower order behavioural strategies across the 7 environment dimensions	Inter-observer	Content Criterion-related Construct	Tessier et al., 2013; Smith et al., 2015

Physical Education Climate Assessment Instrument	Education	Achievement Goal Theory	6 categories based on TARGET structure (task, authority, recognition, grouping, evaluation, time) 2 statements for each of the 6 categories (12 overall) – 6 task-involving, 6 ego-involving	Inter-observer Intra-observer	Content Sensitivity-to-change Treatment-Utility Construct	Curtner-Smith & Todorovich, 2002 Todorovich & Curtner Smith, 2002; 2003
Computer-based Observational Measure of Target	Education	Achievement Goal Theory	6 categories based on TARGET structure (task, authority, recognition, grouping, evaluation, time)	Inter-observer Intra-observer	Content Sensitivity-to-change Construct	Morgan et al., 2005 Morgan & Kingston, 2010
Qualitative Assessment of the Teacher-Created Social Environment	Education/Sport	Self-determination Theory	3 dimensions (autonomy support, interpersonal involvement, structure) 13 bipolar rating scales across the 3 dimensions	Inter-observer Intra-observer	Content Sensitivity-to-change Treatment-utility Construct	Reeve et al., 2004 Jang, Reeve & Deci, 2010 Cheon et al., 2012 Tessier et al., 2010 Mahoney et al., 2015
Observational Grid of Instructional Type and Nature	Education	Self-determination Theory	8 teaching behaviours (organisational communication, technical/tactical hints, questions asked, praises, encouragements, perspective-taking statements, negative communications, criticisms) 3 behaviours rated on whether	Inter-observer Intra-observer	Content Sensitivity-to-change Construct	Sarrazin et al., 2006 Tessier et al., 2008

Observed Need-Supportive and Need-Thwarting Teaching Behaviours	Education	Self-determination Theory	they were autonomy supportive, controlling or neutral (organisational communication, technical/tactical hints, questions asked) 6 environment dimensions (autonomy support, relatedness support, structure, controlling, cold, chaotic) 36 behavioural strategies across the 6 dimensions	Inter-observer Intra-observer	Content Criterion-related Construct	Haerens et al., 2013 De Meyer et al., 2013 Van den Berghe et al., 2013
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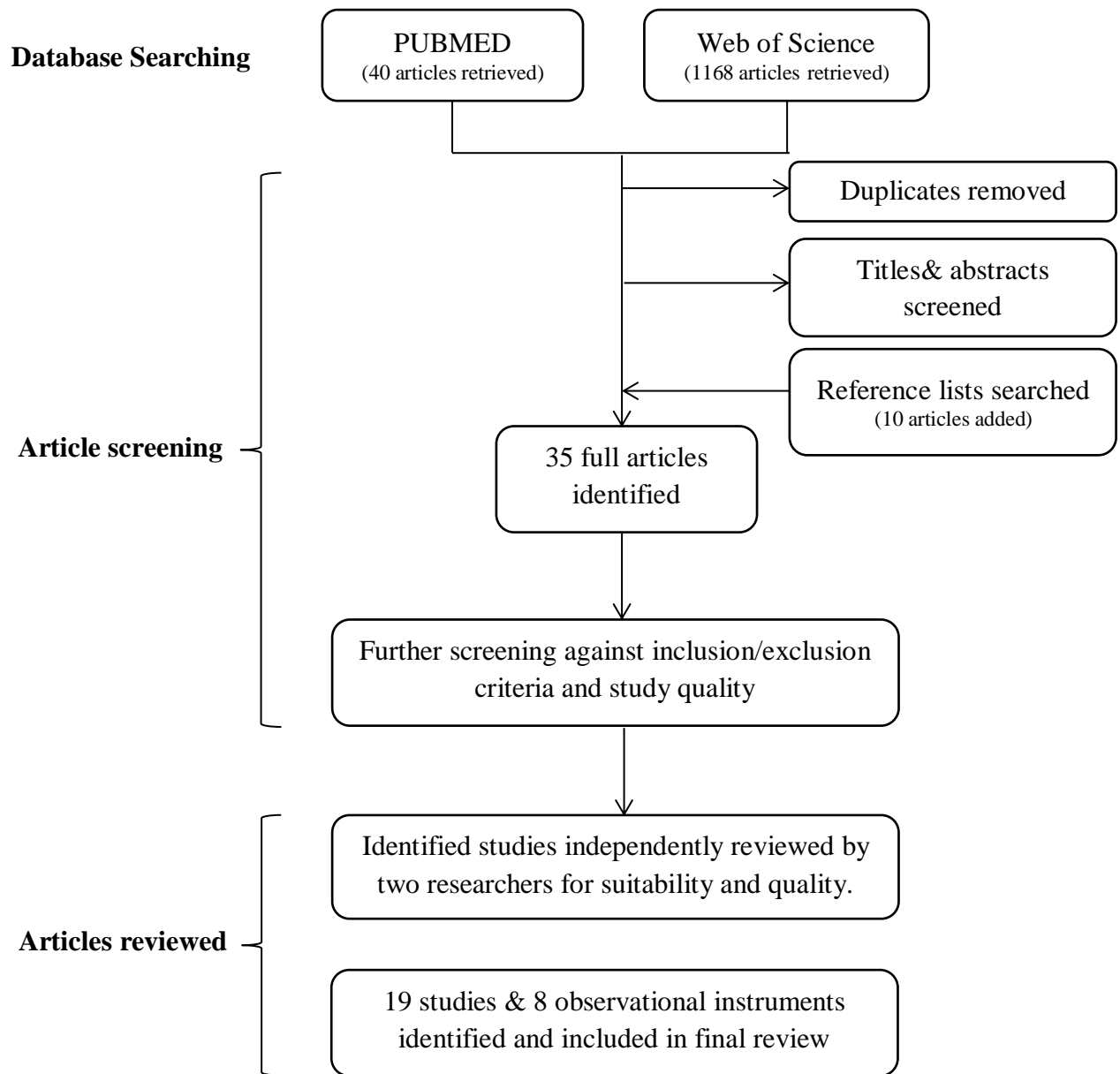


Figure 1

Process followed for systematic review of AGT & SDT-based observational measures used in sport and PE