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**The Electronically Activated Recorder (EAR): A novel approach for examining social environments in youth sport**

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### **Abstract**

The interactions between athletes, parents, and coaches outside of the immediate training and competition environments can shape sport participants' overall experiences. Accordingly, researchers have explored novel approaches that enable the investigation of experiences that occur beyond the sport activity itself. Technological innovations, combined with careful ethical considerations, have led to the development of research methods that can be used to assess participant conversations in their natural sport and social environments. This article introduces sport researchers to the Electronically Activated Recorder (EAR), an ambulatory ecological assessment method that provides access to daily social interactions among athletes, parents, and coaches within and beyond the immediate sport activity (e.g., commute to/from activity, locker rooms, hotels). The EAR software is embedded within a portable device (e.g., Android device) and is programmed to record brief segments of audio from participants' daily lives. In addition to discussing the utility of this approach for sport contexts, we introduce the Audio Coding System for Social Environments in Sport (ACSSES), which was developed to assess the interactions captured from athletes' natural sport and social environments using the EAR. Evidence for the reliability and validity of the ACSSES, the associated coder training protocol, and proposed implications for research are discussed.

*Keywords:* behavioural observation, coding system, social identity, moral behaviour, youth sport



69 athletes' interactions with salient social agents (e.g., coaches, parents, and teammates) when  
70 evaluating how sport involvement contributes to youth development. However, despite evidence  
71 supporting the impact that social agents have on athletes while they engage in sport (e.g.,  
72 Erickson & Côté, 2016; Erikstad et al., 2018), less is known about how daily interactions outside  
73 of the immediate sport environment (e.g., dressing rooms, car rides, team hotels) shape athletes'  
74 sport experiences (e.g., Tamminen et al., 2017).

75 A significant barrier to understanding what constitutes an adaptive and enriching sport  
76 milieu is the complexity of sports' broader social environments. For instance, no two sport teams  
77 are identical—they are collections of idiosyncratic individuals who interact in unique ways  
78 (Carron & Eys, 2012). Accordingly, researchers are tasked with exploring particular  
79 features/situations expected to influence the sport experience (e.g., selection processes for new  
80 members; Benson et al., 2016; normative intergroup behaviours; Bruner et al., 2014b). Further,  
81 although researchers can adopt a range of research methods to address their questions, the  
82 majority of studies have relied on participants' self-reports (~69%), with only ~20% of studies  
83 being conducted in natural sport environments (e.g., ~8% of studies involve observation of  
84 individual in everyday settings; Meredith et al., 2017). In addition to what happens during  
85 training and competition, researchers must also consider how to assess athlete experiences that  
86 extend beyond the sport activity and which methodologies are ideally suited to achieving this  
87 objective. For instance, consider the following anecdote of a youth athlete's sport experience:

88 *Lydia is a 13-year-old ice hockey player involved in her first season playing at a*  
89 *competitive level. She practices twice per week and competes in regular season games*  
90 *and tournaments during the weekends. Although she finds the increased time commitment*  
91 *challenging, she enjoys the opportunity to spend time with teammates before and after*

92           *hockey. The team travels to most tournaments by bus, which means there are many*  
93           *opportunities to socialize with teammates in the hotel, at restaurants, and during travel to*  
94           *and from the arenas. Further, Lydia and her parents also spend more time together*  
95           *because of the additional travel.*

96 Reflecting on Lydia's situation, youth sport involves a range of interactions occurring across  
97 various settings that accumulate to shape the overall sport experience. Accordingly, exposure to  
98 the range of interactions that occur and inevitably shape an athlete's experiences represents an  
99 exciting avenue for researchers interested in youth development. The purpose of this article was  
100 to describe a range of quantitative and qualitative approaches<sup>1</sup> that have been employed to  
101 measure and/or describe sport experiences, with the overarching objective of introducing a  
102 complementary and innovative method of exploring athlete experiences in naturalistic settings.

### 103 **Investigating Sports' Broader Social Environments Using Retrospective Self-Reports**

104           Self-report measures (e.g., questionnaires, interviews) represent the most frequently used  
105 approach for assessing participants' perceptions, motivations, cognitions, emotions, and  
106 behaviours in sport (Meredith et al., 2017). Indeed, sport and exercise psychology researchers  
107 have traditionally used questionnaires and interviews to assess variables associated with athlete,  
108 coach, and parent experiences during training and competition, and efforts have increasingly  
109 been made to investigate the broader social environment surrounding sport participation (e.g.,  
110 Tamminen et al., 2017; Van Hoya et al., 2016). For example, Van Hoya and colleagues (2016)  
111 assessed whether coaches' engagement in health promotion activities (e.g., discussing the  
112 hazards of doping; discussing the impact of sleep on performance) contributed to improved sport

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<sup>1</sup> A comprehensive discussion differentiating quantitative and qualitative methods is a complex issue and is beyond the scope of this article (for a review see Creswell & Creswell, 2018).

113 experience and healthy living for youth athletes. Coaches who demonstrated respect for  
114 themselves and others also had athletes who enjoyed sport, were less likely to drop out, and felt  
115 better about themselves (Van Hoye et al., 2016). In a qualitative inquiry, Tamminen and  
116 colleagues (2017) conducted semi-structured interviews with athletes and their parents who both  
117 described the car ride home as something to either enjoy or endure. Specifically, family dyads  
118 described the car ride as a valuable opportunity to discuss sport as long as the athlete viewed the  
119 timing and nature of the feedback as appropriate and that the power dynamic during these  
120 conversations was considered (Tamminen et al., 2017). As technological advancements have led  
121 to innovations in research methodology, new approaches to self-report that aim to elicit timely  
122 and accurate information have been developed.

123         Sport psychology researchers have adopted the use of photos (i.e., photovoice) and  
124 videos (i.e., stimulated recall) to elicit richer and more contextually specific responses during  
125 interviews with coaches and athletes (e.g., Bruner et al., 2017; McCalpin et al., 2017). Sport  
126 studies utilizing photovoice have participants document their sport experiences through  
127 photography, which subsequently informs interviews or focus groups to explore the meanings  
128 attached to the photos (e.g., McCalpin et al., 2017). Similarly, video footage via stimulated recall  
129 has been used to elicit thought processes and memories about sport experiences. For example,  
130 Bruner and colleagues (2017) utilized stimulated recall during interviews with male and female  
131 competitive youth ice hockey players to examine the relationship between social identity and  
132 intrateam moral behaviour. Their analysis revealed that regardless of the reported frequency of  
133 intrateam antisocial behaviour, athletes attributed stronger social identities to the prosocial  
134 interactions they shared with teammates. Findings also indicated that antisocial teammate  
135 behaviour undermined social identity in teams that reported low to median frequencies of such

136 behaviour, whereas athletes reporting higher frequencies of antisocial behaviour did not perceive  
137 this effect (Bruner et al. 2017). The adaptation of photovoice and stimulated recall to sport  
138 psychology research illustrates how technological integration can aid participants' self-reports,  
139 yet these methods do not negate the effects of retrospection altogether.

140         Experiential sampling methods (ESM) represent a range of modern-day research tools for  
141 assessing participants' patterns of behaviour across experiences or situations in real time (Conner  
142 et al., 2009; Reis & Gosling, 2010). ESM enables researchers to generate insights regarding  
143 intra-individual variation (and stability), how processes unfold over time, and how situational  
144 occurrences connect to patterns of thought, affect, and motivation. Daily diaries are one example  
145 of an ESM that is becoming more widely used in sport psychology research (e.g., Benson &  
146 Bruner, 2018). Daily diary approaches prompt participants to use a range of technologies (e.g.,  
147 paper-and-pencil questionnaires, electronic devices) to self-report experiences as they unfold in  
148 their daily lives (Bolger et al., 2003; Reis & Gosling, 2010). Participants may report based on a  
149 pre-determined schedule (i.e., interval-contingent sampling), specific events (i.e., event-  
150 contingent sampling), or whenever prompted from a researcher (i.e., signal-contingent sampling;  
151 Bolger et al., 2003; Conner et al., 2009; Reis & Gosling, 2010). Benson and Bruner (2018)  
152 utilized a daily diary approach to assess how athletes' social identities were predicted by moral  
153 behaviours. They found that athletes reported stronger perceptions of social identity with their  
154 teams on days when they experienced higher-than-average prosocial behaviours from teammates,  
155 and weaker perceptions of social identity on days when they experienced higher-than-average  
156 antisocial behaviours from teammates. Although ESM overcome some issues related to  
157 participants' recollection of sport experiences, certain limitations with self-report approaches  
158 persist that can be addressed by alternative methods.

159           Concerns regarding the use of participants' self-reporting are generally reflective of  
160 human retrospection. Notably, humans are susceptible to memory issues that may cause them to  
161 mischaracterize experiences in several ways (e.g., transience, absent-mindedness, misattribution,  
162 suggestibility, bias; Schacter, 1999). That is not to say that participants' perceptions should be  
163 assumed to be inaccurate, but that it is a fundamental goal of research to aggregate different  
164 accounts and information over time to provide consumers of knowledge with a holistic  
165 understanding of a topic. For example, social interactions between Lydia and her parents may be  
166 interpreted differently by each party involved (for an example, see Babkes & Weiss, 1999). A  
167 researcher's ability to capture—as objectively as possible—such interactions while triangulating  
168 the experiences with perceptions from Lydia and her parents creates a more comprehensive  
169 understanding of the experience than individual perceptions alone. In this way, methods that  
170 allow researchers to access participants' actual behaviours can mitigate issues related to memory  
171 and biases. Such methods also provide the opportunity to explore issues around when and why  
172 perceptions of past behaviour might diverge from the actual behaviours that were documented.  
173 Generally, research methods that involve observation of participant behaviour shift the burden to  
174 researchers who manage the materials and collection of pertinent information (e.g., video,  
175 audio).

### 176 **Investigating Sports' Broader Social Environments Using Behavioural Observation**

177           Behavioural observation provides valuable, naturalistic information about team dynamics  
178 and individual behaviour (Jonsson et al., 2006). Although there are numerous methods for  
179 observing participants, the term 'behavioural observation' refers to seeing and/or hearing and  
180 then systematically recording and analyzing the behaviour(s) of interest (Heyman et al., 2014).  
181 The objective of behavioural observation is to capture and translate actions, interactions, and

182 emotions into an understanding of the topic (Sparkes & Smith, 2014) that can then provide an  
183 ecologically rich representation of behaviour in real-time (Smith et al., 1977). Such methods  
184 provide contextually specific data while also enabling researchers to collect simultaneous  
185 accounts of both the physical and social interactions with little burden to participants (e.g.,  
186 Erickson et al., 2011; McKenzie & Mars, 2015). In relation to the aforementioned youth-sport  
187 example, filming and analyzing video taken from one of Lydia's team practices could provide  
188 insightful takeaways about coach leadership or peer interactions during training in a competitive  
189 female ice hockey environment.

190       Approaches to systematic observation in youth sport research have evolved from real-  
191 time field observations (e.g., Smith et al., 1977) to behavioural assessment using video  
192 recordings of practice or competition (e.g., Erickson et al., 2011; Vierimaa & Côté, 2016).  
193 Prominent behavioural assessment systems used in youth sport have been developed to assess  
194 coach behaviours (Coaching Behaviour Assessment System [CBAS]; Smith et al., 1977), coach  
195 emotions (Assessment of Coach Emotions [ACE]; Allan et al., 2016), coach-athlete interactions  
196 (e.g., Coach-Athlete Interaction Coding System [CAICS], Erickson et al., 2011), and athlete-  
197 athlete interactions (Athlete Behaviour Coding System [ABCS]; Vierimaa & Côté, 2016).  
198 Collectively, behavioural observation systems specifically developed for sport have contributed  
199 to our understanding of the behaviours that occur in immediate sport environments and how they  
200 relate to important athlete perceptions (for a review, see Vierimaa et al., 2016).

201       Behavioural observation is not without its limitations. First, the interactions and  
202 behaviours that are able to be reliably assessed may be incomplete because participants' verbal  
203 behaviours may be missed. Second, the presence of researchers may influence participant  
204 behaviours as a result of their awareness of observation (i.e., Hawthorne Effect; Sedgwick &

205 Greenwood, 2015). For instance, if a researcher were to follow, observe, and record a participant  
206 as they went about their daily life, the researcher's presence could become invasive and lead to  
207 inauthentic participant behaviours. A key to advancing our understanding of sport experiences,  
208 then, lies in the ability to reliably access ecological information that is expected to be regulated  
209 by morals, values, and norms rather than team structure or the presence of others.

### 210 **A Novel Approach to Assessing Social Processes in Sports' Broader Social Environments**

211 Innovations in technology and careful considerations of legal and ethical concerns have  
212 provided new opportunities for researchers to observe participants' behaviours outside of  
213 controlled environments (Mehl, 2017). First introduced by Mehl and colleagues (2001), the  
214 Electronically Activated Recorder (EAR) is a portable device (e.g., an Android phone/tablet)  
215 enabled by specialized software (i.e., EAR Android app) that functions as an ambulatory  
216 ecological assessment tool programmed to sample brief audio recordings from participants  
217 (Kaplan et al., 2020; Mehl, 2017)<sup>2</sup>. Typically, the audio recordings are limited to durations of 30  
218 to 50 seconds, occurring every 9 to 12.5 minutes (i.e., interval-contingent sampling; Mehl &  
219 Conner, 2012). The data collected using the EAR provide researchers with ecologically valid  
220 social interaction data from settings that are otherwise difficult to directly observe, while also  
221 balancing participants' and surrounding others' confidentiality considerations (Mehl & Conner,  
222 2012; Mehl et al., 2012). Evidence supporting the EAR's reliability when assessing a range of  
223 daily behaviours and its convergent validity with theoretically related measures (e.g., Big Five  
224 personality traits; Mehl et al., 2006) can be found elsewhere (see Mehl, 2017).

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<sup>2</sup> EAR software for Apple's operating system (iOS) has been discontinued. Our research team has used an adapted version of iOS-based EAR software developed at Wayne State University (i.e., SlatchEAR).

225           The EAR method offers sport and exercise psychology researchers with a novel tool to  
226 assess relationships between participants' daily social behaviour outside of the immediate sport  
227 activity (i.e., during training, competition) and important outcomes related to sport experiences.  
228 Unlike other research methods, the EAR enables the assessment of daily behaviour independent  
229 of self-report (e.g., acoustic observation of teammate interactions), examination of subtle and  
230 habitual behaviour that occurs at thresholds below conscious awareness (e.g., participant active  
231 listening during conversations with coaches), and/or the calibration of psychosocial metrics to  
232 actual behaviour (e.g., congruence between actual and perceived conflict; Mehl, 2017). Notably,  
233 the EAR method does not interrupt participants' daily activities to collect information about  
234 experiences—participants wear the device and are only required to recharge the battery  
235 overnight. Multiple studies report low perceptions of obtrusiveness and non-compliance with  
236 EAR protocols (e.g., Manson & Robbins, 2017; Mehl & Holleran, 2007). Participants habituate  
237 to the presence of the EAR relatively quickly (i.e., approximately two hours), which addresses  
238 concerns about limitations from other behavioural observation approaches (e.g., Hawthorne  
239 Effect; Mehl & Holleran, 2007; Sedgwick & Greenwood, 2015). The EAR method offers  
240 researchers a glimpse into the daily activities and interactions that influence participants'  
241 experiences unlike other currently available methods.

#### 242 **Development of the Audio Coding System for Social Environments in Sport (ACSSSES)**

243           Within sport, the EAR method affords researchers opportunities to document the  
244 interplay between interactions that occur outside the immediate sport activity and participants'  
245 motivational, cognitive, and behavioural processes and outcomes. For instance, a glimpse into  
246 Lydia's conversations with her parents and/or teammates while travelling for competitions could  
247 provide new insights in relation to these interactions and recent sport performances. Although

248 audio coding systems used for the analysis of EAR data exist (e.g., Everyday Child Home  
249 Observation [ECHO] coding system, Slatcher & Tobin, 2011; Social Environment Coding of  
250 Sound Inventory [SECSI], Mehl & Pennebaker, 2003), the development of a valid and reliable  
251 coding system was needed to accurately assess relevant social actors (i.e., coaches, teammates,  
252 parents, opponents) and types of interactions (e.g., technical instruction, positive encouragement)  
253 that occur in sports' broader social environments (e.g., the car ride home).

254         The development of the ACSSES followed a five-step process for developing systematic  
255 coding instruments (Brewer & Jones, 2002) and was further informed by theorizing from the  
256 Social Identity Approach (SIA; Haslam, 2001). The first step was to explore the need for a new  
257 context specific coding instrument. This process resulted in a three-fold rationale: (a) adopting  
258 the EAR method for use in sport would allow investigators to obtain observational and  
259 behavioural data from athletes, coaches, referees, spectators, and parents that occur in sports'  
260 broader social environments and that would otherwise be inaccessible; (b) there are no existing  
261 coding instruments designed to assess content and contexts using audio data from sport  
262 environments using the EAR method, and; (c) there are no existing coding instruments designed  
263 to assess social identification processes observed in social interactions among athletes and key  
264 social agents (i.e., teammates, coaches, and parents).

265         The second step involved a literature review aimed at informing the general structure and  
266 content of the ACSSES. The literature review also served to familiarize the research team with  
267 available methods of conducting behavioural and observational assessments. Initially, the review  
268 focused on systematic coding instruments used to assess audio data collected using the EAR (i.e.,  
269 ECHO coding system, Slatcher & Tobin, 2011; SECSI, Mehl & Pennebaker, 2003). Key features  
270 of these coding systems were adapted for the ACSSES. The SECSI and ECHO coding systems

271 are organized into category clusters, or groups of coding variables, based on grouping by a  
272 participant's (a) *location* (e.g., at home, in school, in transit); (b) *activity* (e.g., engaging in  
273 physical activity/sport, watching TV, on the computer), and; (c) *interactions* (e.g., talking, on the  
274 phone, conflict with mother/guardian). The ECHO coding system contains a fourth category  
275 cluster pertaining to child and/or parent *overall* affect (e.g., happy, angry; Slatcher & Tobin,  
276 2011). The category cluster format was adopted for the ACSSES because it provides a  
277 standardized and repeatable approach to coding. While listening to the audio file and reading the  
278 associated transcript concurrently, coders begin by assessing context (i.e., *location* and *activity*),  
279 followed by specific behaviours related to the recorded social interaction (e.g., "Positive  
280 Evaluation of Team from Coach"), and finally, affect, based on the target athlete's and/or head  
281 coach's recorded behaviour (e.g., slamming of a door) or the emotional tone of their voice.

282         A template of the ACSSES was built within a Microsoft Excel spreadsheet, with each  
283 row of the spreadsheet representing a single EAR audio recording and each column represents a  
284 coding variable (insert Figshare link). When a participant's audio recordings are transcribed and  
285 entered into the ACSSES template, the document is saved as a dedicated ACSSES coding sheet  
286 for that participant separate from other participants' coding documents. The ACSSES  
287 incorporates two coding approaches to extracting information from EAR-derived audio  
288 recordings that were adapted from the ECHO coding system. When evaluating evidence within  
289 specific contexts (e.g., locations, activities) or behaviours (e.g., "Positive Evaluation of Coach  
290 from Target Athlete"), the ACSSES uses a binary or "molecular" coding approach to indicate the  
291 presence or absence of the narrowly defined coding variable (Kaplan et al., 2020; Mehl &  
292 Pennebaker, 2003; Slatcher & Tobin, 2011). The molecular approach permits behaviour-  
293 frequency analysis (i.e., estimated percentage of waking time spent engaged in different

294 behaviours) and enables the calculation of what may be viewed as abstract effect sizes (i.e.,  
295 number of audio data samples; Mehl, 2017). When evaluating a participant's overall affect, the  
296 ACSSES uses a three-point Likert-type or "molar" coding approach to rate the degree of feelings  
297 or emotions in the behaviours or tone of a participant's voice including 1 (no emotion present), 2  
298 (moderate emotion), and 3 (extreme emotion; e.g., Kaplan et al., 2020; Slatcher & Tobin, 2011).  
299 To date, the overall affect codes have been used as evidence to support emotion-based behaviour  
300 categories within the ACSSES (e.g., "Emotional Disclosure from Target Athlete"; "General  
301 Negative (comment) from Target Athlete"). Adapting these key features from the SECSI and  
302 ECHO coding system were deemed important for the ACSSES because they form a well-  
303 organized and coherent coding process, which has led to an established record of reliable and  
304 valid analysis of the EAR-derived data (for a review, see Mehl, 2017).

305         The literature review also targeted systematic behavioural observation coding instruments  
306 used to assess videos recorded within sport settings (e.g., Allan et al., 2016; Erickson et al.,  
307 2011; Turnnidge & Côté, 2019; Turnnidge et al., 2014; Vierimaa & Côté, 2016). Specifically, the  
308 CAICS, Para-CAICS, and ABCS informed the development of what would become categories  
309 within the *behaviour* dimension relevant to ingroup behaviour (i.e., teammate interactions,  
310 coach-athlete interactions). For instance, the ACSSES categories that assess technical support,  
311 positive reinforcement/encouragement, and intra/interpersonal support were based on categories  
312 used in the CAICS and Para-CAICS (Erickson et al., 2011; Turnnidge et al., 2014). Additionally,  
313 Vierimaa and Côté's (2016) ABCS categories identifying prosocial and antisocial behaviour  
314 were adapted to the ACSSES to inform categories pertaining to positive and negative evaluations  
315 of individual team members and the broader team. Notably, the development of existing coding  
316 instruments included the evaluation of actual behaviours that occurred in youth-sport settings

317 (Allan et al., 2016; Erickson et al., 2011; Turnnidge & Côté, 2019; Turnnidge et al., 2014;  
318 Vierimaa & Côté, 2016). Further, the first authors of each of the aforementioned video coding  
319 systems were consulted throughout the coding system development and coder training process.

320         The final areas of literature reviewed in development of the ACSSES were Social  
321 Identity Theory (SIT; Tajfel & Turner, 1979) and Self-Categorization Theory (SCT; Turner et  
322 al., 1987), known together as the SIA (Haslam, 2001). According to the SIA, when individuals  
323 define themselves based on a shared social identity (i.e., as “we” or “us” versus “I” and “me”),  
324 they are motivated to coordinate their behaviours in accordance with understood norms and  
325 standards of the group as a means of enhancing or maintaining self-image (Haslam, 2001;  
326 Haslam et al., 2009). Research has demonstrated the implications that components of SIA have  
327 for athletes (e.g., moral behaviour, social and task interdependence; Bruner et al., 2014a; Evans  
328 et al., 2012) and highlights sport as a useful context to study SIA’s implications in the real world.  
329 The review of the SIA literature informed the development of ACSSES’s *behaviour* categories  
330 that affirm the salience of an athlete’s social identity (e.g., “Positive Evaluation of Team  
331 Membership from Target Athlete”), connection with fellow team members (e.g., “Positive  
332 Evaluation of Teammate from Target Athlete”), or demonstrate the sharing of information  
333 relevant to the construction of a shared social identity by athletes or key social agents (e.g.,  
334 “Inter-/Intrapersonal Instruction from Coach”). Together, the three areas of focus in the literature  
335 review informed the general structure and preliminary list of coding categories of the ACSSES.

336         Third, the newly developed ACSSES and procedures were tested and refined to ensure  
337 external and face validity. Strategies pertaining to external validity occurred concurrently  
338 throughout system development. The ACSSES categories were continuously analyzed and  
339 refined throughout a period of informal observation and test-coding to ensure a comprehensive

340 and clearly defined classification process for all reported behaviours (Allan et al., 2016). A  
341 collection of pilot audio data using the EAR was undertaken with male and female competitive  
342 athletes between the ages of 11 and 25 years. These athletes represented seven different single-  
343 gender sports teams (i.e., baseball, basketball, field hockey, ice hockey, soccer, and volleyball).  
344 These data were used to better understand the range of environments, activities, and interactions  
345 that athletes experience during a competitive season. Additionally, ACSSES categories were  
346 submitted to an expert panel of six researchers from the sport and social sub-disciplines of  
347 psychology to assess the face validity of the instrument. The experts all had doctoral degrees,  
348 were tenure-stream faculty members at universities in Canada, the United States, or the United  
349 Kingdom, and had research programs specializing in relevant topics. Ongoing modification of  
350 the ACSSES occurred over a nine-month period, during which updated drafts of the coding  
351 system along with detailed rationale for changes were submitted to the expert panel on three  
352 occasions.

353 An overview of the ACSSES can be found in Table 1. In total, the ACSSES contains 185  
354 categories that fall within four dimensions: (a) *audio data* ( $n = 14$  categories); (b) *context* ( $n = 33$   
355 categories); (c) *behaviour* ( $n = 117$ ), and; (d) *overall affect* ( $n = 21$ ). The *audio data* dimension  
356 contains identifying information for each audio file (e.g., start time of recording) and audio  
357 quality, and the transcripts of any participant conversation. The *context* dimension provides  
358 information about who the participant is interacting with (e.g., coach), the participant's location  
359 (e.g., team bus), and the activity that they are engaged in (e.g., post-game debrief). The  
360 *behaviour* dimension details specific interactions between the participant and their parent(s),  
361 coach(es), and/or teammate(s). Finally, the *overall affect* dimension identifies feelings and  
362 emotions exhibited in a participant's tone of voice or behaviour (e.g., physically slams a door).

### 363 **Overview of Coder Training Protocol and Reliability Assessment**

364           The final process pertaining to the ACSSES involved steps four and five—establishing  
365 inter- and intra-coder reliability of the behavioural classifications using a coder training program.  
366 An essential part of coding system development involves training individuals who are able to  
367 accurately and reliably code observational data (i.e., coders). The objective of coder training is to  
368 familiarize trainees with the coding protocol to enable independent and reliable assessment of the  
369 behaviours and contexts of interest. The coder training protocol is a resource for teaching  
370 trainees the transcription and coding procedures, the parameters of the behaviours and contexts  
371 of interest, and to provide illustrative examples that familiarize them with the quality and content  
372 they will encounter as trained coders (Heyman et al., 2014)<sup>3</sup>.

373           Inter-coder reliability assesses the extent to which coding instruments can differentiate  
374 between coders with different ability levels, when coding evaluations are completed by different  
375 coders (Stolarova et al., 2014). Ideally, different coders can identify the same contexts and  
376 behaviours with a high degree of accuracy. Coders are trained until they meet 70-90% inter-  
377 coder reliability with a master coder (e.g., Cicchetti, 1994; Erickson et al., 2011; Turnnidge et  
378 al., 2014). For example, Turnnidge and colleagues (2014) set their reliability standard at an  
379 agreement of 75% for two 10-minute video segments before progressing to full video coding.  
380 Continual evaluation of coder reliability is important to ensure that pre-established standards of  
381 performance are maintained (Heyman et al., 2014). Coder agreement is an important factor to  
382 consider because it establishes that the codes recorded from an observation reflect a standard  
383 instead of one single perspective of the observation. It is valuable to obtain coder statistics

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<sup>3</sup> The ACSSES Coding Manual is available via (insert Figshare link)

384 throughout a training program to assess a coder's progress and identify problematic codes that  
385 may require greater attention in the training process (Suen, 1988).

386       **ACSSES coder training.** Two coders were recruited to be trained by the first author on  
387 the use of the ACSSES. Over a four-week training period, the coders were systematically  
388 introduced to the dimensions of the ACSSES through a combination of discussion, group coding  
389 practice, and coding assignments that were to be completed between meetings. Over time, the  
390 training examples used during group coding practices became more complex (i.e., involved a  
391 wider range of categories), illustrating the capacity of the coding system and facilitating  
392 discussions to deepen learning. Further, time was allocated during meetings to review the  
393 previous week's coding assignment and to discuss sources of disagreement.

394       The two coders were each exposed to 225 examples during group coding practice  
395 ( $n_{examples} = 50$ ) and weekly coding assignments ( $n_{examples} = 175$ ) over the four-week training  
396 period. At the conclusion of the training period, each coder was given a final coding assignment  
397 that included 50 of the 225 examples used during training to determine the effectiveness of the  
398 coder training protocol. The final coding assignment was compared to coding completed by the  
399 first author to calculate inter-coder reliability. Intraclass correlation (ICC) estimates and their  
400 95% confidence intervals were calculated using SPSS statistical package version 22 (IBM corp.,  
401 2013) based on a single-rating, absolute-agreement, 2-way mixed-effects model. The ICCs at the  
402 conclusion of the coder training indicated good (0.75-0.90) to excellent ( $> 0.90$ ) inter-coder (i.e.,  
403 between individual coders and the first author) reliabilities for coded behaviour (Coder 1 = 0.94;  
404 Coder 2 = 0.87). Further, intra-coder (i.e., within-coder comparison between their coding of files  
405 during training and the final coding assignment) reliabilities at the conclusion of the coder  
406 training program indicated good (0.75-0.90) consistency for coded behaviour (Coder 1 = 0.77;

407 Coder 2 = 0.72). In light of our decision to use percent agreement, we acknowledge the  
408 possibility that coders' scores may be due in part to random guesses (i.e., false agreement;  
409 McHugh, 2012). For larger data sets, it may be appropriate to use Cohen's kappa to account for  
410 the potential of false agreement (McHugh, 2012).

### 411 **Legal and Ethical Considerations for Adopting the EAR Methodology**

412 There are a number of legal and ethical considerations pertaining to the EAR method and  
413 ACSSES. This section provides an overview of our first-hand experience navigating the legal  
414 and ethical challenges of the EAR method with support from institutional research boards (IRB).  
415 Researchers interested in EAR methodology are encouraged to review resources provided by  
416 fellow EAR researchers (see Robbins, 2017, for a discussion) and familiarize themselves with  
417 relevant laws in their area of jurisdiction (e.g., municipal, state/province, and country).

418 With respect to relevant laws, North American countries provide a valuable illustration.  
419 For instance, Canadian law states that the recording of a private conversation is legal if one  
420 person involved in the conversation provides consent (i.e., one-party consent; Criminal Code,  
421 1985, s 184[2][a]). Comparatively, certain areas of jurisdiction in the United States (e.g.,  
422 California) require that every individual involved in a conversation must provide consent (i.e.,  
423 two-party consent; Robbins, 2017). Therefore, researchers should consider the laws in their  
424 specific region and engage in a collaborative relationship with their IRB to ensure all ethical  
425 concerns are addressed. Below, interested researchers can find some basic components of our  
426 IRB applications that have led to approvals at two Canadian universities.

427 Researchers should begin the recruitment process by hosting information sessions where  
428 individuals who may be recorded (e.g., athletes, parents, and coaches in a sport setting) are  
429 provided with an overview of the proposed research and given the opportunity to ask questions.

430 The consent forms should introduce the EAR method, explain how it will be implemented in the  
431 study, and require participants to opt-in to each component of the research (e.g., pre-/post-  
432 questionnaires, daily diaries, EAR). Together, these steps inform participants and their families  
433 of when EAR observations will occur, which negates the expectation of privacy during  
434 conversations around the EAR devices during the observation period. Once data collection  
435 begins, participants should be assigned pseudonyms to de-identify their data. These pseudonyms  
436 are relevant for programming the EAR software, as a “Participant ID” is imbedded in each audio  
437 observation downloaded from the device. All identifiable information should be securely stored  
438 offline and in a separate location from de-identified data (e.g., questionnaires). As suggested  
439 elsewhere (e.g., Robbins, 2017), researchers may find it helpful to keep a “Project Status  
440 Workbook” (i.e., Microsoft Excel spreadsheet) that tracks data collected and workflow status on  
441 data entry and analysis, organized by participant pseudonym. These recommendations help  
442 protect participants’ privacy and confidentiality.

443         The collection of EAR audio recordings raises additional ethical concerns that require  
444 careful consideration. Researchers can manage concerns about participant privacy by selecting a  
445 sub-sample of consenting team members to participate in the EAR component of a study. This  
446 sampling strategy limits the amount of observational data from a specific group and lowers the  
447 risk of potential negative consequences for individuals who prefer not to wear an EAR device  
448 (e.g., peer pressure). Considering that researchers’ access to EAR devices is also likely to be  
449 limited, distributing EAR devices across multiple teams may provide the opportunity to observe  
450 different experiences (e.g., one-on-one conversations, a coaches’ pre-game speech) of the same  
451 event (e.g., a competitive tournament), while maximizing the number of participants available  
452 for other study components (e.g., questionnaires). In fact, we recommend that EAR observation

453 periods are purposely scheduled to coincide with training or competition to maximize the  
454 likelihood of capturing relevant conversations among teammates, coaches, and parents, and to  
455 minimize the likelihood of capturing irrelevant conversations involving non-consenting third  
456 parties. The amount of identifiable information collected during any non-consenting third-party  
457 conversation can be further limited by programming brief audio recordings (e.g., 50 seconds).  
458 Researchers interested in observing youth sport participants should also be aware of additional  
459 ethical approvals required from schools and school boards to conduct research in educational  
460 settings.

461         In relation to analyzing the EAR data, researchers should determine clear and specific  
462 inclusion criteria regarding which conversations meet the aims of the research. For example, we  
463 only retained conversations about team membership or sport participation that included team  
464 members (i.e., athletes, coaches) and/or parents for transcription and analysis (~85-90% of EAR  
465 recordings). It is also important that research assistants have protocols for reporting evidence of  
466 illegal activity and harming behaviours (e.g., child abuse, elder abuse, self-harm) to superiors for  
467 additional review. The legal obligation to relay evidence of a crime or abuse to authorities varies  
468 by area of jurisdiction and it is the investigator's responsibility to understand and follow the  
469 requirements that apply to their data collection. Investigators should also make their reporting  
470 requirements clear to participants in the study's consent form. All other conversations are  
471 permanently deleted at the earliest opportunity. Whereas all discernable conversation captured  
472 from the recordings that meet our inclusion criteria are transcribed, only dialogue from athletes,  
473 coaches, and parents on participating teams is coded using the ACSSES. Only researchers and  
474 research assistants who have signed an IRB approved confidentiality agreement and have  
475 undertaken the coder training program have access to the EAR data.

## 476 **Limitations of the EAR Methodology**

477           Even though the EAR method provides an innovative approach to explore social  
478 phenomena, several key limitations require consideration. First, the EAR cannot capture non-  
479 verbal behaviours that are important for contextualizing effective communication in other video  
480 behavioural observation methods (e.g., Allan et al., 2016). Another limitation is the cost  
481 associated with EAR research, such as acquiring devices (e.g., Android devices start at ~\$60  
482 CAD/device) and protective casing (~\$20 CAD/case). Protective cases that include belt clips can  
483 enhance the audio quality of the recordings as participants will not have the devices in their  
484 pockets. Researchers may also want to consider purchasing wall ports (~\$2 CAD/wall port) to  
485 ensure that participants have the necessary equipment to keep the EAR devices charged and  
486 functioning properly.

487           Collecting, organizing, transcribing, and coding EAR-derived audio recordings is a  
488 lengthy and laborious process. Once the EAR devices are collected from participants after the  
489 observation period, researchers must listen to audio recordings to determine which observations  
490 meet the study's inclusion criteria. For example, if six athletes and a head coach from eight youth  
491 sport teams ( $N = 56$ ) each wear an EAR device programmed to record for 50 seconds, every 12.5  
492 minutes, from 08:00-20:00 over a 3-day observation period, researchers will need to review and  
493 organize ~9,000 audio recordings. Once audio files relevant to the research question are  
494 identified (e.g., 10-15% of recordings or 900-1,350 audio files), researchers transcribe each  
495 audio file and add the transcripts to the coding instrument where trained coders analyze the  
496 data—this process may take 8 to 12 months.

497           The ACSSES also has key limitations that should be considered by researchers interested  
498 in using or building on the coding instrument. For instance, the ACSSES is limited to coding

499 interactions with head coaches, parents, and teammates. The current version of the ACSSES does  
500 not include categories that allow researchers to assess interactions with other key social agents  
501 (e.g., siblings; Blazo & Smith, 2018). In addition, the majority of the ACSSES *behaviour* codes  
502 were developed to assess assumed positive (i.e., supportive) and negative (i.e., aversive)  
503 relationships (Holt-Lunstad & Uchino, 2019). Holt-Lunstad and Uchino (2019) argue that  
504 researchers need to gain a better understanding of social relationships characterized by a mix of  
505 positivity and negativity (i.e., ambivalent relationships) and how they influence health-related  
506 behaviours (e.g., sport participation). Future research with the ACSSES could evaluate how to  
507 analyze the positive and negative behaviours captured with the EAR method to examine the  
508 influence of ambivalent relationships.

#### 509 **Future Application of the EAR Methodology in Sport**

510         The EAR method and ACSSES provide sport researchers with a novel methodology to  
511 address research questions involving the observation of athletes and key social agents (i.e.,  
512 teammates, coaches, parents) as they interact in settings outside of the immediate sport activity.  
513 Together, the EAR method and ACSSES can facilitate the assessment of a wide range of  
514 research topics (e.g., intragroup behaviour, leadership behaviour, social identification processes)  
515 and perspectives (e.g., athlete, coach, parent, official). Using the scenario involving Lydia, we  
516 now consider possible applications of the EAR to explore her identification with her new team.

517         Lydia's story provides a context with numerous research topics for investigators to  
518 choose from. Considering it is her first year with a new team, social identity may be a construct  
519 of interest. For Lydia, her integration into a new team would theoretically involve social  
520 identification processes in the form of interactions with her coach and teammates that would  
521 introduce her to the social identity content (i.e., the morals, values, and norms of the group;

522 Reicher, 1984) of the team. If the social identity content or the way it is introduced appeals to  
523 her, it would likely strengthen her identification with the team (i.e., social identity). Conversely,  
524 she may not agree with the social identity content based on existing beliefs or how the new  
525 information is presented, which could negatively affect her identification with the team. The  
526 EAR methodology could be used with Lydia, a sample of her teammates, and her coach over a  
527 period of time (e.g., tournament) to collect data about the interactions that influence team  
528 members' social identification. Following transcription of all conversations that discuss sport  
529 participation or team membership, trained coders would use the ACSSES to code the transcripts  
530 for relevant contextual information and behaviours present in the interactions. The behavioural  
531 frequency analysis could then be converted to represent a proportion of time spent engaged in  
532 conversations that include target behaviours of interest, and assessed in relation to other  
533 measures (e.g., pre-/post-questionnaires, daily diaries). The transcripts could also be qualitatively  
534 analyzed to determine how actual leader behaviours demonstrated by Lydia's coach aligned with  
535 the four Principles of Social Identity Leadership (Haslam et al., 2011). These analyses would  
536 provide new insights into social identification processes and how they relate to a variety of  
537 potential variables (e.g., moral behaviour, intentions to continue in sport, performance). This is  
538 one example demonstrating how the EAR could be used to observe participants daily  
539 experiences in ways that may have previously been difficult to undertake.

#### 540 **Conclusion**

541 As smartphones and other wearable technologies become more imbedded in everyday  
542 life, so too do the opportunities for researchers to responsibly access real-world information as it  
543 unfolds (Miller, 2012). The ability to access social environments around sport where athletes,  
544 coaches, and parents interact can help advance our understanding of the important, yet complex,

545 social dynamics that exist. As Tamminen and colleagues (2017) noted, youth athletes indicate  
546 that private settings are where many valuable conversations related to their sport experiences  
547 occur. The application of the EAR method and development of the ACSSES affords new  
548 opportunities to examine temporal changes, behaviour, and daily processes that are associated  
549 with short- and long-term outcomes in sport.

550 **References**

- 551 Allan, V., Turnnidge, J., Vierimaa, M., Davis, P., & Côté, J. (2016). Development of the  
552 Assessment of Coach Emotions systematic observation instrument: A tool to evaluate  
553 coaches' emotions in the youth sport context. *Sport Science & Coaching, 11*(6), 859-871.  
554 doi:10.1177/1747954116676113
- 555 Anderson, C., Hildreth, J. A. D., & Howland, L. (2015). Is the desire for status a fundamental  
556 human motive? A review of the empirical literature. *Psychological Bulletin, 141*, 574-  
557 601. doi: 10.1037/a0038781
- 558 Babkes, M. L., & Weiss, M. R. (1999). Parental influence on children's cognitive and affective  
559 responses to competitive soccer participation. *Pediatric Exercise Science, 11* (1), 44-62.
- 560 Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal  
561 attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497-  
562 529. doi:10.1037/0033-2909.117.3.497
- 563 Benson, A. J., Evans, M. B., & Eys, M. A. (2016). Organizational socialization in team sport  
564 environments. *Scandinavian Journal of Medicine & Science in Sports, 26*, 463-473. doi:  
565 10.1111/sms.12460
- 566 Benson, A. J., & Bruner, M. W. (2018). How teammate behaviors relate to athlete affect,  
567 cognition, and behaviors: A daily diary approach within youth sport. *Psychology of Sport*  
568 *and Exercise, 34*, 119-127. doi: 10.1016/j.psychsport.2017.10.008
- 569 Blazo, J. A., & Smith, A. L. (2018). A systematic review of siblings and physical activity  
570 experiences. *International Review of Sport and Exercise Psychology, 11*(1), 122-159. doi:  
571 10.1080/1750984X.2016.1229355

- 572 Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual*  
573 *Review of Psychology, 54*, 579-616. doi:10.1146/annurev.psych.54.101601.145030
- 574 Brewer, C. J., & Jones, R. L. (2002). A five-stage process for establishing contextually valid  
575 systematic observation instruments: The case of rugby union. *The Sport Psychologist,*  
576 *16(2)*, 138-159.
- 577 Bronfenbrenner, U. (1999). Environments in developmental perspective: Theoretical and  
578 operational models. In S. L. Friedman & T. D. Wachs (Eds.), *Measuring environment*  
579 *across the life span* (pp. 3–28). Washington, DC: American Psychological Association.
- 580 Bruner, M. W., Boardley, I. D., Allan, V., Root, Z., Buckham, S., Forrest, C., & Côté, J. (2017).  
581 Examining social identity and intrateam moral behaviours in competitive youth ice  
582 hockey using stimulated recall. *Journal of Sports Sciences, 35*, 1963-1974.  
583 doi:10.1080/02640414.2016.1243797
- 584 Bruner, M. W., Boardley, I., & Côté, J. (2014a). Social identity and prosocial and antisocial  
585 behavior in youth sport. *Psychology of Sport and Exercise, 15(1)*, 56-64.  
586 doi:10.1016/j.psychsport.2013.09.003
- 587 Bruner, M. W., Carreau, J. M., Wilson, K. S., & Penney, M. (2014b). Group norms in youth  
588 sport: Role of personal and social factors. *The Sport Psychologist, 28(4)*, 323-333.  
589 doi:10.1123/tsp.2013-0029
- 590 Carron, A. V., & Eys, M. A. (2012). *Group dynamics in sport* (4<sup>th</sup> ed.). Morgantown, WV:  
591 Fitness Information Technology.
- 592 Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and  
593 standardized assessment instruments in psychology. *Psychological Assessment, 6(4)*, 284-  
594 290. doi: 10.1037/1040-3590.6.4.284

- 595 Conner, T. S., Tennen, H., Fleeson, W., & Feldman Barrett, L. (2009). Experience sampling  
596 methods: A modern idiographic approach to personality research. *Social and Personality*  
597 *Psychology Compass*, 3(3), 292-313. doi: 10.1111/j.1751-9004.2009.00170.x
- 598 Côté, J., Turnnidge, J., & Evans, M. B. (2014). The dynamic process of development through  
599 sport. *Kinesiologia Slovenica*, 20, 14-26.
- 600 Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed*  
601 *methods approaches* (5th ed.). Thousand Oaks, California: SAGE Publications Inc.
- 602 Criminal Code, RSC 1985, c. C – 46. Retrieved from [https://laws-lois.justice.gc.ca/PDF/C-](https://laws-lois.justice.gc.ca/PDF/C-46.pdf)  
603 [46.pdf](https://laws-lois.justice.gc.ca/PDF/C-46.pdf)
- 604 Erickson, K., & Côté, J. (2016). A season-long examination of the intervention tone of coach–  
605 athlete interactions and athlete development in youth sport. *Psychology of sport and*  
606 *exercise*, 22, 264-272. doi: 10.1016/j.psychsport.2015.08.006
- 607 Erickson, K., Côté, J., Hollenstein, T., & Deakin, J. (2011). Examining coach-athlete interactions  
608 using state space grids: An observational analysis in competitive youth sport. *Psychology*  
609 *of Sport and Exercise*, 12(6), 645-654. doi:10.1016/j.psychsport.2011.06.006
- 610 Erikstad, M. K., Martin, L. J., Haugen, T., & Høgaard, R. (2018). Group cohesion, need  
611 satisfaction, self-regulated learning: A one-year prospective study involving elite youth  
612 soccer players' perceptions of their club team. *Psychology of Sport and Exercise*, 39,  
613 171-178. doi.10.1016/j.psychsport.2018.08.013
- 614 Evans, M. B., Eys, M. A., & Bruner, M. W. (2012). Seeing the “we” in “me” sports: The need to  
615 consider individual sport team environments. *Canadian Psychology/Psychologie*  
616 *Canadienne*, 53(4), 301-308. doi: 10.1037/a0030202

- 617 Eys, M., Bruner, M. W., & Martin, L. J. (2019). The dynamic environment in sport and exercise.  
618 *Psychology of Sport and Exercise*, 42, 40-47. doi: 10.1016/j.psychsport.2018.11.001
- 619 Fraser-Thomas, J., & Côté, J. (2009). Understanding adolescents' positive and negative  
620 developmental experiences in sport. *The Sport Psychologist*, 23(1), 3-23.  
621 doi:10.11.23/tsp.23.1.3
- 622 Haslam, S. A. (2001). The social identity approach. In S. A. Haslam (Ed.), *Psychology in*  
623 *Organizations: The Social Identity Approach*, (pp. 17-39). London: Sage Publications  
624 Ltd.
- 625 Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009). Social identity, health and well-  
626 being: An emerging agenda for applied psychology. *Applied Psychology: An*  
627 *International Review*, 58, 1-23. doi: 10.1111/j.1464-0597.2008.00379.x
- 628 Haslam, S. A., Reicher, S. D., & Platow, M. J. (2011). The new psychology of leadership:  
629 Identity, influence and power. Hove, UK: Psychology Press.
- 630 Heyman, R. E., Lorber, M. F., Eddy, J. M., & West, T. V. (2014). Behavioural Observation and  
631 Coding. *Handbook of Research Methods in Social and Personality Psychology*.  
632 doi:10.1017/cbo9780511996481
- 633 Holt, N. L., Neely, K. C., Slater, L. G., Camiré, M., Côté, J., Fraser-Thomas, J., ... Tamminen,  
634 K. A. (2017). A grounded theory of positive youth development through sport based on  
635 results from a qualitative meta-study. *International Review of Sport and Exercise*  
636 *Psychology*, 10(1), 1-49. doi: 10.1080.1750984X.2016.1180704
- 637 Holt-Lunstad, J., & Uchino, B. N. (2019). Social Ambivalence and Disease (SAD): A  
638 Theoretical Model Aimed at Understanding the Health Implications of Ambivalent

- 639 Relationships. *Perspectives on Psychological Science*, 14(6), 941-966. doi:  
640 10.1177/1745691619861392
- 641 IBM Corporation. (2013). *IBM SPSS Statistics for Mac: Version 22.0*. Armonk, NY: IBM  
642 Corporation.
- 643 Jonsson, G. K., Anguera, M. T., Blanco-Villaseñor, Á, Losada, J. L., Hernández-Mendo, A.,  
644 Ardá, T., . . . Castellano, J. (2006). Hidden patterns of play interaction in soccer using  
645 SOF-CODER. *Behavior Research Methods*, 38 (3), 372-381. doi:10.3758/bf03192790
- 646 Kaplan, D. M., Rentscher, K. E., Lim, M., Reyes, R., Keating, D., Romero, J., . . . Mehl, M. R.  
647 (2020). Best practices for Electronically Activated Recorder (EAR) research: A practical  
648 guide to coding and processing EAR data. *Behavior Research Methods*.  
649 doi:10.3758/s13428-019-01333-y
- 650 Manson, J. H., & Robbins, M. L. (2017). New evaluation of the Electronically Activated  
651 Recorder (EAR): Obtrusiveness, compliance, and participant self-selection effects.  
652 *Frontiers in Psychology*, 8. doi:10.3389/fpsyg.2017.00658
- 653 McCalpin, M., Evans, M.B., & Côté, J. (2017). Young female soccer players' perception of their  
654 modified sport environment. *The Sport Psychologist*, 31, 65-77. DOI:  
655 10.1123/tsp.2015-0073.
- 656 McEwan, D., & Beauchamp, M. R. (2018). Teamwork training in sport: A pilot intervention  
657 study. *Journal of Applied Sport Psychology*, 0, 1-16.  
658 doi:10.1080/10413200.2018.1518277
- 659 McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biomechanica Medica*, 22(3),  
660 276-282.

- 661 Mckenzie, T. L., & Mars, H. V. (2015). Top 10 Research Questions Related to Assessing  
662 Physical Activity and Its Contexts Using Systematic Observation. *Research Quarterly*  
663 *for Exercise and Sport*, 86(1), 13-29. doi:10.1080/02701367.2015.991264
- 664 Mehl, M. R. (2017). The Electronically Activated Recorder (EAR): A method for the naturalistic  
665 observation of daily social behavior. *Current Directions in Psychological Science*, 26(2),  
666 184-190. doi:10.1177/0963721416680611
- 667 Mehl, M. R., and Conner, T. S. (2012). *Handbook of Research Methods for Studying Daily Life*.  
668 New York, NY: Guilford.
- 669 Mehl, M. R., Gosling, S. D., & Pennebaker, J. W. (2006). Personality in its natural habitat:  
670 Manifestations and implicit folk theories of personality in daily life. *Journal of*  
671 *Personality and Social Psychology*, 90, 862-877. doi: 10.1037/0022-3514.90.5.862
- 672 Mehl, M. R., & Holleran, S. E. (2007). An empirical analysis of the obtrusiveness of an  
673 participants' compliance with the Electronically Activated Recorder (EAR). *European*  
674 *Journal of Psychological Assessment*, 23(4), 248-257. doi:10.1027/1015-5759.23.4.248
- 675 Mehl, M. R., & Pennebaker, J. W. (2003). The social dynamics of a cultural upheaval: Social  
676 interactions surrounding September 11, 2001. *Psychological Science*, 14(6), 579-585.
- 677 Mehl, M. R., Pennebaker, J. W., Crow, D. M., Dabbs, J., & Price, J. H. (2001). The  
678 Electronically Activated Recorder (EAR): A device for sampling naturalistic daily  
679 activities and conversations. *Behavior Research Methods, Instruments, & Computers*,  
680 33(4), 517-523. doi:10.3758/BF03195410
- 681 Mehl, M. R., Robbins, M. L., & Deters, F. G. (2012). Naturalistic observation of health-relevant  
682 social processes: The Electronically Activated Recorder (EAR) methodology in

- 683 psychosomatics. *Psychosomatic Medicine*, 74(4), 410-417. doi:  
684 10.1097/PSY.0b013e3182545470
- 685 Meredith, S. J., Dicks, M., Noel, B., & Wagstaff, C. R. D. (2017). A review of behavioural  
686 measures and research methodology in sport and exercise psychology. *International  
687 Review of Sport and Exercise Psychology*, 1-22. doi:10.1080/1750984X.2017.1286513
- 688 Miller, G. (2012). The smartphone psychology manifesto. *Perspectives on Psychological  
689 Science*, 7, 221-237. doi: 10.1177/1745691612441215
- 690 Overton, W. F. (2015). Taking conceptual analysis seriously. *Research in Human Development*,  
691 12(3-4), 163-171. doi: 10.1080/15427609.2015.1069158
- 692 Reicher, S. D. (1984). The St Pauls' riots: An explanation of the limits of crowd action in terms  
693 of a social identity model. *European Journal of Social Psychology*, 14, 1-21.
- 694 Reis, H. T., & Gosling, S. D. (2010). Social psychological methods outside the laboratory. In S.  
695 Fiske, D. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., Vol. 1,  
696 pp. 82–114). New York, NY: Wiley.
- 697 Robbins, M. L. (2017). Practical suggestions for legal and ethical concerns with social  
698 environment sampling methods. *Social Psychological and Personality Science*, 8(5), 573-  
699 580. doi:10.1177/1948550617699253
- 700 Sedgwick, P., & Greenwood, N. (2015). Understanding the Hawthorne effect. *The British  
701 Medical Journal*, 351, 1-2. doi:10.1136/bmj.h4672
- 702 Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive  
703 neuroscience. *American Psychologist*, 54(3), 182-203. doi:10.1037/0003-066X.54.3.182
- 704 Slatcher, R. B., & Tobin, E. T. (2011). *Everyday Child Home Observation Coding System*.  
705 Detroit, MI: Wayne State University.

- 706 Smith, A. L. (2003). Peer relationships in physical activity contexts: A road less traveled in  
707 youth sport and exercise psychology research. *Psychology of Sport and Exercise*, 4(1), p.  
708 25-39. doi: 10.1016/S1469-0292(02)00015-8
- 709 Smith, R. E., Smoll, F. L., & Hunt, E. (1977). System for behavioral-assessment of athletic  
710 coaches. *Research Quarterly*, 48, 401–407. doi: 10.1080/10671315.1977.10615438
- 711 Sparkes, A., & Smith, B. (2014). Qualitative research in sport, exercise and health sciences.  
712 From process to product. London, United Kingdom: Routledge.
- 713 Stolarova, M., Wolf, C., Rinker, T., & Brielmann, A. (2014). How to assess and compare inter-  
714 rater reliability, agreement and correlation of ratings: An exemplary analysis of mother-  
715 father and parent-teacher expressive vocabulary rating pairs. *Frontiers in Psychology*, 5.  
716 doi:10.3389/fpsyg.2014.00509
- 717 Suen, H. K. (1988). Agreement, reliability, accuracy, and validity: Toward a clarification.  
718 *Behavioral Assessment*, 10, 343–366.
- 719 Tajfel, H. & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin &  
720 S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-47). Monterey,  
721 CA: Brooks/Cole.
- 722 Tamminen, K. A., Poucher, Z. A., & Povilaitis, V. (2017). The car ride home: An interpretive  
723 examination of parent-athlete sport conversations. *Sport, Exercise, and Performance*  
724 *Psychology*, 6(4), 325-339. doi:10.1037/spy0000093
- 725 Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987).  
726 *Rediscovering the social group: A self-categorization theory*. Oxford: Basil Blackwell  
727 Ltd.

- 728 Turnnidge, J., & Côté, J. (2019). Observing coaches' leadership behaviours: The development of  
729 the Coach Leadership Assessment System (CLAS). *Measurement in Physical Education  
730 and Exercise Science*, 23(3), 214-226. doi:10.1080/1091367X.2019.1602835
- 731 Turnnidge, J., Côté, J., Hollenstein, T., & Deakin, J. (2014). A direct observation of the dynamic  
732 content and structure of coach-athlete interactions in a model sport program. *Journal of  
733 Applied Sport Psychology*, 26(2), 225-240. doi:10.1080/10413200.2013.821637
- 734 Van Hoya, A., Heuzé, J.-P., Van den Broucke, S., & Sarrazin, P. (2016). Are coaches' health  
735 promotion activities beneficial for sport participants? A multilevel analysis. *Journal of  
736 Science and Medicine in Sport*, 19(12), 1028-1032. doi:10.1016/j.jsams.2016.03.002
- 737 Vierimaa, M., & Côté, J. (2016). An exploration of sociometric status and peer relations in youth  
738 sport. *Journal of Sport Behavior*, 39(1), 72-91.
- 739 Vierimaa, M., & Turnnidge, J., Evans, B., & Côté, J. (2016). Tools and techniques used in the  
740 observation of coach behavior. In P. A. Davis (Ed.), *The Psychology of Effective  
741 Coaching and Management (pp. 111-132)*. New York: Nova.