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4 **Parent and Child Car-Ride Interactions Before and After Sport Competitions and**
5 **Practices: Video Analysis of Verbal and Non-verbal Communication**
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Abstract

25
26 **Objective:** Parents' behaviours have important implications for youth athletes' sport
27 experiences, and researchers have begun to examine parental communication with youth athletes.
28 However, there is a lack of information about the range of behaviours in parent-child
29 interactions, and much of the existing research has focused on parental verbal comments. Thus,
30 there is a need to better understand the quality, quantity, and types of sport-related
31 communication between parents and athletes that occurs before and after sport events. The
32 purpose of the present study was to examine the nature of parent-child communication during the
33 car ride to and from sport practices and games. **Design and Methods:** Video recordings ($N = 98$
34 videos) of interactions during the car ride to and from sporting events were collected from 28
35 parent-child dyads (30 hours of video in total). Sport-related conversations were analyzed to
36 identify verbal and non-verbal behaviours and patterns of responses between parents and
37 athletes. **Results:** The amount of time spent talking about sport-related topics was minimal
38 (12.9%) compared to non-sport-related conversations (28.5%) or periods of silence (59.0%).
39 Parents provided more praise about their child's performance than athletes did themselves.
40 Parents' praise and criticism typically consisted of general or task-oriented comments, with few
41 instances of ego-oriented praise or criticism. Parents asked closed/descriptive questions most
42 frequently, while open/reflective questions were asked least often. In several instances, parents
43 interjected before athletes could respond to parents' comments. **Conclusions:** The results of this
44 study identify a wider range of verbal and non-verbal behaviours than previously reported in the
45 literature on parent-athlete communication in sport. The patterns of interactions and responses
46 identified in this study provide a starting point for further research to understand parent-athlete
47 communication and its contribution to positive developmental outcomes for youth athletes.

48 **Parent and Child Interactions Before and After Sport Competitions and Practices:**
49 **Video Analysis of Verbal and Nonverbal Communication**

50 Parents play an important part in young athletes' sport participation and sport
51 experiences. Parents facilitate children's access to sport participation by selecting opportunities
52 for their children and providing support for their children's sport participation (Harwood &
53 Knight, 2015), and parents are also key role models who act as socializers of young athletes'
54 sport experiences (Dorsch et al., 2021). Consequently, parents have a broad influence on a
55 number of aspects of children's experiences in sport, including the extent of their participation
56 and the quality of their motivation for sport participation, sport enjoyment and commitment,
57 emotions and anxiety, and athletes' conduct in sport (e.g., sportpersonship; prosocial and
58 antisocial behaviours) (Dorsch et al., 2021; Harwood et al., 2019). For example, adolescent
59 athletes' perceptions of parental behaviours that include praise and understanding positively
60 predicted athletes' life skill development (teamwork, goal setting, leadership, and total life skills;
61 Mossman & Cronin, 2019). Athletes' perceptions of having a positive relationship with their
62 mother and father (e.g., 'my mother/father looks out for me', 'after I make mistakes, my
63 mother/father encourages me') are positively associated with self-determined motivation for
64 sport participation; conversely, athletes' perceptions of having a relationship with their parents
65 that was characterized by greater conflict (e.g., 'my mother/father and I have arguments', 'my
66 mother/father and I fight') are negatively associated with sport enjoyment (Ullrich French &
67 Smith, 2006). Furthermore, parental behaviours characterized as punitive, controlling, and
68 reflecting high expectations for achievement are thought to be linked to youth athletes' fear of
69 failure in sport (Sagar & Lavallee, 2010), and athletes' perceptions of parent pressure and parent
70 behaviours that are controlling are positively associated with pre-competitive anxiety among
71 adolescent tennis players (Bois et al., 2009). Additionally, athletes' perceptions of parental

72 pressure and support, as well as parents' self-reported socialization about coping (i.e., direct
73 comments about how their child should cope with stressors), have been linked to athletes' coping
74 strategy use in sport (Tamminen et al., 2016). Thus, there is convincing evidence that parents'
75 behaviours and interactions with their children about their sport experiences are linked with key
76 outcomes for youth athletes.

77 An important aspect of parental behaviours and interactions with their children in youth
78 sport concerns the ways that parents and children communicate and interact with one another.
79 Researchers in this area have explored parent-child communication and interactions prior to,
80 during, and after competition, focusing on topics such as athlete preferences for parental
81 behaviours across these periods (e.g., Elliott et al., 2018; Knight et al., 2010; Knight et al., 2011;
82 Elliott et al., 2018), parent and spectator sideline behaviour during competitions (Bowker et al.,
83 2009; Dorsch et al., 2015; Holt et al., 2008; Kidman et al., 1999; Teques et al., 2018), and parent
84 feedback and debriefing after competition (e.g., Elliott & Drummond, 2017a; Tamminen et al.,
85 2017). In preparing for competitions, adolescent female athletes have indicated that they prefer
86 parents to support them with their physical and mental preparation by helping them to relax and
87 to enhance their confidence, and they expressed a desire for positive feedback and information
88 about areas for improvement following competitions (Knight et al., 2011). During competitions,
89 parents and spectators have been shown to make a variety of verbal comments identified as
90 positive (praise or encouragements), instruction or performance feedback, negative (critical or
91 corrective), derogatory, or neutral (Bowker et al., 2009; Holt et al., 2008; Kidman et al., 1999);
92 these behaviours have also been linked to parents' empathy and sport knowledge (Holt et al.,
93 2008), their goals for their child in sport (Dorsch et al., 2015), and their coping and emotional
94 intelligence (Teques et al., 2018). In studies of parents' debriefing with athletes after
95 competition, researchers have documented a range of verbal and non-verbal behaviours and

96 actions on the part of parents and athletes. For example, parents and athletes have described
97 various types of feedback including positive reinforcement and supportive feedback as well as
98 corrective, critical, and negative comments (Elliott & Drummond, 2017a; Tamminen et al.,
99 2017). While some athletes have said that they enjoy talking with their parents and seek out
100 critical feedback from parents in order to perform better in the future (Elliott et al., 2018; Knight
101 et al., 2010), other athletes have described ‘enduring’ these interactions with their parents during
102 the car ride home after games and practices (Tamminen et al., 2017).

103 Findings from these studies have shed light on the types of comments and behaviours that
104 parents engage in, athletes’ experiences of these conversations, and the challenges that parents
105 face in providing feedback to their children. For example, parents are sometimes unsure of what
106 to say or how to best support their child in sport (Harwood & Knight, 2009), and parents and
107 athletes have described challenges in navigating ‘awkward’ conversations and regulating their
108 emotions during these interactions (Tamminen et al., 2017). Additional contributions of the
109 existing research on parent-child interactions and communication in youth sport include the
110 exploration of the reasons that parents offer for their comments and their involvement in their
111 child’s sport. For example, parental criticism and negative feedback have been described by both
112 parents and athletes as being useful for athlete development and sport performance (Elliott &
113 Drummond, 2017a; Tamminen et al., 2017), and Elliott and Drummond (2017b) also described
114 the ways that parents downplayed or otherwise rationalized their comments as demonstrations of
115 active parental involvement and interest in their child’s sport.

116 Despite the contributions of the existing studies in this area, there are some limitations
117 that provide points for further exploration. First, much of the research to date on interactions and
118 communication between parents and athletes has relied largely on retrospective accounts of
119 athletes’ and parents’ experiences of these interactions, gathered primarily through qualitative

120 interviews (e.g., Elliott & Drummond, 2017a,b; Knight et al., 2011; Tamminen et al., 2017).
121 Notwithstanding the value of these studies for advancing our understanding of parent-child
122 communication, research in this area could be enhanced by adopting ‘in-vivo’ or ‘naturalistic’
123 approaches to data collection that capture parent-child interactions in real time. Second,
124 researchers have focused primarily on the types of verbal comments made by parents (e.g.,
125 verbal statements of criticism, praise, or instruction), and as such the non-verbal behaviours that
126 occur in these interactions have received relatively less attention. Some examples of non-verbal
127 behaviours within parent-child communication have been identified in previous research,
128 including athletes’ choice of where to sit in the car on the ride home after a competition, listening
129 to music, refusing to respond to parents’ questions, or pretending to be asleep (Tamminen et al.,
130 2017). Athletes have also noted that non-verbal aspects of parental communication (e.g., tone of
131 voice and posture) can shift their perceptions of their parents’ comments and feedback from
132 being more supportive to more pressuring (Knight et al., 2010). Given that communication
133 consists of verbal and non-verbal interactions, both of which affect family members and enact
134 their interpersonal relationships (Koerner & Fitzpatrick, 2004), it would seem important to
135 characterize the dynamics of parent-child sport-related communication by also capturing non-
136 verbal behaviours during these conversations.

137 Third, research in this area has tended to focus on understanding the types of comments
138 and feedback provided by parents, while children’s comments and behaviours have been largely
139 unexamined as contributors to the overall conversation and interactions about sport-related
140 discussions. Although much of the communication that may occur between parents and children
141 may consist of parents exerting their influence over their children’s behaviour (Koerner &
142 Fitzpatrick, 2004), children are active participants in family discussions and contribute to the
143 patterns of interaction with their parents. For example, adolescents may take positions or express

144 opinions in conversations that differentiate themselves from their parents (Koerner & Fitzpatrick,
145 2004). In sport contexts, athletes have described some strategies such as listening to music or
146 pretending to be asleep to try and navigate unpleasant sport-related conversations with their
147 parents (Tamminen et al., 2017). Thus, youth athletes' behaviours and expressions during
148 interactions and communication with their parents warrant fuller examination, beyond focusing
149 primarily on parents' comments and behaviours.

150 The car ride to and from sport competitions has been identified as a specific context for
151 examining interactions between parents and children, as it is a site where parents may socialize
152 children regarding norms and values related to sport participation (Tamminen et al., 2017).

153 Elliott and Drummond (2017a) argued that parents should consider the behaviours they exhibit
154 after games and on the drive home in order to provide a truly supportive and encouraging sport
155 experience for young athletes, and Woolger and Power (2000) suggested that observational
156 measures should be used to examine parenting practices in youth sport. To advance the literature
157 in this area, there is a need to adopt methods that help capture the verbal and non-verbal
158 communication that occurs between parents and children in relation to their sport experiences.

159 One such approach is to use video recordings to capture conversations and interactions between
160 parents and children before and after sport practices and games, as videos can provide a rich
161 source of data to observe the nature and characteristics of parent-child communications. For
162 example, researchers have examined video-recorded discussions between parents and children to
163 study conflict, power relations, and turn-taking in conversations (Black & Logan, 1995), and
164 researchers have also analyzed videos of interpersonal communication in more naturalistic
165 settings such as during mealtimes (e.g., Spieth et al., 2001) and in doctors' offices to examine
166 communication between parents, doctors, and children during medical appointments (e.g.,
167 Becker et al., 2018).

168 In one of the few studies that examined video-recorded observations of parent-child
169 interactions in a sport context, Rouquette et al. (2021) analyzed parents' responsiveness in
170 interactions with their children in a 10-minute video-recorded discussion about goal-setting.
171 Parents' behaviours included warmth and positive affect, listening and attentiveness, confidence
172 in their child's ability, support for the child's goals, responsive emotional support, responsive
173 instrumental support, goal reflection, proximity-seeking behaviours, and sensitive/responsive
174 caregiving. Higher overall parental responsiveness observed in the videos was significantly
175 associated with athletes' self-efficacy, self-esteem, and thriving, although observed parental
176 responsiveness was not correlated with athletes self-reported perceived parental responsiveness.
177 This study provided novel information about the types of behaviours that may be associated with
178 positive outcomes for young athletes; however, focus of the study was limited to examining a
179 lab-based goal-setting conversation, which may not be representative of the natural conversations
180 and interactions between parents and athletes before and after sporting practices and games.

181 One study that adopted a more naturalistic approach to capture conversations between
182 parents and athletes was recently reported by Sutcliffe et al. (2021), who used Electronically
183 Activated Recorders (EAR) devices to capture 50-second audio segments of conversations every
184 12.5 minutes in an unobtrusive manner. Thematic analysis of transcripts from sport-related
185 conversations between parents and athletes during the car ride to and from sport events revealed
186 parent feedback in the form of technical instruction, positive and negative evaluations, and
187 instructions to athletes. Parents also provided supportive comments to athletes about their
188 performance and social support (e.g., emotional, esteem, and informational support). Further,
189 parents engaged in discussions about other social agents (e.g., comments about coaches and
190 teammates) during the car rides to and from sport events. These findings provided useful

191 information about the types and frequencies of comments exchanged between parents and
192 athletes during sport-related conversations.

193 However, there are some limitations in the nature of the data collected using the EAR
194 devices, and video recordings offer some advantages in advancing this area of research over
195 EAR devices. First, video recordings allow for continuous observations of parent-child
196 interactions, which is an advantage over capturing short segments of audio recordings using the
197 EAR device that can miss potentially important interactions. Second, capturing continuous
198 observations of the car ride to and from sport events enables the examination of the overall
199 duration of behaviours displayed by parents and athletes across the entire conversation. Third,
200 using video recordings enables researchers to examine both verbal and non-verbal behaviours
201 exhibited between parents and athletes. Athletes have reported several types of verbal and non-
202 verbal communication strategies to try and influence the nature of the conversation in the car ride
203 to and from sport games and practices, including disagreeing with their parent, changing the
204 conversation, non-responsiveness, sleeping or sitting with their eyes closed, or turning on the
205 radio or listening to music with headphones (Tamminen et al., 2017). Finally, the findings
206 reported by Sutcliffe et al. (2021) focused primarily on the types and frequencies of verbal
207 comments provided by parents, with limited information about athletes' contributions to
208 interactions with their parents. Thus, to build on and extend previous research by Rouquette et al.
209 (2021) and Sutcliffe et al., in the present study we used continuous video recordings to examine
210 parent-child communication in a naturalistic setting (i.e., the car ride to and from sport practices
211 and games).

212 In sum, previous research indicates that sport-related communication between parents
213 and athletes can impact youth athletes' sport experiences. Despite some previous research in this
214 area (Rouquette et al., 2021; Sutcliffe et al., 2021), some basic features of parent-child sport-

215 related communication remain unknown, such as the amount of time that parents and children
216 engage in sport-related communication; the various statements, questions, and comments that are
217 made during these conversations; and the various non-verbal strategies of communication
218 between parents and children. Therefore, the purpose of the present study was to examine parent-
219 child communication and interactions during the car ride to and from sport practices and games
220 using an in-vivo video methodology.

221 **Methods**

222 **Paradigmatic Position**

223 This study was approached from a pragmatic philosophical position, which is concerned
224 with the utility of knowledge for its practical uses; pragmatism is appropriate for research that
225 aims to use research findings to promote practical outcomes and improve human experiences
226 (Morgan, 2014). Pragmatism is informed by relativist assumptions that although a physical
227 reality exists apart from human experience, truth is never certain and is relative to the current
228 context; accordingly, pragmatism also holds that knowledge is influenced by the social context
229 and is inherently social, and that human actions cannot be separated from past experiences or
230 beliefs arising from those experiences (Morgan, 2014, p. 26).

231 **Participant Demographics**

232 The sample of participants in this study included 28 athletes and their parents. Thirteen
233 dyads were comprised of parents and athletes of the same gender (six female-female, seven
234 male-male), and 15 dyads were of different genders (five female parents with male athletes, 10
235 male parents with female athletes). Athletes ranged in age from 11 to 16 years ($M = 13.1$, $SD =$
236 1.4) and parents ranged in age from 38 to 54 years ($M = 47.6$, $SD = 4.5$). Athletes had been
237 participating in organized sport at varying competitive levels for two to eight years, and they
238 represented a variety of sports including hockey, soccer, basketball, diving, ringette, and

239 wheelchair rugby. Participants' self-reported ethnicities included Black (14.7%), Caucasian
240 (47.1%), Japanese (2.9%), West Asian/Middle Eastern (2.9%), and 'Other not listed' (11.8%) or
241 'chose not to answer' (20.6%).

242 **Participant Recruitment**

243 Participating families were recruited from local sport organizations in a large Canadian
244 city. Recruitment was restricted to the city and its surrounding area because members of the
245 research team had to physically meet with participants to provide them with the GoPro cameras,
246 meaning participants had to be within a reasonable distance to be accessed by public transit or
247 car. Initially, convenience sampling was used to recruit participants. Members of the research
248 team shared study information with local sport organizations through publicly available contact
249 information (i.e., phone number and email) and asked to share study information with the parents
250 of their respective sport organizations to invite interested families to participate. Snowball
251 sampling (Patton, 2002) was also used as the research team encouraged participating families to
252 share study information with other families who may be interested. Recruitment aimed to sample
253 male or female adolescent athletes under the age of 17, participating in any sport, at any level
254 (e.g., recreational, competitive, high-performance, etc.). There were no age limits or inclusion
255 criteria specific to parents; however, participating parents had to be able to drive legally.
256 Families interested in participating in the research study were asked to contact a member of the
257 research team via phone or email. Once contact was made, an initial phone call was scheduled
258 with interested participants to provide a more detailed overview of study procedures and ask for
259 verbal consent to participate. Once participating families provided verbal consent, a member of
260 the research team scheduled an in-person meeting where they provided participants with all
261 study information (inclusive of written GoPro instructions), one GoPro camera per vehicle, and
262 collected signed consent from both the parent and athlete. Recruitment began in the spring of

263 2018 and was completed by winter 2020. The research team initially aimed to recruit 50 parent-
264 athlete dyads, but ultimately stopped recruitment after collecting data from 34 dyads due to
265 restrictions on sport participation due to the covid-19 pandemic. Of the 34 dyads who
266 participated in the study, videos from 28 dyads were retained for analysis following screening,
267 and videos from 6 dyads were removed. Videos were removed if they were filmed at night with
268 poor lighting that made it difficult to code non-verbal behaviours; if videos contained individuals
269 other than the two primary participants; or if the participants were not clearly in view; see
270 detailed screening information below.

271 **Data Collection**

272 *Video Recordings*

273 Parents and athletes were provided with a GoPro camera and car dashboard mounting kit
274 and they were asked to film a minimum of six car rides (with no maximum) to or from sport-
275 related events (i.e., practices or competitions).¹ Participants were encouraged to complete filming
276 within two weeks, but were provided as much time as necessary to complete filming. A member
277 of the research team provided participants with a demonstration on how to use the GoPro, and
278 informed participants that they could contact a member of the research team at any time if they
279 had questions or challenges when using the GoPro. Participants were also informed that they
280 could choose which car ride videos to submit to the research study and were shown how to delete
281 any videos that they did not want to have submitted. Once filming was completed, a second in-
282 person meeting was scheduled. During this second meeting, a member of the research team

¹ Prior to recruitment, members of the research team tested the GoPro cameras (GoPro Hero 5 Session) in their own cars to determine optimal camera placement and settings for the filming purposes. It was determined that the GoPro should be mounted below the rear-view mirror on the front windshield and programmed to the following settings: 1080 resolution, 48 frames per second, and large field of view.

283 collected the GoPro camera, and parents and athletes were each provided with a \$20.00 gift card
284 to a sporting goods store for their participation in the study.

285 **Data Analysis**

286 *Development of Video Coding Framework*

287 The coding framework was developed in a two-stage process. The first stage involved a
288 review of 45 peer-reviewed articles examining parent-athlete interactions and communication in
289 sport. These articles were selected based on a search of databases and the research team's
290 existing knowledge of the literature. Key findings related to parent-athlete communication were
291 extracted from the articles and served as an initial reference point for developing the first
292 iteration of the coding framework. Examples of codes that were derived from these findings
293 included praise, criticism, and non-sport related conversation, as well as tone (i.e., positive,
294 negative, or neutral). Ultimately, findings from this review proved to be less informative in the
295 development of the framework than initially anticipated as it highlighted the paucity of research
296 outlining specific behaviours parents engage in while communicating with athletes. For instance,
297 previous studies identified that parents' behaviours can influence the motivational climate,
298 perceived pressure, and perceived support, but did not specify examples of interpersonal
299 interactions between parents and athletes that contribute to such parental influences. Further,
300 there was little to no information in previous publications about parents' non-verbal behaviours;
301 as such, the development of the coding framework proceeded in an inductive manner to identify
302 and code verbal and non-verbal behaviours between parents and athletes.

303 The second stage of developing the coding framework involved the second and third
304 authors watching a random selection of the videos to make note of observed verbal and non-
305 verbal behaviours that were not included in the first iteration of the coding framework. The
306 research team then met and discussed the newly observed behaviours and how they could be

307 incorporated into the existing framework. Through this discussion, similar behaviours were
308 collapsed into singular codes, novel behaviours were added as new codes, and definitions of the
309 codes were established. The research team engaged in several rounds of watching selections of
310 videos and then meeting to discuss, and through this iterative process, the framework was
311 established (see Tables 1 and 2). The coding framework was then input into the *Observer XT*
312 software, and interrater reliability of the coding between the second and third authors was
313 established before coding the remaining videos. Of the 98 videos, 11 videos were coded by both
314 the second and third authors to compare their coding; the overall percentage of agreement
315 between the raters was 78.1% with a Kappa value of 0.74.

316 ***Video Screening and Preparation for Analysis***

317 In total, 513 video segments² were collected from 34 dyads. Cleaning of video data began
318 by removing 87 video segments that were filmed accidentally or as a test (i.e., videos that were
319 only a few seconds in length). An additional 274 video segments were removed from the data set
320 for one or more of the following reasons: videos filmed at night with poor lighting that made it
321 difficult to code non-verbal behaviours; videos containing individuals other than the two primary
322 participants; and videos where the participants were not clearly in view (e.g., poor camera
323 angles, or athlete sitting in the back seat, as opposed to the front seat). Following these steps in
324 data cleaning, 152 video segments from 28 dyads remained (videos from six dyads were
325 removed entirely); these video segments were edited and combined into the final data set of 98
326 car ride videos from 28 dyads (average number of videos per dyad = 3.5, range = 1-10).

² The term “video segments” refers to portions of entire car ride videos. The default setting for GoPro cameras filmed videos in segments that were 17:42.00 in length, meaning that car ride videos longer than 17:42.00 consisted of multiple video segments; thus, car ride videos that consisted of multiple video segments had to be combined into complete videos during the video preparation process.

327 *Video Coding Procedures*

328 The second and third authors coded the data set for parent and athlete verbal and non-
329 verbal behaviours. To enhance the accuracy of coding, coders focused on only one subject's
330 verbal or non-verbal behaviours at a time. As such, each car ride video was watched a total of
331 four times, being coded for a different set of behaviours during each viewing (i.e., athlete –
332 verbal, athlete – non-verbal, parent – verbal, parent – non-verbal). If a coder viewed an
333 interaction that they were uncertain of how to code, the interaction was temporarily coded as
334 'unsure'. The second and third authors would then meet to determine an appropriate code, and
335 they consulted with the first and last authors to discuss the coding of the interaction. Throughout
336 the coding process, verbal and non-verbal interactions with any individuals other than the parent
337 and athlete were ignored. This included such interactions as speaking to drive-thru employees,
338 waving to neighbours, and conversations via Bluetooth phone calls.

339 The coding of participant silence involved the use of a three-second grace period to
340 account for natural lulls in one's speech. This meant that if participants began speaking, paused
341 for less than three seconds, and then continued elaborating on their initial thought, the period of
342 silence between both segments of speech was not coded and one verbal code was used to capture
343 the dialogue. If, however, the participant paused for longer than three seconds, or the next
344 segment of verbal dialogue was not a continuation of the previous statement, the period of
345 silence in between both instances of speech was coded as 'silence'.

346 *Video Analysis*

347 The first step of the analysis of the behaviours in the videos included an examination of
348 the descriptive information for the verbal and non-verbal behaviours for each dyad and across the
349 set of videos (e.g., frequency, mean, median, and range of verbal and non-verbal behaviours).

350 The second step of the analysis included an examination of the type and frequency of responses
351 from athletes following parent statements.

352 **Methodological Rigor & Integrity**

353 Several steps and strategies were taken to strengthen the methodological rigor and
354 integrity of this study (Levitt et al., 2018; Tracy, 2010). We aimed to pursue a worthy topic (i.e.,
355 investigating parent-child interactions in sport) that has the potential to advance research and
356 practice; we used a novel approach to data collection (i.e., in-vivo videos of parent-child
357 interactions in a naturalistic setting); we gathered sufficient data from an appropriate sample that
358 were rigorously analyzed by multiple coders, which was appropriate given the approach to data
359 analysis that sought to identify the types of verbal and non-verbal behaviours exhibited by
360 parents and athletes; and the results make a significant contribution to the literature on parent-
361 child interactions in youth sport. These strategies align with the pragmatic paradigmatic
362 approach from which the study was conducted, supporting the methodological coherence of the
363 study (Poucher et al., 2020).

364 **Results**

365 **Descriptive Information**

366 The average length of the videos was 18:23.04 (range = 03:36.55-64:17.44) and the total
367 length of all videos was 30 hours, 1 minute, 38 seconds and 34 milliseconds. Tables 3 and 4
368 report descriptive statistics for the frequencies of verbal and non-verbal behaviours.

369 **Duration of Verbal and Non-Verbal Behaviours**

370 *Verbal Behaviours*

371 The total duration of sport-related conversation or comments by parents was 139:05.44
372 (7.81% of combined length of all videos), while the duration of sport-related conversation or
373 comments by athletes was 90:37.01 (5.09% of combined length of all videos). This included the

374 combination of performance praise, performance criticism, descriptive questions, reflective
375 questions, areas for improvement, general statements, expectations, expressions of confidence,
376 and expressions of concern (see Table 1 for examples and definitions of each of these types of
377 comments). The total duration of non-sport-related conversation among parents was 260:17.64,
378 which amounted to 14.62% of the combined length of all videos. Among athletes, the total
379 duration of non-sport-related discussion was 247:01.68, which amounted to 13.87% of the
380 combined length of all videos.

381 The total length of all verbal dialogue (i.e., combined length of sport-related
382 conversation, non-sport-related conversation, and responses) for parents was 417:24.04, and
383 358:48.47 for athletes. On average, the parent of each dyad spoke for a total length of 14:54.43
384 while athletes spoke for 12:48.87, meaning that parents spoke on average 2:05.56 longer
385 (16.33% more) than athletes. The total duration of absolute silence (i.e., when neither subject
386 was speaking) was 1063:10.04 (59.01% of total length of all videos); the average duration of
387 silence was 38:58.22 per dyad.

388 *Non-Verbal Behaviours*

389 Non-verbal behaviours included parents' or athletes' orientation toward the other person,
390 eye contact, laughing or smiling, gesturing, resting or sleeping, using headphones, head
391 movements (agree/disagree/neutral), using a phone/screen or reading, and eye rolling. For a full
392 description of these non-verbal behaviours coded in the videos, see Table 2, and for the
393 descriptive statistics regarding these behaviours, see Table 4.

394 Athletes from 19 dyads spent a combined 229:14.17 looking at a phone screen or reading
395 (average per dyad = 12:03.93; range = 00:06.97 – 38:27.76). There were nine dyads where
396 athletes did not look at a phone screen or read during the videos. Parents from 17 dyads spent a
397 combined duration of 23:50.92 looking at a phone screen or reading across all the videos

398 (average per dyad = 01:24.17; range = 00:03.61 – 7:28.51); many instances of parents looking at
399 a phone screen occurred when the vehicle had stopped at a stoplight or intersection. The parents
400 of the remaining 11 dyads did not look at a phone screen or read. Athletes from seven dyads
401 spent a combined 133:47.13 with headphones on (average per dyad = 19:06.73; range = 03:58.92
402 – 54:41.43). Athletes from 11 dyads spent a total of 51:23.58 resting (i.e., head leaning against
403 window) or sleeping (average per dyad = 04:40.33; range = 00:02.60 – 27:07.98).

404 **Frequency of Verbal Behaviours**

405 *Performance Praise*

406 Performance praise referred to positive verbal statements about the athlete's past or
407 previous performance (e.g., "Your goal was the most impressive of the whole match"; see also
408 Table 1). There were 12 dyads (29 videos) where parents did not provide any performance praise
409 to their child. Among the remaining 16 dyads (69 videos), at least one instance of parental
410 performance praise was observed within their videos, although these instances of praise were
411 contained in 24 videos, and 45 videos had no instances of parental performance praise. Of the 24
412 videos that did contain instances of performance praise from parents, 11 videos had a
413 combination of both praise and criticism, while 13 videos exclusively had instances of praise
414 (i.e., no criticism). The most frequent types of performance praise from parents were task-related
415 (32 instances) and 'general' (31 instances).

416 Athletes provided performance praise (positive comments about their own performance;
417 e.g., "My passing was really accurate today") less frequently than parents, with 16 dyads (47
418 videos) having no instances of athletes' performance praise. The remaining 12 dyads (51 videos)
419 had at least one observed instance of athletes' performance praise within the duration of their
420 respective car ride videos. These instances of praise, however, were limited to 16 videos, while
421 35 videos had no instances of athletes' performance praise. There were no observed instances of

422 athletes' ego-based praise for their own performances. The most frequent types of athlete
423 performance praise were task-related (12 instances) and 'general' (10 instances).

424 *Performance Criticism*

425 Performance criticism referred to critical verbal statements about the athlete's past or
426 previous performance (e.g., "Your team lost because you let that goal in"; see also Table 1).
427 There were 16 dyads (53 videos) where parents provided no performance criticism. Among the
428 remaining 12 dyads (45 videos), at least one form of performance criticism by a parent was
429 observed; however, within these dyads, 26 videos had no instances of parental performance
430 criticism. The remaining 19 videos contained instances of performance criticism; 11 of these
431 included a combination of both praise and criticism, and eight contained only criticism. The most
432 frequent type of performance criticism from parents was task-related (30 instances).

433 Contrary to performance praise, athletes provided performance criticism (criticism about
434 their own performance; e.g., "I played horribly") at a frequency similar to that of the parents.
435 There were 14 dyads (33 videos) with no instances of performance criticism from athletes. Of the
436 remaining 14 dyads (65 videos), at least one instance of athletes' performance criticism was
437 observed across 18 videos. The most frequent type of athletes' performance criticism was task-
438 related (26 instances).

439 *Areas for Improvement*

440 Areas for improvement referred to verbal statements about areas of sport performance
441 that the athlete can improve upon in the future (e.g., "I need to work on being more aggressive
442 when driving the ball to the basket"). The main distinction between 'performance criticism' and
443 'areas for improvement' was that the former included negative statements indicating the athlete
444 had done something incorrectly or poorly, while the latter included statements that indicated
445 specific information about things the athlete could improve (these often occurred in sequence;

446 i.e., parents may provide a statement of performance criticism followed by a statement about
447 areas for improvement). There were 12 dyads (39 videos) where there were no instances of
448 parental suggestions of areas for improvement. Of the remaining 16 dyads (59 videos), 29 videos
449 included at least one instance of a parent suggesting an area for improvement (107 total
450 instances).

451 Among athletes, there were five dyads (across six videos) that had at least one instance of
452 an athlete suggesting an area for their own improvement (18 instances), while the remaining 23
453 dyads (76 videos) had no instances of athletes making statements about areas for improvement.
454 One athlete in particular accounted for 13 of the 18 (72.2%) instances of statements of areas for
455 improvement in their own performance.

456 *Expression of Confidence*

457 Expressions of confidence referred to verbal statements that reflect confidence in the
458 athlete's ability to succeed (e.g., "You'll do great – I believe in you"). There were 20 dyads (76
459 videos) that contained no instances of parental expressions of confidence. Of the remaining eight
460 dyads (22 videos), 10 videos included at least one coded instance of a parental expression of
461 confidence (19 instances), while 12 videos included none. There were no instances of athletes'
462 expressions of confidence across the entire dataset.

463 *Descriptive and Reflective Questions*

464 Parents asked a total of 682 descriptive questions (557 closed and 125 open) and 169
465 reflective questions (151 closed and 18 open). See Table 1 for examples of open and closed
466 descriptive and reflective questions. Thus, 80.1% of the questions asked by parents were
467 descriptive and 19.9% of the questions were reflective in nature, and 83.2% of the questions
468 were closed in nature while the remaining 16.8% were open-ended questions. Similarly, athletes
469 asked 279 descriptive questions (210 closed and 69 open) and 33 reflective questions (30 closed

470 and 3 open). Thus, 89.4% of questions asked by athletes were descriptive while 10.6% were
471 reflective in nature, and 76.9% were closed in nature while the remaining 23.1% were open-
472 ended questions.

473 **Athlete Verbal Responses to Parent Statements**

474 We examined athletes' verbal and non-verbal responses to parents providing performance
475 praise, expressions of confidence, performance criticism, and suggesting areas for improvement,
476 as well as responses to their parents asking open reflective and descriptive questions.

477 *Athlete Responses to Parent Praise, Expressions of Confidence, Criticism, and Areas for* 478 *Improvement*

479 A detailed breakdown of athletes' verbal responses to parent statements can be found in
480 the Supplementary File, Table S1. Athletes' most frequent verbal responses to praise,
481 expressions of confidence, criticism, and areas for improvement were statements and brief
482 responses in agreement (e.g., "yeah", "I agree"). On three instances, athletes provided neutral
483 responses to parents providing praise by saying, "thank you". Athletes sometimes provided no
484 response to parents' praise (six of 64 instances; 9.4%) and areas for improvement (10 of 107
485 instances; 9.3%). By comparison, athletes' 'no response' was least frequent when responding to
486 expressions of confidence (1 of 18 instances³; 5.6%) and parental criticism (2 of 42 instances;
487 4.8%).

488 In several cases, parents interjected before athletes could respond, or parents did not
489 allow a verbal response (e.g., the parent continued talking or changed the topic before the athlete
490 could respond). Roughly half the time after parents provided praise, expressed confidence, or

³ Only 18 instances of 'expressions of confidence', rather than 19, were included in this portion of the analysis because the GoPro was turned off immediately following one instance of a parent expressing confidence, meaning it was not possible to determine how the athlete responded in this specific case.

491 suggested areas for improvement, the parents interjected or did not allow athletes to respond: 35
492 of 64 instances following praise (54.7%), nine of 18 instances following expressions of
493 confidence (50.0%), and 48 of 107 instances following comments about areas for improvement
494 (44.9%). Further, parents interjected or did not allow a verbal response in roughly a quarter of
495 instances when providing criticism (11 of 42 instances of criticism; 26.2%). Athletes' average
496 response times were quickest in response to parental criticism and areas for improvement, but
497 slowest in response to parental praise and expressions of confidence.

498 *Athlete Responses to Parents' Open Descriptive and Reflective Questions*

499 The most frequent athlete response to parents' open descriptive and reflective questions
500 were statements (descriptive = 65 statements; reflective = 12 statements). Athletes were also
501 found to respond with a moderate frequency to parents' descriptive questions with their own
502 descriptive questions (frequency = 13) or with neutral responses (frequency = 12). Instances of
503 athletes responding with descriptive questions frequently consisted of the athletes asking for
504 clarification regarding what the parent had asked, while neutral responses were often the athletes
505 stating that they did not know the answer to the parents' questions.

506 Parents interjected or did not allow an athlete to provide a verbal response in 12.0% of
507 instances (15 of 125) when asking an open descriptive question, and 5.6% of instances (1 of 18)
508 when asking an open reflective question. Athletes responded to all questions asked by parents,
509 unless parents interjected or did not allow them to provide a response.

510 **Athlete Non-Verbal Responses to Parent Statements**

511 Athletes' non-verbal responses to parent statements were also noted (a detailed summary
512 of athletes' non-verbal responses to parent statements can be found in the Supplementary File,
513 Table S2). Across all 374 instances of parents' praise, expressions of confidence, criticism, areas
514 for improvement, open descriptive questions, and open reflective questions, there were 225 cases

539 The results from this study contribute to several limitations and gaps in the existing
540 literature on parent-child communication in youth sport. First, our findings provided information
541 about a broader range of verbal and non-verbal behaviours than previously reported in the
542 literature, giving more details and insight into the types of behaviours demonstrated by parents
543 and athletes. For example, parents' use of questions has been briefly mentioned in studies
544 examining parent communication with youth athletes (e.g., Azimi & Tamminen, 2020;
545 Tamminen & Holt, 2012); however, in the present study we identified that parents asked open
546 and closed questions, as well as descriptive and reflective questions. Similarly, parents'
547 expressions of concern about their child's wellbeing identified in the current study have not been
548 reported extensively in the youth sport literature as aspects of parent-child communication,
549 although there is research on parents' concerns about their children as a source of parental stress
550 in sport (e.g., Harwood & Knight, 2009). Furthermore, the analysis of non-verbal behaviours
551 also extends previous studies that have typically only examined verbal comments from parents
552 (e.g., Knight et al., 2011; Sutcliffe et al., 2021; Tamminen & Holt, 2012). In previous research,
553 non-verbal behaviours that have been identified included parents' tone of voice and posture
554 (Knight et al., 2010), and athletes' choice of where to sit in the car, listening to music, refusing to
555 respond to parents' questions, or pretending to be asleep (Tamminen et al., 2017). Building on
556 this research, we further identified non-verbal behaviours that included participants' orientation
557 toward the other person, eye contact, laughing/smiling, gesturing, resting or sleeping, listening to
558 music with headphones, head movements (agree, disagree, neutral), screen or phone use, and eye
559 rolling. Therefore, the development of the framework for coding parent-child conversations and
560 interactions provided further information about the types of non-verbal behaviours that build
561 upon those identified in past research.

562 By examining the behaviours of both parents and athletes, we identified that overall,
563 parents spoke more than children, and parents also interjected frequently in conversations with
564 children. Comparing parents' and athletes' contributions to the conversation also indicated that
565 there were similar rates of criticism from parents and athletes about the athletes' performances;
566 however, athletes provided fewer instances of praise about their own performance compared to
567 parents, and there was no evidence of any expressions of confidence from the athletes about their
568 own performance. Thus, while parents tended to speak more than athletes, their positive
569 comments may be important in conversations with athletes who may otherwise be more critical
570 about their sport performance. These findings lend evidence to the notion that parents are crucial
571 providers of emotional support to young athletes and can contribute to creating an understanding
572 emotional climate in youth sport (Harwood & Knight, 2015; Knight & Holt, 2014). Overall, this
573 study makes an important contribution to the literature in sport by examining the comments and
574 behaviours of athletes as well as parents, as previous studies have tended to focus primarily on
575 parental comments (e.g., Azimi & Tamminen, 2020; Knight et al., 2011; Sutcliffe et al., 2021;
576 Tamminen & Holt, 2012).

577 When engaging their children in sport-related conversations, parents made general
578 statements most frequently (e.g., "your practice time was moved an hour later"); however, when
579 examining the types of questions used to engage athletes in conversations, parents tended to ask
580 descriptive questions (e.g., "was your friend at practice today?"), while open, reflective questions
581 were used least frequently (e.g., "what do you think you did well in your last match?"). The
582 benefits of reflection-enhancing communication have been noted in the developmental
583 psychology literature, as parental communication that enhances reflection is associated with their
584 children's communication competence and emotional competence (Young, 2009). Reflection-
585 enhancing communication (Burluson et al., 1995) can also encourage children to consider how

586 their actions impact others, which can promote prosocial behaviours and enhanced competence
587 in communication (Sillars et al., 2005). Enhancing reflection can support athletes' self-
588 awareness, which is associated with player development (Mills et al., 2012). Yet, despite the
589 importance of self-awareness and self-reflection for sport performance and the development of
590 metacognition (Jonker et al., 2010), there is limited research examining how parents'
591 communication with their child athlete can enhance self-reflection. It may be valuable in future
592 research to engage parents in developing young athletes' self-awareness and metacognition.
593 Based on the current results, it appears that parents used limited questions that would engage
594 athletes in reflection. Moving forward, more research is needed to examine the benefits of
595 encouraging parents to engage in reflective questioning and reflection-enhancing communication
596 to promote greater self-awareness, enhanced confidence, prosocial behaviours, and
597 communication competence among youth athletes.

598 Another notable finding from our analysis of the car ride videos was that the majority of
599 the time spent in the car was silent, and sport-related conversations made up only 12.9% of the
600 interactions between parents and children. This could indicate that athletes and parents simply
601 did not have much to talk about during the car ride to and from sporting events, or perhaps it is
602 possible that parents and children do not commonly discuss sport-related topics because they do
603 not know how to effectively have these conversations, and parents may not want to upset their
604 child or the child may want to avoid these conversations. This proposition would align with the
605 suggestion that parents are unsure of how to behave or do not know what to say to help their child
606 in sport (Harwood & Knight, 2009). In the current study we did not interpret the 'meaning' or
607 function of silences during the car ride to or from sport competitions and practices, although
608 silences can have multiple meanings or purposes in interactions: for example, silence may serve
609 linguistic functions or serve as a way to express emotions (Ephratt, 2008), or it may be indicative

610 of emotional states and emotional changes among participants during conversation, reflected in
611 resting, daydreaming, or contemplation when individuals are deciding what to say (Bruneau,
612 2009). Silence could also be a neutral conflict-resolution strategy (Pasley & Ihinger-Tallman,
613 1990) or a withdrawal behaviour (Wilson & Morgan, 2004). Nonetheless, the information about
614 the relative amounts of silence and time spent talking about sport-related topics is an important
615 addition to our understanding of parent-athlete communication, which was enabled by the use of
616 continuous videos as the method of data collection in the present study.

617 It is not known whether parents' and athletes' conversations were diminished due to the
618 presence of the camera; however, it is also plausible that participants might have talked more
619 about sport-related topics because they were aware that they were participating in a study related
620 to youth sport. Although the overall amount of time actually spent talking about sport during the
621 car ride was relatively short, these brief conversations could still impact youth athletes by
622 influencing their goal involvement in sport (Gershgoren et al., 2011). Indeed, athletes and
623 parents have reported that these interactions can be fraught with intense negative emotions and
624 criticism, or conversely that athletes valued the time spent talking about sport with their parents
625 (e.g., Elliott & Drummond, 2017a; Tamminen et al., 2017). However, given that the present
626 findings indicated minimal time was spent exclusively talking about sport during the car ride, we
627 should consider the possibility that less sport-specific conversation takes place during the car
628 ride than assumed, and that these conversations are also occurring at home and at sporting
629 venues (Sutcliffe et al., 2021). Given that a relatively little amount of time was spent talking
630 about sports during the observed periods in the current study, one useful topic for future research
631 would be to ask parents and athletes about other times they engage in sport-related
632 communication; an experience sampling or daily diary design would be well-suited to assess
633 when, and for how long, parents and athletes communicate about sport-related topics, as well as

634 the nature and effect of the communication (e.g., topics discussed, experience, and impact of the
635 interaction).

636 Although more research is required to examine the associations between various types of
637 interactions and communication approaches with athlete and parent outcomes, there are some
638 potential applied implications of this research for sport practitioners working with parents. First,
639 parents can be encouraged to reflect on their communication and critically think about the types
640 of interactions they engage in with their child; for example, parents could be encouraged to
641 consider whether they tend to ask open or closed questions, and whether they ask questions that
642 invite a descriptive answer or a more reflective answer from their child (see also Azimi &
643 Tamminen, 2020). In doing so, practitioners working with athletes could facilitate discussions
644 with parents to consider how their own patterns of interaction with their child can be enhanced to
645 support athletes' own critical reflection and self-awareness. Furthermore, given that athletes in
646 the current study made very few positive comments about their own performance compared to
647 parents, it also seems valuable to remind parents about their importance in creating a supportive
648 emotional climate for athletes (Harwood & Knight, 2015), as athletes may be inclined to focus
649 more on the negative aspects of their own performance.

650 **Strengths, Limitations, and Areas for Future Research**

651 One strength of this study was the use of video recordings of the entire length of the car
652 ride to and from sport-related events; this type of in-vivo data collection is useful for capturing
653 the dynamics of parent-child interactions and adds to previous research that has relied on
654 retrospective interviews or surveys with participants. A second strength was the development of
655 a coding framework in a two-stage process that was initially informed by literature in youth sport
656 and that was enhanced by the content of the interactions captured in the videos. Third, the use of
657 multiple coders strengthened the analysis of the videos, and a fourth strength of this study was

658 that we analyzed the entirety of the videos (as opposed to smaller segments of videos), which
659 enabled us to examine all instances of sport-related interactions between parents and children
660 during the car ride to and from sport competitions.

661 A limitation to the present study was that recruitment was likely subject to social
662 desirability and selection bias, as only parents who were comfortable with themselves and their
663 children being filmed were expected to have provided consent and participated in the study.
664 Further, given that participants were aware that their behaviours were being captured on film, it
665 is possible that participants censored their behaviours so not to display any that may appear
666 inappropriate, such as yelling, cursing, or providing highly critical feedback. Social desirability
667 or impression management is an issue to consider in studies where participants are observed or
668 interviewed (Collins et al., 2005), or where they self-report behaviours such as in surveys on
669 sensitive topics (Krumpal, 2013). We did note some instances of these more negative behaviours,
670 as well as examples of parents looking at their cell phones while driving (which is illegal),
671 suggesting that not all the participants censored their behaviours due to the presence of the
672 camera. Another limitation was that no data was collected regarding when each car ride took
673 place (i.e., whether the video was before or after a game versus a practice) or if parents attended
674 the sporting event. These factors may have influenced the kinds of interactions that took place in
675 the car ride and the amount of sport-related dialogue during the car ride. Thus, future research
676 may seek to examine potential differences in interactions and communication before and after
677 games and practices. Finally, there were several videos that were removed due to the recording
678 occurring at night or when there were other people in the vehicle; thus, the behaviours observed
679 in the videos cannot be generalized beyond dyadic interactions between parents and athletes.

680 To address these limitations, incorporating multiple methods of data collection to capture
681 communication patterns between parents and athletes over the course of the entire day and in

682 other contexts should be explored. For example, combining several methods of data collection,
683 such as the use of video recordings, EAR devices (Sutcliffe et al., 2021), and experience
684 sampling measures (i.e., daily diaries) could be used to corroborate data and identify where
685 sport-related conversations are taking place. Such a combination of methods would allow
686 researchers to capture a wider array of situations and contexts (e.g., dinnertime, watching sports
687 on TV, etc.) that might produce information about patterns of daily parent-child communication.
688 Future research using video recordings could also pair them with daily diary methods to ask
689 parents and athletes about their perceptions of each car ride experience to determine whether the
690 car ride reflected a typical experience, as well as their affective responses to the conversation.

691 The current study included 98 videos of parent-child interactions (over 30 hours of
692 videos); however, our study was limited by the small sample size (28 dyads), which limits the
693 generalizability of the results to other groups and precluded comparative analyses. It is important
694 to note that patterns of communication, expressions of emotions, and conflict between parents
695 and children differ depending on athletes' ages, stages of development, levels of competitive
696 sport, as well as gender (Laursen & Collins, 2004; Lienhart et al., 2019). The small sample size
697 in the current study precluded considering such factors. Thus, researchers in the future should
698 study a broader sample of participants to consider how parent-child communication differs as a
699 function of age, gender, and competitive level.

700 In conclusion, the present study adopted a novel approach to examine parent-child sport-
701 related communication, and the results of the study provide insight into 'what actually happens'
702 during the car ride to and from sporting events. We identified various verbal and non-verbal
703 behaviours from parents and athletes, and our analysis of patterns of interactions provided insight
704 into parents' and athletes' contributions to conversations. The findings from this study and the
705 coding framework can serve as a platform for future research to advance understanding of

706 parent-athlete communication, and ultimately promote positive developmental outcomes for
707 youth athletes.

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Table 1. Coding framework for parent-child verbal behaviours during car ride videos

Verbal Behaviours		
Behaviour	Definition & Example Statements	Modifier
Performance Praise	<p><u>Ego</u>: Positive comments about the athlete’s performance related to an objective outcome, such as winning, or based on a comparison where the athlete performed better than others.</p> <ul style="list-style-type: none"> • Parent: “Your goal was the most impressive of the whole match.” • Athlete: “My goal in the second half helped keep us in the game and led us to the win.” 	Ego (0) Task (1) Gen. (2)
	<p><u>Task</u>: Positive comments about the athlete’s execution of a skill during their performance.</p> <ul style="list-style-type: none"> • Parent: “Nice footwork today.”, “Your serving looked better this practice.” • Athlete: “My passing was really accurate today.” 	
	<p><u>General</u>: Positive comments about the athlete’s performance that are not related to performance outcomes or skill execution.</p> <ul style="list-style-type: none"> • Parent: “Good job today.” • Athlete: “I played a great game this evening.” 	
Performance Criticism	<p><u>Ego</u>: Negative comments about the athlete’s performance related to an objective outcome, such as winning, or based on a comparison where the athlete performed worse than others.</p> <ul style="list-style-type: none"> • Parent: “Your team lost because you let that goal in.” • Athlete: “I’m so mad we lost because I missed that penalty shot.” 	Ego (0) Task (1) Gen. (2)
	<p><u>Task</u>: Negative comments about the athlete’s execution of a skill during their performance.</p> <ul style="list-style-type: none"> • Parent: “You made a lot of bad passes that led to neutral zone turn overs.” • Athlete: “I wasn’t being patient enough and waiting for opportunities to pass the ball during that drill.” 	
	<p><u>General</u>: Negative comment about the athlete performance that are not related to performance outcomes or skill execution.</p> <ul style="list-style-type: none"> • Parent: “It wasn’t good enough today.”, “You guys had some really sloppy stretches.” • Athlete: “I played horribly.” 	
Areas for Improvement	<p>Comments outlining areas of sport performance that the athlete can improve upon.</p> <ul style="list-style-type: none"> • Parent: “When you’re defending, remember not to be afraid to challenge the opposing players.”, “You should really work on improving your passing and making it more accurate.” • Athlete: “I need to work on being more aggressive when driving the ball to the basket.” 	
General Statement	<p>General statements related to sport.</p> <ul style="list-style-type: none"> • Parent: “Your game next week is at a new arena in Oshawa.”, “Your practice time was moved an hour later.” • Athlete: “We won our game today 2-0.”, “Coach was angry today.” 	

Expression of Confidence	Comments that reflect confidence in the athlete's ability to succeed. <ul style="list-style-type: none"> • Parent: "You'll do great – I believe in you.", "You've got this game, buddy. You're good." 	
Expectations	<u>Ego:</u> Performance-based comments expressing an expectation for the athlete or team. <ul style="list-style-type: none"> • Parent: "I expect you to score a goal today." • Athlete: "I want our team to win today." 	Ego (0) Task (1) Gen. (2)
	<u>Task:</u> Skill mastery-based comments expressing an expectation for the athlete or team. <ul style="list-style-type: none"> • Parent: "I want you to concentrate on your passing today." • Athlete: "Just like last game, I want my hitting percentage above 0.500." 	
	<u>General:</u> Comments expressing an expectation that are neither skill- nor performance-based. <ul style="list-style-type: none"> • Parent: "I just want you to have fun.", "I don't want you to give up. You have to play hard." 	
Expression of Concern	Comments expressing concerns regarding athlete health, wellbeing, safety, or upcoming sporting events. <ul style="list-style-type: none"> • Parent: "I think your practices are getting too intense.", "I just don't want you to get hurt." • Athlete: "I'm worried that I won't make the team next year." 	
Descriptive Questions	<u>Closed:</u> Questions that invite subjects to respond with brief, definitional answers. <ul style="list-style-type: none"> • Parent: "Was [teammate/friend] at practice today?" • Athlete: "What time is my game this weekend?" 	Closed (0) Open (1)
	<u>Open:</u> Questions that invite subjects to respond with longer free-form, definitional answers. <ul style="list-style-type: none"> • Parent: "What needs to happen for your team to make playoffs?" • Athlete: "What's the plan for travelling to the tournament next weekend?" 	
Reflective Questions	<u>Closed:</u> Questions that invite subjects to reflect and respond with a brief answer. <ul style="list-style-type: none"> • Parent: "Do you think you played well tonight?" • Athlete: "Do you think I played well tonight?" 	Closed (0) Open (1)
	<u>Open:</u> Questions that invite subjects to reflect and respond with a longer answer. <ul style="list-style-type: none"> • Parent: "What do you think you did well last match?" • Athlete: "How do you think I could improve my game?" 	
Response ^a	Brief responses to questions or statements. <ul style="list-style-type: none"> • Disagree: "No.", "Nah." • Agree: "Yeah.", "You're right.", "Totally.", "I know." • Neutral: "I don't know.", "Thanks.", "Maybe.", "Kind of." 	Disagree (0) Agree (1) Neutral (2)
Non-Sport Related	Any verbal dialogue that is not directly related to sport (e.g., family-related issues, school, etc.). This code is also used for instances of singing and irregular sound effects (e.g., retching, blowing raspberries, etc.).	
Silence	When the subject is not talking. Note: To account for natural pauses in speech, a 3-second grace period is used. This means that if a subject pauses for less than 3 seconds before continuing their initial train of thought, this pause in speech is not coded as silence.	

Table 2. Coding framework for parent-child non-verbal behaviours during car ride videos.

Non-Verbal Behaviours		
Behaviour	Definition & Examples	Modifier
Orient Towards other Person	Subject turns head to look at the other subject but no eye contact is made.	
Eye Contact	Both subjects are looking at one another. Note: The timestamps when using this code should be identical for both subjects' non-verbal behaviours.	
Laughing / Smiling	Laughing: Vocalizations and movements of face and body that express amusement, exultation, or scorn. Examples include: <ul style="list-style-type: none"> • Parent/athlete laughing at one another's jokes • Parent/athlete laughing out of uncertainty • Parent/athlete laughing derisively Smiling: corners of mouth turn upward, indicating amusement, exultation, or scorn.	
Gesturing	Continuous movements of the arms and hands. Examples include, but are not limited to: <ul style="list-style-type: none"> • Parent/athlete demonstrating a practice drill/game play • Parent pats/rubs child on head • Parent/athlete dancing This code is also used to denote any head movements that cannot be adequately captured by the 'Head Movement' code, such as gesturing with one's head to point at something or when using one's head to demonstrate a sport-related movement (e.g., a header in soccer).	
Resting / Sleeping	Subject is engaged in resting behaviours with eyes opened (i.e., leaning head against window or lying down with front seat laid back) or the subject's eyes are closed and they appear to be sleeping.	
Headphones	Subject has one or both headphones placed in their ear.	
Head Movement ^a	Subject engages in repeated upward/downward or left/right motions of the head. <ul style="list-style-type: none"> • Disagree: moving head from left to right • Agree: moving head upward and downward (i.e., nodding) • Neutral: head movement that is neither in agreement or disagreement; includes combination of tilting head to either side and shrugging shoulders 	Disagree (0) Agree (1) Neutral (2)
Screen, Phone, Reading	Subject is using their phone (e.g., texting or playing game), speaking directly on the phone, or engaged in a reading activity (e.g., looking at directions printed out on paper).	
Eye Roll	Subject turns their eyes upward in an arching motion from one side to the other.	

Notes: Non-verbal behaviours not listed above are considered default driving behaviour (e.g., checking blind spots or mirrors, changing the radio, looking ahead at the road, etc.). There is no code for these behaviours, rather all portions of videos that do not have a non-verbal code are considered ‘default driving behaviour’.

Verbal or non-verbal behaviours that do not involve both consenting participants (i.e., parent and athlete) are not coded. This includes such instances as verbal dialogue with an individual through Bluetooth phone call, laughing in relation to something an individual said through Bluetooth phone call, or waving to neighbours outside of the car.

^a Responses and head movements are context dependent and should be coded as such. For example, if a negative question is asked (e.g., “You didn’t have fun out there?”), the response “no” or a head movement from left to right would be coded as “agree”.

Table 3. Descriptive statistics for verbal behaviours.

Verbal Behaviour		Parents				Athletes			
		Total instances	Mean	Median	Range	Total instances	Mean	Median	Range
Performance Praise	Ego	1	0	0	0-1	0	0	0	0-0
	Task	32	1.1	0	0-9	12	0.4	0	0-8
	General	31	1.1	0.5	0-7	10	0.4	0	0-2
Performance Criticism	Ego	3	0.1	0	0-1	1	0.0	0	0-1
	Task	30	1.1	0	0-6	26	0.9	0	0-5
	General	9	0.3	0	0-3	9	0.3	0	0-3
Descriptive Question	Open	125	4.5	2.5	0-22	69	2.5	1	0-30
	Closed	557	19.9	14.5	1-60	210	7.5	4	0-26
Reflective Question	Open	18	0.6	0	0-6	3	0.1	0	0-2
	Closed	151	5.4	2.5	0-34	30	1.1	0	0-9
Areas for Improvement		107	3.8	2	0-26	18	0.6	0	0-13
General Statement		1278	45.6	29	2-196	1193	42.6	32.5	4-137
Expectations	Ego	5	0.2	0	0-1	0	0	0	0-0
	Task	8	0.3	0	0-3	2	0.1	0	0-1
	General	17	0.6	0	0-5	4	0.1	0	0-1
Expression of Confidence		19	0.7	0	0-6	0	0	0	0-0
Expression of Concern		4	0.1	0	0-1	7	0.3	0	0-3
Response	Agree	1416	50.6	34	6-166	1618	57.8	41.5	1-208
	Disagree	368	13.1	7	0-65	423	15.1	11	0-82
	Neutral	363	13.0	9	0-53	368	13.1	12.5	0-42
Non-Sport Related Statements or Discussion		5234	186.9	136.5	8-939	4766	170.2	121.5	9-1113
Silence		8456	302.0	243	23-1170	7889	281.8	248	20-1359

Note. The mean, median, and range values are based on frequencies per dyad.

Table 4. Descriptive statistics for non-verbal behaviours.

Non-Verbal Behaviour		Parents				Athletes			
		Total instances	Mean	Median	Range	Total instances	Mean	Median	Range
Orient Toward Other Person		2556	91.3	60	2-399	4159	148.5	69.5	4-1109
Eye Contact		805	28.8	13.5	1-188	805	28.8	13.5	1-188
Laughing/Smiling		895	32.0	14.5	0-164	1009	36.0	19.5	0-275
Gesturing		1234	44.1	22	0-178	1068	38.1	17	0-275
Head Movement	Agree	622	22.2	15	0-122	572	20.4	13.5	1-71
	Disagree	228	8.1	4	0-36	158	5.6	3	0-30
	Neutral	732	26.1	15	0-116	341	12.2	10	0-58
Resting/Sleeping		0	0	0	0-0	57	2.0	0	0-14
Screen/Phone/Reading		514	18.4	2	0-85	922	32.9	20	0-137
Headphones		0	0	0	0-0	14	0.5	0	0-5
Eye Roll		3	0.1	0	0-1	2	0.1	0	0-1

Note. The mean, median, and range values are based on frequencies per dyad.

Supplementary File

Section A – Reference list of 45 peer-reviewed articles used for development of initial coding framework

Section B – Table S1

Section C – Table S2

Section A

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Table S1. Frequencies and average response times of athletes' verbal responses to parent verbal behaviours.

Parent Verbal Behaviour	Athlete Verbal Response																	Average Athlete Response Time (min:sec.ms)
	Statement	Praise – Task	Praise – General	Criticism – Ego	Criticism – Task	Criticism – General	Areas for Improvement	Expectation - Task	Concern	Descriptive Question	Response – Agree	Response – Disagree	Response – Neutral	Non-Sport Related	No Response	Parent Interjected	Parent did not allow Verbal Response	
Descriptive Question (125 instances; average 6.0/dyad)	65	4	3	-	4	-	5	-	2	13	-	-	12	2	-	14	1	00:00.90
Reflexive Question (18 instances; average 2.0/dyad)	12	2	-	-	-	1	-	-	-	-	-	-	2	-	-	1	-	00:00.98
Performance Praise (64 instances; average 4.0/dyad)	5	1	-	1	1	1	-	-	-	3	8	-	3	-	6	21	14	00:01.02
Expressions of Confidence (19 instances; average 2.4/dyad)	2	-	-	-	-	-	-	-	-	-	4	-	-	2	1	5	4	00:01.06
Performance Criticism (42 instances; average 3.5/dyad)	15	-	-	-	1	-	-	-	-	-	12	1	-	-	2	7	4	00:00.68
Areas for Improvement (107 instances; average 6.7/dyad)	16	-	-	-	1	1	1	2	-	2	23	-	2	1	10	30	18	00:00.74

Note. The averages per dyad were calculated based on the number of dyads that had at least one instance of the given behaviour. For example, parents in 12 dyads out of 28 dyads provided at least one performance criticism, thus there were 3.5 instances of performance criticism per dyad (i.e., 42 instances/12 dyads).

Table S2. Frequencies of athletes’ non-verbal responses to parent verbal behaviours.

Parent Verbal Behaviour	Athlete Non-Verbal Response									
	Orient Towards Parent	Eye Contact	Laughing / Smiling	Head Movement: Agree	Head Movement: Neutral / Unsure	Head Movement: Disagree	Gesturing	Screen / Phone	Headphones	None
Descriptive Question (125 instances; average 6.0/dyad)	20	6	1	1	5	-	8	-	-	76
Reflexive Question (18 instances; average 2.0/dyad)	1	1	1	-	-	-	-	3	1	13
Performance Praise (64 instances; average 4.0/dyad)	3	1	2	11	2	2	-	6	4	40
Expressions of Confidence (19 instances; average 2.4/dyad)	1	1	-	1	-	-	3	-	-	13
Performance Criticism (42 instances; average 3.5/dyad)	10	5	-	6	1	-	2	1	-	21
Areas for Improvement (107 instances; average 6.7/dyad)	15	3	4	23	-	-	2	7	-	62

Note. The averages per dyad were calculated based on the number of dyads that had at least one instance of the given behaviour. For example, parents in 12 dyads out of 28 dyads provided at least one performance criticism, thus there were 3.5 instances of performance criticism per dyad (i.e., 42 instances/12 dyads).