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From Imaginative Experiments to Inventive Performances

On the Role of Creativity in the Developmental Experiences of Professional Ice Hockey Players

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1 **From Imaginative Experiments to Inventive Performances:**

2 **On the Role of Creativity in the Developmental**

3 **Experiences of Professional Ice Hockey Players**

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5 **Abstract**

6 Despite an increasing interest in studying creativity in sport, previous research has primarily focused on
7 in-game creative performance and employed research designs neglecting sport participants' perspectives.
8 Hence, this study explored professional athletes' developmental experiences involving creativity. Semi-
9 structured retrospective interviews were conducted with eight ice hockey players performing in or retired
10 from National Hockey League (NHL), Kontinental Hockey League (KHL), or Swedish Hockey League
11 (SHL). Players described 15 modalities of creative actions emerging when playing, practicing, and
12 performing. Based on the players' experiences, creativity led to augmented levels of enjoyment (i.e., elicit
13 passion), development (i.e., enhance potential), achievement (i.e., enrich in-game qualification), and
14 fulfillment (i.e., extend career progression). Findings contribute to a more nuanced understanding of
15 creativity in sport and provide novel insights on the role of creativity in the development and maintenance
16 of expertise in sport and the nature and role of deliberate play and deliberate practice in developing
17 creativity.

18 **Keywords:** *Deliberate Play; Deliberate Practice; Creativity; Pragmatism; Developmental Activities;*

*Athlete Perspectives on Creativity***19 From Imaginative Experiments to Inventive Performances: On the Role of Creativity in
20 the Developmental Experiences of Professional Ice Hockey Players**

21 The term “creative” is often used by sports coaches, researchers, and media to describe athletes
22 capable of making surprising and rare decisions, for the benefit of themselves and/or their team.
23 For such reasons, creative players such as ice hockey legend and NHL Hall of Famer, Wayne
24 Gretzky, are celebrated as sporting geniuses (Hopsicker, 2011). Known as “The Great One”,
25 Gretzky could invent things on the ice that no one had ever seen before (Campos, 2014). While
26 research in sporting creativity has portrayed such greatness at its fruition and has taken several
27 steps to determine how it is developed, there is a limited number of in-depth explorations of sport
28 participants’ perspectives on developmental experiences involving creativity (e.g., Bar-Eli et al.,
29 2008; Durand-Bush & Salmela, 2002; Goldenberg et al., 2010). Based on an in-depth exploration
30 of the creative career experiences of professional ice hockey players, this paper discloses that
31 diverse modalities of creative actions may not only lead to highly creative and innovative game
32 performances but play important roles in the development of sporting expertise. Before
33 delineating the purpose and pragmatist position of this study, we address a gap in the extant
34 literature: The underexplored voice of the sport participants.

35 The underexplored perspectives

36 The amount of creativity research in team invasion games has increased exponentially in recent
37 decades (Fardilha & Allen, 2020), including several theoretical accounts of definitional criteria
38 (e.g., Campos, 2014; Vaughan et al., 2019) and developmental activities towards becoming an
39 extraordinary creative player (e.g., Santos et al., 2016). Two systematic reviews of creativity in
40 sports have been published in the last few years. In the first review, Fardilha and Allen (2020)
41 investigated definitions, correlates, assessments, and developmental activities. Among more, the
42 study showed that extant research has been limited by cognitive tradition in the field of creativity
43 research, with definitions and measurements privileging creative thinking over creative action,
44 as well as an emphasis on examining relations between creativity and cognitive rather than social

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45 variables. As Fardilha and Allen (2020) argue, the field of sporting creativity is skewed towards
46 quantitative, experimental, and quasi-experimental designs. Consequently, the voices of sports
47 participants' have to a large degree been neglected. This also limits the understanding of doing
48 as an integral feature of creativity in sport (e.g., scoring the player's actions for motor
49 components such as versatility instead of describing unique solutions and experiential
50 advantages). Besides adopting qualitative methods to gain additional insights into creativity,
51 Fardilha and Allen (2020) called for more detailed descriptions of developmental activities
52 leading to creativity and a more accurate conceptualization of what constitutes deliberate play
53 and practice, which have been too broadly defined in the extant literature. These suggestions
54 guided the design of the present study.

55 In the second review, Zahno and Hossner (2020) classified the diverse conceptualizations and
56 operationalizations of sporting creativity. Adding to the suggestions above, their results showed
57 that most studies focus on creative game performance rather than creative activities taking place
58 beyond matches. Moreover, the study exhibited that the term creativity is mainly defined and
59 applied as a personal attribute. Few studies focus on exploratory processes or creative actions.

60 Quantitative designs are important to access the relationships between creativity and selected
61 variables and compare the efficiency of approaches. Still, as stressed in a critical examination of
62 creativity-enhancing approaches, such designs rarely encompass other outcomes than creativity
63 variables (Rasmussen & Rossing, 2022). Put differently, a narrow focus on creative outcome
64 measures tells little about who created what, how they did it, and what this meant to them. It fails
65 to situate the creative process within the wider life context of the embodied subjects (Glăveanu
66 & Beghetto, 2020). To bring together player, process, context, and outcomes, there is a need for
67 in-depth research on sport participants' lived experiences of creative activities. Hence, sport
68 researchers need to embrace the complexity of creativity by moving away from focusing on
69 testable relationships and studying individual elements in isolation (Richard et al., 2021).

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70 Despite the necessity of qualitative research designs, a limited number of studies have aimed
71 to study sport participants' perspectives on creativity and its development and potentials (e.g.,
72 Fardilha, 2021; Martin & Cox, 2016). For example, an autoethnographic study discussing the
73 possibilities to transfer general creative skills from jazz to field hockey stressed the transfer of
74 pattern recognition and selective pattern breaking to surprise, confound expectations, and create
75 scoring opportunities (Harrison, 2016). This offers a unique insider perspective, with a focus on
76 real-time improvisatory creativity in expert performances. Despite the unique contribution of
77 such research, only a few studies on creativity-enhancing approaches in invasion games explored
78 participants' perspectives and thereby transcended the focus on creative performance correlates,
79 as described above. As a rare exception, Rasmussen and Østergaard's (2016) qualitative study
80 focusing on the application of *The Creative Soccer Platform* on a recreational U15 team, showed
81 that the approach established a safe and autonomous environment, with playful engagement in
82 flexible, original, and abnormal actions without fearing mistakes. Similarly, Santos and Morgan
83 (2019) showed that the application of principles transferred from jazz improved U14 recreational
84 volleyball players' tactical and strategic knowledge, communication, and improvised gameplay.
85 Studies like these offer insights into young people's experiences of creative activities applied in
86 practice by the initiative of researchers. However, they do not capture experiences resulting from
87 creative activities emerging in various sports contexts across the sport participants' careers.

88 Such insights could be gained from exploring athletes' perspectives on the role of creativity.
89 Studying the development and maintenance of expert performance, Durand-Bush and Salmela
90 (2002) showed that multiple Olympic gold-medalists perceived creativity as a vital personal
91 attribute in the maintenance years. Since creativity was not the central topic of investigation, no
92 insights were provided on the role of creativity during the sampling, investment, or specialization
93 years. Hence, and to sum up, there is a need for in-depth, contextualized knowledge regarding
94 the role of creativity in the development and maintenance of expert sport performance.

*Athlete Perspectives on Creativity***95 Purpose and positions**

96 Considering the points detailed above, the purpose of this study was to explore professional ice
97 hockey players' creative experiences across different contexts in their careers. Creative
98 experiences are “novel person-world encounters grounded in meaningful actions and
99 interactions, which are marked by the principles of open-endedness, nonlinearity, pluri-
100 perspectives and future-orientation” (Glăveanu & Beghetto, 2020, p. 76). Such markers of
101 creativity help account for the uniqueness of creative experiences. Creativity results in a diversity
102 of lived experiences since it emerges in indefinite and dynamic “encounters and entanglements
103 with the people, ideas, objects, projects, situations, uncertainties, and actions of everyday life”
104 (p. 76). Rather than considering creativity as an outcome, focusing on creative experiences turns
105 attention towards outcomes of creative activities, where the creating is oriented towards thinking,
106 acting, and being in new ways, engaging with fresh, unexpected potentials, exploring emerging
107 directions, and moving away from any dogged pursuits of pre-determined ends.

108 As creativity is personally meaningful, adopting a pragmatist stance allowed great sensitivity
109 to and context-dependent exploration of individual perspectives. From this position, human
110 experience is generated through dynamic transactions between person and environment,
111 meaning that our inner (e.g., subjective realities and personal capacities) and outer environments
112 (e.g., physical, social, and cultural features) are continuously constructed in co-dependent
113 relationships. Hence, pragmatism is portrayed by a practical, plastic, prospective, and pluralist
114 worldview, where reality is created through human action (Rasmussen & Glăveanu, 2019).
115 Considering the pragmatist position, the study design recognized that all participants experience
116 the world differently since they bring unique interests, dispositions, and histories to the situation.

117 To clarify our position as researchers, we are inspired by the socio-cultural stream in the field
118 of creativity research. Within this area, Glăveanu (2013) has proposed the five A's (i.e., actors,
119 actions, artifacts, audiences, and affordances) as a useful framework to empathize the articulation
120 of creativity in concrete socio-cultural settings. From this perspective, creativity “is concerned

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121 with the action of an actor or groups of actors, in its constant interaction with multiple audiences
122 and the affordances of the material world, leading to the generation of new and useful artifacts”
123 (p. 76). Hence, we neither understand creativity as a cognitive process, personality trait, or a
124 feature of products or ideas, but as a dynamic quality of action. As highlighted by Rasmussen et
125 al. (2019), we are oriented toward the developmental potentials of creative experiences for sport
126 participants at all levels and all playing positions (i.e., not only important for offensive players).
127 Considering creativity as a means rather than an end, everyone can be creative (i.e., by exploring
128 new and unusual action possibilities) and, among more, this process may enrich and expand
129 experiences and foster generative capacities to transform persons and environments.

Methods**Participants**

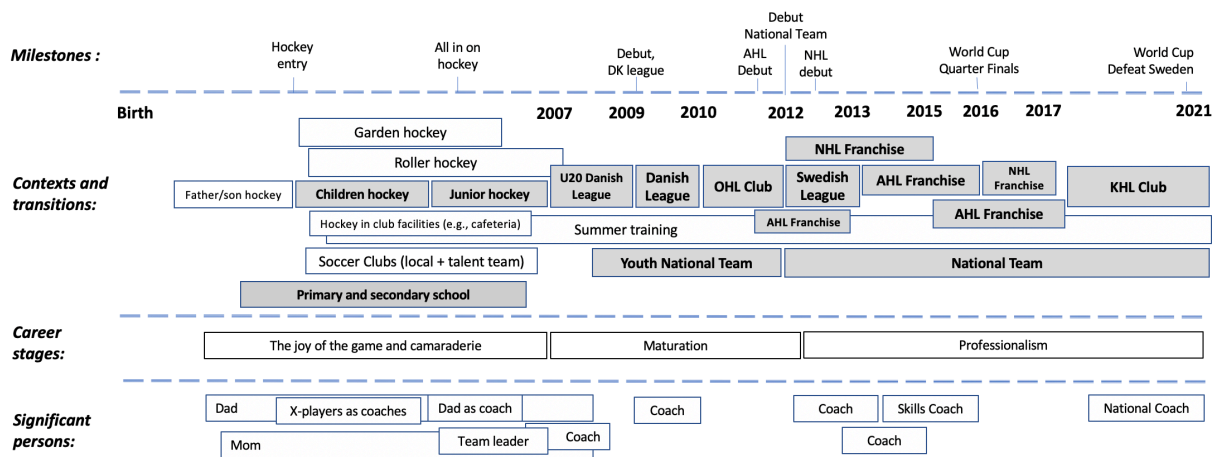
132 Seven current and one former player volunteered to take part (i.e., one goalie, two defensemen,
133 two centers, two wingers, and one winger/center). At the time of the interviews, they were 26–
134 40 years old (M age = 32.4; SD = 4.7), had played an average of 458 games across NHL, KHL,
135 and SHL (SD = 311), and represented Denmark in 49 World Championship games (SD = 27).
136 Ice hockey was chosen as the sport of interest due to opportunistic and purposive case selection
137 (Smith & Caddick, 2012). Recruitment was led by the second author, who had practiced and
138 played children, youth, or senior hockey with most participants. Contact was made by phone,
139 explaining the study’s aims and scope, or through gatekeepers on the National Team. Moreover,
140 purposeful criterion measures were applied to enhance the possibility to gain insights into the
141 role of creativity in athletes’ developmental experiences. To recruit Danish players performing
142 at the highest international level (or retired for no more than four years), criteria included at least
143 200 games across NHL, KHL, and SHL, and partaking in the IIHF World Championship. Players
144 from all field positions were recruited to emphasize varied experiences. Considering the focus

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145 on creative experiences it was expected that players had relevant insights although they did not
146 suffice as stereotypes of in-game creative players. Hence, no criteria were related to creativity.

147 Context

148 Compared to the rest of Scandinavia, Denmark has no proud winter sports tradition. For example,
149 Denmark only has 26 indoor ice hockey rinks and nearly 5.000 registered players. Both numbers
150 are at least 10 times greater in Sweden (363 rinks; 73.293 players) and Finland (282 rinks; 71.064
151 players) (Statistia, 2022). Nevertheless, in the last few decades, Danish ice hockey has advanced
152 from competing in the C-group in the IIHF National Championship to currently competing in
153 the A-group since 2003, and progression to the quarterfinals in 2010 and 2016. Today, Denmark
154 is the nation with the most NHL players (i.e., 14 in total) per registered player (Larsen, 2018).



156 **Figure 1:** Timeline example. Gray-scaled boxes were prepared before the interview, and the rest was added
157 during the interview. Names of hockey clubs and coaches have been removed for the purpose of anonymity.

158 Interviews

159 Suiting the purpose, interviews are useful to gain complex and detailed insights into events and
160 experiences (Smith & Sparkes, 2016). Interviews were conducted in a semi-structured manner
161 to allow further exploration of emerging narratives. This process was inspired by the small story
162 approach, which is oriented toward “real-life small stories-in-interaction” across timepoints and
163 contexts (Bamberg, 2005, p. 368). Accounting for the situatedness of telling stories, the small
164 story method avoids the tendencies of narrative inquiry to equate life and story and to essentialize

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165 identity with the core organizing concept found in “big stories” (Bamberg, 2008). Rather than
166 excavating enough episodes to be strung together into a coherent and authentic life-organizing
167 narrative for each player, it also allowed a more flexible approach to the interview. To discover
168 relevant life episodes, the interviewer applied a timeline as an elicitation technique to facilitate
169 and structure the conversations. Inspired by Storm et al. (2012), and as exemplified in figure 1,
170 a timeline representing each participant’s time in children, junior, and senior hockey was roughly
171 sketched. Preparing these timelines by searching the internet (e.g., www.eliteprospects.com)
172 allowed tailoring the interviews to players. While interviewing, the personalized sketches were
173 displayed on a shared screen on Zoom. Players portrayed key narratives from their life, while
174 LJTR wrote keywords to develop the timeline. To finalize these timelines, the first part of the
175 interviews comprised open-ended questions about personal, social, and cultural qualities playing
176 significant roles in their career (e.g., “How did you begin playing hockey?”; “How would you
177 describe your time in junior hockey?”). Players were also asked to portray self-organized sport
178 activities and name different career stages (e.g., “just for the fun of it”). Besides serving purposes
179 of elicitation and contextualization, this provided a basis for bringing forth creative experiences.
180 Hence, the last part of the interviews covered creativity-related questions directed against these
181 developmental activities and stages (e.g., “Was there any creativity involved when playing
182 hockey in the garden as a kid? “Which role did creativity play in the X stage defined earlier?”).
183 Players were encouraged to provide detailed examples of 1) their conception of creativity (e.g.,
184 “what does creativity mean to you?” and 2) its role in their development (e.g., “In your
185 experience, why is creativity important for ice hockey players?”). A generic interview guide is
186 provided as supplemental material to this paper (this was translated from Danish to English).

187 Due to COVID-19 and geographical distance, all interviews were conducted and recorded via
188 Zoom. Seven players took part from home, and one was traveling to a game. Before interviews,
189 informed consent was obtained after reminding players about the aims, use of personal data, and
190 the nature of qualitative interviewing. In this regard, the project was conducted in accordance

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191 with national and institutional guidelines for research ethics as approved by an institutional unit
192 governing the use of personal data (project serial no. 2021-068-01449).

193 Interviews were conducted by the first author, who curiously, respectfully, and responsively,
194 encouraged them to elaborate on their narratives (e.g., “Can you say more about why that’s
195 creative?”). As Glăveanu and Beghetto (2020) argue, we are not “always aware of creative
196 experiences as ‘creative’.” (p. 77). Thus, players’ experiences could be externally evaluated as
197 creative if (most of) the creativity markers apply (cf. *Purpose and positions*). The interviews
198 lasted 70–160 minutes (M time = 108; SD = 32) and were transcribed verbatim. All interviews
199 were conducted in Danish, whereas specific quotes used in the results were translated to English
200 after being selected during the thematic analysis.

201 Analysis

202 An inductive approach was used to analyze the data guided by reflexive thematic analysis (Braun
203 et al., 2016), which was chosen due to its flexibility and ability to adapt the analytical process to
204 the research question (Braun & Clarke, 2019). This iterative process was led by the first author,
205 whereas the second author and a sport psychology expert continuously served as critical friends
206 to constructively challenge findings. First, all transcripts were read twice to become familiarized
207 with overall career experiences, while making notes on attention-grabbing sequences (also when
208 transcribing). In coding, analytically relevant data segments were located, extracted, and named
209 with informative, concise labels (e.g., “design drills and duels”). To preserve players’
210 experiences, this stage focused on the semantic level. In later stages, a more latent level of
211 analysis was used to differentiate outcomes (e.g., to interpret underlying assumptions about the
212 nature of creativity). Guided by the purpose of the study, three overarching themes were initially
213 generated: A) definition of creativity, B) contexts for creativity, and C) outcomes of creativity.
214 During further theme development (i.e., generate sub-themes), these were apportioned to 1)
215 experiences of creative modalities (i.e., uniting definitions and contexts) and 2) experiences of

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216 creative outcomes. The underlying themes and sub-themes were generated inductively, based on
217 emerging codes and relations between sub-themes. To shape and classify themes and sub-
218 themes, the original codes were iteratively clustered in core meaning patterns around central
219 constructs that formed the sub-themes (e.g., “inventive play” and “the joy of invention”). Themes
220 and sub-themes were continuously refined by carefully examining whether they represented the
221 textual data extracts. Amongst other things, this resulted in dividing “re-inventive play” and
222 “impulsive play” which were initially compiled and reconceptualizing the outcomes, which were
223 first divided into “passion”, “progression”, and “performance”. Such alterations prevented
224 redundancy and ensured attending to the purpose in a compelling yet perspectival and partial
225 way (Braun et al., 2016). Throughout the analytical steps naming and especially theme writing
226 served as tools of inquiry and discovery (Richardson & St. Pierre, 2005). Before finalizing the
227 analysis, e-mails with two-page summaries of the findings were sent to the players for member
228 reflections (Smith & McGannon, 2018), inviting them to access whether their views and
229 experiences were adequately represented. Within four weeks, three players responded and all
230 three endorsed the findings. All names are pseudonyms.

231 Consideration of research quality

232 Based on the pragmatist position, the knowledge produced is to be considered time and context-
233 bound and cannot be seen as independent truths. Similarly, in a changeable and contingent world,
234 it would not be meaningful to apply universal approaches to research appraisal. As this may
235 counteract innovative and valuable research, authors should disclose their chosen markers of
236 quality (Smith & McGannon, 2018). Coherence, credibility, transparency, and resonance were
237 emphasized in this study. For example, credibility was enhanced by crystallization (Richardson
238 & St. Pierre, 2005), which regards appreciating an unstable and complex world (e.g., reflecting
239 a multivocality of lived experiences). To this end, the diverse narratives about creativity may
240 entail resonance, or naturalistic generalization, by stimulating readers’ curiosity, making them

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241 form connections to their situations, and provoking actions (Smith & Caddick, 2012). Moreover,
 242 transparency was inter alia enhanced by providing the general interview guide as supplemental
 243 material, and coherence by ensuring an alignment between the purpose and our methodological
 244 choices (e.g., analytical categories and topics chosen for the discussion).

245 **Results**
 246 As shown in tables 1 and 2, the results illustrate 1) how the players were creative (i.e., modalities
 247 of creativity), and 2) why these modes of creativity were important (i.e., outcomes of creativity).

248

249

<i>Themes</i>	<i>Sub-themes</i>	<i>Description</i>
Playing	Inventive play	Self/peer-led invention of challenging drills and duels
	Explorative play	Explore different ways to solve unusual challenges
	Impulsive play	Attempt all kinds of foolish and frivolous moves
	Imaginative play	Impersonate idols and imagine game scenarios
	Reinventive play	Curiously reproduce others' moves or solutions
	Self-training experiments	Test ideas and explore how to do things differently
Practicing	Illusionistic approach	Exploring original ways to duke and deceive others
	Self-imposed exploration	Inventing ways to add variability to repetitive drills
	Refining technical finesses	Geeking with the small details of specific skills
	Utilizing novel equipment	Exploiting new and alternative ways to practice
Performing	Individual and unrestricted decisions	Independently find ways to solve game situations
	Changeable and spontaneous solutions	Make quick decisions to adapt to unexpected events
	Disguised and misleading actions	Outsmart the opponents with unexpected solutions
	Frisky and risky attempts	Try stunning moves to make an impact on the game
	Co-creative plays	Improvisation to create possibilities for each other

250 **Table 1:** Modalities of creativity across play (i.e., self-led activities), practice (i.e., coach-led activities), and
 251 performance (i.e., in-game actions) contexts during children, youth, and senior hockey.

252
 253 Modalities of creativity

254 Results comprise 15 modalities of creativity that occurred in the contexts of *playing* (i.e., during
 255 self- or peer-led activities), *practicing* (i.e., coach-led activities), or *performing* (i.e., in-game).

256 *Playing*

257 The players engaged in a variety of creative modalities during unsupervised and self-controlled
 258 play activities throughout their childhood and early adolescence. These modalities of creative

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259 play took place at an array of locations, such as outdoor courts (i.e., “street hockey”), backyards
260 (i.e., “garden hockey”), and club facilities (i.e., rinks on the ice during the off-season; pre/post
261 games and practice). In these play contexts, creativity emerged as *inventive play*, which regards
262 the process of designing challenging drills and duels with competitive and/or explorative tasks.

263 It’s creative to make small competitions. If you made a contest about who could hit a cola can on
264 a goal, for example, then you took turns to be creative, saying “okay, now we have to drive around
265 that cone and shoot”. We were creative in the ways we challenged each other and didn’t take it all
266 too seriously, but just found different ways to test each other. For example, a small obstacle course
267 with some cones to dribble around, and then see who could get the best time. (Alen)

268 While some players mostly linked creativity to the self- or peer-led crafting of the competitive
269 challenges and “putting each other in unfamiliar situations” (Leo), others described creativity as
270 *explorative play*, which regarded exploring different a way to solve the challenges:

271 I often put a hockey goal in front of the garage to practice different things and invent things. I made
272 these contests, where I had to hit things hanging from the crossbar with a tennis ball. In this way,
273 I tried to set some challenges and ask myself “how can I do this.” Try one thing, and “no, that was
274 not the right way to shoot, let me try another way instead. Okay, now it worked.” I didn’t have all
275 the answers to how to solve the challenges, but I found the process to succeed. (Ron)

276 Whereas *inventive* and *explorative play* were explicit and relatively structured ways of being
277 creative by defining the rules and coming up with varied solutions, a more frivolous, irrational,
278 and random modality of creativity could be portrayed as *impulsive play*. Here, players attempted
279 all kinds of remarkable and difficult tricks, including many actions that would not be proper in
280 games, but emerged when fooling around, doing whatever came to mind.

281 In street hockey, one tried some even more stupid and silly things, in a funny way. Trying some
282 weird things, juggling all the way through, putting it through the feet, or something. This is exactly
283 the part of the sport that you thought was fun back then, no matter if it was on ice or streets. (Ned)

284 This lighthearted extemporization possibly also involved *imaginative play*, which regards
285 impersonating hockey idols and envisioning fictive hockey scenarios to try out imaginative
286 solutions. For example, Gus was inspired by a previous Danish national player:

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287 He could do fantastic things with the puck that I would like to learn. So, I practiced it daily, running
288 around and playing with the puck, flipping it, juggling it, all those things. I just ran around playing
289 I was him, and then it was not just shooting, but trying to dangle [a hockey-specific term describing
290 different kinds of moves used to fake opponents] by sliding the puck under the opponent's stick,
291 and such, because he did those kinds of things. (Gus)

292 *Reinventive play* also relied on the players' imaginative capacity but was seen as a re-creation
293 of alluring tricks or solutions observed among peers or on videos. This was not seen as copying,
294 but as an appropriation of their style and as a curious reproduction based on certain prerequisites.

295 Being curious about how to become better, or find an advantage, without cheating of course, but
296 finding out how can I become better than the others during the summer. Spend time playing, for
297 example, trying things out and see if you can do the things you see in highlight videos. (Alen)

298 The abovementioned modalities of creative play primarily occurred during children and junior
299 hockey, but gradually faded out as players progressed to a professional level. Most of the time
300 previously devoted to playful activities was later occupied by rigorous training and tournament
301 programs, professional routines, and demands. Yet, most players managed to maintain a
302 modality of creative play at home gyms, after practices, and during the off-season, namely *self-*
303 *training experiments*, where the players devoted extra time to optimizing specific parts of their
304 game by creatively setting up drills that improved soft spots or sharpened peak competencies.

305 One of the things I am good at is being creative in offensive moments. That's something I work a
306 lot at. Being creative by learning a new move, feint, or a new way to drive to the net or something.
307 After serious team training with coaches, playing systems, and the things you need to get through,
308 we usually have 30 minutes where you can practice whatever you want. I often fool around with a
309 buddy or two and find some silly things to do, like getting a hard pass on the heel and trying to take
310 it with you. It can be all kinds of things and you just laugh all the time because you often fail. (Ned)

311 Compared to the five above modes of creative play, these self-directed experiments resulted
312 in attempting more mature and realistic innovation, focusing on nuances of game-related skills
313 or roles. As Ned stated, "you do some quite silly things, but there is a limit. You can't practice
314 juggling it through a whole zone". As shown below, such limits to irrational acts also occurred
315 as players progressed from children to youth and especially in professional hockey.

*Athlete Perspectives on Creativity*316 *Practicing*

317 Whereas the above modalities of creative action emerged in self-organized contexts, others took
318 place in coach-led contexts (e.g., skills-coach training and supervised summer training). Several
319 players labeled children hockey as “pure play” (Gus), especially the last half of training sessions
320 (60 minutes in total) which involved free play without any coach intervention. Such freedom
321 enabled players to engage in reinventive, imaginative, and impulsive play. The open limits also
322 enabled an *illusionistic approach*, involving what-if-thinking to explore personally new ways to
323 duke and deceive opponents, find ways to fake it and surpass their expectations.

324 In children hockey, we played a lot across the rink and I would say that this relates to creativity,
325 because we just played in two teams and might have been around 15 players in one endzone, so
326 you had to try to dribble, and could be creative and find out “okay, if I try to go around him on the
327 right, then I could jerk my shoulder a little to show that I go left.” Without being conscious about
328 it, I think you learned those 1-on-1 situations where you could feint an opponent. And I still think
329 it is exciting to foresee, “okay if I do this, then he might do that.” (Ron)

330 Players argued that creativity both regarded the process of inventing personally novel ways
331 to dangle opponents (e.g., dekes, decoys, or clever puck moves to maneuver past defenders) and
332 later using these in games. Like creative play, this sparkled in children hockey but stifled during
333 junior and especially professional practice, which was more structured and “hockey-focused”
334 (Leo), with team-specific concepts, systems, and positional restrictions. This transition opened
335 yet another modality of creativity. *Self-imposed exploration* regards initiatives to induce
336 variability to repetitive, structured drills by adding extra layers and coming up with customized
337 focus points. For example, when rehearsing movement patterns pre-designed by their coaches,
338 players tried to perform each pass slightly differently or to “challenge yourself with a turn”
339 (Gus).

340 I would like it if practices were a little more creative. Often, it’s just simple stuff, and in a lot of
341 our drills, there is not much creativity. You have to do it on your own. For example, in 2-on-1 or
342 2-on-2 drills, there is room to be creative. If you make something completely insane, I don’t think
343 the coach wants to see it, but this is an area where you can work on your game. Let’s say you tend
344 to be too simple out on the ice, then you can try to break that bad habit, by doing things that you

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345 don't usually do, for example, taking it to the slot area instead of skating to the corner to protect
346 the puck. (Ben)

347 This helped the players to explore and refine their game within the limits of coaching agendas.
348 In many of their professional clubs, an analogous modality of practice was likely to emerge in
349 skill coach practice (e.g., 30 minutes after team training), which focused on specific individual
350 skills rather than team-tactical aspects. Here, players engaged in *refining technical fitnesses*,
351 which involved “geeking with” (Ron) specific skills. This took place in drills designed by skills
352 coaches, or by player initiative (i.e., resembling re-inventive play and self-training experiments).

353 There is room to be creative, and often it's some simple things and small details. Maybe you stand
354 by the net, and someone shoots pucks from the blue line, and then you have to chip them in. (Ben)

355 Sometimes we throw a bucket of pucks on the ice and say, “we need to come down to the goal at
356 almost full speed, but it's up to ourselves to find out what to do”. There are many different variants
357 of how to execute it, so it is individual creativity that arises in us. And then you can see the other
358 players do it and think about how you can use some of it in your own way. (Ned)

359 Related to individual practice, purposeful integration and collaborative *utilization of novel*
360 *equipment* were reported as a creative modality of practice, which provides alternative ways to
361 become better. As argued by Alen, this was especially evident for the goalie position.

362 We are quite creative in terms of training aids and tools. We bring a lot of stuff on the ice and my
363 coach likes using it when it serves a purpose. For example, we have a plastic mannequin dressed
364 like a player, that we use to shoot around to challenge the shooting, avoid someone getting hit by
365 accident, and make it harder for goalies to see the puck. (Alen)

366 *Performing*

367 Whereas the above theme covers creative modalities of action from different practice contexts,
368 the following regards in-game creativity. In this regard, *individual and unrestricted decisions*
369 involved independent thinking and finding one's own way to solve the situations on the ice. As
370 implied in the next quote, this especially regarded children and youth hockey contexts.

371 If coaches keep setting limits and say you can't do this, you can't do that, then there would be no
372 creativity. It requires an open inquiry where you need to find a solution to something. There are no
373 right and wrong answers, but different outcomes [...] I had a coach, who had this rule, “three out

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374 of five times, you must do as I say, but the last two I don't care what you do". If you did something
375 strange twice, he said, "now you've used yours, do as I say for the rest of the game". (Leo)

376 A related mode of creative performance, *changeable and spontaneous solutions*, was reported
377 as a basic requirement in hockey regardless of age, which enabled the players to handle the rapid,
378 complex, and unpredictable game, where not everything can be planned. The game situations
379 can be solved differently, but often, quick, and situated decisions are needed to adapt to and
380 solve unexpected events successfully.

381 Sometimes you need to be creative and just react and find a way to do things. Maybe you fell, the
382 puck might have hit something and gone in another direction than expected, and then you have to
383 come up with something in a split second, to make a new decision. (Alen)

384 Another modality concerned *disguised and misleading actions* to outsmart opponents across
385 the field. This does not only require a repertoire of deceptive moves but situated decisions to
386 find ways to lure and surprise opponents, making it difficult to read what, when, and where it
387 happens: "You need to look like you do one thing and then suddenly do another" (Alen).

388 Creativity is about finding a way to handle a challenge. To come out of a situation as the winner,
389 then you have to be creative to find a way to do it. Of course, there are fancy moves and such, but
390 for me, creativity is more about hitting blind passes, having spotted a player a few seconds before,
391 knowing where he might go, and hitting a backhand pass to an area where I expect him to be. (Ron)

392 Besides handling and creating unpredictable situations, the in-game creative performance also
393 concerns *frisky and risky attempts*, which regard acting on the edge of game concepts by utilizing
394 precarious, difficult, and spectacular solutions to create game-decisive situations. This mostly
395 took place in the offensive zone, where there were fewer consequences of failing.

396 If you want to create something you need to take some chances, play with smaller marginals and
397 in some smaller areas, and make some plays that quickly can go wrong. It can also be creative to
398 do something technical that looks nice or to create some unexpected skating routes, or some
399 variants that pull opponents out of their sockets, to open the game in that way. (Gus)

400 The final in-game modality, *co-creative plays*, was described as a collaborative improvisation
401 process. As opposed to designed plays with specific skating and passing patterns, this kind of
402 creative action emerged when two or more players interacted in unrehearsed and original ways

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403 to solve dynamic and complex game situations. This was especially relevant for centers, who
 404 “act as the spider in the net, to keep track of the four others and bind things together” (Gus):

405 In sport, you can try to create or destroy something, and to create you need to be creative. I’m good
 406 at finding solutions and getting ideas when the game is ongoing. In my world, that’s to be creative.
 407 That you can open things that are somehow locked and loosen things in interplay with others on
 408 the ice. Like, if he was here, then I could take two steps to the left, and signal to him to go right so
 409 I can do something to play him free. It’s creative to solve the situations in ways you don’t have on
 410 the drawing board. You need to somehow get inside the others’ heads, to think “okay, what is he
 411 doing”. In team sports, you can’t be creative if just thinking within your own box. (Gus)

412

<i>Themes</i>	<i>Sub-themes</i>	<i>Description</i>
Enjoyment	The joy of invention	Coming up with new challenges enhances passion
	The joy of discovery	Solving novel challenges in successful ways is fun
	The joy of fooling around	Trying playful, foolish, and artistic moves is enjoyable
	The joy of creative self-control	Self-imposed experiments make rigid drills tolerable
	The joy of design and deception	Anticipating and forming the game is satisfactory
	The joy of authentic decisions	Using one’s own thoughts and ideas is more meaningful
Development	Devoting more time	Prevent boredom and exploit poor material conditions
	Maximizing practice output	Improve weaknesses and refine peak competencies
	Challenging habit thinking	Push oneself to avoid choosing easy, low-risk solutions
	Learning from experience	Learn through problem solving and diverse experiments
Achievement	Boosted confidence	Inventing new skills enhances belief in personal qualities
	Enhanced production	Create favorable situations and enhance game impact
	Refined technical qualities	Develop stickhandling and hand-eye coordination
	Expanded solution repertoires	Invent new and exciting solutions transferable to games
	Improved game intelligence	Refined understanding of possible game (inter)actions
Fulfillment	Create career advantages	Gaining an edge in dealing with intrateam competition
	Compile a unique style	Synthesizing elements to a unique and noticeable style
	Develop peak competencies	Utilizing prerequisites to compensate for weaknesses
	Maintain competitiveness	Challenging oneself to stay ahead of competitors
	Become extraordinary	Fortify capacities required to perform creatively

413 **Table 2:** Outcomes of creativity in terms of enjoyment (i.e., elicit passion), development (i.e., enhance potential),
 414 achievement (i.e., enrich game-relevant qualifications), and fulfillment (i.e., extend career promotion).

415 Outcomes of creativity

416 The overarching theme regarding the players’ perspectives on the value of the various modalities
 417 of creativity was analytically divided into themes of *enjoyment* (i.e., elicit passion), *development*

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418 (i.e., enhance potential), *achievement* (i.e., enrich game-relevant qualifications), and *fulfillment*
419 (i.e., career promotion).

420 *Enjoyment*

421 Several modalities of creative actions across the play, practice, and performance contexts in the
422 players' careers led to augmented levels of fun: "Creativity is one of the biggest parts that makes
423 hockey fun" (Ned). First, *the joy of invention* relates to designing novel, hockey-related
424 challenges with peers or alone in inventive play and self-training experiments.

425 Challenging each other shows that you have a passion for hockey. It is just two things that go hand
426 in hand. It was so fun to shoot after old metal cans or something in the backyard, and it just helps
427 you use so much time on it. And when using a lot of time, then you come up with situations you
428 have not seen before and try to solve them and challenge each other. (Alen)

429 Referring to the variable and explorative process of solving the novel tasks in useful ways to
430 win over themselves or peers, some stressed that the fun part of self- or peer-invented challenges
431 regarded *the joy of discovery*. This involves the satisfaction of creating new skills or solutions.

432 I think it's interesting and fun to come up with a lot of things, trying to learn different strokes, and
433 trying to be creative in different ways. I never really thought about it before, about what turns me
434 on, but it's actually all these things. It's just what makes it fun and makes you feel like an 8-year-
435 old again. Whether it's to become better, finding out how can I solve this situation, or because you
436 want to make a move that looks nice, or whatever, then it just contributes to making it fun. (Ron)

437 *The joy of fooling around* was evident in the players' explanations of how they had engaged
438 in creative play activities, where they came up with a lot of playful and artistic actions that would
439 not make sense in hockey games. These jolly and cheerful activities mostly occurred in
440 impulsive, explorative, and imaginative play, as well as self-training experiments.

441 Nowadays, it's still fun to be creative. After practice, it's fun to work on difficult small details or
442 skills. You know that you're working on things that you can use and become better at, but it is
443 mostly the fun and joy of feeling like a boy again when you fool around and juggle with the puck
444 and practice some other things, especially when you are an offensive player. (Ned)

445 Self-imposed exploration was also related to *the joy of creative self-control*. In this regard,
446 the use of self-imposed constraints maintained the players' motivation in banal, structured, and

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447 repetitive training. As Ron argued, creativity plays a crucial role in “making it to an elite level”
448 since it is “a huge motivation factor”. For example, self-imposed exploration involved reflecting
449 on how to solve the situations and challenging oneself. This maintained player enjoyment.

450 The first thing that comes to mind when thinking about creativity is that it has somehow contributed
451 to maintaining the joy of playing hockey. And it comes from challenging myself. I think a lot about
452 how I can solve it, even today when we have technical drills. Just to keep it simple, if I skate around
453 a circle, get a pass, and shoot quickly, then I think about where I should have my weight when
454 receiving the pass, and where my legs should be. In that way, I think a lot about how I can be as
455 efficient as possible. So being able to find the solutions have motivated me a lot. (Ron)

456 Whereas most of the creative modalities that were related to passion originated from play and
457 practice contexts, *the joy of design and deception* involves the satisfaction of anticipating and
458 forming the game using an illusionistic approach, disguised actions, and co-creative plays to set
459 up oneself or teammates in fortunate situations: “some of the most fun and cool is to hit some
460 blind passes. It looks amazing and can open the game” (Ron). Players also reported that reduction
461 of creativity due to rigorous training, authoritative and punitive coaching, and overly structured
462 game concepts make hockey less fun by demolishing in-game creative modalities such as
463 disguised actions, individual decisions, and risky attempts. It was more fun to play in systems
464 allowing creative freedom than in rigid systems, where failed endeavors to do the extraordinary
465 have unfortunate consequences (i.e., reduced ice time). It removed *the joy of authentic decisions*.

466 Without creativity, it gets too boring, monotonous, and robot-like since everything is decided in
467 advance. It’s much more fun to be allowed to be creative. [Interviewer: *What makes it fun?*] Well,
468 if the coach always says, “when you get in this situation, then pass it to the left every time”. That’s
469 not fun at all, because everyone could do it. If you are not being allowed to use a few of your own
470 thoughts and ideas, but have to do the same all the time, then it’s not fun at all. (Gus)

471 Development

472 Several of the modalities of creative action in play, practice, and performance contexts were seen
473 as keys to their progressive development towards a professional level. Especially, the modalities
474 of play helped players *devote more time* to hockey-related activities. For example, imaginative

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475 play, explorative play, and inventive play helped them avoid boredom and exploit poor material
476 conditions.

477 Often, and especially for kids, it can get boring because not much happens when playing alone. So
478 there I was creative with my head, by thinking about game situations and mimicking players from
479 NHL and around the world. Because I didn't have much [equipment] in the garden, only a hockey
480 stick, a somewhat flat, non-bouncing tennis ball, and a small hockey net, which was not so exciting,
481 but it was enough for me to practice the different things that have made me better. (Ben)

482 Related to the issue of time, players linked several modes of creative play and practice with
483 the possibility to *maximize practice output*. For example, self-training experiments involved an
484 explicit motive of development. Inventing and testing new ideas, and exploring how to do things
485 differently, this "extra work" (Ben) was said to be equally efficient as coach-led training.

486 For me, creativity is about improving one's game through the extra work you do at home, to find
487 a way to work on the things you want to become better at. When you don't have a coach to tell you
488 what to work on you need to be creative to come up with something, small details to improve your
489 technique, shooting, overview, and so on. If you work on these things, you'll live up to the best
490 you can become. But if you are not creative, you won't get as good as you could have been. (Ben)

491 Further, self-imposed exploration enhanced output by allowing players to meet the situations
492 in explorative ways and attempt different solutions, instead of being sedated by repetitive drills.

493 Some coaches use the same drills across the whole season, so you can almost go to practice with
494 your eyes closed and without giving it 100 % because you have done it so much don't need to think
495 during practice. You need a mindset where you add an extra pass or an extra turn, so it doesn't end
496 up being the same things you practice day in and day out. Otherwise, you start to be satisfied by
497 just doing this robot-like training instead of challenging yourself. (Ned)

498 Hence, self-imposed exploration and self-training experiments *challenge habit thinking* and
499 conventional decisions. For example, Ben tried to avoid always choosing the easy, low-risk
500 solution (e.g., dump the puck under pressure), and Gus pushed himself to do alternative and fun
501 things instead of "simply running it on the routines". Further, Ron stressed the developmental
502 benefits of designing unknown drills "where you don't know the answer" during inventive play.

503 If you have the answers for how to do it and know that you can do it like this and like this, and
504 then set up drills where you succeed with the things you already can, then, in principle, you do not

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505 develop. It's better to find out, "Okay, now I have to do this," because then I have to find a solution,
506 find the process to succeed with something challenging by solving it in the best way. (Ron)

507 Another reason why creativity accelerated development is related to *learning from*
508 *experience*. Hence, players argued that most modalities of play and practice creativity gave them
509 diversified possibilities to learn through individual problem solving, independent decision
510 making, and diversified experiments, which involve learning from mistakes.

511 We are humans, not robots. We are not programmed to just be told what to do. We have our own
512 thoughts and opinions and that's what creativity is all about, being allowed to develop from within
513 and not from outside. It's healthy to come up with some conclusions on your own about what works
514 and what doesn't work. Being creative and trying one's hand at it helps you do that, so you use
515 your creativity to develop and avoid being walled into a corner regarding what you can do. (Leo)

516 *Achievement*

517 Whereas the above outcomes covered general developmental gains, the following concern how
518 creativity enhances game-relevant qualifications and thereby hockey performance. In this regard,
519 different modalities of creativity led to *boosted confidence* which was highlighted as a key to
520 performing well. For example, inventing novel skills in self-training experiments (i.e., shootout
521 trickshot) and performing these in games provided an extra belief in personal qualities.

522 At times you are almost too creative and practice things that you'll never use, but anyway you get
523 some confidence in what you do from being creative and fooling around after practice. The more
524 you build up, the more creative you might be in games to do things that others don't do or expect.
525 To be surprising to get past someone or get your shot through, you could turn fast, change the
526 angle, make a body feint, protect the puck in a creative way or something. Doing something
527 unexpected can give you that split second that can make difference on whether he blocks your shot
528 or not. And this comes from working after practice. Half of the time you don't succeed, but you
529 just get that feeling in your body that you have done it before, so you dare to do it in a game. (Ned)

530 Several modalities of in-game creative performance were coveted because they were involved
531 in *enhancing production* of favorable game situations for themselves or teammates. Optimizing
532 their in-game creativity, players enhanced their impact on the course of the game, for example
533 by misleading opponents, orchestrating the game, or doing the unexpected.

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534 The creation of chances in the offense also comes from creativity, from finding a way to get around
535 the defense or make yourself a threat. Every moment of the game is kind of a creative thought
536 process you go through to create chances, produce, and be efficient. (Ned)

537 Players also argued that several modalities of creative play developed the capacity to make
538 changeable and spontaneous solutions, which regards surviving pressure to maintain possession.
539 Whereas in-game creative action modalities served as targets, modalities of play and practice
540 served as means of advancing game performance. For example, these early-career activities led
541 to *refined technical qualities* that were beneficial later in their professional careers. Depending
542 on which kinds of drills were designed and explored during inventive play, for example, these
543 activities refined technical aspects such as “stickhandling” (Ben), “puck-protection” (Ned), and
544 “hand-eye coordination” (Gus). Players also argued that creative modalities such as impulsive
545 play, explorative play, and self-training experiments *expanded solution repertoires*. Although
546 these activities involved “much foolish creativity” (Ned), they also enabled the generation of
547 new and exciting solutions that could potentially be used in hockey games.

548 Thinking about myself as a player then this is what I am good at, to come up with something new,
549 invent something new and be creative in that way. Maybe you have been practicing a new kind of
550 deke, fake, or a move close to the net that can surprise the goalie or the defense. Of course, you
551 can't just go out and do it, but situations occur in games, where defenders come in more or less the
552 way you practiced, and then you have it in your back pocket somehow. If it works successfully and
553 leads to a goal, then it has been worth it all. You learn a lot from just fooling around and playing a
554 little on the ice in a creative way since it can be transferred to many moments in the game. (Ned)

555 Creative play and practice in game-like activities not only led to technical resourcefulness but
556 also *improved game intelligence* or “game understanding” (Gus), which regarded insights for
557 (inter)action in the quick and complex game. For example, using an illusionistic approach and
558 learning from experience, Ron matured personalized principles for co-creative plays (e.g.,
559 counting players to foresee open areas; knowing what the defense expects).

560 I think it's very hard to become good if all decisions are based on something others have told you,
561 “now you need to do this in this situation.” You need to find out yourself and experience it on your

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562 own body to see what works, learn to take in the information you see, and try to find a way to solve
563 it. Each time you solve it in a good way, you put it in your backpack for similar situations. (Ron)
564 I learned to foresee the game because I've put myself in all these situations. Those things I did as
565 a boy in the garden, roller hockey, and different things just help with the small marginals. Dribbling
566 around with a puck or a ball, you know, such things make your hockey brain smarter. (Ben)

567 *Fulfillment*

568 Whereas the above concerns in-game benefits, the present focus on how modalities of creativity
569 impact career promotion. For example, engagement in creative play and practice were vital to
570 *creating career advantages* as opposed to peers. For example, Leo argued that his independent
571 initiatives in self-training experiments gave him an edge in dealing with intrateam competition.
572 Others argued that creativity separated the best from the rest.

573 We were some players on the same level, who competed to be the best. [...] I took some steps that
574 the others didn't when we were around 15 to 17 years. Somehow, I wanted it more and enjoyed
575 playing more, both on and off the ice. This is where I think creativity comes in. You've just worked
576 on more things over the years. I don't think they used so many hours alone in the garden to improve
577 their stickhandling or shooting. When they played video games, I was creative in the garden with
578 all these things [...] I want to say that you always need to be creative, but I think it's most important
579 from 14 to 18, where you try to make a difference to get possibilities to get into a big club. You
580 need something that separates you from others before the clubs want to use time on you. (Ben)

581 In this regard, creative modalities associated with individual choices and decisions were seen
582 as critical to withstand authority (e.g., coaches or esteemed teammates, with fixed ideas about
583 best practice) and avoid being limited by acculturation. Hence, creativity played a critical role in
584 *compiling a unique style* through a self-governed process of finding out which player one wants
585 to become, without being controlled by others' views. Alen reported that re-inventive play and
586 self-training experiments contributed to a customized style by synthesizing other players' styles.

587 It can help to think for yourself and not just do what you are told is the right way to do things, so
588 you take a new route to the goal than others do. That you experiment with different ways and are
589 curious. I handpick from what others do in diverse situations. If I see something I would like to use
590 in my game, I try it out to see if I can make it work, and then I create a hybrid of the players I look
591 a lot at, while of course, still being myself. That's what makes you unique, that you seek out new

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592 knowledge in different places, and then can be creative in the way you train it and combine it. That
593 you challenge yourself to try it and then see what makes sense and comes naturally. (Alen)

594 Creativity was accentuated as a key to taking control and ownership of personal development.

595 In this regard, creativity led to *developing peak competencies* by utilizing personal prerequisites
596 in the best ways. This underlines that there are many ways to excel, and that creative modalities
597 such as inventive play, explorative play, reinventive play, and refining technical finesses may
598 help players identify and develop peak competencies to compensate for weaknesses.

599 We are all different and hockey is so complex that you need to be able to think creatively to use
600 the things you have in your toolbox to create the best result for yourself. There are so many things
601 you can be good at, that you need to be creative to find a way to succeed. I'm not the fastest skater
602 but found a way to cheat the system so to say. Creativity is to think outside the box to find solutions
603 to tactical aspects. I've been creative by realizing my limits and finding a combination of my tools
604 to succeed at a high level, by destroying others' game in efficient ways. I found out, that if I excel
605 in these things, then I have a chance to fill a role on a team and be a piece in a puzzle. (Leo)

606 Further, this open-ended nature of the game was important to *maintain competitiveness*,
607 which regards continuing to challenge oneself during one's professional career instead of going
608 into hibernation. As argued by Ned, "there is always something new to learn, something new to
609 come up with", for example, during self-training experiments or self-imposed exploration, which
610 help "finding a way to be a step ahead of one's competitors" (Ron).

611 When you become professional, players quickly forget to do all the extra work they used to do but
612 those who maintain a high level keep working on small details and finding solutions to get better.
613 Of course, there are practices where I just shoot without using my brain, but I mostly try to find
614 new ways to surprise the goalie. It's something I focus a lot on. (Ben)

615 Finally, developing modalities of in-game creativity by engaging with the play and practice
616 modalities, played a key role in *becoming extraordinary*. Accordingly, most participants strived
617 to become more creative, since these qualities were associated with the very best hockey players.
618 They worked on improving the technical and mental capacities of creative performances.

619 The really good players think hockey in a different way than many others, and that's what makes
620 them a notch better and more special, that they have a creative and inventive side. I think this is

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621 one of the things I am good at, being creative in offensive moments, and I still try to work a lot on
622 it, cheating opponents, inventing new moves, and creating scoring opportunities. (Ned)

623 In this regard, several players linked creativity with maximizing practice output through extra
624 work (e.g., self-training experiments): “If you are both hardworking and creative, I think that
625 you have a much larger chance of becoming an extraordinarily good player” (Jay).

626 **Discussion**

627 In this study, we addressed the lack of creativity studies encompassing the perspectives of sport
628 participants by exploring professional ice hockey players’ creative experiences. This exploration
629 of novel person-world encounters in the players’ careers materialized as 15 modalities of creative
630 actions in play, practice, and performance. These variants of novel and meaningful (inter)actions
631 entail 20 outcomes related to augmented enjoyment, development, achievement, and fulfillment.
632 Below the study’s unique contributions are discussed in terms of refining 1) the understanding
633 of creativity, 2) its developmental impact, and 3) the role of play and practice.

634 Athlete perspectives provide a refined understanding of creativity

635 Accounting for the complexity and uniqueness of creative experiences in athletes’ careers, the
636 findings point toward creativity markers that may help explore and interpret creativity in future
637 studies. The present findings provide in-depth and contextualized insights into creative activities
638 and qualities that are not captured by prevailing methodologies in the research field. Such
639 research measure motor outcome variables such as flexibility, originality (Memmert et al., 2010),
640 fluency, attempts, and versatility (Santos et al., 2017), and assume that improved scores enhance
641 performance. On the contrary, this study offers several alternatives to the performance-oriented
642 definitions in the field, where creativity is a risk of being reserved for the few best offensive
643 players (Rasmussen et al., 2019). Hence, the present results point out that creative processes in
644 sport regard the willingness to engage with the unfamiliar, the capacity to approach the familiar
645 in new and unusual ways, and the possibility to move away from pursuing pre-determined ends.
646 Specifically, the modalities of creative action suggest that markers such as existential courage

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647 (Maddi, 2004), imagination (Rasmussen, 2019), and playfulness (de Vries, 2021) may serve as
648 principles to grasp creativity in sport. Moreover, several modalities of creative action in play and
649 practice contexts involve curious and inventive experiments where personally new and unusual
650 action possibilities are explored (Rasmussen et al., 2019). Rather than objectively creative
651 products or performances, the players were oriented towards subjective experiences of creating
652 something new or solving something in a new and personally meaningful way (e.g., in terms of
653 having fun or developing) during play or practice activities. Moreover, modalities of creative
654 performance (e.g., changeable and spontaneous solutions, and disguised and misleading actions)
655 resemble less predominant perspectives regarding imaginatively (Campos, 2010) or seductively
656 (Aggerholm et al., 2011) solving challenges in complex games. The fact that ice hockey players
657 from all playing positions were able to portray relevant developmental experiences foregrounds
658 that creativity plays different roles in athletes' diverse career pathways.

659 Novel insights on the developmental role of creativity

660 This study provides a nuanced understanding of the role of creativity in developmental pathways
661 towards expertise by providing contextualized insights into different situations, activities, and
662 events across careers that involve different kinds of creative (inter)actions. Several modalities of
663 creative action were recognized as sources of progressive development towards and continuous
664 maintenance of an expert performance level. By employing a rare focus on athletes' creative
665 experiences, the study provides novel insights into the role of creativity across several stages of
666 development. This extends extant findings about creativity at specific career stages. For example,
667 highlighting the implications of creativity in early developmental experiences, Weissensteiner et
668 al. (2009) described the self-challenges and experimentation involved in the creative play of
669 cricket batsmen. Resembling inventive play and explorative play, the batsmen e.g., challenged
670 themselves with alternative bats, balls, and tasks requiring creative actions. These self-organized
671 activities were “fundamental to later sporting success” (p. 282) since they nurtured problem-

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672 solving, creativity, and adaptability. Since the topic of creativity emerged as part of developing
673 a holistic model of expertise, the study did not explore the role of creativity in other career stages.
674 This was also the case in the study of Durand-Bush and Salmela (2001), who disclosed the role
675 of creativity in the maintenance years. Here, creativity helped two-fold Olympic Champions be
676 innovative and keep an edge over competitors by “developing new tactics and skills” (p. 162).
677 For example, an athlete reported that “the most important thing for me at this level is to try new
678 things, be innovative, and to always go forward” (p. 162). The present findings elaborate on this
679 creative orientation.

680 Several modalities of creative action are also reflected by a position exchange analysis on the
681 developmental experiences of two-fold National Basketball League (NBA) most valuable player,
682 Steve Nash (Martin & Cox, 2016). The study showed how interpersonal exchanges with peers,
683 parents, and coaches contributed to developing his team-oriented on-court creativity, making
684 him a fivefold NBA assist leader. Reflecting themes such as self-training experiments, these
685 exchanges allowed him to engage in self-instruction, where he methodically, timelessly, and
686 self-critically assessed and challenged certain parts of his game to refine strengths and reduce
687 weaknesses. And like modalities such as disguised and misleading actions, Nash reported that
688 his father created a value system for being creative, seeing things before they happened, tricking
689 people, and being cheeky, which made him more interested in creating chances for others than
690 scoring points.

691 Moreover, the present findings demonstrate that diverse creative experiences may underscore
692 the development and maintenance of sporting expertise by enabling the players to both play and
693 practice more than others (e.g., devoting more time), and doing so with a higher quality (e.g.,
694 self-imposed exploration, maximizing practice output). Virtually all modalities of creative action
695 were linked with enhanced enjoyment. For example, by introducing variation to repetitive drills,
696 self-imposed exploration made structured practice sessions more tolerable and profitable. Hence,
697 as shown by Rasmussen and Østergaard (2016) for recreational soccer players, creative activities

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698 may be key to supporting sport participants' intrinsic motivation. The finding that diverse
699 modalities of creativity support intrinsic motivation is also an important conceptual contribution
700 to extant models of creativity, both within sport research (Richard et al., 2021) and general
701 creativity research (e.g., Amabile & Pillemer, 2012), where intrinsic motivation is seen as a key
702 to generate new and useful solutions to given set of task constraints.

703 In terms of enjoyment and intrinsic motivation, the present results demonstrate that creative
704 activities enrich immediate sport experiences, which is important to reach short- and long-term
705 outcomes of youth sport as defined within the personal assets framework (Côté et al., 2014;
706 2020). For example, the present results indicate that the facilitation of creative sport experiences
707 may be useful to develop sport participants' competence and confidence, as well as support their
708 continued participation, personal development, and long-term performance. Whereas the present
709 study has focused on the outcomes of creativity, future research should generate contextualized
710 accounts of the dynamic elements (i.e., personal engagement in activities, appropriate settings,
711 and quality social relationships) that shape suitable conditions for creativity.

712 As implied here, creativity is not a panacea for attaining sporting expertise. Yet, with the right
713 mix of personal qualities, psychological skills (Pankow et al., 2021), environmental conditions
714 (e.g., Bendorff et al., 2021), socio-cultural constraints (e.g., Uehara et al., 2020), and
715 characteristics of elite sport developmental systems (Ogden & Edwards, 2016), it may play a
716 significant role. Specifically, creativity supported the endeavor to perform each self- or coach-
717 led practice session at the highest quality level. In this regard, several players dismissed the
718 developmental impact of self-same and repetitive activities (e.g., challenging habit thinking).
719 Hence, it could be argued that several modalities of creativity share characteristics of deliberate
720 practice, which regards practicing the challenging things that help one develop. As Ericsson
721 (1998) argued, "it is *necessary* for expert performers to avoid mindless memorizing and
722 automatization of skilled performance in order to continue improving and increasing their control
723 over their performance" (p. 94). Creativity not only aided these players in inventing challenging

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724 things to practice (e.g., inventive play; self-training experiments), to overcome their weaknesses
725 and refine their strengths, but also helped them solve these challenges in the best ways.

726 Based on the present findings, one could speculate that creative experiences play a larger role
727 in developing and maintaining expert performance than recognized in the extant literature. This
728 impression is supported by the idea that creative experiences are not always conceived as creative
729 by the subject (Glăveanu & Beghetto, 2020). Thus, without being prompted, creative experiences
730 might not be articulated in retrospective interviews focusing on developmental activities and
731 environmental conditions throughout the diverse pathways to expert performance in sport. Also,
732 when initiating the interviews, some players admitted that they had never really thought about
733 creativity in this way before, but after being invited, they had started to reflect on its meaning.
734 Also, during interviews, some realized that they had been more creative than thought beforehand
735 (e.g., Gus discovered that his way to come up with new self-challenges was creative). Similarly,
736 researchers might not be familiar with the concept of creativity nor its role in the development
737 of expertise. Therefore, they might not notice athletes' reference to it in retrospective interviews.
738 Based on the present findings, enhancing the awareness of creativity among sport researchers
739 (e.g., through literature and education) is important to illuminate more creative experiences.

740 While the present exploration provided novel insight into the role of creativity in developing
741 a range of affective, cognitive, and motor qualities deemed important for the development of
742 sporting expertise, it falls short of insights into social and cultural outcomes. Yet, as Glăveanu
743 and Beghetto (2020) argue, creativity does not reside within people, products, or processes.
744 Despite emphasizing creative processes, actions, and person-world encounters, some parts of the
745 findings unintentionally maintain the subjectivist tradition in the field, consequently isolating
746 creativity within the player. Although most analytical themes on the modalities of creative action
747 imply the interactional and social nature of creativity, this is not reflected by the outcome themes.
748 This issue might trace back to the interviews, which focused on the role of creativity in players'
749 careers rather than its impact on their groups, relationships, or environments. For example, when

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750 players described how they challenged each other in *inventive play*, no follow-up questions were
751 asked on the role of creativity in their way of being together. Inspired by the framework of
752 Richard et al. (2021), future investigations of the role of creative experiences may benefit from
753 developing interview guides based on themes such as cultural, social, affective, and cognitive
754 potentials. That being said, future studies should also employ prospective designs to explore the
755 role of creativity not only for individual athletes but especially for groups and communities.

756 Novel insights into the role of play and practice

757 The present study provides novel contextualized insights into the recurring finding that deliberate
758 play, or self-organized sport participation, is more fruitful in developing creative abilities than
759 deliberate practice, or organized sport participation (e.g., Bowers et al., 2014; Memmert et al.,
760 2010; Roca & Ford, 2021). Particularly, the findings enrich the understanding of the impact of
761 sport-specific deliberate play on in-game creativity. Elaborating extant findings (Martin & Cox,
762 2016; Weissensteiner et al., 2009) and supporting key assumptions in creativity-developmental
763 frameworks (e.g., Rasmussen et al., 2019; Santos et al., 2016), this study features that creativity
764 in play (e.g., imaginative play), practice (e.g., illusionistic approach), and performance (e.g.,
765 individual and unrestricted decisions) contexts across children and junior hockey are forerunners
766 to creative game performances in professional hockey (e.g., disguised and misleading actions).

767 Generally, the six modalities of creative action in play contexts were linked with creativity
768 since they enabled the players to explore and invent a wide variety of risky, imaginative, original,
769 and unorthodox actions that were rarely utilized during organized practice (e.g., due to
770 consequences when failing and the need to respect the game concept). As discussed in earlier
771 work, specialized, prescriptive, rigid accounts of deliberate practice may limit creativity (e.g.,
772 Roca & Ford, 2021). In this regard, the lack of focus on creativity in practice contexts is
773 illuminated by the modality of self-imposed exploration, where players crafted their own

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774 constraints. Similarly, most practice modalities were not directly encouraged by coaches but
775 originated from player motives.

776 Taking a critical stance toward the latter points it should be stressed that the modalities of
777 creative actions were divided into themes resembling three types of activities investigated by
778 retrospective questionnaires in previous research (e.g., Roca & Ford, 2021). Such designs define
779 practice as structured and effortful coach-supervised activities intended to enhance performance,
780 play as informal games set up and supervised by players to have fun, and competition as league
781 games oriented towards winning. Such categorization has been criticized for being too broad and
782 simplistic and failing to precisely describe the tasks accomplished by players during the diverse
783 activities (Fardilha & Allen, 2020). The modalities of creativity transcend the usual categories,
784 by outlining play activities oriented towards improvement, several in-game actions performed to
785 enjoy, and even a self-directed practice modality oriented towards enjoyment and improvement
786 (i.e., self-imposed exploration). And whereas some modes of in-game creative performance were
787 oriented towards development (e.g., individual and unrestricted decisions), some modalities of
788 play and practice were highly competitive, e.g., with intentions to win over peers or themselves.
789 As such, findings portray the multidimensional nature of athlete development (Macnamara et al.,
790 2016), by providing in-depth knowledge about a diversity of “play” and “practice” activities (not
791 claiming to cover all) responsible for affording creative actions and enhancing creative abilities.
792 Hence, matching the advice posed by Hendry et al. (2018), the findings provide some insights
793 into the underlying components of diverse kinds of playing and practicing (and competing) to
794 understand and distinguish their impact on the development of sport-specific skills such as game
795 intelligence and creativity. To enrich the understanding of diverse kinds of (self)organized
796 activities further, future studies need to apply prospective designs to explore situated creative
797 experiences of sport participants at different levels and in different socio-cultural contexts. In
798 this regard, concepts from the general literature on play could serve to reconceptualize its
799 meaning in sport (de Vries, 2021).

*Athlete Perspectives on Creativity***800 Conclusion**

801 Addressing the lack of knowledge about sport participants' perspectives on creativity, this study
802 explored professional ice hockey players' creative experiences throughout their developmental
803 pathway. Based on the results, it is evident that creativity does not only regard performative end
804 products, but plays significant roles across different play, practice, and performance contexts.
805 Moreover, both the modalities of creative action engaged in by the players and the outcomes
806 associated with these, shifted as players progressed in their careers. Hence, the study shows that
807 a diversity of creative (inter)actions was considered crucial for a variety of developmental
808 purposes on the journey towards sporting expertise. These purposes regard the enhancement of
809 creativity-related features (i.e., modalities of creative performance) and hockey-related elements
810 conceived as keys to promote passion, personal development, performance, and career
811 progression.

812 Representing diverse markers of creative (inter)action that are rarely encompassed by existing
813 research, the findings may implicate how future research is framed and designed to explore or
814 enrich means in sport. Besides enriching and broadening the meaning and evaluation of creativity
815 in team invasion games such as ice hockey, the findings also transverse the typical categorization
816 of play, practice, and performance, and thereby nuance the understanding of the developmental
817 activities underscoring the development of in-game modalities of creative (inter)action.

818 Adopting a more dynamic and encompassing view of sporting creativity, this study focused
819 on what the athletes created, how they did it, and what it meant to their sporting life, recognizing
820 the varied role of their encounters with other athletes and/or the different environments. Further,
821 this conceptual shift may empower practitioners and researchers alike to come up with a wider
822 range of principles and conditions that should be established to nurture – not only measure –
823 novel and meaningful (inter)actions in sport. In this regard, the practical implications of this
824 study are threefold. First, sport practitioners need to recognize the various kinds of creation that

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825 may be important in sport; that sport participants can be creative in different ways and that
826 creativity may play several roles throughout all development stages.

827 Elaborating recent findings advocating the design and implementation of sport programs and
828 practice activities encompassing key elements of play (Fardilha, 2021; Roca & Ford, 2021), the
829 second is that coaches could operationalize the diverse modalities of creativity into day-to-day
830 practices. Considering the technological distractions and societal changes taking children's time
831 away from spare-time outdoor play, it would be timely to transfer the modalities of creative play
832 to creative practice, as suggested by Machado et al. (2019). We can already imagine principles
833 that may guide the crafting of creative experiences in practice and beyond, such as “what-if” and
834 “as-if” scenarios, making the known unknown and player-led design of competitive challenges.
835 Further, the design of such activities may be inspired by principles of extant approaches such as
836 the Creativity Developmental Framework (Santos et al., 2016), The Creative Soccer Platform
837 (Rasmussen & Østergaard, 2016), and the Creative Potential System (Richard et al., 2021).

838 Third, adults should avoid rigidly standardizing the remaining play activities while preferably
839 promoting imagination and exploration by inspiring young players to invent their own tasks.
840 Showcasing a diversity of lived experiences on the role of creativity in the thriving,
841 improvement, and success of athletes, this study may inspire sport participants at all levels to
842 invest more time in inventing unusual ways to do things and exercise creative control over their
843 life no matter if they continue to progress in their sport or not. As argued by one of the players,
844 “Creativity has no limits, so I don't think we have seen its full potential.” (Leo)

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