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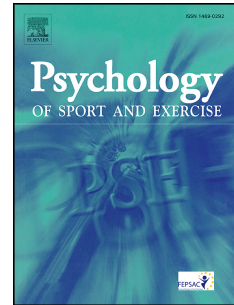
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Exploring the Role of Sport in the Development of Substance Addiction

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Exploring the Role of Sport in the Development of Substance Addiction

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17 **Purpose:** Potential benefits of participation in sport are widely known. However, sport
18 participation has also been associated with risks, including consumption of alcohol and drugs and
19 such risks may be enhanced among certain populations. The purpose of this study was to examine
20 the possible links between participation in sport and the subsequent development of substance
21 addiction.

22 **Methodology:** Realistic Evaluation guided the study, with data collection occurring through
23 semi-structured interviews. Interviews were conducted on the university campus or at a
24 residential treatment center. A total of 21 participants: 7 people who had between 3 and 29 years
25 of sobriety, 13 people in a residential addiction treatment program, and 1 counselor.

26 **Results:** Participants were grouped according to their sport backgrounds as 1) limited sport
27 backgrounds, 2) recreational sports, 3) competitive athletes or 4) competitive athletes whose sport
28 was terminated. Five main contexts were identified: 1) Familial History, Stability, and Illness, 2)
29 Perceived Acceptability of Alcohol, 3) School and Social Atmosphere, 4) Sport Culture,
30 Demands, and Expectations, and 5) Termination of Sport Involvement. The three main
31 mechanisms were identified as: 1) Psychological Characteristics, 2) Coping Strategies, and 3)
32 Availability of Substances.

33 **Conclusions:** The prevalence of substance abuse in sports settings might be under-represented in
34 extant literature. The prevalence of substance abuse in sport contexts poses heightened risk of
35 addiction for individuals who are already vulnerable for other reasons such as the presence of
36 predisposing behaviors, psychological characteristics, or circumstances.

37

38 **Keywords:** Substance use, Substance addiction, Sport, Qualitative research, Realistic
39 Evaluation

41 Substance addiction¹ is a widespread problem (Potenza, 2013), with over 21.6 million
42 people age 12 years and older suffering from substance dependence or abuse² worldwide
43 (Substance Abuse and Mental Health Services Administration, 2013). The costs of substance
44 abuse are substantial, totaling \$39.8 billion in Canada alone, with direct and indirect costs
45 including additional health care, law enforcement, and loss of productivity (Canadian Centre on
46 Substance Abuse, 2006). Further, the social impact of addictions worldwide is estimated to affect
47 seven people for each identified addicted individual (Potenza, 2013). As such, understanding how
48 and why substance addiction develops, as well as identifying strategies to prevent substance
49 addiction, is extremely important.

50 Alcohol and drug use³ is most likely to begin during adolescence (Ashtari et al., 2011;
51 DuPont, 2000; Swendsen & Le Moal, 2012) and adolescents are also four times more likely than
52 adults to report harm to self and others resulting from drug use (Canadian Alcohol and Drug Use
53 Monitoring Survey, 2012). Personal harm occurs through overdose, suicide, injury, impaired
54 development of the brain, and unsafe sex resulting in unwanted pregnancy and/or contracting
55 HIV (Ashtari et al., 2011; Foxcroft, Ireland, Lister-Sharp, Lowe, & Breen, 2003; Grant et al.,
56 2012). The greatest escalation of substance use occurs between ages 13 and 14, peaking around
57 age 16 (Ashtari et al., 2011; Meier, Anthony, & Troost, 2012).

58 Early initiation of substance use is associated with future cognitive impairments (Potenza,
59 2013; Torregrossa, Corlett, & Taylor, 2011), a large number of problems in adulthood, and is

¹ Substance addiction refers to a chronic dependence where use has become habitual and compulsive despite negative health and social effects (Carter & MacPherson, 2014).

² Substance abuse refers to use that begins to have negative consequences for individuals, friends, family, or society (Carter & MacPherson, 2014).

³ Substance use refers to initial and or casual, recreational use that has negligible health or social effects (Carter & MacPherson, 2014).

61 Swendsen & Le Moal, 2012; Terry-McElrath & O'Malley, 2011). For example, individuals who
62 initiate alcohol use by age 14, compared to those who wait until age 20, are more likely to face
63 impaired health status (Foxcroft et al., 2003; Hawkins et al., 2009). Similarly, of those who
64 reported using marijuana at or before age 14, 12.8 % were classified as drug dependent in
65 adulthood (Substance Abuse and Mental Health Services Administration, 2011). Consequently, it
66 is particularly important to understand factors that may contribute to substance use during this
67 critical time period.

68 However, early use is just one of the risk factors in the development of addiction. Other
69 risk factors are biological vulnerability, the influence of family, times of transition, the desire to
70 do something new or risky, and peer pressure (DuPont, 2000; Szapocznik & Coatsworth, 1999).
71 The more risk factors that are present, the more likely it is that addiction will occur (Szapocznik
72 & Coatsworth, 1999). Conversely, the elimination or reduction of risk factors and/or an increase
73 in protective factors (e.g., conditions that could discourage substance use) such as personal
74 competence, social acceptance, and family support, can help prevent addiction (European
75 Monitoring Centre for Drugs and Drug Addiction, 2009).

76 **Physical Activity as a Protective Factor**

77 Engaging in various types of physical activity, including sport, is generally associated
78 with positive health outcomes (Tassitano et al., 2010) and traditionally, health practitioners have
79 viewed physical activity and sport participation as providing protection (e.g.,
80 reducing/preventing) against stress, depression, and drug use (Lisha & Sussman, 2010; Pichard,
81 Cohen-Salmon, Gorwood, & Hamon, 2009). For example, physical activity has been shown to
82 decrease many of the physical and mental health issues young people can experience, which may
83 prevent subsequent substance use (Dunton, Atienza, Rodriguez, & Tscherne, 2011). Further, it

85 and better academic achievement (Moore & Werch, 2005), as well as protecting against and
86 alleviating the symptoms of depression and anxiety (Kantomaa, Ebeling, Taanila, & Tammelin,
87 2008). Given that physical activity and sport participation can provide rewards such as elevating
88 mood and decreasing anxiety, regular physical activity has been proposed as a potential strategy
89 to reduce individuals' desires to engage in other reward seeking behaviors such as substance use,
90 and possibly to prevent escalation of substance use (Fontes-Ribeiro, Macedo, Marques, Pereira,
91 & Silva, 2011; Kantomaa et al., 2008; Moos, 2007). Moreover, participation in physical activity,
92 including sport, is gaining attention as a potential strategy for reducing substance use and as
93 adjunct treatments for substance use disorders (Weinstock, Van Heest, & Wadeson, 2012)

94 **Sport as a Risk Factor**

95 However, the relationship between sport participation and substance use is far from
96 conclusive (Korhonen, Kaprio, Kujala, & Rose, 2009; Peck, Eccles, & Vida, 2008). For example,
97 although there are many potential benefits associated with sport participation (as detailed above),
98 in some individuals who are at risk of developing addiction, certain sport conditions have been
99 shown to encourage substance use (Goldberg & Elliot, 2005; Lisha & Sussman, 2010; Moore &
100 Werch, 2005; Wichstrøm & Wichstrøm, 2009). Factors that appear to mediate the relationship
101 between sport participation and substance use include the type of sport and the setting; for
102 example, whether participation is through school or community (Taliaferro, Donovan, & Rienzo,
103 2010). Participants in team sports appear to be at the greatest risk (Terry-McElrath & O'Malley,
104 2011; McDuff & Baron, 2005) with binge drinking being more common for athletes than for non-
105 athletes (Barry & Piazza, 2010; Lisha & Sussman, 2010).

106 Unfortunately, despite the evidence highlighting the potentially negative relationships
107 between sport participation and substance use in some individuals, our understanding of the role

109 activity, including sport, is being suggested as a potential strategy for limiting substance use or as
110 an adjust for the treatment of substance use disorders, coupled with the fact that millions of
111 adolescents worldwide participate in sport and that adolescence is a critical period for initiating
112 substance use, understanding exactly if or how participation in sport may influence substance
113 addiction appears critical. Accordingly, the purpose of this study was to examine any possible
114 links between participation in sport and the subsequent development of substance addiction.
115 Specifically, this study sought to gain insights from individuals in recovery from substance
116 addiction into the perceived influence of involvement or non-involvement in sport in the
117 development of their substance addiction.

118 **Method**

119 **Methodology**

120 The study was guided by an approach developed from Realistic Evaluation (RE), a
121 framework grounded in critical realism, which has been used widely to understand outcomes
122 (Pawson & Tilley, 1997). Traditionally, these outcomes arose from interventions and RE sought
123 to understand the pathways through which these interventions influenced outcomes (mechanisms)
124 and how context moderated these affects (Pawson & Tilley, 1997; Mark, Henry, & Julnes, 1998;
125 Porter & O'Halloran, 2011). As with previous studies, we have applied the concepts of RE in this
126 study to understand outcomes as they occur in the real world – via an examination of the causal
127 mechanisms associated with substance addiction and how context modifies these (Clark, Whelan,
128 Barbour, & MacIntyre, 2005). This is important because the incidence of substance addiction is
129 complex and results from the reciprocal interplay of underlying biological, psychological, and
130 social causal factors. Within this study the application of RE enabled us to explore the
131 mechanisms of effect and context when the outcome of interest was addiction, and identify

133 used for a variety of studies in sport, including an intervention using football reminiscences for
134 men with dementia (Tolson & Schofield, 2012) and a case study of the social benefits of sports
135 playing fields for young people in two communities (Nanninga & Glebbeek, 2011).

136 RE focuses on two major process components; mechanisms and contexts. Mechanisms
137 can be either protective or enabling, and describe the steps or series of steps that bring about
138 change by influencing the choices that people make. That is, they are the decisions and capacities
139 that lead to regular patterns of social behavior (Pawson & Tilley, 1997). Contexts are the spatial
140 and institutional locations of social situations including the norms, values, and prior sets of social
141 rules that affect different individuals (Kazi, 2003). Compared to mechanisms, contexts are
142 broader structures or circumstances affecting populations rather than individuals (Kazi, 2003).
143 Our use of RE was focused on the mechanisms linking factors (sport) and the influence of
144 contexts leading to a known outcome (substance use and eventually addiction).

145 **Participants and Recruitment**

146 Given the target outcome being examined in this study, the population of interest was
147 people in recovery from substance addiction. A total of 21 people in recovery participated in this
148 study in two phases. Two phases were desired because, although there is evidence to indicate
149 that engagement in sport is associated with substance use and anecdotally stories linking
150 substance use to sport are common, there has been limited investigation of the influence of sport
151 on substance addiction. Particularly, there has been little research from the perspective of
152 individuals who suffered from addictions, with the majority of research examining the likelihood
153 of development of addictions using quantitative approaches. As such phase 1 was conducted as a
154 preliminary examination of the viability of the study premise prior to visiting a treatment centre.

156 identified as being in recovery from substance addiction. The majority of these participants were
157 recruited through the lead researcher's previous connections. Specifically, six of them were
158 known to the lead researcher through volunteer work on a committee to plan an event pertaining
159 to recovery from addiction. We recognized the potential bias that may arise as a result of this
160 (albeit it limited) pre-existing relationship with the participants and took steps to minimize this
161 (such as limiting any discussion about the project away from interviews). The participants' time
162 abstinent ranged from three to 29 years (see Table 1). Participants were sampled based only on
163 their interest in participating in the study and their history of substance addiction and recovery;
164 information regarding their sporting histories was obtained only during interviews. This was
165 deemed important to ensure we did not create an artificial link between sport participation and
166 substance addiction. We continued to conduct interviews with phase 1 participants until we had
167 gained insights from sufficient individuals to fully examine the feasibility of the study across
168 participants with a range of sport experiences, from recreational through to elite involvement.

169 Having completed phase 1 of the study, phase 2 sought to gain insights from individuals
170 at a private inpatient (residential) substance treatment center located in western Canada⁴. The
171 lead researcher explained the study to the patient population in a group setting and then potential
172 participants indicated their interest to a designated staff member who scheduled interviews for
173 those meeting the inclusion criteria. Participants were deemed eligible to participate if they
174 provided consent and had been resident in the treatment center for a minimum of 30 consecutive
175 days; the minimum time in treatment deemed by the center director for participants to be 'clean'
176 and stabilized. Participants were recruited based on their history of substance addiction, rather

⁴ Walking, yoga, and gym sessions are a mandatory component of this program

178 participation or non-participation in sport on the development of substance addiction. This was
179 deemed important to ensure that the identification of mechanisms or contexts related to sport
180 engagement and the outcome of substance addiction was not forced. However, all of the
181 participants had engaged in some form of sport, with their level of involvement ranging from
182 limited or sporadic frequency to very high-level competition including professional sports.

183 Counselors were also personally invited to participate by the lead researcher as a means of
184 expanding our general understanding of the role of sport in substance addiction and to triangulate
185 insights from the patients. In total, 13 people in active recovery and one counselor were included
186 in phase 2. The patient group included Canadians from across the country, eight of whom were
187 men and five women ranging in age from 20 to 59 years who had resided at the center for a
188 minimum of 30 consecutive days (the average length of stay at the center is six to eight weeks).
189 Several counselors had agreed to be interviewed, however, logistical issues resulted in only one
190 being available during the data collection period. See Table 1 for further details.

191 ***** Insert table 1 here *****

192 **Data Collection**

193 Following approval by a University Research Ethics Board, participants for phase 1 were
194 contacted by email or telephone. They were provided with a brief description of the research and
195 invited to participate. All agreed and interviews were arranged. After obtaining informed consent,
196 semi-structured interviews began with a broad question, asking participants to tell the interviewer
197 about themselves (e.g., please can you tell me about yourself). The focus then shifted towards
198 their engagement in sport (e.g., What was your previous experience with sport), their substance
199 use (e.g., I am interested in knowing about your substance use, please can you tell me how it
200 started and what influenced your continued use?) and their perceptions of any links between sport

202 questions, participants were asked to provide any further information on either sport or substance
203 use). The duration of the interviews ranged from 48 to 106 minutes ($M = 64$ mins, $SD = 20$ mins).

204 The interviews from phase 1 were fruitful in providing data to address all areas of interest
205 and highlighted the feasibility of examining this topic. Given the depth and detail of the stories
206 provided by the participants in phase 1 it was decided to proceed to phase 2 of the study and
207 subsequently to include data from both phases in the overall data set. In phase 2, the semi-
208 structured interviews followed the same structure as those from phase 1. The duration of the
209 interviews for phase 2 ranged from 35 to 80 minutes ($M = 52$ mins, $SD = 15$ mins).

210 **Data Analysis**

211 Immediately following each interview, the lead researcher transcribed the recordings
212 verbatim, removed all identifying information, and initiated analysis. There is no single analytic
213 method recommended for RE research. In fact, there is very little instruction available beyond
214 creating a design to suit the proposed theories and the available data (Pawson & Tilley, 2004).
215 With the goal of RE research being to identify general patterns of contexts and mechanisms, the
216 decision was made to utilize Miles and Huberman's (1994) data analysis procedures as these are
217 embedded within critical realism and provide clear explanations of linking themes across
218 participants to identify patterns. Initially lower order categories were identified, which were then
219 grouped into higher order themes and, after much deliberation, allocated as mechanisms or
220 contexts based on the definition of these two elements. The data were then placed within a data
221 matrix of contexts and mechanisms to allow for comparisons across all participants. The
222 identification of patterns across participants allowed for the development of a visual display
223 illustrating the contexts and mechanisms for different groups of participants.

224 **Methodological Rigor**

226 throughout data collection and analysis by the lead researcher who conducted all of the
227 interviews. This journal enhanced the interviewer's self-awareness; facilitating an internal
228 dialogue to evaluate thoughts and feelings about the information being gathered (Jasper, 2005)
229 and helped to ensure that the emerging patterns were reflective of the data rather than the
230 researcher's preconceptions. Although this reflective journal was not shared with the research
231 team, the lead researcher regularly discussed the data and emerging themes with other
232 experienced researchers, and considered the convergence of the patterns with previous personal
233 experiences interacting with a family member and several acquaintances (not including the
234 participants in phase 1) in recovery from addictions to ensure that personal experiences were not
235 being forced onto the data. Finally, data analysis began prior to completion of the data collection
236 creating an awareness of emerging categories, which informed subsequent interviews. The
237 interview with the counselor also provided additional understanding to the participants' stories
238 and allowed for examination of the emerging patterns.

239 **Results**

240 All of the participants had engaged in some form of sport and many perceived a link
241 between participation in sports and substance use; some participants viewed substance use as an
242 integral part of particular sports environments. On examining the data, participants were allocated
243 into four groups based on their sporting history: 1) limited sport backgrounds, 2) recreational
244 sports, 3) competitive athletes who continued to engage in some sport, and 4) competitive
245 athletes whose sport participation was terminated. Group 1 included four participants who had
246 only casual exposure to sports, an outcome that they each attributed to their family's low socio-
247 economic status. Three of the four were from phase 1 and the fourth was from phase 2. Group 2
248 included three participants who began recreational sports as young children but dropped out

274 that, anecdotally, a physician on staff said that when a patient cannot describe a family member
275 with an addiction, they have not looked hard enough.

276 In addition to a perceived genetic influence, participants also pointed to certain elements
277 in their family that they thought contributed to the development of their substance addictions. For
278 many participants, witnessing their families' substance use (beyond alcohol) created a context
279 where substance use could be initiated. For example, participant 3 explained his experience:

280 I guess it was also a bit of glamour that I seen with it [selling drugs], cause when my
281 cousin was selling, I seen all the different girls he had, and I seen the money that he had,
282 and I seen that cars...I seen the different cars he would have, right.

283 Participant 5 attributed his initiation of substance use to his desire to spend time with his
284 mother's boyfriend. He shared:

285 She's [mom] an alcoholic so there's lots of parties and stuff...I visited my mom, one of
286 the boyfriends who...he was around for the longest...turns out he was a crackhead living
287 in a crack den...so I'd rather spend time with him just doing whatever he's doing, than
288 not spending time with him.

289 Constant change or instability in the family, as pointed to by Participant 5, was also identified by
290 some participants as contributing to substance use. For example, Participant 3's interview began
291 with him talking about his mother coming to take him to live with her once again, away from the
292 home with his stepfather. His reaction to the new environment, combined with easy access to
293 substances, led to his substance use:

294 It [substance use] wasn't at school; it was actually with my own family. Cause ah...when
295 my mom came to [province] to pick me up and bring me back to [city] ... and [pause]
296 when I was introduced to [city], not only am I a country kid introduced to the city and I'm

298 have no friends here; it's all brand new. It was very scary, very intimidating. And then to
299 find my mom's household as soon as we walked in, it was a party house...She would leave
300 for days on end, she would be drinking, she'd come back piss drunk.

301 In addition to the fear and intimidation participants could experience as a result of
302 instability in family relationships, uncertainty and unpredictability associated with mental illness
303 was also discussed by a number of participants as contexts that encouraged their use of
304 substances. Participant 7, who as an adult was diagnosed with anxiety disorder and depression,
305 provided one example of mental illness in a family and its impact on his substance use:

306 ...the easiest place to start with would be 13. Um, I remember the first time I used drugs
307 that my mother had attempted suicide the day before and had been taken away to a, the
308 hospital in an ambulance and was placed in intensive care and we didn't know whether
309 she was going to live or die. And I was, I had to go to school. I also had to tell my
310 [younger] brother and sister what happened, um...

311 Finally, for some participants, growing up in a family environment in which they
312 experienced verbal and physical abuse also appeared to be a significant contributor to their use of
313 substances. For example, when describing why she began using substances Participant 5 said,
314 "...my mom was very emotionally abusive, emotionally, mentally and physically abusive to
315 me..." While Participant 16 shared:

316 Ah, I wouldn't say he [father] would get angry, but he would definitely criticize me a lot,
317 to where it really bothered me. Cause I was young and I wanted to be as good as the other
318 [soccer] players, and when he criticized me he would bring up how good the other players
319 were. And that's my dad, so I took that really hard and it would make me super angry,
320 very angry.

322 development of their substance addiction and their journeys to recovery, with multiple
323 overlapping and interrelated factors combining to create a context in which participants, in
324 retrospect, perceived their substance use as almost inevitable.

325 **2. Perceived acceptability of alcohol.** In addition to the genetic and family influences
326 described above, the participants described a perception that alcohol consumption was acceptable
327 in their homes and their society, as Participant 2 shared, ... “it’s [alcohol] such a socially
328 acceptable thing in [province], as well as with my family.” This acceptance of alcohol
329 subsequently created an environment in which participants felt comfortable consuming alcohol,
330 often from a young age. For example, Participant 10 was exposed to alcohol as a child, although
331 he did not abuse it until many years later. As he said, “I had my first drinks when I was, oh
332 probably 6 or 7, I’d have a glass of wine at dinner.” For Participant 20, her experience of drinking
333 also started early and was accepted and encouraged by her family. As she said:

334 It was how was raised, I'd been drinking since I was 13, it's normal nobody's ever said
335 anything to me about it, right?... This is how you live, this is life this is real, right, it's, it's
336 fine. ...At 12 I was actually going to this bar. And it's funny, well not funny but it is
337 funny, because my dad would drive me there, knowing full well that I was going to drink
338 and get drunk and dance and so he would drive me there and pick me up at midnight.

339 Most of the participants perceived that alcohol was acceptable in their homes because they
340 witnessed their parents or other family members enjoyment while using it and some were
341 encouraged or supported to drink themselves. Having observed the acceptance of alcohol in their
342 homes it was deemed unsurprising by the participants that it was the substance most abused by
343 individuals.

345 participants describing the implicit expectation of alcohol consumption on their sports teams. For
346 example, Participant 16 described the drinking culture in his hockey team:
347 For senior men’s hockey that I just recently started playing last year, um, drinking was a
348 big part of it, actually. Like, after the games there would be a big cooler full of beer and
349 on bus trips we’d drink on the bus the whole way back.

350 Similarly, Participant 20’s comments were indicative of the stories shared by many participants,
351 when she explained, “...it [drinking] was what we did, it, it went hand in hand with baseball. You
352 didn’t play ball without drinking, and you didn’t drink without playing ball.” Such social
353 acceptance of alcohol not only appeared to set the stage for future alcohol use and abuse but its
354 integration into so many facets of society subsequently created a challenge for those wanting to
355 live without it. Overall, acceptability of alcohol, as well as genetic, and family influences were
356 the largest contributing contexts to substance use among participants in groups one and two.

357 **3. School and social atmosphere.** Beyond the perceived acceptability of alcohol, all of
358 the participants indicated that they were exposed to substance use (beyond just alcohol) in their
359 school years and that, depending upon the structure and social atmosphere, school could enhance
360 or reduce their likelihood of using substances. The positive influences (i.e., preventing or
361 reducing substance use) of school were seen in very strict or very structured environments.
362 Participant 10 mentioned that his boarding school environment was strict and was successful in
363 curtailing his substance use. Another participant, Participant 8 described a school environment he
364 attended for one term to which he attributed to his temporary termination of drug use:

365 And ah, everyone that I know, that has gone through it [school based outdoor education
366 program], like, I know hundreds of people that have gone through it, everyone says the

368 drinking, everyone stopped.

369 He went on to say that upon returning to the regular school environment, he also returned to his
370 substance using behaviors.

371 More commonly described were participants' experiences of attending schools with fewer
372 restrictions and seemingly low levels of supervision, which enabled them to begin to use
373 substances. Participant 14 moved from a private school to a public high school and offered the
374 following comparison:

375 ...when I went to the high school, um, which was a public school, there was a lot more
376 leeway and bigger classes and not as much checking in and you know, I kind of took
377 advantage of that.

378 In taking advantage of this leeway, some participants sought out other like-minded individuals
379 who were using substances, and such substance use subsequently became part of the participants'
380 social circles. For example, Participant 2 described the impact of new friends after moving from
381 (a smaller, more regulated) elementary school to junior high school:

382 By about, I think it was, in grade 8 was the first time I had smoked pot...it was cause all
383 the people I was hanging out with...starting in grade 8, I started hanging out with a new
384 group of friends, the cool kids.

385 Consequently, within their social circles, participants perceived the use of substances as desirable
386 in enhancing their social status and subsequently prompting their continued substance abuse:

387 I'm not really proud of it, but I was the one drug dealer, that was the only drug dealer that
388 was at that high school for that whole time that I was there. So, I accumulated a lot of
389 friends, but they weren't friends, they were more of, more ah, more associates than

391 made the soccer team, that's how I made high school hockey team.

392 With the exception of attendance at private schools or the outdoor education program described
393 by Participant 8, the school culture was perceived to facilitate substance use and it was the most
394 influential context for those in Group 2.

395 **4. Sport culture, demands, and expectations.** The participants in Groups 3 and 4 were
396 influenced by the same contexts as those in Groups 1 and 2. However, they also focused upon the
397 elements of sport culture that they felt contributed to the development of their substance
398 addictions. Specifically, many participants in Groups 3 and 4 emphasized the sport culture of
399 socializing and recognition, along with the physical demands and expectations, as encouraging
400 their use of substances. Participant 16 explained:

401 I did a little bit of drinking as well in the Bantam level [hockey] which is well, which is
402 14, 15. ...Um, I was introduced to ecstasy first by some of the hockey friends actually and
403 ah, it kinda picked up from there. I tried cocaine when I was drunk one time and ah I
404 really liked it...

405 He further explained:

406 It [substance use] was definitely passed down because you feel like you have to live up to
407 the older guys' expectations, there's a 3-year gap in between... we'd always be invited [to
408 parties] and we really tried to live up to the, to the standards they were setting.

409 Encouraging substance use was not exclusively the domain of peers but included some adults in
410 authority roles in sport. For instance, Participant 1 described his experience of being rewarded
411 with substances at age 16:

413 ...he brings a bunch of girls on the bus and drugs, you know pot, cocaine. I mean, this is,
414 this is what they do to kids. Here you go, thanks for winning.

415 Beyond the reward and recognition by team officials, Participant 1 also described his sense of
416 importance as a professional hockey player outside the team environment, "You know the
417 lifestyle was great...people give you everything and you know you're basically a rockstar in the
418 community that you're playing in." Participant 15 had a similar experience, explaining:

419 That's another thing with, with hockey is, is you're very popular, and all the girls tend to,
420 to attract, you get attracted, or they get attracted to you because you're new in town,
421 you're not from around there, you're new like um.

422 For these participants, living this "rockstar" lifestyle often included receiving money from fans,
423 drinking large amounts of alcohol and using substances, which consequently developed into
424 addictions. As Participant 9 explained, even as a member of the high school hockey team, "...we
425 always fit in at parties and stuff, like it was a hockey team right, so we were kinda like the life of
426 the party and I, it just came hand in hand with drinking and substance abuse."

427 In contrast to the partying and socializing, for many participants the physical demands
428 and expectations placed on them to engage in certain behaviors when competing also encouraged
429 substance use. For example, one participant attributed his substance addiction to the trauma he
430 experienced as a hockey player. Being taller and heavier than his peers, he was encouraged to use
431 his size as a defensive player, he explained, "...my life changed because of an incident on a
432 hockey rink, I broke a kid's neck." The participant never recovered from the incident and was
433 overcome with emotion while sharing this story.

434 Fighting was an issue that was problematic for two other participants who, as hockey
435 players, were expected to fight, but were not comfortable with this. Participant 1 shared:

437 gosh I don't have to fight!" And he came over, and this was, ah, you know, I remember
438 like yesterday he came over and he dropped his gloves and I just looked at him and I just
439 feared for my life. I was just, "oh my gosh, what do I do?". Cause he, I had never fought
440 before. And just out of fear, I just started doing and it came natural kind of to me. Like it
441 just, I was scared, I was fighting out of fear and that was it.

442 This participant went on to explain that he was financially rewarded for fighting so consequently
443 he fought despite his intense fear. However, the long-term consequences for this participant were
444 use and abuse of substances to enable him to fight and manage the physical and emotional toll
445 fighting took on him. Such experiences are not unique, as the counselor shared:

446 One of more overpopulated, the over represented pro athlete that we get in here [treatment
447 centre], ah, is NHL enforcers that had to fight for living. The absolute fear that they
448 describe in their sessions with me, of their absolute, overwhelming anxiety, throwing up
449 before they were going on the ice cause they knew they were going to fight some six foot
450 eight giant on the other side, ah and then when that fear was, the only way they could get
451 on the ice for some of them, was to literally be high while they were playing.

452 **5. Termination of sport participation.** Generally, the participants who were competitive
453 athletes devoted substantial amounts of time to their sports. When their participation was
454 terminated, they reported being unable to resolve the end of their engagement and this appeared
455 to leave them vulnerable to substance abuse. Substance use and abuse occurred to fill the void
456 created by the loss of sport itself, their athletic identity, and for some, the loss of a connection
457 with the team. For example, Participant 6 explained that substance use was a consequence of
458 ending her dance involvement:

460 stopped paying for my dance classes...for a long time it was my identity and I had to find
461 something to replace it ...
462 After a few years of sobriety, this participant continues to feel that she has not overcome the loss
463 that followed the termination of her dance career and is still seeking a “new” identity.

464 Participant 10, who had been an international rower, described how the lingering effect of
465 the termination of his sporting career, due to injury, contributed to his substance use. He had been
466 exposed to alcohol from a young age but did not abuse it until an injury during high-school ended
467 his rowing career:

468 ...so that [injury] was kinda the end of my rowing... Yeah, I was his [coach] star, and
469 then I just got thrown in the garbage. I basically, I don't know, I just, didn't want to have
470 anything to do with anybody or anything...I remember watching the Olympics and seeing
471 the men win the gold in the eight, and I cried...the loss of being a part of the team, a loss
472 of a dream, cause ever since, like I said...Olympics was my goal. Ah that's all I dreamed
473 about when I was younger, is I'm going to the Olympics.

474 Although this participant drank alcohol socially prior to his career ending injury, and described
475 consuming a couple of beers following a regatta, his alcohol use escalated when he finished high
476 school with no life plans and his only goal no longer attainable.

477 For Participant 4, his injury and subsequent substance use actually occurred while
478 attempting to become accepted by his team. He had been bullied by most of his teammates who
479 were two years older. After he scored his first goal, two of the boys made the attempt to befriend
480 him and he took full advantage. Without a license, he joined them riding motorcycles and
481 suffered serious injuries putting an end to playing sports:

483 coma, the doctor turned around and told me outright ah, you may never walk again. And
484 so being a hockey player from age 5 'til 13, to be told that, was like the end of life for me.
485 It was ah a moment where the trauma took me into um really not seeing a future. And ah,
486 at the same time they were pumping me full of morphine and Demerol and codeine over
487 the period of about 18 weeks...And ah, so I'm, I wanted to be in the NHL, that was the
488 dream...it's more the, um, loss of, of future, the way I saw it at the time.

489 Participant 4's drug career progressed; he became an international drug trafficker that eventually
490 resulted in a lengthy prison sentence.

491 For other participants, their substance use began while they played sport and was the
492 eventual trigger for them ending or being forced to end their involvement with sport. For these
493 participants, the regrets over the substance use influencing their loss of sport appeared to
494 stimulate their ongoing use. As Participant 16 explained:

495 And my coach had called me and kicked me off the team, so, yeah. I missed out on a big
496 part of what I really cared about and ah, it hurts now to think back that I chose that
497 [substance use] over something I love to do. And it affected me like that because I was the
498 nicest person ever when I wasn't, like antagonized or you know, hung over or upset about
499 something that I had done when I was drinking. And ah, yeah, it's tough to think about.

500 **Mechanisms**

501 During the early years of their childhoods the participants in this study were not using
502 substances but when the contexts (described above) changed or were experienced- the
503 mechanism(s) leading to substance use were activated. Some of the initial contexts might have
504 been conducive to substance use but without the mechanisms being activated, the behavior to use
505 and abuse substances did not occur. A mechanism can be protective against, or enabling of,

507 coping strategies, and availability of substances. These mechanisms predominantly enabled
508 substance addiction, only in a limited number of situations were they described as being
509 protective.

510 **1. Personal characteristics.** The participants noted a range of psychological
511 characteristics, specifically low self-esteem, a strong and persistent need to fit in (or strong
512 feeling of not fitting in), and high levels of competitiveness, that they felt contributed to the
513 development of substance addictions when in certain contexts. For example, a number of
514 participants indicated that they suffered from low self-esteem and feelings of inferiority and that
515 substance use helped to combat this. Participant 20 had already been using alcohol, but increased
516 this after joining the ball team and realizing how it helped her to socialize:

517 ...I don't have real high self-esteem and, and I think where I felt confident was in ball
518 because I knew I was good, and I was sought after which made me feel even better. Um,
519 but the socializing aspect of it, you know, everyone wants to be liked and so the alcohol
520 really helped me do that. Alcohol gave me the courage to be outgoing so that I could, you
521 know, be accepted.

522 Many participants indicated that their need for social acceptance was a reason for their substance
523 use. Several described feeling that they did not fit in with their families and/or their peers, thus
524 making the opportunity to socialize by using substances particularly appealing. As Participant 16
525 explained:

526 So I guess when I would practice and try to get better, I was really just trying to fit in and
527 ah, be a part of that praised group of people that the town always looked up to and ah. I
528 always envied the better players because they got so much praise from the parents and, so

530 ah picked on the people that were below me.

531 In addition to low self-esteem or perceived social acceptance, a number of participants
532 described themselves as being overly competitive, as Participant 15 shared when discussing
533 training while ill:

534 I had, that expectation that I needed to be there, so that I can be good. I need to have that,
535 competitiveness in me, and um, I always liked being, being a part of a team with a group
536 of guys or kids, you know that we had a lot of fun, but winning was everything, right?

537 Such competitiveness was not mentioned as the reason for initiating substance use but it
538 contributed to the continued use of substances or the quantity used. Further, when describing
539 their competitiveness and desire to win, many participants indicated that this influenced both
540 their sport involvement as well as their substance use. For instance, Participant 6 explained:

541 I was the type of a kid where, sigh, um I was very motivated and I was very driven. Um,
542 and I would take more, more, more, right? Kind of that addict personality, so you give
543 me one dance class a week and I want more.

544 While, Participant 16 succinctly explained:

545 And the competitive side of me...it's not a healthy competitiveness...I brought that
546 competitiveness to my drinking. I did, ah, I always wanted to be the one that can drink
547 the most and the fastest and stuff like that, yeah.

548 Some participants, particularly those involved in competitive sport, indicated an awareness of the
549 similarity between their drive in sport and their substance use, as Participant 2 reflected:

550 But now being through all the substance abuse and, and recovery that I've been through, I
551 look at it [sports] as ah, it was definitely my first addiction. I ah see many, many, many
552 parallels ah, not to the extremes... something when you do substances, is the same thing

554 Do you know what I mean? Because I've done both and something there is the same,
555 whether it's dopamine or whatever the hell. Ah [pause] there's there's there, it jives.

556 **2. Coping strategies.** When forced to deal with difficult, challenging, and often traumatic
557 situations, participants described initially leaning on their sport participation and later substances.
558 For instance, a number of participants managed the stress in their lives by seeking out strategies
559 to numb themselves or escape. Sports were often used as the initial coping mechanism as
560 described by Participant 8:

561 It [sports] provides ah, it provides protection at a young age, yeah, for sure. Um, I think it
562 just masks the addiction, though. I think it just takes away the drugs but keeps everything
563 else there all the, cause as you learn in here [treatment], the addiction is, isn't always all
564 about the drugs, it's about all the, not being able to express yourself, the feelings and
565 everything. I think it's just; it alternates drugs for sports, like it's another escape. It's,
566 yeah, it gets you, it helps you to avoid what the real problems that are going on in life.

567 Substances were then introduced either in addition to or instead of sport, often when sport alone
568 was insufficient in helping individuals. As Participant 11 shared:

569 Um, my dad, [she corrected herself] my uncle passed away, alcoholic and when that
570 happened, my addiction with the cocaine just doubled. And that continued for about a
571 year, and I was still working, I was still doing ok with that, kept it all good on the outside.
572 But the inside was just messed up and then my dad died...Um, so my father passed away
573 and I turned to drugs and I couldn't maintain the career in the fitness industry because I
574 was doing drugs on a daily basis. And about a year, not even a year after my dad passed
575 away, I found myself at [name], another treatment center.

577 cope with the situations they encountered within sport or with the physical pain. Participant 15
578 described a situation shared by others in the study, when realizing he could not progress with his
579 sports career, "... I can remember laying in bed, and, and sobbing, crying and, and thinking to
580 myself, well you're just not good enough. You know, you'll never be good enough and, maybe,
581 maybe smoking weed helped numb that." While Participant 1 shared a different story arising
582 from his role as a hockey enforcer, "... I turned to alcohol for a lot of the violence or the way of
583 life that I lived." Similarly, Participant 11, who initially had an eating disorder and subsequently
584 developed substance addictions, experienced some very negative coaching during her sport
585 involvement and, reflecting on these interactions, she perceived them as contributing to her
586 subsequent substance abuse. As she said, "Verbally abusive, psychologically abusive coaches as
587 you're growing up, right. At the time you don't think of it but when I look back on it I'm like,
588 yup, that definitely had an impact on me, right."

589 In addition to managing psychological pain, many of the participants initially started
590 taking drugs to cope with physical pain and this transitioned into substance use. This was the case
591 for Participant 8, a dirt biker, who explained, "It was just so easy to get prescriptions [dirtbiking].
592 With Tylenol 3s and then by the time I was 13, yeah, it was every day..." He went on to describe
593 how the use of prescription drugs masked the pain and led to careless riding. Although he did not
594 provide any details other than to say it was their reckless riding and drug use that was the cause
595 of his best friend's death, it was a traumatic event for Participant 8 at age 19. Escalated substance
596 use was subsequently his means of coping with the emotional pain.

597 **3. Availability of substances.** The availability of substances at home, school, and in
598 sports environments was identified as a mechanism underpinning substance use because it

600 in the home:

601 ...[friend] and I [age 10 or 12] were babysitting our younger siblings...And our parents
602 had been drinking at their house first and then they went to a party and left us with the
603 younger kids. And so all the bottles of booze were sitting on the table and, so we just dug
604 our heels in and, had a few drinks...

605 Alcohol was typically the substance described as being available at home, whereas at
606 school it was more commonly marijuana. Participant 2 describes both the availability and the
607 pressure to use marijuana while in grade 8, "Oh it was, oh, the very first time, I can tell you I, I
608 remember clear as day. Ah, total peer pressure for sure, for sure, for sure, for sure, 100 percent."
609 Participant 9 also felt the pressure to use marijuana when it was available at school:

610 It's ultimately your choice whether you do it [marijuana] or whether you don't. But,
611 having it pushed in your face all the time, or being available [at school] all the time
612 doesn't really help your choices, you know what I mean?

613 Further, Participant 9 was involved in school sports and he explained how the availability of
614 substances at school extended into school sports:

615 Ah, just cause everybody else on the baseball team was started doing it...so yeah, like I
616 can't even really remember a sport that I actually played for a frequent amount of time
617 that I didn't actually use a substance of some sort...

618 Substances were also available in sports environments outside of school, as Participant 20
619 recounted, "...it [drug use] was everywhere [baseball]; it was all around...you could get
620 whatever you wanted." Similarly, Participant 1 explained, "...when I started playing junior
621 hockey in [year] and it [substance use] was promoted, alcohol was... I was around cocaine...I was
622 around pretty much everything you can get your hands on." When in the contexts described

624 with some psychological characteristics and the need for a coping mechanism, provided the
625 impetus to take advantage of the substances on offer in their sporting environments.

626 **Discussion**

627 RE provided a methodology and structure for exploring the complex interactions of
628 mechanisms and contexts comprising the participants' experiences in the development of their
629 addictions and their sport involvement. This was accomplished through the identification of the
630 main mechanisms perceived to link participation in sport to substance addiction and the different
631 influences of contexts on the outcome of substance addiction. Although the findings of this study
632 are not intended to generalize to all individuals, it is hoped that the insight into these experiences
633 may resonate with, and help us to better understand, how sport may contribute to the
634 development of substance addiction in certain individuals and consequently what may be needed
635 to better support vulnerable individuals. The current study provides perspectives from a broad
636 spectrum of individuals and experiences. Their one commonality was the development, and
637 subsequent treatment, of substance addictions. This is a novel approach to the problem of
638 substance use in sport, one that has more traditionally been examined with sport participation as
639 the commonality among participants (Tassitano et al., 2010; Moore & Werch, 2005; Terry-
640 McElrath & O'Malley, 2011). Given the choice to recruit individuals with addictions, it is
641 noteworthy that all the participants had some experience of sport and that sport contexts revealed
642 patterns of associations that might pose particular risks for certain individuals.

643 Highlighted in the current findings is the vulnerability of some individuals to the
644 development of addictions in the context of sport culture. Several participants entered sport with
645 multiple risk factors, including a family history of addiction, and then the sport context created
646 new and additional risks increasing the likelihood of substance abuse and addiction. Sport

648 Ninot & Hauw, 2011; McDuff & Baron, 2005). This can include the need to tolerate pain caused
649 by over use or injury, and as a “performance enabler” (Bilard et al., 2011; McDuff & Baron,
650 2005). Other reasons for drug use in sport are reduction of anxiety, injury prevention, and
651 recovery (Bilard, Ninot & Hauw, 2011). It also seems that the expectations for performance and
652 the absence of alternative coping skills creates stress along with physical or emotional pain that
653 pushes some individuals toward substance use, particularly where the culture is uncritical of
654 substance use and substances are readily available (see Branch 2014).

655 Certainly, participants in this study came to the sport contexts with characteristics that
656 made them vulnerable to the demands and opportunities of those contexts, similar to non-athletes
657 (McDuff & Baron, 2005). For those who were already dealing with feelings of not fitting in for
658 example, the availability of substances to manage their social anxiety added to their risk for
659 developing addiction. Such situations are consistent with the literature indicating that the
660 presence of multiple risk factors increases the likelihood of the development of substance
661 addiction (Szapocznik & Coatsworth, 1999; Vampleq, 2005), but also highlight the specific
662 challenges inherent within sport (e.g., managing pain and expectations to be part of a team).

663 The participants in Groups 1 and 2 had dropped out of sports early in adolescence,
664 sometimes subsequent to their substance abuse. Such behavior is recognized in literature
665 reporting that dropout rates from sports tend to coincide with increased levels of substance use
666 (McCaul, Baker & Yardley, 2004; Moore & Werch, 2005). For example, Terry-McElrath and
667 O’Malley (2011) found that children with delinquent histories are likely to drop out of sports
668 before reaching high school. However, adolescents who remain involved in sports seem to be
669 more likely to conform to the social expectations of the sport context, potentially creating
670 vulnerability to substance use and abuse and related effects where those are salient aspects of the

672 conform to social expectations. As sport involvement intensified, the existence of certain risk
673 factors in the sport context were described as contributing to excessive substance use and abuse.

674 The alcohol use described by some participants resulted from the social expectations of
675 their older teammates. Such a finding is contrary to the expectation that sport involvement
676 encourages association with same-age teammates and prevents the negative influences of older
677 teammates (Wichstrøm & Wichstrøm, 2009). For many of the participants in our study, it was in
678 the company of older teammates that their substance use was initiated and/or was escalated.
679 Further, the support and encouragement of fans and non-athlete peers was also described as
680 influential in the escalation of alcohol use, particularly at post-game celebrations. Some of the
681 participants who described feelings of low self-esteem noted how much they savored the
682 recognition and popularity that accompanied their roles as hockey players (in particular). Such a
683 finding points to the importance of ensuring athletes, particularly young athletes, are provided
684 with education and support (e.g., performance lifestyle support) regarding managing these
685 expectations and pressures as well as being guided to develop appropriate coping strategies. Most
686 importantly, perhaps, this points to the critical need for an evaluation of the current culture of
687 (certain) sports, particularly those that cater to vulnerable youth populations.

688 This study also highlighted the connection between sport involvement and the exposure to
689 and use of other substances in addition to alcohol. Alcohol was only one of many substances
690 described as being readily available in their sport environments. Taliaferro et al. (2010) indicated
691 that marijuana and cocaine were drugs more typically used by non-athletes. However, the four
692 hockey players described the use of cocaine as being popular on their teams, being used at
693 parties, and subsequently becoming the drug of choice for two of them. Use of cocaine appeared
694 to be encouraged in the lifestyle that these participants experienced as hockey players. The

696 sports (Lisha & Sussman, 2010; McDuff & Baron, 2005; Terry-McElrath & O'Malley, 2011), but
697 the current reports suggest that other substances are more common, and for young age groups,
698 than has previously been reported. Given this finding, it would again appear important to review
699 what is deemed acceptable practice in this environment. Within this study, cocaine use was
700 limited to high-level hockey players, so perhaps it is limited to certain sports. However, as more
701 sports become professionalized at an earlier age and more young athletes are finding themselves
702 "caught up" in a professional lifestyle and earning money, the value of performance lifestyle
703 support and education of athletes' support networks would seem particularly valuable.

704 Literature suggests that participation in sport will have a generally protective influence on
705 substance use, both due to the activity itself and the social association with people thought to
706 hold negative attitudes toward drug use (Chen et al., 2004; Donaghy, 2007; Terry-McElrath &
707 O'Malley, 2011). The participants in this study provided few descriptions of positive or
708 preventive influences of sport on their substance abuse, although it is possible that positive
709 influences existed but that they were overridden by other factors such as heritability.
710 Nevertheless, the lack of positive influence is concerning given the often blanket support for the
711 benefits of physical activity and sport participation, especially for young people. Even though
712 not all (or even most) athletes exposed to sport environments will develop addictions, our
713 findings point to substance abuse and binge consumption problems at various levels of sport
714 including high-school and recreational sport. The prevalence of substance abuse in sports settings
715 discussed by the participants suggests that the true exposure might be under-represented in extant
716 literature and highlight the need for education and support programmes to address the challenges
717 young athletes may be facing.

719 individuals who are vulnerable for other reasons such as a family history of addiction, the
720 existence of other predisposing behaviors, psychological characteristics, or circumstances (Peck
721 et al.,2008; Szapocznik & Coatsworth, 1999). However, binge consumption poses risks to
722 individuals who do not share these vulnerabilities. With the complexity of the patterns it is
723 impossible to predict what exact ‘constellation’ of risk factors will lead to an addiction, but
724 clearly the levels of substance use, abuse, and bingeing are of concern. Such information
725 highlights the importance of considering the range of risk factors that influence substance
726 addiction and ensuring that one factor, in this instance sport participation, is not considered in
727 isolation. It is also unclear whether access to, or awareness of, better coping strategies might have
728 served a protective effect, but is worth considering in the future.

729 **Limitations and Future Directions**

730 The participants in this study all had a substance addiction and were in treatment or
731 recovery. Such a sample provides a unique insight into the experiences of individuals who are not
732 often consulted. However, the results are limited to the role of sport only for those people who
733 did develop substance addiction. It is not possible to comment on the role that involvement in
734 sport might have on those who did not develop substance addiction, even if they were exposed to
735 the same contexts and/or mechanisms. This gives some clear direction for future research.

736 Further, a purposeful sample of people with substance addictions who have been in
737 recovery for an extended period of time or who are in treatment at a private treatment facility
738 may have different characteristics than those who did not seek treatment or those who obtained
739 publicly funded treatment. The participants in this study were of various ages and years of
740 abstinence, which, while providing a broad range of experiences, may have influenced their
741 stories. Neither of these factors appeared to impact upon the experiences of the participants or the

743 involvement as well as their addictions did differ, and this may have influenced their recollection.
744 Additionally, given the challenges of accessing this population, but the importance of including
745 their views in research, we did not distinguish by gender in the study. Previous literature has
746 indicated that substance use may differ between genders and future research should consider this..

747 Finally, the participants varied with regard to their sporting experiences. While this was
748 desirable for this study to allow for the identification of any differences based on sporting
749 experience, to further understand the role of sport in substance addiction more explicit focus upon
750 individuals who were involved a certain level of sport may be beneficial.

751 The current results point to several promising avenues of greater understanding of the
752 experiences of substance addictions and how controllable contexts (e.g., school, sports) might be
753 instrumentally protective or facilitative of substance abuse. Consideration should be given to how
754 these contexts might exacerbate existing risks within the family and other aspects of community
755 in relation to the development of substance addiction. Moreover, the findings point to the value
756 of developing and evaluating interventions to support athletes in the development of more
757 appropriate and effective coping skills, the integration of appropriate team building and social
758 activities, and the recognition and reflection on individual personal characteristics that may lead
759 to individuals being susceptible to substance use or addiction. Clearly, the role of sport
760 psychology practitioners who may be working with individuals susceptible to the substance use
761 or addiction appears critical, both in identifying individuals who may be at risk and also
762 supporting and educating athletes, coaches, and broader sport organizations regarding sport and
763 substance use. However, further research examining the specific strategies that may be used in
764 such instances are needed. That said, by providing stability, helping athletes develop effective
765 coping strategies, managing the influence of significant others in the athletes' network, and

767 important means through which practitioners may reduce some risks.

768 **Conclusion**

769 This study examined the perceived role of sport involvement in the development of
770 substance addiction from the perspective of individuals in recovery from such addictions. Data
771 analysis identified a number of contexts (or circumstances) that may facilitate or contribute to the
772 subsequent development of addictions. Overall, the social acceptance of alcohol within families
773 and the participants' social environments, as well as heritability and specific family influences
774 appeared to have the greatest influence on the majority of participants' substance use and
775 subsequent addiction. However, for those individuals involved in competitive sport, the culture,
776 expectations, and demands of sport as well as termination of sport involvement also seemed to
777 create contexts in which substance use and subsequently addiction could develop. Within these
778 contexts, certain mechanisms were activated resulting in substance use and subsequent addiction.
779 These mechanisms were personal characteristics such as low self-esteem and high
780 competitiveness, a lack of effective coping strategies, and easy access to substances. Sport
781 participation is traditionally thought to provide protection against substance use but, although
782 participants in this study made some positive mentions, the overwhelming contribution of sport
783 involvement to substance use was negative for this sample. Generally, for these participants,
784 substance use was often initiated and continued in the company of their sport teammates, with
785 substance use including alcohol and other drugs such as marijuana and cocaine.

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	Gender	Age	Time Sober	Main Sport	Level of PA or Sport Engagement	Drug of Choice	Age Abuse Began
	Phase 1		(Years)				
1	Male	37	4	Hockey	Professional	Alcohol	16
2	Male	32	2	Basketball	High School Varsity	Crystal Meth.	12
3	Male	28	5	Badminton	Jr High School Varsity	Crystal Meth.	12
4	Male	61	26	Hockey	AAA	Cocaine	13
5	Male	33	5	Various	School recreation	Crystal Meth.	16
6	Female	33	3	Dance	Competitive	Marijuana	18
7	Female	59	19	Various	School recreation	Alcohol	13
	Phase 2						
8	Male	Not shared	30+ days	Dirt Bike	Professional	Painkillers	13
9	Male	30	30+ days	Hockey/Soccer	High School Varsity	Marijuana	13
10	Male	40	30+ days	Rowing	International	Alcohol	18
11	Female	28	30+ days	Soccer	College Scholarship	Crack cocaine	18
12	Male	59	30+ days	Gymnastics	Provincial	Cocaine	12
13	Male	46	30+ days	Various	Recreational	Alcohol	18
14	Female	40	30+ days	Various	Recreational	Alcohol	14
15	Male	28	30+ days	Hockey	Professional	Cocaine	16
16	Male	Not shared	30+ days	Hockey/Soccer	AA	Alcohol	14
17	Female	25	30+ days	Karate	Black Belt	Alcohol/ Cocaine	15
18	Female	28	30+ days	Various	Recreational	Alcohol/Marijuana	15
19	Male	20	30+ days	Various	Recreational	Alcohol	15
20	Female	42	30+ days	Fastball	Competitive	Alcohol	13

Mechanisms and patterns in the development of substance addiction

Contexts	Mechanisms	
	Sub Mechanisms	
C ₁ Familial History, Stability & Illness	M ₁ Psychological Characteristics	M _{1,1} Low Self-esteem
C ₂ Perceived acceptability of Alcohol		M _{1,2} Need to Fit In
C ₃ School Culture and Social Atmosphere		M _{1,3} Competitive
C ₄ Sport Culture, Demands & Expectations	M ₂ Coping Strategies	M _{2,1} Stress
C ₅ Termination of Sport		M _{2,2} Pain Relief
	M ₃ Availability	M _{3,1} Family
		M _{3,2} School
		M _{3,3} Sports

5

ACCEPTED MANUSCRIPT

3 **1. Limited physical activity**

4 (Participants 3, 5, 7, and 13*)

5 $C_1 + C_2 + M_{1,1} + M_{2,1} + M_{3,1} = 0$

6 **2. Recreational sport as a child**

7 (Participants 14, 18, and 19)

8 $C_1 + C_2 + C_3 + M_{1,1} + M_{1,2} + M_{2,1} + M_{3,1} + M_{3,2} = 0$

9 **3. Competitive Athlete**

10 (Participants 1, 8, 9, 15, 16 and 20)

11 $C_1 + C_2 + C_3 + C_4 + M_{1,2} + M_{1,3} + M_{2,1} + M_{3,3} = 0$

12 **4. Competitive athlete followed by termination of sport**

13 (Participants 2, 4, 6, 10, 11, 12 and 17)

14 $C_1 + C_2 + C_3 + C_4 + C_5 + M_{1,3} + M_{2,1} + M_{2,2} = 0$

- Describes experiences of the development of substance addictions and sport involvement
- Realistic evaluation used to identify contexts and mechanisms of substance addiction
- All participants interviewed have developed, and subsequently received treatment for, substance addiction.
- For some individuals, the sport culture appears to support the development of addictions.
- As sport involvement intensified, the presence of certain risk factors in the sport context appeared to contribute to substance use and abuse.
- There is an apparent prevalence of substance abuse in sports settings, with alcohol only one of many substances available.