1   **A Thematic Analysis of Social Identity and Injury in CrossFit®**

2

3   Vista L. Beasley[1], Rosie Arthur[2], Robert C. Eklund[3], Pete Coffee[4], & Calum Arthur[5]

4

5   [1]Department of Kinesiology, Sport Studies, and Physical Education, State University of New

6   York-Brockport

7   [2]School of Health and Life Sciences, University of the West of Scotland

8   [3]College of Education, Florida State University

9   [4]Faculty of Health Sciences and Sport, University of Stirling

10   [5]Culture Development Advisor, United Kingdom Sport

11

12

13

14   **Author Note**

Abstract

18

19   The purpose of this study was to explore the viability of the social identity approach as a

20   theoretical framework for examining injury in the context of a group exercise program,

21   CrossFit®. Specifically, we sought to identify values of group exercise participants relevant to

22   overuse risk behaviors as well as participants' responses to criticisms about injury. Via thematic

23   analysis, observations of a CrossFit® setting (N = 31) and interviews of members (N = 14)

24   yielded three social identity content (i.e., Being Hard Core, Achieving Results, Camaraderie).

25   Behaviors employed to enact these social identity content (e.g., engage in frequent, high-

26   intensity workouts; attend despite low-level pain; encourage others to continue despite pain;

27   withhold pain reports from group leaders) enabled members to obtain positive evaluations or

28   avert negative evaluations of group members yet also incurred higher overuse injury risk. We

29   also identified two prominent types of responses of CrossFit® members to criticisms about

30   injury in CrossFit® activity: Compare dimensions (e.g., how well members handled the injuries;

31   the effort they put into prevention; health benefits; strength gained) of the group which were

32   perceived as superior to other contexts, and denounce critics. These response types were

33   interpreted to reflect social creativity and polarization, respectively. Altogether, the findings

34   indicate that group-based psychological factors contribute to overuse injury, advancing previous

35   literature in which intra- and inter-personal factors were the primary focus. This study

36   contributed to the literature by identifying theory-based injury risk factors in group exercise

37   contexts which may inform future injury-prevention interventions.

38   *Keywords:* pain, fear of negative evaluation, pragmatic paradigm, self-esteem, social

39   threat

Thematic Analysis of Social Identity Constructs and Injury in CrossFit®

40

41   Many harms are associated with injury incurred in physical activity contexts including

42   inability to work or attend school, financial costs of medical treatment, psychological distress,

43   surgery, arthritis, and restricted mobility (Maffulli et al., 2010; Turner et al., 2002). To reduce

44   these harms, researchers attempt to identify psychological factors which contribute to injury.

45   The study of psychological factors of injury has been hampered in that, typically,

46   researchers did not distinguish between acute and overuse injury though the two have different

47   causal mechanisms and pain patterns (Ekenman et al., 2001; Johnson et al., 2014). Acute

48   injuries stem from a single, identifiable event (e.g., foot broken when a person falls off a

49   plyometric box) whereas the causal mechanisms of overuse injuries (e.g., shin splints) involve

50   excessive intensity and frequency of movement, with no single, identifiable, causal event. At the

51   onset of overuse injury, referred to as the early stages, pain reflects minor physical damage (e.g.,

52   tiny lesions in a tendon; Wilder & Sethi, 2004). The pain is typically low-level, persistent,

53   and/or intermittent, such that it is sometimes described as 'nagging' but does not impair function

54   (e.g., able to run or squat despite pain; Launay, 2015; Russell & Wiese-Bjornstal, 2015;

55   Tranaeus et al., 2014; Turner et al., 2002). Without functional impairment, sufferers in the early

56   stages of overuse injury may not view themselves as injured, and they are able to continue

57   engaging in the physical activity of their choice. The injury of those who rest or reduce effort

58   may be resolved in the early stages because the body's repair response is sufficient for healing

59   the damaged component (Wilder & Sethi, 2004). But in many instances, those in the early stages

60   of overuse injury continue with physical activity despite the pain (Turner et al., 2002). Those

61   who continue physical activity despite the initial pain may exacerbate the damage (e.g., the

62   lesions become larger) such that the injury's severity increases (Wilder & Sethi, 2004).

63   Taken together, behaviors that risk *occurrence* of overuse injury include exercising with

64   excessive intensity and/or frequency, and/or insufficient rest (American College of Sports

65   Medicine, ACSM, 2014; Drum et al., 2017; Launay, 2015; Traneous et al., 2014; Wilder &

66   Sethi, 2004). Behaviors that risk increasing *severity* of overuse injury involve exercising and/or

67   failure to rest despite initial injury pain. In this study, we refer to behaviors that increase risk of

68   overuse injury occurrence, or severity of overuse injury, collectively as overuse risk behaviors.

69   One focus of the current study is to examine psychological factors which influence engagement

70   in these overuse risk behaviors.

71   In recent years, research involved initial attempts to identify psychological factors

72   specific to overuse injury of athletes involved in sports (e.g., runners, floorball players, rhythmic

73   gymnasts; Cavallerio et al., 2016; Russell & Wiese-Bjornstal, 2015; Tranaeus et al., 2014).

74   Some of the psychological factors identified in these studies were specific to competitive, sport

75   contexts (e.g., desire to complete a marathon in three hours; pressure from coaches to train

76   despite pain). It would seem that psychological factors relevant to injury in exercise contexts

77   differ from those of sport contexts, given the absence of win/loss outcomes and coaches whose

78   reputations and livelihoods rely on those outcomes. To our knowledge, research specific to

79   overuse injury psychological factors has not been conducted in exercise contexts. Additionally,

80   the psychological factors pertaining to overuse injuries of athletes were of an intra-personal (e.g.,

81   Type A personality, Ekenman et al., 2001) and inter-personal (e.g., relationship between athletes

82   and medical personnel; Turner et al., 2002) nature. Little is known about *group-based*

83   psychological factors in relation to overuse injury in sport or exercise contexts.

84   One theoretical framework that could enhance the study of group-based exercise contexts

85   is the social identity approach. This approach is used in the study of groups (e.g., a sports team,

86   an exercise program/class) whose members perceive themselves to be similar to each other in

87   meaningful ways through shared values, beliefs, attitudes, and/or behaviors (Jetten et al., 2017).

88   Social identity content refers to shared values that underpin group membership (Evans et al.,

89   2016; Hogg & Reid, 2006; Jetten et al., 2017; Livingstone & McCafferty, 2015; Slater et al.,

90   2014). For example, let us suppose that members of a running group say "pushing ourselves to

91   the limit is what we're about" whereas members of an exercise class say "it's important to us to

92   exercise safely". Such values impact subsequent behaviors that are either endorsed or rejected

93   by members of the group. Members of the running group who continue running despite pain to

94   achieve the absolute limits of their performance capability might be considered exemplar

95   (prototypical) members of their group. Conversely, this same type of behavior may be frowned

96   upon by members of the exercise class who value exercising safely. Evidence for the impact of

97   social identity content on behaviors has been demonstrated in the literature. For example, when

98   alcoholic consumption is viewed as a defining value (a negative social identity content) of a

99   group of university students, binge drinking may occur (Livingstone & McCafferty, 2015). In

100   this way—and similar to the social identity content underpinning our running group example—

101   social identities may become a curse that threatens and potentially harms group members' health

102   and well-being (Jetten et al., 2017). Building on this, we proposed that negative social identity

103   content may influence engagement in injury-risk behaviors in group exercise contexts.

104   To examine psychological factors specific to injury in group exercise contexts, we chose

105   the group exercise context of CrossFit®. More than 15,000 gyms around the world are affiliates

106   of the CrossFit® brand (CrossFit®, n.d.). While some members may opt to engage in CrossFit®

107   competitions, the focus of this study is the group exercise component of the program. CrossFit®

108   is one of the few exercise contexts known to us in which injury rates, and specifically overuse

109   injury occurrence, have been studied. In these studies, 19% to 73.5% of CrossFit® members

110   reported injury, and 16% to 35.5% of the injuries were designated as overuse injury or chronic

111   onset (Klimek et al, 2018; Montalvo et al., 2017; Weisenthal et al., 2014). These injury rates

112   were on par with that of sports participants (e.g., powerlifters, elite gymnasts; Montalvo et al.,

113   2017). Some critics of Crossfit® have expressed concern about the amount of involved injury

114   risk (Diamond, 2015). In contrast, CrossFit® members find that the modalities of the CrossFit®

115   context, along with the atmosphere and connectedness, contribute to physical activity adherence

116   (Bailey et al., 2017). As such, CrossFit® members may perceive the criticisms of the injury rate

117   of CrossFit® to be threatening to their group. In other words, within the social identity

118   approach, social threats involve negative evaluations of a social identity group such that

119   members, feeling that a source of positive self-esteem is threatened, may be incited to defend

120   their group (Brown & Ross, 1982; Evans et al., 2016).

121   The overarching purpose of this study was to apply the social identity approach to the

122   exploration of the psychological factors related to injury in a CrossFit® exercise context. While

123   the literature review suggested numerous avenues of research, we narrowed our focus to these

124   two research questions: (1) What are the values within a CrossFit® group, and how might they

125   be relevant to overuse risk behaviors? (2) How do CrossFit® members respond to criticisms

126   about the occurrence of injury in CrossFit® activity?

127   **Method**

128   **Philosophical Perspective and Design**

129   This project was shaped by the pragmatic paradigm in which research can be perceived as

130   a means for gaining knowledge about a problem in the human experience (e.g., injury; Kaushik

131   & Walsh, 2019; Morgan, 2014). Within this paradigm, an alignment between methods and

132   research questions, rather than philosophical concerns (e.g., nature of reality and knowledge), is

133   a focus. Thus, researchers are called upon to consider the information and beliefs that informed

134   their methodological choices, weigh the consequences, and adjust accordingly until they form a

135   warranted belief that the method is suited for answering the research questions.

136   The first research question required a means for identifying values of a CrossFit® group.

137   In previous studies, the values of groups—to infer social identity content—were pre-identified

138   by researchers, or statements of group leaders were used to identify meaningful social identity

139   content (Barker et al., 2014; Livingstone & McCafferty, 2015; Slater et al., 2014). Given the

140   above-noted conflict between views of CrossFit® members and critics, we perceived it to be

141   critical that CrossFit® members themselves contribute to identification of the group's values.

142   Therefore, we adopted the recommendation of Evans et al. (2016) by employing qualitative

143   methods to elicit the group's social identity content. In line with the pragmatic paradigm, we

144   also opted to use two methods—observations and interviews—as multiple methods enhance the

145   ability to gain knowledge (Morgan, 2014). Observations are also relevant to social identity

146   content because they reveal which behaviors are used to enact the values of a social identity

147   group (Hogg & Reid, 2006). The use of interviews is also aligned with the pragmatic paradigm

148   in that people are not expected to have identical perceptions because they do not have identical

149   experiences (Kaushik & Walsh, 2019). However, there are degrees of shared experiences

150   between any two people that lead to degrees of shared beliefs which can be captured to some

151   degree via interviews.

152   **Sampling and Participants**

153   Participants in this study were members of a CrossFit® gym in a city in the southeastern

154   United States. The choice to limit this study to one gym was based in part on the knowledge, as

155   stated by an owner of this gym, that almost all gym members engaged in CrossFit® as an

156   exercise activity. Only a handful engaged in the competitive component of the CrossFit®

157   program. Additionally, there is evidence that there is wide variation between CrossFit® gyms

158   (e.g., management practices, injury rates) though they share the same brand name (Weisenthal et

159   al., 2014). Given these disparities between gyms, social identity content may also differ between

160   gyms; thus, we sought participants with membership at the same gym. Convenience sampling

161   was primarily used for both observations and interviews in order to be non-invasive and

162   emphasize anonymity. This decision reflected ethical consideration to avoid negatively affecting

163   the gym's business activity or the relationships between owners and members.

164   For observations, participants consisted of members who entered the gym during the

165   times when the first author conducted observations. Sex, role (e.g., trainer, member), physical

166   description, and behaviors were the only characteristics of observed members recorded. To

167   increase the number of members and types of behaviors observed, observations of 29 workouts

168   were made at multiple times of day (i.e., morning, $n = 7$; afternoon, $n = 10$; evening, $n = 12$). To

169   prevent observations from being biased by advance knowledge, participants were not notified in

170   advance about which workout periods would be observed. Also observed were one intra-gym

171   competition and one mandatory induction course for new members. Observations included 85

172   participants (44 male members, 32 female members, 6 male trainers, 1 female trainer, 2 gym

173   owners). For interviews, 10 members volunteered to be interviewed. Two members were

174   recruited when they initiated conversation with the first author, at which time the first author

175   invited them to participate as interviewees. Snowball sampling was also used in that

176   interviewees were asked to recommend other members for interviews. The first author

177   approached two recommended members, providing contact information in case they were willing

178   to be interviewed. Within these strategies, we aimed to interview members who possessed

179   attributes which were pertinent to overuse injury. Attributes included membership duration,

180   wearing physical appliances (e.g., knee brace), prior overuse injury, an athletic background, sex,

181   and age. Most interviewees represented multiple attributes (e.g., an older member with no

182   athletic background wore a knee brace). The 14 interviewees encompassed all of these

183   attributes, consisting of 8 male members, 4 female members, 1 male trainer, and 1 male gym

184   owner, ages 20 – 52 years ($M = 34.43$). The mean duration of interviews was 75 minutes, 21

185   seconds. Table 1 contains more details about interviewees.

186   [Table 1 near here]

187   **Data Collection**

188   Prior to data collection, five pilot interviews and three pilot observations were conducted.

189   A high quantity of data was rendered from each pilot interview and observation, highlighting the

190   need to narrow the scope of the study. Therefore, the research questions were limited to social

191   identity content and criticisms of CrossFit® rather than exploring more aspects. Further, we

192   learned that some members perceive researchers conducting research about injury in CrossFit®

193   settings to be critics, evoking a defensive posture. After piloting, the interview guide was

194   adjusted such that explicit questions about pain and injury were last. In this way, we were

195   careful to avoid asking leading questions about injury. Consequently, we found that

196   interviewees brought up the topics of pain and injury prior to being explicitly asked about these

197   topics. Pilot interviews also revealed that members were not familiar with overuse injury origins

198   or pain patterns which limited their ability to respond to explicit questions about overuse injury.

199   This demonstrated the need for researchers to identify participants' descriptions of behaviors as

200   overuse risk behaviors when participants did not name them as such.

201   The final interview guide (online Appendix A) consisted of rapport-building and

202 biographical questions, followed by questions pertaining to social identity constructs, criticisms

203 of CrossFit®, and then explicit questions about pain and injury. The interview questions

204 addressed four aspects of social identity content. Descriptions of the four aspects, along with

205 sample questions, are: (1) In-group homogeneity (Turner et al., 1987): Perceived similarities of

206 group members (e.g., "What, if anything, do you have in common with other CrossFitters?"); (2)

207 Positive distinctiveness (Haslam et al., 2011): Attributes of a group which serve as reasons for

208 members to join and/or perceive the group to be distinct from and, typically, preferred to other

209 groups (e.g., "What do you like about CrossFit®?"; "How is that different from what you liked

210 about other exercise activity you've been involved in?"); (3) Prototypicality (Haslam et al.,

211 2011): Attributes possessed by prototypical, highly-regarded members (e.g., "Who at your

212 CrossFit® gym impresses you most? Please describe them."); and (4) In-group status (Turner et

213 al., 1987): Attributes for which members can be perceived positively by other members (e.g., If

214 you want to be perceived favorably by other CrossFitters, what do you need to do?). Questions

215 in the interview guide also addressed our second research question by eliciting participants'

216 responses to criticisms of CrossFit® (e.g., "What, if any, criticisms have you heard about

217 CrossFitters?").

218   After receiving approval from an institutional ethics committee, informed consent was

219 sought from the gym owner. Given the public nature of the venue, the gym owner was identified

220 as the "gatekeeper" who was responsible for providing access and giving informed consent for

221 observations in these settings. Two weeks before observations started, flyers at the gyms and

222 posts on the gym's social media were used to notify members about the study. These materials

223 included a description of the study and informed members that a researcher would be observing

224   members in the gym as part of the study. Members were invited to ask questions or express

225   concerns to the gym staff, owner, researchers, or ethics committee prior to start of observations.

226   No members expressed concerns. The first author conducted observations over a two-month

227   period. During observations, the first author jotted handwritten notes. In these notes, members

228   were given an identifier code, constructed to indicate sex (F = female, M = male), role (M =

229   member, T = trainer, GO = gym owner), and the chronological order in which the researcher

230   observed the participant (e.g., MM1 was the first male member observed). After each

231   observation, the first author typed the handwritten notes to form field notes (N = 106 single-

232   spaced pages). Two weeks after the start of observations, flyers and posts recruiting

233   interviewees were displayed. The choice to start interviews after a short time of observations

234   was deliberate, as it was intended to enable the researcher to ask questions about what was

235   observed. Interviewees selected the locations (e.g., coffee shops) for interviews and provided

236   informed consent. Interviews were conducted by the first author, audio-recorded, and

237   transcribed verbatim.

238   **Data Analyses and Saturation**

239   Data were analyzed using NVivo software (v. 11). To start, the first author reviewed all

240   interview transcripts and field notes. Transcripts were sent to interviewees who were invited to

241   provide comments, clarifications, or changes in views. This was intended to check transcript

242   accuracy and generate additional data and insight, but interviewees did not provide new

243   information. Next, an inductive approach was used for a thematic analysis (Braun & Clarke,

244   2006). The analysis consisted of descriptive coding used to identify simple, lower-order codes

245   across interviews followed by coding of observation data. Then, higher-order themes were

246   developed to represent relationships between lower-order codes across interviews and

247   observations. A focus of these steps was on internal homogeneity (i.e., each code/theme had

248   adequate evidence) and external homogeneity (i.e., no overlap between evidence supporting two

249   codes/themes). A final step, as employed by other sport/exercise psychology researchers (e.g.,

250   Chan et al., 2014; Long et al., 2014; Hings et al., 2020), involved relating the higher-order

251   themes to the research questions and theoretical constructs. For the first research question, social

252   identity content were determined by higher-order themes which spanned all four social identity

253   constructs (i.e., positive distinctiveness; in-group status; prototypicality; in-group homogeneity).

254   Behaviors used to enact each social identity content were examined for indicators of overuse risk

255   behaviors (e.g., a member continued to participate in workouts despite low-level injury pain; a

256   member exercised with excessive intensity and/or frequency, and/or insufficient rest). For the

257   second research question, themes derived from participants' responses to criticisms of the injury

258   occurrence in CrossFit® were examined. The first author provided research team members with

259   sample texts and themes, along with memos in which data were interpreted through a social

260   identity lens. Iterative discussions and reviews occurred. The aims of these interactions were to

261   determine whether the interpretations were supported by the data (i.e., warranted assertions) and

262   the research questions were answered, aims that are emphasized within the pragmatic paradigm

263   (Kaushik & Walsh, 2019; Morgan, 2014).

264   Throughout data collection and analysis, data saturation was considered to determine

265   whether additional interviews or observations were needed. We note that guidance regarding

266   data saturation and sample size typically pertains to analysis of one type of data such that little

267   guidance is given in assessing data saturation from multiple methods (i.e., observations and

268   interviews). Thus, we opted to assess data saturation after higher-order themes were identified.

269   In accordance with Hennick et al. (2014), saturation was reached when no new salient codes (i.e.,

270   pertaining to injury or social identity constructs) were generated. Additionally, we considered

271   the guidance of Morse (2020) indicating that smaller sample sizes are appropriate when sampling

272   a cohesive group, addressing narrow research questions, and the scope of the project is narrow.

273   Given our sample consisted of members of one CrossFit® gym in a two-month period, addresses

274   two specific research questions, and focused on one phenomenon, injury, the sample size of 14

275   interviews and 31 observations was commensurate with this guidance.

276   **Methodological Rigor**

277   Amongst pragmatist researchers, a standard to consider in terms of rigor is whether the

278   method produced desired and useful results such that (1) knowledge was gained; (2) research

279   questions were answered; and (3) interpretations are defensible, consisting of warranted

280   assertions (Kaushik & Walsh, 2019). To meet these standards, research team members consisted

281   of scholars with expertise in injury, social identity, and exercise psychology who supervised the

282   first author, a graduate student at the time of the study, in the design, data collection, and

283   analysis. Their expertise enabled them to assess data and interpretations to determine whether

284   knowledge was gained in terms of advancing the extant literature in these areas. Additionally,

285   they served as critical friends to determine whether interpretations were defensible and as peer

286   reviewers to determine whether research questions were answered.

287   Rigor can also be assessed specific to the methods used. Given our use of qualitative

288   methods, we considered markers of quality of qualitative research, including criteria (italicized

289   below) summarized by Tracy (2010). We believed the *topic to be worthy* given the harms of

290   injury. To achieve *rich rigor*, we considered theoretical constructs in relation to the topic;

291   captured extensive data from multiple sources; and presented original text samples such that

292   readers could determine plausibility of our interpretations. To contribute to *transparency*, we

293   provided details regarding our rationale for our choices (e.g., why we placed explicit questions

294   about injury last in the interview guide). Regarding *self-reflexivity*, we acknowledge the first

295   author was a member of this CrossFit® gym for a five-month period approximately two years

296   prior to conduct of this study. This membership resulted in a positive preconception of

297   CrossFit® as a program which enabled people to gain the physical and psychological benefits of

298   physical activity. Thus, it was of particular value to include research team members who had no

299   relationship with the gym. Though the first author's five-month membership at the gym was a

300   potential source of bias, prior knowledge of the gym's practices contributed to the study's

301   *credibility*. Credibility was also enhanced by ensuring findings included thick description (e.g.,

302   concrete details) and dissenting views amongst participants. To enhance *resonance*, details of

303   participants' words and behaviors were presented such that readers with no exposure to

304   CrossFit® gyms or CrossFit® lexicon could understand within their own personal life

305   experiences, thus contributing to naturalistic generalizability. The study represents a *significant*

306   *contribution*, in that we give voice to a population who may be criticized by others, and we

307   advance the study of injury in exercise contexts. *Ethical considerations* included efforts to

308   ensure anonymity such that participants' characteristics were not detailed to a degree that would

309   enable them to be recognized by other members, trainers, or gym owners. Finally, we attempted

310   to achieve *meaningful coherence* by showing how our choices were supported by the pragmatic

311   paradigm and by focusing on psychological factors unified by theory.

312   **Results**

313   In this section, the findings are divided into two parts reflecting the two research

314   questions: (a) group values relevant to overuse risk behaviors, and (b) responses to criticisms

315   about the occurrence of injury in CrossFit® activity. Verbatim quotations from participants are

316   within quotation marks.

Group Values Relevant to Overuse Risk Behaviors

318   Three values, represented by *in vivo* terms, were found to be relevant to overuse risk

319   behaviors: Being Hard Core, Achieving Results, and Camaraderie. For each value, we describe

320   (a) characteristics of the value, (b) how the values are enacted, (c) reasons for enacting the values

321   in that way, and/or (d) how the values were relevant to overuse risk behaviors.

322   **Being Hard Core.** "Hard core-ness" was a term used by MM44 to describe the type of

323   people who do CrossFit®, which tended to be people who "enjoy intense workouts" and were

324   "not afraid of discomfort". According to MM42, "People that voluntarily join CrossFit® are

325   people that want to sort of push themselves more or exert more effort." MM34 liked CrossFit®

326   because "it's something that pushes me really to the limit of what I can tolerate". He previously

327   experienced that feeling in cycling, but "still never anything quite as much as something that is

328   really a great CrossFit® session". One way that members enacted the value for being hard core

329   was by completing high-intensity, challenging workouts. A reason for completing high-intensity

330   workouts is explained by MM43 who said that members earn a "badge of honor". "Like, 'I'm

331   kind of a tough guy because I can do these CrossFit® workouts, and I push myself'".

332   Completing the difficult workouts enhanced FM31's beliefs about her abilities:

333   I would look at the workout, and I would be like, 'There's no way. Like, this is way too
334   hard. Is GO1 out of his mind?' I was like, 'I'm not an athlete. I can't', you know, and,
335   and I would finish it…I would be laying on the floor, about to pass out. 'I just did that. I
336   really completed that workout'…and I was like, 'I can't believe it.'…That's what sucked
337   me in, was I started to see I was doing things that I didn't think I could do. (FM31)
338
339   A second way in which members enacted the value of being hard core was by attending

340   regularly despite the intensity or other difficulty which, when excessive, is an overuse risk

341   behavior. Members indicated that consistency in attendance was enacted uniquely in relation to

342   CrossFit® participation, as shown by MM32:

343   As an adult, I got into golf, a little bit of basketball here and there with friends, and then
344   off and on with the gym, very sporadically. Really, CrossFit® has been the first time I
345   was almost religious about it in terms of truly dedicated, five days a week. Obviously
346   now it's been 20 months straight.
347
348   One reason may be because CrossFit® members who attended regularly were positively

349   evaluated by other members. As MM32 stated, "Pretty much everyone that comes there on a

350   regular basis, doesn't mean daily, but on a regular basis, I have a great affinity for and admiration

351   for." Admiration for attendance despite difficulty was displayed in an exchange in which FM12

352   told FM14 about having a sore throat for the previous two days. FM14 responded, "Yeah, but

353   you're here", in a tone indicative of praise. To FM24, members were hard core in that they

354   attended "no matter what": "We wake up the next day and come to it, no matter how sore we

355   are, no matter what we feel like, like oh, 'I don't want to go', we still show up". FM24's

356   enactment of the hard core value in this way resulted in the overuse risk behavior of continuing

357   exercising in the early stages of injury:

358   I kind of tweaked my back, and I was like 'Oh I'm fine. It's probably like just a little
359   muscle spasm strain, no big deal.' That happened like November, and I kept going until
360   February to the point where I couldn't sit. I couldn't sleep. I was crying. I popped
361   Advil® every few hours.
362
363   In one instance, the first author observed that being hard core in terms of attending "no matter

364   what" affected CrossFit® members' amount of rest in between workouts. On a morning in

365   which the gym was not open due to a scheduling glitch, members (e.g., MM20, FM12, MM39)

366   who usually attended the 5:30 a.m. sessions arrived, but, seeing the gym was closed, left. Later

367   that day, these members attended the 5:30 p.m. CrossFit® class. The next day, they attended the

368   CrossFit® workout at their normal 5:30 a.m. class time. Therefore, they attended two, high-

369   intensity CrossFit® workouts in less than 12 hours rather than opting to miss a workout, yet

370   insufficient rest is an overuse risk behavior.

371   However, it was also observed that some members adjusted their attendance and intensity

372   at times. For examples, MM32 typically attended despite pain but did not attend "no matter

373   what". "I definitely come with aches and pains every day, don't get me wrong", but "one time

374   where I really felt like I hurt myself, I wasn't going to go in for a few days through that." When

375   FM31 struggled with an illness, she did not attend CrossFit® for a couple of weeks. During

376   FM31's absence, GO2 messaged her, "When are you going to be here? I miss you". FM31

377   perceived these actions by GO2 to be "really sweet". When FM31 returned to CrossFit® after

378   the absence, FM31 did the warm-up with the rest of the members, but then did a workout that

379   GO2 designed for FM31. The workout "was something to get me sweating a little bit, but it

380   wasn't too intense because I had been sick, and I didn't want to push myself too far." GO2 told

381   FM31, "Any time you want to come in and you've been sick or something like that and you want

382   the trainer to do that [tailor a workout to needs], they'll do that...because I'd rather you show up

383   than not show up." GO1 explained the gym owners' proactive stance towards encouraging

384   members' attendance: If CrossFit® members attended workouts often, they achieved desired

385   results which, per the next section, was a basis for members continuing as paying gym members.

386   A third way in which members enacted being hard core was by withholding pain reports

387   from trainers. That is, they did not inform the trainers or others about pain. Instead, they

388   continued to exercise despite pain which is an overuse risk behavior. One reason for doing so

389   was an aversion to being perceived negatively, as shown by MM43: "especially when I first

390   started, there was a lot of pulling shoulders and things like that…like, 'Okay, I probably

391   shouldn't do this movement because my shoulder's still a little sore,' but I'm like, 'I don't want to

392   be a wimp and complain again.' It's like, 'All right. Just try to do it'". As stated by FM2, people

393   who complained during workouts could be described as "annoying". MM43 indicated positive

394   evaluations could be obtained "Even if you're the slowest person there, if people see…you're not

395   whining about, you know, this or that exercise". Fear of negative evaluation inhibited MM44's

396   pain report as well. When he felt shoulder pain, he at first did not tell trainers for fear he would

397   be perceived as "sandbagging", but when the shoulder pain was so bad that he could not do

398   more, he finally told a trainer. The trainer reacted to the pain report by being upset with MM44

399   for not being open about what was going on. The trainer also let other trainers know about

400   MM44's pain which resulted in them devising ways to help MM44 modify workouts:

401   I hadn't seen MT1 in weeks, and I was doing squats, and he walked over and said "Hey
402   man how is your shoulder?". Just out of the blue. I hadn't talked to him about it. It was
403   genuine concern there, probably because the workout that day had a lot overhead stuff,
404   and he wanted to get his gears going on what might need to be scaled or addressed. He
405   was genuinely understanding, and we talked about what I've been doing to fix it, and he
406   gave me more advice on how to strengthen those rotator cuff muscles.
407
408   After MT1 asked MM44 about the pain, MM44 became more comfortable reporting pain.

409   "Now, during the warm-ups, I will say 'MT6, hey, my shoulder is not feeling so hot today'".

410   Likewise, other members tended not to report pain until trainers directly solicited a pain report.

411   In one workout, a female member said, "My arms really hurt." After hearing her, MT1 asked,

412   "Who else is in this boat? The 'can't do push-ups' boat?" Two female members raised their

413   hands. He gave them a different activity to do. Of note, the members did not tell MT1 about the

414   pain until after he asked, suggesting they would have continued with the activity despite pain if

415   he had not solicited that information. Likewise, MM19 did not discuss pain he was having until

416   MT4 asked him, "How's the back?" After that, MT4 expressed that he himself was having pain

417   too, after which MM19 added "Hips destroyed", referring to other pain he was experiencing.

418   MM19 appeared comfortable telling MT4 about his pain only after MT4 asked him, and after

419   MT4 expressed that he too had pain.

420   **Achieving Results.** CrossFit® members valued achieving results in the form of

421   improvements in performance (e.g., amount of weight lifted) and/or appearance (e.g., body

422   weight). Some interviewees indicated that results from CrossFit® participation were better than

423   results obtained via other physical activity contexts. Per FM31: "I didn't see the results at those

424   group [name of traditional gym] classes that I saw the results at CrossFit®". For MM30, who

425   had been a professional athlete, the performance results he gained from CrossFit® were better

426   than those he gained during his training as professional athlete: "In hindsight, I wish I'd done

427   CrossFit® supplementary to my training…today, I hit the highest numbers I've ever hit in terms

428   of squat, in terms of deadlift, numbers I wasn't even coming close to [before CrossFit®]." The

429   varied nature of CrossFit® workouts provided all members, not just the high-caliber athletes,

430   with opportunities to perform better than other members. MM29 described himself, saying "I'm

431   at the end of the pack in terms of results or, you know, where I finish," but "I'm good at box

432   jumps I guess. That's about really all I can do to impress people athletically." Similarly, FM12

433   said, "I'm certainly not the, like, weight-wise the strongest person at the gym, but... I was able to

434   do dips without bands fairly quickly...I mean not that there's a hundred of them,

435   but...people were blown away by that." By performing well at one specific activity, these

436   members were able to garner positive evaluations of group members.

437   Members also emphasized appearance results, as shown by MM42: "I was a very skinny

438   person, so I like the fact I gained 30 pounds in a year and a half [after starting CrossFit®]."

439   MM29 sought appearance-related results "in terms of the eyeball test, how I look." Before he

440   started CrossFit®, "people would be like, 'So, are you working out?' And I'd be like, 'Yes, I've

441   been working out religiously. Is this not apparent?'. And they'd be like, 'No'''. Discouraged, he

442   had ceased participation in previous exercise programs. During his few months of CrossFit®

443   attendance, he increased his number of pull-ups from zero to six. Despite these performance

444   results, he expressed his intent to quit CrossFit® if he did not experience visible, appearance

445   results. FM24, too, was initially interested in appearance results, participating in CrossFit® "just

446   to lose the weight and to keep it off." Her focus eventually changed from appearance to

447   performance as she started to "get better, to take it more serious, instead of just like a form of

448   weight management." FM12 loved "seeing the changes in my body", such as muscular

449   striations. Due to the strength she gained via CrossFit® participation, she was "able to lift

450   things, and not have to ask for help…I used to always have to ask someone for help, open jars,

451   stuff like that…I just feel...more confident."

452   A key feature of results in CrossFit® is that they could be achieved quickly. As FM31

453   said, "I've tried different things [exercise activities] over the years...the only thing that I see

454   results quickly from is CrossFit®." FM24 stated, "When you start [CrossFit®], and you'll see a

455   dramatic change from when you first start to like two months." MT1 indicated that excitement

456   over these quickly-obtained results led to overuse risk behaviors:

457   Overuse does happen. It's like…kids and candy. They love it. They'll eat it all day, but
458   it'll give them cavities, and it'll make them bounce off the walls and make your life a
459   living hell until they calm down and fall asleep or something. These guys [CrossFit®
460   members] come in. They'll be so excited [about the results]. They'll do all this work.
461   They'll do all this work. They'll do all this work. They'll get injured. They'll get
462   miserable about it. They'll stop coming in…That is where we start getting down the path
463   of overuse: too much all the time…They have no idea what we have in store for them the
464   rest of the week, but they decide to do something [extra workouts] on their own.

466   Because injured members "stop coming in", GO1 stated that injury of members went against his

467   business interest as some injured members discontinue their paid membership. Unfortunately,

468   the desire for results could drive members to "push themselves recklessly and get hurt" (MM42)

469   and engage in overuse injury risk behaviors. For example, MM29's desire to improve

470   performance results affected his decision to persist despite pain: "If I have to do 60 kettle bell

471   swings, and I'm on number 20, I'll probably take a break. If I'm at number 50, I'll probably push

472   through it [pain] to finish the 60…It'd be…how close I am to…target goal." FM2 similarly

473   opted to "push through" the pain when she was close to finishing a workout:

474   Tonight we were doing knees-to-elbow, and…my right shoulder is giving me problems.
475   It always has, ever since I started CrossFit®. The part where you put your knee up hurt
476   my shoulder…I felt like a shooting pain here. I was just like, 'Let me just keep going.
477   Workout's almost done. You've got like 30 seconds left,' so I kept going.
478
479   Thus, in pursuit of desired results, some CrossFit® members engaged in overuse risk behaviours

480   (e.g., continuing exercise despite pain; doing more repetitions rather than resting).

481   **Camaraderie.** Members indicated that they valued camaraderie which embodied social

482   aspects of CrossFit® such as "social interaction", "community", "like family", "encouraging",

483   "welcoming", and "inclusive". One way in which this value was enacted was conversations.

484   When the first author entered the gym, the cacophony of noise often resembled that of a

485   restaurant due to the sound of laughing and chatter of numerous members assembled in the

486   stretching areas and on the benches. During observations, some content of members'

487   conversation was CrossFit®-specific (e.g., impending workouts, pain, equipment, perceptions of

488   trainers), but much was not (e.g., restaurants, sports, social plans, tv shows, life events, flirtatious

489   comments). GO1 thought that the "shared experience of the intense workout" was a reason this

490   form of camaraderie developed. MM32 explained further:

491   You have a natural affinity to people that are also doing CrossFit® because pretty much
492   they're the only ones that know how intense it is or how hard that particular day's
493   workout was…and that common experience I think leads to sort of a community sense of
494   camaraderie…This is a crazy analogy, but there's a reason why Presidents of the United
495   States, whether they're Republican or Democrat, you notice that after they leave the
496   White House, they're all friends. Only they have been through what they've been

497   through. Same thing with people in the military. There are certain activities that are
498   these shared experiences that I think lead[s] to people liking each other.
499
500 Another interviewee demonstrated that the shared, intense experience led to "people liking each

501 other". He initially disliked a new, "annoying" member, but "I love the guy now

502 because…we've been doing this thing together, and we've experienced all the highs and the

503 lows." Observations revealed another way in which camaraderie was enacted as members and

504 trainers were often observed addressing each other by name. FM31 noted that she did not know

505 the names of the instructors or other participants of group fitness classes she had taken at other

506 gyms. A reason CrossFit® members knew each other's names was regular attendance. In group

507 fitness classes she took prior to CrossFit®, FM2 "rarely recognized a face because people were

508 just random, and, but with CrossFit®, people usually do it at the same time every day. You get

509 familiar with who you're working out with." MM32 came to enjoy this aspect:

510   I'm the least social person so the fact that I would enjoy it [social interaction in
511   CrossFit®] or kind of willingly participate in it is shocking to me…There's interaction
512   with the athletes who are in the previous class, that are just kind of getting ready to leave,
513   and you're coming in, so you get to see them. Then those that are in the class after yours,
514   so you almost have like three groups of people that you kind of see on a regular basis,
515   every day…and I get to have interaction with.
516
517   Aside from conversing and personal greetings, another way camaraderie was enacted was

518 via encouragement of other members (e.g., applauding, cheering other members). According to

519 FM12, members could be positively evaluated by other members when they encouraged others.

520 She was "very impressed by the good people who encourage the people who are struggling".

521 For some members, such as MM30, the outcome of encouragement was to increase effort: "I can

522 think of multiple examples of when guys I'm directly competing with are encouraging me to

523 move faster, move quicker, push harder". This effect of encouragement was observed multiple

524 times, as members encouraged each other to "Keep going". For example, while climbing up a

525   rope that was affixed to the gym's ceiling, MM21 stopped about halfway up, appearing stuck.

526   When MM20 called up to MM21, "Go, go, go!", MM21 resumed climbing. However, the

527   trainers appeared aware of a need to temper excessive effort resulting from encouragement. In

528   one observation, MT4 was guiding FM14 through her first attempt at climbing up a rope. He

529   directed her to climb only to the third knot (i.e., halfway up). He did not want her to go all the

530   way up only to find she was too fatigued to return down safely. As FM14 climbed, a member

531   started cheering for FM14, saying "Go all the way [to the top]!". MT4 countered in a light tone,

532   saying "The goal was three. Don't listen to your peers. They'll get you in trouble."

533   The value of camaraderie was relevant to overuse risk behaviors in two ways. First,

534   regular attendance and engagement in intense workouts were the ingredients for creating

535   camaraderie. Yet, by exercising excessively or despite pain in order to be with the people they

536   enjoyed being with, members risked overuse injury. Second, an outcome of verbal

537   encouragement was that members increased effort. Members can be susceptible to overuse

538   injury when they respond to encouragement with excessive effort or "keep going" despite pain.

539   **Responses to Criticisms about the Occurrence of Injury in CrossFit® Activity**

540   For the second research question, all interviewees indicated awareness of criticisms about

541   injury incurred in CrossFit®. They responded to these criticisms by (a) comparing various

542   dimensions in CrossFit® to other physical activities, and (b) denouncing the critics.

543   **Comparing Dimensions to Other Contexts.** In discussing criticisms, members did not

544   appear to perceive the occurrence of injury in CrossFit® to be high. Members supported this

545   perception by comparing injury in CrossFit® to injury in other physical activity contexts such as

546   sport, everyday activities, and other forms of exercise. For example, FM12 indicated that the

547   risk of injury in CrossFit® was acceptable when compared to sports:

548   Any sport has risks, has risk of injury. And, that's really, it's really our personal
549   responsibility to know them and to take care of them…I do not in any way feel like it's
550   CrossFit®'s fault, any more than it's NFL's [National Football League] fault that people
551   get their like s*** knocked out of them at football games… I don't really understand all
552   the finger-pointing at CrossFit®.
553
554 Some members, like FM31, pointed out that injury occurs during everyday activities: "It's not

555 CrossFit® that you can just hurt your back in. You can lift a box that's too heavy."

556   Other members emphasized aspects of injury which made them perceive CrossFit® to be

557 superior to those contexts. Members perceived the frequency and severity of injuries incurred in

558 CrossFit® to be less than that of injuries incurred during prior sport/exercise participation:

559   When I would run, I would be in a lot more pain, and I would either turn an ankle, or my
560   knee would swell up. I would have all sorts more aches and pains and injuries than I've
561   ever experienced at CrossFit®…I've had one injury in 20 months. Compared to previous
562   injuries that I had doing other forms of exercise, I used to have a lot more. (MM32)
563
564 MM34 thought that the strength gained via CrossFit® participation made him less susceptible to

565 injuries: "I think I've kind of built up my tendons and ligaments and scar tissue, and everything

566 is just to the point where now I'm kind of adapted I guess." Further, members emphasized that

567 injury prevention in CrossFit® gyms was better than other gyms because of the presence of

568 trainers during workouts:

569   I know plenty of people who have injured themselves in a [traditional] gym because of
570   improper form, and no one was there to show them how to properly do it…whereas in
571   CrossFit®, you do have that coach that's going to walk around, correct you, and be able
572   to tell you what you did wrong, and to fix it so that you won't get injured. (FM24)
573
574 Members also indicated that CrossFit® was superior to other exercise contexts because members

575 tended to modify workouts around pain and resolve injury rather than giving up and ceasing

576 exercise due to injury. As MM1 stated, "CrossFit® will find your weakness, so a lot of people,

577 they get their weakness exploited, and they look for the door. It takes a lot of patience to figure

578 out a way around it."

579   **Denouncing Critics.** Another prominent way in which members responded to criticisms

580   about injury in CrossFit® activity was by denouncing critics for using a flawed rationale in their

581   criticism. Some interviewees criticized critics for using extreme examples as a basis for negative

582   perceptions of injuries in the CrossFit® context:

583   It's the availability bias right? You hear people talk about, 'Well I did CrossFit® for a
584   week, but then I injured my back, and then I injured it twice more in that same month, so
585   I quit CrossFit®.' Those stories stick with you…People that join CrossFit® and don't
586   have any issues probably don't talk daily about the fact that they don't have any injury
587   issues, so it's easy to recall instances where you heard about someone getting injured or
588   you saw someone getting injured. Standing in a class of six people and witnessing an
589   injury means there were five other people that weren't injured. (MM42)
590
591   MT1, too, thought that false perceptions of CrossFit®'s high injury risk were based on extreme

592   examples, such as when a member at another gym became paralyzed. When the member at the

593   other gym dropped a bar, the bar landed on some plates that were lying on the floor, then

594   bounced back and hit the member's spine, yet this is not a common occurrence in CrossFit®

595   workouts nor exclusive to CrossFit®.

596   Some CrossFit® members criticized critics who demonized CrossFit® without taking

597   into account the health and fitness benefits of exercise adherence. Before starting CrossFit®,

598   MM1 was overweight and had not adhered to any physical activity consistently. Though he

599   nursed a sore shoulder for 10 months during CrossFit® workouts, he weighed the sore shoulder

600   against the benefits of CrossFit® membership which enabled him to adhere consistently so that

601   he lost weight and perceived himself to be healthier. MM32 had tried many other exercise/sport

602   programs but only sustained regular adherence in CrossFit®. Though he tweaked his back in

603   CrossFit®, CrossFit® was still worthwhile to him. As MM34 said, "If this is what I need to do

604   to get in shape and be the best person that I can be, more power to me. I'll work out my way.

605   You work out your way".

606   Interviewees also negated critics' who had no direct experience with CrossFit®. FM31's

607   boyfriend was "very worried about me doing it…he's afraid I'm going to hurt my back."

608   However, "He's never tried it [CrossFit®]." Rather than stopping CrossFit® due to his

609   concerns, she opted to not discuss CrossFit® with him: "I don't really talk about it with

610   him…because if we do bring it up, I don't really want to have an argument about it." When FM2

611   learned that students in exercise science programs at a nearby university were being taught that

612   CrossFit® was "bad", she said, "you need to try it before you say anything else… you don't

613   know what you're talking about…it's like trying to talk about cake when you've never tried

614   cake." MM36 also discredited critics who did not participate in CrossFit®: "[they] make it

615   sound like we do one-rep maxes 20 times…They don't know about scaling."   In the CrossFit®

616   lexicon, scaling involves reducing workout quantities to amounts suited to the individual's

617   factors (e.g., ability level, injury). MM44 described his interactions with two physical therapists

618   who initially indicated disapproval of CrossFit®. One told him, "You're going to hurt yourself.

619   You're going to mess your shoulder up. I'd never let my kids do it". After interacting with him

620   more, they then told MM44, "You seem like the kind of guy who's going to take care of

621   yourself...if it hurts, stop. If you feel yourself going too far, take a break, but as long as you do

622   exercises…and rehab your shoulder on your own, you'll be fine". Thus, MM44 believed that

623   critics' negative perception of CrossFit® activities changed when they were exposed to an actual

624   CrossFit® member. Finally, interviewees emphasized that CrossFit® gyms differ on many

625   facets (e.g., trainer attentiveness/experience, workout programming). Thus, they discounted

626   general criticism of CrossFit® that was not specific to the context at this gym.

Discussion

627
628   In this study, we sought to identify values of group exercise participants relevant to

629   overuse risk behaviors as well as their responses to criticisms about injury. Through thematic

630   analysis, we identified three values (i.e., being hard core, achieving results, camaraderie) that

631   were relevant to overuse risk behaviors. We also identified two prominent types of responses

632   (i.e., compare dimensions of CrossFit® to other physical activities, denounce critics) of

633   CrossFit® members to criticisms about injury in CrossFit® activity. Here, we discuss these

634   findings in relation to constructs of the social identity approach: Social identity content and

635   social threats.

Social Identity Content

636
637   The three values identified in this study – being hard core, achieving results, camaraderie

638   – were interpreted to represent the social identity content of the group. That is, members

639   perceived these values to be reasons for being members of this group instead of other physical

640   activity groups; commonly endorsed by members; exemplified by highly-regarded members; and

641   a means for being perceived more positively by other members. This is not to say that these

642   values and associated behaviors are unique to this group; it might be that members of other social

643   identity groups endorse similar values (e.g., military members endorse camaraderie). Nor do we

644   imply that these members did not experience these values in other contexts (e.g., camaraderie felt

645   in previous sport participation). Rather, these CrossFit® members indicated that these values,

646   and the behaviors they used to enact the social identity content, were unique to their membership

647   in CrossFit®. This is demonstrated by CrossFit® members who expressed that they had not

648   engaged in some behaviors to the same degree in other physical activity contexts (e.g., a member

649   who had not engaged in the same intensity in biking; a member's attendance in previous

650   sport/exercise contexts was sporadic; a member did not know the names of people in other, non-

651   CrossFit® fitness classes). Only when they became members of this social identity group—this

652   CrossFit gym—were these values central to shared social identity such that members engaged in

653   associated behaviors to a higher intensity, frequency, or level not experienced previously. When

654   behaviors stemming from the group's social identity content constituted overuse risk behaviors,

655   this group-based psychological factor was shown to be relevant to overuse injury. This finding is

656   unique given that individual (e.g., Type A personality) and inter-personal (e.g., pressure from

657   coaches to train despite pain) factors were the focus or findings of previous overuse injury

658   research (e.g., Ekenman et al., 2001; Russell & Wiese-Bjornstal, 2015; Tranaeus et al., 2014).

659   The value for being hard core was enacted, in part, by members who attended high-

660   intensity workouts more than three times per week and, in some instances, with less than 24

661   hours between workouts, which puts members at risk for overuse, orthopedic injuries (ACSM,

662   2014; Drum et al., 2014). For some CrossFit® members, the choice to engage frequently in

663   high-intensity workouts was due in part to enjoyment of intense workouts. This is aligned with

664   researchers who found that people engaged in and/or preferred high-intensity physical activity in

665   part because of the pleasure they derived from engaging in high-intensity physical activity

666   (Ekkekakis et al., 2011). However, these CrossFit® members indicated more reasons for

667   engaging in high-intensity workouts. Completing difficult, high-intensity workouts, consisting

668   of "things that I didn't think I could do", enabled them to earn a "badge of honor" and yielded a

669   higher confidence in abilities. CrossFit® members in other studies (e.g., Bailey et al., 2017)

670   similarly expressed a sense of accomplishment from engaging in high-intensity workouts. One

671   interpretation is that CrossFit® members who gained confidence in their abilities by participating

672   in the group's activity—high-intensity workouts—also experienced an increase in their self-

673   competence which is an aspect of global self-esteem (i.e., positive evaluation of one's self based

674   on one's abilities; Tafarodi & Swann, 2001). The social identity content of being hard core was

675   also enacted by withholding pain reports (e.g., not whining). By doing so, members could

676   prevent negative evaluations by group members and leaders. Previous studies of overuse injury

677   revealed that athletes in sport contexts likewise tended to withhold pain reports because they

678   feared they would be negatively evaluated by team members and leaders which could affect their

679   sport careers/livelihood (e.g., team selection, winning, professional athletes' paychecks;

680   Tranaeus et al., 2014; Turner et al., 2002). The current study was unique, demonstrating that

681   members of a group exercise program exhibited the same tendencies as athletes, though careers

682   and livelihood were not at stake. Fear of negative evaluation is a commonality in both contexts.

683   In this study, we observed a desire for performance- and/or appearance-related results.

684   This desire was not captured in previous studies of CrossFit® members who primarily expressed

685   desires to be healthy, be fit, and learn new skills (Bailey et al., 2017) which do not intuitively

686   contribute to overuse risk behaviors. Here, group members' desire for results was shown to be

687   relevant to overuse risk behaviors. As indicated by a trainer, the desire for results induced

688   members to do more than the workouts prescribed by trainers. These statements mirrored the

689   findings of Montalvo and colleagues (2017) that CrossFit® members who did extra physical

690   training outside of CrossFit® workouts were at higher risk for injury than those who only did

691   CrossFit® workouts. The current findings indicate that this social identity content—the group

692   members' value for results—was an underlying reason for engaging in the extra training that

693   underlies overuse injuries.

694   Some findings pertaining to CrossFit® members' camaraderie was not exclusive to this

695   study. Other researchers (e.g., Bailey et al., 2017) have also found that the shared experience of

696   high-intensity workouts is viewed as a source of CrossFit® members' camaraderie, and that

697   encouragement between members is a common behaviour in the CrossFit® context. However, a

698   novel finding was that a way in which camaraderie is enacted—through verbal encouragement—

699   may induce higher effort. These findings in a naturalistic setting augment those of laboratory

700   settings in which researchers provided verbal encouragement to participants who then tended to

701   respond with increased effort (e.g., Moffatt et al., 1994). Together, these findings are suggestive

702   that verbal encouragement used to enact camaraderie may inadvertently be relevant to overuse

703   injury when members respond to verbal encouragement with excessive effort.

704   Throughout the findings related to social identity content, members were able to obtain

705   positive evaluations or avert negative evaluations of group members and/or leaders when

706   behaviors were aligned with social identity content. As illustrated by the member who initially

707   found another member annoying, completing high-intensity workouts enabled the 'annoying

708   member' to eventually be liked and accepted. Moreover, participants admired—or were admired

709   by—fellow Crossfit® members who enacted the social identity content via other behaviors such

710   as regular attendance, attendance despite adversity (e.g., recovering from illness), performing

711   well on a specific activity even if they were not typically one of the best performers, and

712   encouraging a struggling member. Thus, the behaviors used to enact social identity content gave

713   CrossFit® members a means for being respected and/or liked by other group members. It could

714   be that members of the group engage in these behaviors because doing so enables them to

715   experience enhanced self-liking, a form of global self-esteem that relies in part on the social

716   judgements of one's self conveyed by others (Tafarodi & Swann, 2001). Altogether enjoyment

717   and gains in self-esteem, be it in the form of self-competence or self-liking, appear to be positive

718   outcomes of adhering to the social identity content of this group. However, the overarching

719   concern is this: The behaviors that group members used to enact social identity content may

720   enable them to derive enjoyment and self-esteem from group membership, yet the same

721   behaviors put members at higher risk for overuse injury occurrence and severity.

722   **Social Threats**

723   In responding to criticisms about injury, interviewees compared CrossFit® to other

724   physical activity contexts on various dimensions. Members asserted that the injury occurrence in

725   CrossFit® was equivalent to or lower than that in other physical activities, whilst the severity of

726   injuries incurred in CrossFit® was lower. They pointed out that the health benefits of CrossFit®

727   membership were greater than that of other contexts and, as such, outweighed the drawback of

728   injuries. Members also implied superiority of the CrossFit® context in that trainers were on

729   hand to prevent injury occurrence, in contrast to gyms with no such presence. This assertion was

730   supported by previous studies which indicated that the presence of CrossFit® trainers was related

731   to lower injury rates (Weisenthal et al., 2014). In this study, specific ways in which trainers can

732   be integral to injury-prevention efforts were revealed: Trainers modified workouts when

733   members expressed pain; guided members to temper their effort when encouraged by other

734   members to try harder; and reduced fear of negative evaluation by soliciting pain reports and

735   expressing their own pain. Also, participants viewed CrossFit® members as superior to

736   participants in other physical activity programs in that they handled their injuries well instead of

737   ceasing exercise when injuries occurred. Further, the CrossFit® program was viewed as superior

738   in that it strengthened members so that their injury susceptibility decreased.

739   According to the social identity approach, through positively distinguishing one's group

740   from other groups, being a member of a group increases positive evaluations of one's own worth

741   (i.e., self-esteem; Jetten et al., 2017). When an aspect of a group is negatively evaluated by

742   others, the valued source of self-esteem is threatened (i.e., social threat). In response, group

743   members may engage in social creativity (Haslam & Reicher, 2006). Social creativity involves

744   maintaining a positive social identity through developing the group's social identity content such

745   that the group is seen as superior to other groups (i.e., achieves positive distinctiveness). For

746   example, a sport team on a losing streak cannot achieve positive distinctiveness on the dimension

747   of winning (outcome). Therefore, members may assert the teams' superiority on a dimension

748   other than outcome, such as sportsmanship or creativity. They may claim, for example, 'that

749   winning isn't everything; more important is how you play the game and playing fairly.' In this

750   sense, CrossFit® members' responses to injury criticisms resembled social creativity such that

751   injury occurrence wasn't everything; more important was how well members handled the

752   injuries, the effort they put into prevention, the health benefits, or the strength they gained.

753   The second pattern observed in CrossFit® members' responses to injury criticisms

754   involved denouncing features of those who criticize CrossFit®. This was done by dismissing

755   critics whose criticisms were products of bias from extreme examples of injury, incomplete

756   information, lack of personal experience with CrossFit®, or lack of specificity to individual

757   CrossFit® contexts. A possible interpretation of this pattern is another type of response to social

758   threats referred to as polarization (Brown & Ross, 1992). Polarization involves members'

759   defense of a social identity group by discounting the information critics provide. Of note,

760   instead of agreeing with critics, or adhering to advice and recommendations of critics, members

761   tend to react to criticisms by becoming more ensconced in their beliefs as well as a decreased

762   desire to leave the group and an increased antipathy towards other groups (Brown & Ross, 1982;

763   Hogg & Reid, 2006). Altogether, these findings demonstrated that criticisms about injury—even

764   when the critics were exercise and medical experts—did not induce members to perceive injury

765   as a problem, reflect on how to prevent injury, or change their injury-related behaviors because

766   these criticisms did not come from members of their own group.

767   Having identified some underlying values associated with a CrossFit group together with

768   associated (negative) behaviors, future research might examine how social identity content can

769   be modified by group leaders to change resultant negative behaviors (Haslam et al., 2011).

770   Injury-prevention interventions in CrossFit® contexts may consist of leaders emphasizing values

771   that are not enacted by overuse risk behaviors. Doing so can change members' perceptions of

772   group values from, for example, "We are hard core" to "We are smart about injury prevention".

773   Likewise, the basis for positive evaluations could be changed. For example, CrossFit® members

774   may be more apt to work out at a more moderate intensity, rest more, or decrease

775   effort/participation/report pain when they feel pain if they are praised for being injury-free for 20

776   months instead of only being praised for attending 20 months or for visible results. The findings

777   about social threats suggest that injury-prevention recommendations may be more effective when

778   implemented or communicated by CrossFit® leaders or members rather than experts who are not

779   members. For example, rather than experts critiquing the form of CrossFit® members, group

780   leaders may teach members to word verbal encouragement to emphasize technique (e.g., "Keep

781   good form!") instead of excessive effort (e.g., "Keep going!").

782   Despite the value of these practical implications, we acknowledge the study's limitations.

783   We limited the scope of psychological factors to identification of group values. Other factors

784   may have greater bearing on overuse injury occurrence in this context. Also, we opted to focus

785   on the utility of the social identity approach which led to us interpret data in relation to social

786   identity constructs (e.g., social identity content, social creativity, polarization). Other theoretical

787   approaches may reveal different, viable interpretations of participants' experiences and data. For

788   example, impression management theory could yield insight into findings pertaining to fear of

789   negative evaluation beyond negative evaluation by members of one's social identity group.

790   Further, our use of qualitative methodology and sampling method limited the generalizability in

791   that these findings are specific to one CrossFit® gym.

792   However, we considered the results in terms of other forms of generalizability applicable

793   to qualitative research methods (Smith, 2018), which could be viewed as a strength of this

794   project. Naturalistic generalizability involved presenting details of participants' words and

795   behaviors such that readers with no exposure to CrossFit® gyms, CrossFit® lexicon, social

796   identity, or injury could understand these results within their own personal life experiences (e.g.,

797   being amazed upon learning one can complete a difficult task; a gym where patrons do not talk

798   to each other or know each other's names). Via inferential transferability, people not involved in

799   this specific CrossFit® setting may consider adopting a new practice due to what was learned in

800   this project (e.g., other exercise group leaders may guide exercisers to temper effort when

801   encouraged by others to try harder or solicit pain reports). Analytical generalization was achieved by

802   generalizing results to an established concept or theory (e.g., discussing results in relation to

803   social identity constructs of social creativity and polarization).

804   This study is one of the first to examine social identity constructs in relation to injury,

805   psychological factors of overuse injury in exercise contexts, and psychological factors

806   underlying injury in a CrossFit® context. It provided empirical support for the proposition that

807   the social identity approach is an applicable theoretical framework for examination of injury.

808   Overall, this study is critical in understanding why exercisers engage in injury-inducing

809   behaviors and how membership in social identity groups plays a role.

810   **References**

811   American College of Sports Medicine (2014). *ACSM's guidelines for exercise testing and*

812   *prescription*. Philadelphia, PA: Wolter Kluwere/Lippincott, Williams & Wilkins.

813   Bailey, B., Benson, A. J., & Bruner, M. W. (2017). Investigating the organisational culture of

814   CrossFit. *International Journal of Sport and Exercise Psychology.*

815   https://doi.org/10.1080/1612197X.2017.1329223

816   Braun, V., & Clark, V. (2006). Using thematic analysis in psychology. *Qualitative Research in*

817   *Psychology, 3*(2), 77-101. doi: 10.1191/1478088706qp063oa

818   Brown, R. J., & Ross, G. F. (1982). The battle for acceptance: An investigation into the

819   dynamics of intergroup behaviour. In H. Tajfel (Ed.), *Social identity and intergroup*

820   *relations* (pp. 15-40)*.* Cambridge, UK: Cambridge University Press.

821   Cavallerio, F., Wadey, R., & Wagstaff, C. R. D. (2016). Understanding overuse injuries in

822   rhythmic gymnastics: A 12-month ethnographic study. *Psychology of Sport and*

823   *Exercise, 25,* 100-109. https://doi.org/10.1016/j.psychsport.2016.05.002

824   Chan, D. K. C., Lentillon-Kaestner, V., Dimmock, J. A., Hardcastle, S. J., Donovan, R. J., &

825   Hagger, M. S. (2014). Athlete's beliefs about and attitudes towards taking banned

826   performance-enhancing substances: A qualitative study. *Sport, Exercise, and*

827   *Performance Psychology, 3*(4), 241-257. https://doi.org/10.1037/spy0000019

828   CrossFit. (n.d.) *Affiliate map*. Retrieved January 20, 2020, from https://map.crossfit.com/

829   Diamond, D. (2015, May). *Is CrossFit® safe? What 60 Minutes didn't tell you.* Forbes.

830   https://www.forbes.com/sites/dandiamond/2015/05/11/is-crossfit-good-for-you-what-60-

831   minutes-didnt-say/#3b515ea2508c

832   Drum, S. N., Bellovary, B. N., Jensen, R. L., Moore, M. T., & Donath, L. (2017). Perceived

833   demands and post-exercise physical dysfunction in CrossFit® compared to an ACSM

834   based training session. *The Journal of Sports Medicine and Physical Fitness, 57*(5), 604-

835   609. doi: 10.23736/S0022-4707.16.06243-5

836   Ekenman, I., Hassmen, P., Koivula, N., Rolf, C., & Fellander-Tsai, L. (2001). Stress fractures of

837   the tibia: Can personality traits help us detect the injury-prone athlete? *Scandinavian*

838   *Journal of Medicine & Science in Sports, 11,* 87-95. doi: 10.1034/j.1600-

839   0838.2001.011002087.x

840   Ekkekakis, P., Parfitt, G., & Petruzzello, S. J. (2011). The pleasure and displeasure people feel

841   when they exercise at different intensities: Decennial update and progress towards a

842   tripartite rationale for exercise intensity prescription. *Sports Medicine, 41*(8), 641-671.

843   doi: 10.2165/11590680-000000000-00000

844   Evans, A. L., Slater, M. J., Coffee, P., & Barker, J. B. (2016). Pulling the group together: The

845   role of the social identity approach. In Thelwell, R., Harwood, C., & Greenlees, I. (Eds.).

846   *The psychology of sports coaching: Research and practice.* (pp. 265-280). Routledge.

847   Jetten, J., Haslam, S. A., Cruwys, T., Greenaway, K. H., Haslam, C., & Steffens, N. K. (2017).

848   Advancing the social identity approach to health and well-being: Progressing the social

849   cure research agenda. *European Journal of Social Psychology, 47,* 789-802.

850   https://doi.org/10.1002/ejsp.2333

851   Haslam, S. A., & Reicher, S. (2006). Stressing the group: Social identity and the unfolding

852   dynamics of responses to stress. *Journal of Applied Psychology, 91,* 1037-1052.

853   DOI: 10.1037/0021-9010.91.5.1037

854   Haslam, S. A., Reicher, S. D., & Platow, M. J. (2011). The new psychology of leadership:

855   Identity, influence and power. East Sussex, UK: Psychology Press.

856   Hennink, M. M., Kaiser, B. N., & Marconi, V. C. (2017).   Code saturation versus meaning

857   saturation: How many interviews are enough? *Qualitative Health Research, 27*(4), 591-

858   608. https://doi.org/10.1177/1049732316665344

859   Hings, R. F., Wagstaff, C. R. D., Anderson, V., Gilmore, S., & Thelwell, R. C. (2020). Better

860   preparing sports psychologists for the demands of applied practice: The emotional labor

861   training gap. *Journal of Applied Sport Psychology, 32*(4), 335-356.

862   https://doi.org/10.1080/10413200.2018.1560373

863   Hogg, M. A., & Reid, S. A. (2006). Social identity, self-categorization, and the communication

864   of group norms. *Communication Theory, 16,* 7-30. https://doi.org/10.1111/j.1468-

865   2885.2006.00003.x

866   Johnson, U., Tranaeus, U., & Ivarsson, A. (2014). Current status and future challenges in

867   psychological research of sport injury prediction and prevention: A methodological

868   perspective. *Revista de Psicologia del Deporte, 23*(2), 401-409.

869   Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for

870   social work research. *Social Sciences, 8*(255), 1-17.

871   https://doi.org/10.3390/socsci8090255

872   Klimek, C., Ashbeck, C., Brook, A. J., & Durall, C. (2018). Are injuries more common with

873   CrossFit training than other forms of exercise? *Journal of Sport Rehabilitation, 27,* 295-

874   299. doi: 10.1123/jsr.2016-0040

875   Launay, F. (2015). Sports-related overuse injuries in children. *Orthopaedics & Traumatology:*

876   *Surgery & Research, 101,* S139-S147. doi: 10.1016/j.otsr.2014.06.030

877   Livingstone, A. G., & McCafferty, S. (2015). Explaining reactions to normative information

878   about alcohol consumption: A test of an extended social identity model. *International*

879   *Journal of Drug Policy, 26*(2015), 388-395. doi: 10.106/j.drugpo.2014.10.005

880   Long, N., Readdy, T., & Raabe, J. (2014). What motivates firefighters to exercise? A mixed-

881   methods investigation of self-determination theory constructs and exercise behavior.

882   *Sport, Exercise and Performance Psychology, 3*(3), 203-218.

883   https://doi.org/10.1037/spy0000012

884   Maffulli, N., Longo, U. G., Gougoulias, N., Caine, D., & Denaro, V. (2010). Sport injuries: A

885   review of outcomes. *British Medical Bulletin, 97,* 47-80.

886   https://doi.org/10.1093/bmb/ldq026

887   Moffatt, R. J., Chitwood, L .F., & Biggerstaff, K. D. (1994). The influence of verbal

888   encouragement during assessment of maximal oxygen uptake. *The Journal of Sports*

889   *Medicine and Physical Fitness 34*(1), 45-49.

890   Montalvo, A. M., Shaefer, H., Rodriguez, B., Li, T., Epnere, K., & Myer, G. D. (2017).

891   Retrospective injury epidemiology and risk factors for injury in CrossFit. *Journal of*

892   *Sports Science and Medicine, 16,* 53-59.

893   Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry, 20*(8).

894   1045-1053. https://doi.org/10.1177/1077800413513733

895   Morse, J. (2019). The changing face of qualitative inquiry. *International Journal of Qualitative*

896   *Methods, 19,* 1-7. https://doi.org/10.1177/1609406920909938

897   Russell, H. C., & Wiese-Bjornstal, D. M. (2015). Narratives of psychosocial response to

898   microtrauma injury among long-distance runners. *Sports, 3,* 159-177.

899   https://doi.org/10.3390/sports3030159

900   Smith, B. (2018). Generalizability in qualitative research: Misunderstandings, opportunities and

901   recommendations for the sport and exercise science. *Qualitative Research in Sport,*

902   *Exercise and Health, 10*(1), 137-149. https://doi.org/10.1080/2159676X.2017.1393221

903   Tracy, S. J. (2010). Qualitative quality: Eight "Big Tent" criteria for excellent qualitative

904   research. *Qualitative Inquiry, 16*(10), 837-851.

905   https://doi.org/10.1177/1077800410383121

906   Tranaeus, U., Johnson, U., Engstrom, B., Skillgate, E., & Werner, S. (2014). Psychological

907   antecedents of overuse injuries in Swedish elite floorball players. *Athletic Insight, 6*(2),

908   155-172.

909   Tafarodi, R. W., & Swann Jr, W. B. (2001). Two-dimensional self-esteem: Theory and

910   measurement. *Personality and Individual Differences, 31*(5), 653-673.

911   https://doi.org/10.1016/S0191-8869(00)00169-0

912   Turner, A., Barlow, J., & Ilberry, B. (2002). Play hurt, live hurt: Living with and managing

913   osteoarthritis from the perspective of ex-professional footballers. *Journal of Health*

914   *Psychology, 7*(3), 285-301. https://doi.org/10.1177/1359105302007003222

915   Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987).

916   *Rediscovering the social group: A self-categorization theory.* Oxford, UK: Basil

917   Blackwell.

918   Weisenthal, B. M., Beck, C. A., Maloney, M. D., DeHaven, K. E. & Giordano, B. D. (2014).

919   Injury rate and patterns among CrossFit athletes. *Orthopedic Journal of Sports Medicine,*

920   *2*(4), 1-7. https://doi.org/10.1177/2325967114531177

921   Wilder, R. P., & Sethi, S. (2004). Overuse injuries: Tendinopathies, stress fractures,

922   compartment syndrome, and shin splints. *Clinics in Sports Medicine, 23,* 56-81.

923   https://doi.org/10.1016/S0278-5919(03)00085-1

924   Table 1

925   *Characteristics of Interviewees*

Interviewee	Age	Membership Duration (Months)	Frequency (Times per Week)	Competitive Status	Ability Level	Interview Duration (Minutes)
FM12	43	13	4 - 5	1 competition for beginners	Meets some	56.20
MM43	34	6	4	Attends workouts	Often last in workouts	68.33
FM2	33	60	3 - 4	Attends workouts	Meets most	60.42
MM42	33	65	3	Attends workouts	Meets some	52.52
MM29	32	6	4	Attends workouts	Does not meet	93.68
FM24	20	42	4 - 5	2 competitions	Meets most	80.55
MM44	25	8	4 - 6	Intends to compete	Always meets	49.97
FM31	28	48	2	Attends workouts	Meets some	74.62
MT1	25	41	7	Competes in CrossFit® Games	One of best males at this gym	80.58
MM34	48	41	3	Attends workouts	Meets some	71.20
GO1	52	78		Attends workouts	Meets some	142.62
MM1	34	48	3 - 5	Attends workouts	Meets some	73.65
MM32	48	20	5	Attends workouts	Meets most	83.13
MM30	27	7	5 - 6	Intends to compete	One of best males at this gym	67.38

926

927   *Notes.* Additional information about participants is not presented to preserve anonymity. Ability level refers to participants' ability to

928   meet assigned quantities in workouts (e.g., amount of weight or repetitions).