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A Thematic Analysis of Social Identity and Injury in CrossFit®

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Abstract

The purpose of this study was to explore the viability of the social identity approach as a theoretical framework for examining injury in the context of a group exercise program, CrossFit®. Specifically, we sought to identify values of group exercise participants relevant to overuse risk behaviors as well as participants' responses to criticisms about injury. Via thematic analysis, observations of a CrossFit® setting (N = 31) and interviews of members (N = 14) yielded three social identity content (i.e., Being Hard Core, Achieving Results, Camaraderie). Behaviors employed to enact these social identity content (e.g., engage in frequent, high-intensity workouts; attend despite low-level pain; encourage others to continue despite pain; withhold pain reports from group leaders) enabled members to obtain positive evaluations or avert negative evaluations of group members yet also incurred higher overuse injury risk. We also identified two prominent types of responses of CrossFit® members to criticisms about injury in CrossFit® activity: Compare dimensions (e.g., how well members handled the injuries; the effort they put into prevention; health benefits; strength gained) of the group which were perceived as superior to other contexts, and denounce critics. These response types were interpreted to reflect social creativity and polarization, respectively. Altogether, the findings indicate that group-based psychological factors contribute to overuse injury, advancing previous literature in which intra- and inter-personal factors were the primary focus. This study contributed to the literature by identifying theory-based injury risk factors in group exercise contexts which may inform future injury-prevention interventions.

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

threat

42 **Thematic Analysis of Social Identity Constructs and Injury in CrossFit®**

43 Many harms are associated with injury incurred in physical activity contexts including
44 inability to work or attend school, financial costs of medical treatment, psychological distress,
45 surgery, arthritis, and restricted mobility (Maffulli et al., 2010; Turner et al., 2002). To reduce
46 these harms, researchers attempt to identify psychological factors which contribute to injury.

47 The study of psychological factors of injury has been hampered in that, typically,
48 researchers did not distinguish between acute and overuse injury though the two have different
49 causal mechanisms and pain patterns (Ekenman et al., 2001; Johnson et al., 2014). Acute
50 injuries stem from a single, identifiable event (e.g., foot broken when a person falls off a
51 plyometric box) whereas the causal mechanisms of overuse injuries (e.g., shin splints) involve
52 excessive intensity and frequency of movement, with no single, identifiable, causal event. At the
53 onset of overuse injury, referred to as the early stages, pain reflects minor physical damage (e.g.,
54 tiny lesions in a tendon; Wilder & Sethi, 2004). The pain is typically low-level, persistent,
55 and/or intermittent, such that it is sometimes described as ‘nagging’ but does not impair function
56 (e.g., able to run or squat despite pain; Launay, 2015; Russell & Wiese-Bjornstal, 2015;
57 Tranaeus et al., 2014; Turner et al., 2002). Without functional impairment, sufferers in the early
58 stages of overuse injury may not view themselves as injured, and they are able to continue
59 engaging in the physical activity of their choice. The injury of those who rest or reduce effort
60 may be resolved in the early stages because the body’s repair response is sufficient for healing
61 the damaged component (Wilder & Sethi, 2004). But in many instances, those in the early stages
62 of overuse injury continue with physical activity despite the pain (Turner et al., 2002). Those
63 who continue physical activity despite the initial pain may exacerbate the damage (e.g., the
64 lesions become larger) such that the injury’s severity increases (Wilder & Sethi, 2004).

65 Taken together, behaviors that risk *occurrence* of overuse injury include exercising with
66 excessive intensity and/or frequency, and/or insufficient rest (American College of Sports
67 Medicine, ACSM, 2014; Drum et al., 2017; Launay, 2015; Traneous et al., 2014; Wilder &
68 Sethi, 2004). Behaviors that risk increasing *severity* of overuse injury involve exercising and/or
69 failure to rest despite initial injury pain. In this study, we refer to behaviors that increase risk of
70 overuse injury occurrence, or severity of overuse injury, collectively as overuse risk behaviors.
71 One focus of the current study is to examine psychological factors which influence engagement
72 in these overuse risk behaviors.

73 In recent years, research involved initial attempts to identify psychological factors
74 specific to overuse injury of athletes involved in sports (e.g., runners, floorball players, rhythmic
75 gymnasts; Cavallerio et al., 2016; Russell & Wiese-Bjornstal, 2015; Tranaeus et al., 2014).
76 Some of the psychological factors identified in these studies were specific to competitive, sport
77 contexts (e.g., desire to complete a marathon in three hours; pressure from coaches to train
78 despite pain). It would seem that psychological factors relevant to injury in exercise contexts
79 differ from those of sport contexts, given the absence of win/loss outcomes and coaches whose
80 reputations and livelihoods rely on those outcomes. To our knowledge, research specific to
81 overuse injury psychological factors has not been conducted in exercise contexts. Additionally,
82 the psychological factors pertaining to overuse injuries of athletes were of an intra-personal (e.g.,
83 Type A personality, Ekenman et al., 2001) and inter-personal (e.g., relationship between athletes
84 and medical personnel; Turner et al., 2002) nature. Little is known about *group-based*
85 psychological factors in relation to overuse injury in sport or exercise contexts.

86 One theoretical framework that could enhance the study of group-based exercise contexts
87 is the social identity approach. This approach is used in the study of groups (e.g., a sports team,

88 an exercise program/class) whose members perceive themselves to be similar to each other in
89 meaningful ways through shared values, beliefs, attitudes, and/or behaviors (Jetten et al., 2017).
90 Social identity content refers to shared values that underpin group membership (Evans et al.,
91 2016; Hogg & Reid, 2006; Jetten et al., 2017; Livingstone & McCafferty, 2015; Slater et al.,
92 2014). For example, let us suppose that members of a running group say “pushing ourselves to
93 the limit is what we’re about” whereas members of an exercise class say “it’s important to us to
94 exercise safely”. Such values impact subsequent behaviors that are either endorsed or rejected
95 by members of the group. Members of the running group who continue running despite pain to
96 achieve the absolute limits of their performance capability might be considered exemplar
97 (prototypical) members of their group. Conversely, this same type of behavior may be frowned
98 upon by members of the exercise class who value exercising safely. Evidence for the impact of
99 social identity content on behaviors has been demonstrated in the literature. For example, when
100 alcoholic consumption is viewed as a defining value (a negative social identity content) of a
101 group of university students, binge drinking may occur (Livingstone & McCafferty, 2015). In
102 this way—and similar to the social identity content underpinning our running group example—
103 social identities may become a curse that threatens and potentially harms group members’ health
104 and well-being (Jetten et al., 2017). Building on this, we proposed that negative social identity
105 content may influence engagement in injury-risk behaviors in group exercise contexts.

106 To examine psychological factors specific to injury in group exercise contexts, we chose
107 the group exercise context of CrossFit®. More than 15,000 gyms around the world are affiliates
108 of the CrossFit® brand (CrossFit®, n.d.). While some members may opt to engage in CrossFit®
109 competitions, the focus of this study is the group exercise component of the program. CrossFit®
110 is one of the few exercise contexts known to us in which injury rates, and specifically overuse

111 injury occurrence, have been studied. In these studies, 19% to 73.5% of CrossFit® members
112 reported injury, and 16% to 35.5% of the injuries were designated as overuse injury or chronic
113 onset (Klimek et al., 2018; Montalvo et al., 2017; Weisenthal et al., 2014). These injury rates
114 were on par with that of sports participants (e.g., powerlifters, elite gymnasts; Montalvo et al.,
115 2017). Some critics of Crossfit® have expressed concern about the amount of involved injury
116 risk (Diamond, 2015). In contrast, CrossFit® members find that the modalities of the CrossFit®
117 context, along with the atmosphere and connectedness, contribute to physical activity adherence
118 (Bailey et al., 2017). As such, CrossFit® members may perceive the criticisms of the injury rate
119 of CrossFit® to be threatening to their group. In other words, within the social identity
120 approach, social threats involve negative evaluations of a social identity group such that
121 members, feeling that a source of positive self-esteem is threatened, may be incited to defend
122 their group (Brown & Ross, 1982; Evans et al., 2016).

123 The overarching purpose of this study was to apply the social identity approach to the
124 exploration of the psychological factors related to injury in a CrossFit® exercise context. While
125 the literature review suggested numerous avenues of research, we narrowed our focus to these
126 two research questions: (1) What are the values within a CrossFit® group, and how might they
127 be relevant to overuse risk behaviors? (2) How do CrossFit® members respond to criticisms
128 about the occurrence of injury in CrossFit® activity?

129 **Method**

130 **Philosophical Perspective and Design**

131 This project was shaped by the pragmatic paradigm in which research can be perceived as
132 a means for gaining knowledge about a problem in the human experience (e.g., injury; Kaushik
133 & Walsh, 2019; Morgan, 2014). Within this paradigm, an alignment between methods and

134 research questions, rather than philosophical concerns (e.g., nature of reality and knowledge), is
135 a focus. Thus, researchers are called upon to consider the information and beliefs that informed
136 their methodological choices, weigh the consequences, and adjust accordingly until they form a
137 warranted belief that the method is suited for answering the research questions.

138 The first research question required a means for identifying values of a CrossFit® group.
139 In previous studies, the values of groups—to infer social identity content—were pre-identified
140 by researchers, or statements of group leaders were used to identify meaningful social identity
141 content (Barker et al., 2014; Livingstone & McCafferty, 2015; Slater et al., 2014). Given the
142 above-noted conflict between views of CrossFit® members and critics, we perceived it to be
143 critical that CrossFit® members themselves contribute to identification of the group’s values.
144 Therefore, we adopted the recommendation of Evans et al. (2016) by employing qualitative
145 methods to elicit the group’s social identity content. In line with the pragmatic paradigm, we
146 also opted to use two methods—observations and interviews—as multiple methods enhance the
147 ability to gain knowledge (Morgan, 2014). Observations are also relevant to social identity
148 content because they reveal which behaviors are used to enact the values of a social identity
149 group (Hogg & Reid, 2006). The use of interviews is also aligned with the pragmatic paradigm
150 in that people are not expected to have identical perceptions because they do not have identical
151 experiences (Kaushik & Walsh, 2019). However, there are degrees of shared experiences
152 between any two people that lead to degrees of shared beliefs which can be captured to some
153 degree via interviews.

154 **Sampling and Participants**

155 Participants in this study were members of a CrossFit® gym in a city in the southeastern
156 United States. The choice to limit this study to one gym was based in part on the knowledge, as

157 stated by an owner of this gym, that almost all gym members engaged in CrossFit® as an
158 exercise activity. Only a handful engaged in the competitive component of the CrossFit®
159 program. Additionally, there is evidence that there is wide variation between CrossFit® gyms
160 (e.g., management practices, injury rates) though they share the same brand name (Weisenthal et
161 al., 2014). Given these disparities between gyms, social identity content may also differ between
162 gyms; thus, we sought participants with membership at the same gym. Convenience sampling
163 was primarily used for both observations and interviews in order to be non-invasive and
164 emphasize anonymity. This decision reflected ethical consideration to avoid negatively affecting
165 the gym's business activity or the relationships between owners and members.

166 For observations, participants consisted of members who entered the gym during the
167 times when the first author conducted observations. Sex, role (e.g., trainer, member), physical
168 description, and behaviors were the only characteristics of observed members recorded. To
169 increase the number of members and types of behaviors observed, observations of 29 workouts
170 were made at multiple times of day (i.e., morning, $n = 7$; afternoon, $n = 10$; evening, $n = 12$). To
171 prevent observations from being biased by advance knowledge, participants were not notified in
172 advance about which workout periods would be observed. Also observed were one intra-gym
173 competition and one mandatory induction course for new members. Observations included 85
174 participants (44 male members, 32 female members, 6 male trainers, 1 female trainer, 2 gym
175 owners). For interviews, 10 members volunteered to be interviewed. Two members were
176 recruited when they initiated conversation with the first author, at which time the first author
177 invited them to participate as interviewees. Snowball sampling was also used in that
178 interviewees were asked to recommend other members for interviews. The first author
179 approached two recommended members, providing contact information in case they were willing

180 to be interviewed. Within these strategies, we aimed to interview members who possessed
181 attributes which were pertinent to overuse injury. Attributes included membership duration,
182 wearing physical appliances (e.g., knee brace), prior overuse injury, an athletic background, sex,
183 and age. Most interviewees represented multiple attributes (e.g., an older member with no
184 athletic background wore a knee brace). The 14 interviewees encompassed all of these
185 attributes, consisting of 8 male members, 4 female members, 1 male trainer, and 1 male gym
186 owner, ages 20 – 52 years ($M = 34.43$). The mean duration of interviews was 75 minutes, 21
187 seconds. Table 1 contains more details about interviewees.

188 [Table 1 near here]

189 **Data Collection**

190 Prior to data collection, five pilot interviews and three pilot observations were conducted.
191 A high quantity of data was rendered from each pilot interview and observation, highlighting the
192 need to narrow the scope of the study. Therefore, the research questions were limited to social
193 identity content and criticisms of CrossFit® rather than exploring more aspects. Further, we
194 learned that some members perceive researchers conducting research about injury in CrossFit®
195 settings to be critics, evoking a defensive posture. After piloting, the interview guide was
196 adjusted such that explicit questions about pain and injury were last. In this way, we were
197 careful to avoid asking leading questions about injury. Consequently, we found that
198 interviewees brought up the topics of pain and injury prior to being explicitly asked about these
199 topics. Pilot interviews also revealed that members were not familiar with overuse injury origins
200 or pain patterns which limited their ability to respond to explicit questions about overuse injury.
201 This demonstrated the need for researchers to identify participants' descriptions of behaviors as
202 overuse risk behaviors when participants did not name them as such.

203 The final interview guide (online Appendix A) consisted of rapport-building and
204 biographical questions, followed by questions pertaining to social identity constructs, criticisms
205 of CrossFit®, and then explicit questions about pain and injury. The interview questions
206 addressed four aspects of social identity content. Descriptions of the four aspects, along with
207 sample questions, are: (1) In-group homogeneity (Turner et al., 1987): Perceived similarities of
208 group members (e.g., “What, if anything, do you have in common with other CrossFitters?”); (2)
209 Positive distinctiveness (Haslam et al., 2011): Attributes of a group which serve as reasons for
210 members to join and/or perceive the group to be distinct from and, typically, preferred to other
211 groups (e.g., “What do you like about CrossFit®?”; “How is that different from what you liked
212 about other exercise activity you’ve been involved in?”); (3) Prototypicality (Haslam et al.,
213 2011): Attributes possessed by prototypical, highly-regarded members (e.g., “Who at your
214 CrossFit® gym impresses you most? Please describe them.”); and (4) In-group status (Turner et
215 al., 1987): Attributes for which members can be perceived positively by other members (e.g., If
216 you want to be perceived favorably by other CrossFitters, what do you need to do?). Questions
217 in the interview guide also addressed our second research question by eliciting participants’
218 responses to criticisms of CrossFit® (e.g., “What, if any, criticisms have you heard about
219 CrossFitters?”).

220 After receiving approval from an institutional ethics committee, informed consent was
221 sought from the gym owner. Given the public nature of the venue, the gym owner was identified
222 as the “gatekeeper” who was responsible for providing access and giving informed consent for
223 observations in these settings. Two weeks before observations started, flyers at the gyms and
224 posts on the gym’s social media were used to notify members about the study. These materials
225 included a description of the study and informed members that a researcher would be observing

226 members in the gym as part of the study. Members were invited to ask questions or express
227 concerns to the gym staff, owner, researchers, or ethics committee prior to start of observations.
228 No members expressed concerns. The first author conducted observations over a two-month
229 period. During observations, the first author jotted handwritten notes. In these notes, members
230 were given an identifier code, constructed to indicate sex (F = female, M = male), role (M =
231 member, T = trainer, GO = gym owner), and the chronological order in which the researcher
232 observed the participant (e.g., MM1 was the first male member observed). After each
233 observation, the first author typed the handwritten notes to form field notes (N = 106 single-
234 spaced pages). Two weeks after the start of observations, flyers and posts recruiting
235 interviewees were displayed. The choice to start interviews after a short time of observations
236 was deliberate, as it was intended to enable the researcher to ask questions about what was
237 observed. Interviewees selected the locations (e.g., coffee shops) for interviews and provided
238 informed consent. Interviews were conducted by the first author, audio-recorded, and
239 transcribed verbatim.

240 **Data Analyses and Saturation**

241 Data were analyzed using NVivo software (v. 11). To start, the first author reviewed all
242 interview transcripts and field notes. Transcripts were sent to interviewees who were invited to
243 provide comments, clarifications, or changes in views. This was intended to check transcript
244 accuracy and generate additional data and insight, but interviewees did not provide new
245 information. Next, an inductive approach was used for a thematic analysis (Braun & Clarke,
246 2006). The analysis consisted of descriptive coding used to identify simple, lower-order codes
247 across interviews followed by coding of observation data. Then, higher-order themes were
248 developed to represent relationships between lower-order codes across interviews and

249 observations. A focus of these steps was on internal homogeneity (i.e., each code/theme had
250 adequate evidence) and external homogeneity (i.e., no overlap between evidence supporting two
251 codes/themes). A final step, as employed by other sport/exercise psychology researchers (e.g.,
252 Chan et al., 2014; Long et al., 2014; Hings et al., 2020), involved relating the higher-order
253 themes to the research questions and theoretical constructs. For the first research question, social
254 identity content were determined by higher-order themes which spanned all four social identity
255 constructs (i.e., positive distinctiveness; in-group status; prototypicality; in-group homogeneity).
256 Behaviors used to enact each social identity content were examined for indicators of overuse risk
257 behaviors (e.g., a member continued to participate in workouts despite low-level injury pain; a
258 member exercised with excessive intensity and/or frequency, and/or insufficient rest). For the
259 second research question, themes derived from participants' responses to criticisms of the injury
260 occurrence in CrossFit® were examined. The first author provided research team members with
261 sample texts and themes, along with memos in which data were interpreted through a social
262 identity lens. Iterative discussions and reviews occurred. The aims of these interactions were to
263 determine whether the interpretations were supported by the data (i.e., warranted assertions) and
264 the research questions were answered, aims that are emphasized within the pragmatic paradigm
265 (Kaushik & Walsh, 2019; Morgan, 2014).

266 Throughout data collection and analysis, data saturation was considered to determine
267 whether additional interviews or observations were needed. We note that guidance regarding
268 data saturation and sample size typically pertains to analysis of one type of data such that little
269 guidance is given in assessing data saturation from multiple methods (i.e., observations and
270 interviews). Thus, we opted to assess data saturation after higher-order themes were identified.
271 In accordance with Hennick et al. (2014), saturation was reached when no new salient codes (i.e.,

272 pertaining to injury or social identity constructs) were generated. Additionally, we considered
273 the guidance of Morse (2020) indicating that smaller sample sizes are appropriate when sampling
274 a cohesive group, addressing narrow research questions, and the scope of the project is narrow.
275 Given our sample consisted of members of one CrossFit® gym in a two-month period, addresses
276 two specific research questions, and focused on one phenomenon, injury, the sample size of 14
277 interviews and 31 observations was commensurate with this guidance.

278 **Methodological Rigor**

279 Amongst pragmatist researchers, a standard to consider in terms of rigor is whether the
280 method produced desired and useful results such that (1) knowledge was gained; (2) research
281 questions were answered; and (3) interpretations are defensible, consisting of warranted
282 assertions (Kaushik & Walsh, 2019). To meet these standards, research team members consisted
283 of scholars with expertise in injury, social identity, and exercise psychology who supervised the
284 first author, a graduate student at the time of the study, in the design, data collection, and
285 analysis. Their expertise enabled them to assess data and interpretations to determine whether
286 knowledge was gained in terms of advancing the extant literature in these areas. Additionally,
287 they served as critical friends to determine whether interpretations were defensible and as peer
288 reviewers to determine whether research questions were answered.

289 Rigor can also be assessed specific to the methods used. Given our use of qualitative
290 methods, we considered markers of quality of qualitative research, including criteria (italicized
291 below) summarized by Tracy (2010). We believed the *topic to be worthy* given the harms of
292 injury. To achieve *rich rigor*, we considered theoretical constructs in relation to the topic;
293 captured extensive data from multiple sources; and presented original text samples such that
294 readers could determine plausibility of our interpretations. To contribute to *transparency*, we

295 provided details regarding our rationale for our choices (e.g., why we placed explicit questions
296 about injury last in the interview guide). Regarding *self-reflexivity*, we acknowledge the first
297 author was a member of this CrossFit® gym for a five-month period approximately two years
298 prior to conduct of this study. This membership resulted in a positive preconception of
299 CrossFit® as a program which enabled people to gain the physical and psychological benefits of
300 physical activity. Thus, it was of particular value to include research team members who had no
301 relationship with the gym. Though the first author's five-month membership at the gym was a
302 potential source of bias, prior knowledge of the gym's practices contributed to the study's
303 *credibility*. Credibility was also enhanced by ensuring findings included thick description (e.g.,
304 concrete details) and dissenting views amongst participants. To enhance *resonance*, details of
305 participants' words and behaviors were presented such that readers with no exposure to
306 CrossFit® gyms or CrossFit® lexicon could understand within their own personal life
307 experiences, thus contributing to naturalistic generalizability. The study represents a *significant*
308 *contribution*, in that we give voice to a population who may be criticized by others, and we
309 advance the study of injury in exercise contexts. *Ethical considerations* included efforts to
310 ensure anonymity such that participants' characteristics were not detailed to a degree that would
311 enable them to be recognized by other members, trainers, or gym owners. Finally, we attempted
312 to achieve *meaningful coherence* by showing how our choices were supported by the pragmatic
313 paradigm and by focusing on psychological factors unified by theory.

314

Results

315

316

In this section, the findings are divided into two parts reflecting the two research questions: (a) group values relevant to overuse risk behaviors, and (b) responses to criticisms

317 about the occurrence of injury in CrossFit® activity. Verbatim quotations from participants are
318 within quotation marks.

319 **Group Values Relevant to Overuse Risk Behaviors**

320 Three values, represented by *in vivo* terms, were found to be relevant to overuse risk
321 behaviors: Being Hard Core, Achieving Results, and Camaraderie. For each value, we describe
322 (a) characteristics of the value, (b) how the values are enacted, (c) reasons for enacting the values
323 in that way, and/or (d) how the values were relevant to overuse risk behaviors.

324 **Being Hard Core.** “Hard core-ness” was a term used by MM44 to describe the type of
325 people who do CrossFit®, which tended to be people who “enjoy intense workouts” and were
326 “not afraid of discomfort”. According to MM42, “People that voluntarily join CrossFit® are
327 people that want to sort of push themselves more or exert more effort.” MM34 liked CrossFit®
328 because “it’s something that pushes me really to the limit of what I can tolerate”. He previously
329 experienced that feeling in cycling, but “still never anything quite as much as something that is
330 really a great CrossFit® session”. One way that members enacted the value for being hard core
331 was by completing high-intensity, challenging workouts. A reason for completing high-intensity
332 workouts is explained by MM43 who said that members earn a “badge of honor”. “Like, ‘I’m
333 kind of a tough guy because I can do these CrossFit® workouts, and I push myself”.

334 Completing the difficult workouts enhanced FM31’s beliefs about her abilities:

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

340

341 A second way in which members enacted the value of being hard core was by attending
342 regularly despite the intensity or other difficulty which, when excessive, is an overuse risk

343 behavior. Members indicated that consistency in attendance was enacted uniquely in relation to
344 CrossFit® participation, as shown by MM32:

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

349
350 One reason may be because CrossFit® members who attended regularly were positively
351 evaluated by other members. As MM32 stated, “Pretty much everyone that comes there on a
352 regular basis, doesn't mean daily, but on a regular basis, I have a great affinity for and admiration
353 for.” Admiration for attendance despite difficulty was displayed in an exchange in which FM12
354 told FM14 about having a sore throat for the previous two days. FM14 responded, “Yeah, but
355 you're here”, in a tone indicative of praise. To FM24, members were hard core in that they
356 attended “no matter what”: “We wake up the next day and come to it, no matter how sore we
357 are, no matter what we feel like, like oh, ‘I don't want to go’, we still show up”. FM24's
358 enactment of the hard core value in this way resulted in the overuse risk behavior of continuing
359 exercising in the early stages of injury:

360 I kind of tweaked my back, and I was like ‘Oh I'm fine. It's probably like just a little
361 muscle spasm strain, no big deal.’ That happened like November, and I kept going until
362 February to the point where I couldn't sit. I couldn't sleep. I was crying. I popped
363 Advil® every few hours.

364
365 In one instance, the first author observed that being hard core in terms of attending “no matter
366 what” affected CrossFit® members' amount of rest in between workouts. On a morning in
367 which the gym was not open due to a scheduling glitch, members (e.g., MM20, FM12, MM39)
368 who usually attended the 5:30 a.m. sessions arrived, but, seeing the gym was closed, left. Later
369 that day, these members attended the 5:30 p.m. CrossFit® class. The next day, they attended the
370 CrossFit® workout at their normal 5:30 a.m. class time. Therefore, they attended two, high-

371 intensity CrossFit® workouts in less than 12 hours rather than opting to miss a workout, yet
372 insufficient rest is an overuse risk behavior.

373 However, it was also observed that some members adjusted their attendance and intensity
374 at times. For examples, MM32 typically attended despite pain but did not attend “no matter
375 what”. “I definitely come with aches and pains every day, don't get me wrong”, but “one time
376 where I really felt like I hurt myself, I wasn't going to go in for a few days through that.” When
377 FM31 struggled with an illness, she did not attend CrossFit® for a couple of weeks. During
378 FM31’s absence, GO2 messaged her, “When are you going to be here? I miss you”. FM31
379 perceived these actions by GO2 to be “really sweet”. When FM31 returned to CrossFit® after
380 the absence, FM31 did the warm-up with the rest of the members, but then did a workout that
381 GO2 designed for FM31. The workout “was something to get me sweating a little bit, but it
382 wasn't too intense because I had been sick, and I didn't want to push myself too far.” GO2 told
383 FM31, “Any time you want to come in and you've been sick or something like that and you want
384 the trainer to do that [tailor a workout to needs], they'll do that...because I'd rather you show up
385 than not show up.” GO1 explained the gym owners’ proactive stance towards encouraging
386 members’ attendance: If CrossFit® members attended workouts often, they achieved desired
387 results which, per the next section, was a basis for members continuing as paying gym members.

388 A third way in which members enacted being hard core was by withholding pain reports
389 from trainers. That is, they did not inform the trainers or others about pain. Instead, they
390 continued to exercise despite pain which is an overuse risk behavior. One reason for doing so
391 was an aversion to being perceived negatively, as shown by MM43: “especially when I first
392 started, there was a lot of pulling shoulders and things like that...like, ‘Okay, I probably
393 shouldn't do this movement because my shoulder's still a little sore,’ but I'm like, ‘I don't want to

394 be a wimp and complain again.’ It’s like, ‘All right. Just try to do it’”. As stated by FM2, people
395 who complained during workouts could be described as “annoying”. MM43 indicated positive
396 evaluations could be obtained “Even if you’re the slowest person there, if people see...you’re not
397 whining about, you know, this or that exercise”. Fear of negative evaluation inhibited MM44’s
398 pain report as well. When he felt shoulder pain, he at first did not tell trainers for fear he would
399 be perceived as “sandbagging”, but when the shoulder pain was so bad that he could not do
400 more, he finally told a trainer. The trainer reacted to the pain report by being upset with MM44
401 for not being open about what was going on. The trainer also let other trainers know about
402 MM44’s pain which resulted in them devising ways to help MM44 modify workouts:

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

409 After MT1 asked MM44 about the pain, MM44 became more comfortable reporting pain.

410 “Now, during the warm-ups, I will say ‘MT6, hey, my shoulder is not feeling so hot today’”.

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

412 In one workout, a female member said, “My arms really hurt.” After hearing her, MT1 asked,

413 “Who else is in this boat? The ‘can’t do push-ups’ boat?” Two female members raised their

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

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

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

417 MT4 asked him, “How’s the back?” After that, MT4 expressed that he himself was having pain

418 too, after which MM19 added “Hips destroyed”, referring to other pain he was experiencing.

420 MM19 appeared comfortable telling MT4 about his pain only after MT4 asked him, and after
421 MT4 expressed that he too had pain.

422 **Achieving Results.** CrossFit® members valued achieving results in the form of
423 improvements in performance (e.g., amount of weight lifted) and/or appearance (e.g., body
424 weight). Some interviewees indicated that results from CrossFit® participation were better than
425 results obtained via other physical activity contexts. Per FM31: “I didn't see the results at those
426 group [name of traditional gym] classes that I saw the results at CrossFit®”. For MM30, who
427 had been a professional athlete, the performance results he gained from CrossFit® were better
428 than those he gained during his training as professional athlete: “In hindsight, I wish I'd done
429 CrossFit® supplementary to my training...today, I hit the highest numbers I've ever hit in terms
430 of squat, in terms of deadlift, numbers I wasn't even coming close to [before CrossFit®].” The
431 varied nature of CrossFit® workouts provided all members, not just the high-caliber athletes,
432 with opportunities to perform better than other members. MM29 described himself, saying “I'm
433 at the end of the pack in terms of results or, you know, where I finish,” but “I'm good at box
434 jumps I guess. That's about really all I can do to impress people athletically.” Similarly, FM12
435 said, “I'm certainly not the, like, weight-wise the strongest person at the gym, but... I was able to
436 do dips without bands fairly quickly...I mean not that there's a hundred of them,
437 but...people were blown away by that.” By performing well at one specific activity, these
438 members were able to garner positive evaluations of group members.

439 Members also emphasized appearance results, as shown by MM42: “I was a very skinny
440 person, so I like the fact I gained 30 pounds in a year and a half [after starting CrossFit®].”
441 MM29 sought appearance-related results “in terms of the eyeball test, how I look.” Before he
442 started CrossFit®, “people would be like, ‘So, are you working out?’ And I'd be like, ‘Yes, I've

443 been working out religiously. Is this not apparent?'. And they'd be like, 'No''. Discouraged, he
444 had ceased participation in previous exercise programs. During his few months of CrossFit®
445 attendance, he increased his number of pull-ups from zero to six. Despite these performance
446 results, he expressed his intent to quit CrossFit® if he did not experience visible, appearance
447 results. FM24, too, was initially interested in appearance results, participating in CrossFit® "just
448 to lose the weight and to keep it off." Her focus eventually changed from appearance to
449 performance as she started to "get better, to take it more serious, instead of just like a form of
450 weight management." FM12 loved "seeing the changes in my body", such as muscular
451 striations. Due to the strength she gained via CrossFit® participation, she was "able to lift
452 things, and not have to ask for help...I used to always have to ask someone for help, open jars,
453 stuff like that...I just feel...more confident."

454 A key feature of results in CrossFit® is that they could be achieved quickly. As FM31
455 said, "I've tried different things [exercise activities] over the years...the only thing that I see
456 results quickly from is CrossFit®." FM24 stated, "When you start [CrossFit®], and you'll see a
457 dramatic change from when you first start to like two months." MT1 indicated that excitement
458 over these quickly-obtained results led to overuse risk behaviors:

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

467
468 Because injured members "stop coming in", GO1 stated that injury of members went against his
469 business interest as some injured members discontinue their paid membership. Unfortunately,
470 the desire for results could drive members to "push themselves recklessly and get hurt" (MM42)

471 and engage in overuse injury risk behaviors. For example, MM29's desire to improve
472 performance results affected his decision to persist despite pain: "If I have to do 60 kettle bell
473 swings, and I'm on number 20, I'll probably take a break. If I'm at number 50, I'll probably push
474 through it [pain] to finish the 60...It'd be...how close I am to...target goal." FM2 similarly
475 opted to "push through" the pain when she was close to finishing a workout:

476 Tonight we were doing knees-to-elbow, and...my right shoulder is giving me problems.
477 It always has, ever since I started CrossFit®. The part where you put your knee up hurt
478 my shoulder...I felt like a shooting pain here. I was just like, 'Let me just keep going.
479 Workout's almost done. You've got like 30 seconds left,' so I kept going.
480

481 Thus, in pursuit of desired results, some CrossFit® members engaged in overuse risk behaviours
482 (e.g., continuing exercise despite pain; doing more repetitions rather than resting).

483 **Camaraderie.** Members indicated that they valued camaraderie which embodied social
484 aspects of CrossFit® such as "social interaction", "community", "like family", "encouraging",
485 "welcoming", and "inclusive". One way in which this value was enacted was conversations.
486 When the first author entered the gym, the cacophony of noise often resembled that of a
487 restaurant due to the sound of laughing and chatter of numerous members assembled in the
488 stretching areas and on the benches. During observations, some content of members'
489 conversation was CrossFit®-specific (e.g., impending workouts, pain, equipment, perceptions of
490 trainers), but much was not (e.g., restaurants, sports, social plans, tv shows, life events, flirtatious
491 comments). GO1 thought that the "shared experience of the intense workout" was a reason this
492 form of camaraderie developed. MM32 explained further:

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

499 through. Same thing with people in the military. There are certain activities that are
500 these shared experiences that I think lead[s] to people liking each other.

501
502 Another interviewee demonstrated that the shared, intense experience led to “people liking each
503 other”. He initially disliked a new, “annoying” member, but “I love the guy now
504 because...we've been doing this thing together, and we've experienced all the highs and the
505 lows.” Observations revealed another way in which camaraderie was enacted as members and
506 trainers were often observed addressing each other by name. FM31 noted that she did not know
507 the names of the instructors or other participants of group fitness classes she had taken at other
508 gyms. A reason CrossFit® members knew each other’s names was regular attendance. In group
509 fitness classes she took prior to CrossFit®, FM2 “rarely recognized a face because people were
510 just random, and, but with CrossFit®, people usually do it at the same time every day. You get
511 familiar with who you’re working out with.” MM32 came to enjoy this aspect:

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

518
519 Aside from conversing and personal greetings, another way camaraderie was enacted was
520 via encouragement of other members (e.g., applauding, cheering other members). According to
521 FM12, members could be positively evaluated by other members when they encouraged others.
522 She was “very impressed by the good people who encourage the people who are struggling”.
523 For some members, such as MM30, the outcome of encouragement was to increase effort: “I can
524 think of multiple examples of when guys I’m directly competing with are encouraging me to
525 move faster, move quicker, push harder”. This effect of encouragement was observed multiple
526 times, as members encouraged each other to “Keep going”. For example, while climbing up a

527 rope that was affixed to the gym's ceiling, MM21 stopped about halfway up, appearing stuck.
528 When MM20 called up to MM21, "Go, go, go!", MM21 resumed climbing. However, the
529 trainers appeared aware of a need to temper excessive effort resulting from encouragement. In
530 one observation, MT4 was guiding FM14 through her first attempt at climbing up a rope. He
531 directed her to climb only to the third knot (i.e., halfway up). He did not want her to go all the
532 way up only to find she was too fatigued to return down safely. As FM14 climbed, a member
533 started cheering for FM14, saying "Go all the way [to the top]!". MT4 countered in a light tone,
534 saying "The goal was three. Don't listen to your peers. They'll get you in trouble."

535 The value of camaraderie was relevant to overuse risk behaviors in two ways. First,
536 regular attendance and engagement in intense workouts were the ingredients for creating
537 camaraderie. Yet, by exercising excessively or despite pain in order to be with the people they
538 enjoyed being with, members risked overuse injury. Second, an outcome of verbal
539 encouragement was that members increased effort. Members can be susceptible to overuse
540 injury when they respond to encouragement with excessive effort or "keep going" despite pain.

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

542 For the second research question, all interviewees indicated awareness of criticisms about
543 injury incurred in CrossFit®. They responded to these criticisms by (a) comparing various
544 dimensions in CrossFit® to other physical activities, and (b) denouncing the critics.

545 **Comparing Dimensions to Other Contexts.** In discussing criticisms, members did not
546 appear to perceive the occurrence of injury in CrossFit® to be high. Members supported this
547 perception by comparing injury in CrossFit® to injury in other physical activity contexts such as
548 sport, everyday activities, and other forms of exercise. For example, FM12 indicated that the
549 risk of injury in CrossFit® was acceptable when compared to sports:

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

555
556 Some members, like FM31, pointed out that injury occurs during everyday activities: "It's not
557 CrossFit® that you can just hurt your back in. You can lift a box that's too heavy."

558 Other members emphasized aspects of injury which made them perceive CrossFit® to be
559 superior to those contexts. Members perceived the frequency and severity of injuries incurred in
560 CrossFit® to be less than that of injuries incurred during prior sport/exercise participation:

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

565
566 MM34 thought that the strength gained via CrossFit® participation made him less susceptible to
567 injuries: "I think I've kind of built up my tendons and ligaments and scar tissue, and everything
568 is just to the point where now I'm kind of adapted I guess." Further, members emphasized that
569 injury prevention in CrossFit® gyms was better than other gyms because of the presence of
570 trainers during workouts:

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

575
576 Members also indicated that CrossFit® was superior to other exercise contexts because members
577 tended to modify workouts around pain and resolve injury rather than giving up and ceasing
578 exercise due to injury. As MM1 stated, "CrossFit® will find your weakness, so a lot of people,
579 they get their weakness exploited, and they look for the door. It takes a lot of patience to figure
580 out a way around it."

581 **Denouncing Critics.** Another prominent way in which members responded to criticisms
582 about injury in CrossFit® activity was by denouncing critics for using a flawed rationale in their
583 criticism. Some interviewees criticized critics for using extreme examples as a basis for negative
584 perceptions of injuries in the CrossFit® context:

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

592
593 MT1, too, thought that false perceptions of CrossFit®'s high injury risk were based on extreme
594 examples, such as when a member at another gym became paralyzed. When the member at the
595 other gym dropped a bar, the bar landed on some plates that were lying on the floor, then
596 bounced back and hit the member's spine, yet this is not a common occurrence in CrossFit®
597 workouts nor exclusive to CrossFit®.

598 Some CrossFit® members criticized critics who demonized CrossFit® without taking
599 into account the health and fitness benefits of exercise adherence. Before starting CrossFit®,
600 MM1 was overweight and had not adhered to any physical activity consistently. Though he
601 nursed a sore shoulder for 10 months during CrossFit® workouts, he weighed the sore shoulder
602 against the benefits of CrossFit® membership which enabled him to adhere consistently so that
603 he lost weight and perceived himself to be healthier. MM32 had tried many other exercise/sport
604 programs but only sustained regular adherence in CrossFit®. Though he tweaked his back in
605 CrossFit®, CrossFit® was still worthwhile to him. As MM34 said, "If this is what I need to do
606 to get in shape and be the best person that I can be, more power to me. I'll work out my way.
607 You work out your way".

608 Interviewees also negated critics' who had no direct experience with CrossFit®. FM31's
609 boyfriend was "very worried about me doing it...he's afraid I'm going to hurt my back."
610 However, "He's never tried it [CrossFit®]." Rather than stopping CrossFit® due to his
611 concerns, she opted to not discuss CrossFit® with him: "I don't really talk about it with
612 him...because if we do bring it up, I don't really want to have an argument about it." When FM2
613 learned that students in exercise science programs at a nearby university were being taught that
614 CrossFit® was "bad", she said, "you need to try it before you say anything else... you don't
615 know what you're talking about...it's like trying to talk about cake when you've never tried
616 cake." MM36 also discredited critics who did not participate in CrossFit®: "[they] make it
617 sound like we do one-rep maxes 20 times...They don't know about scaling." In the CrossFit®
618 lexicon, scaling involves reducing workout quantities to amounts suited to the individual's
619 factors (e.g., ability level, injury). MM44 described his interactions with two physical therapists
620 who initially indicated disapproval of CrossFit®. One told him, "You're going to hurt yourself.
621 You're going to mess your shoulder up. I'd never let my kids do it". After interacting with him
622 more, they then told MM44, "You seem like the kind of guy who's going to take care of
623 yourself...if it hurts, stop. If you feel yourself going too far, take a break, but as long as you do
624 exercises...and rehab your shoulder on your own, you'll be fine". Thus, MM44 believed that
625 critics' negative perception of CrossFit® activities changed when they were exposed to an actual
626 CrossFit® member. Finally, interviewees emphasized that CrossFit® gyms differ on many
627 facets (e.g., trainer attentiveness/experience, workout programming). Thus, they discounted
628 general criticism of CrossFit® that was not specific to the context at this gym.

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Discussion

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In this study, we sought to identify values of group exercise participants relevant to overuse risk behaviors as well as their responses to criticisms about injury. Through thematic analysis, we identified three values (i.e., being hard core, achieving results, camaraderie) that were relevant to overuse risk behaviors. We also identified two prominent types of responses (i.e., compare dimensions of CrossFit® to other physical activities, denounce critics) of CrossFit® members to criticisms about injury in CrossFit® activity. Here, we discuss these findings in relation to constructs of the social identity approach: Social identity content and social threats.

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Social Identity Content

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The three values identified in this study – being hard core, achieving results, camaraderie – were interpreted to represent the social identity content of the group. That is, members perceived these values to be reasons for being members of this group instead of other physical activity groups; commonly endorsed by members; exemplified by highly-regarded members; and a means for being perceived more positively by other members. This is not to say that these values and associated behaviors are unique to this group; it might be that members of other social identity groups endorse similar values (e.g., military members endorse camaraderie). Nor do we imply that these members did not experience these values in other contexts (e.g., camaraderie felt in previous sport participation). Rather, these CrossFit® members indicated that these values, and the behaviors they used to enact the social identity content, were unique to their membership in CrossFit®. This is demonstrated by CrossFit® members who expressed that they had not engaged in some behaviors to the same degree in other physical activity contexts (e.g., a member who had not engaged in the same intensity in biking; a member's attendance in previous

652 sport/exercise contexts was sporadic; a member did not know the names of people in other, non-
653 CrossFit® fitness classes). Only when they became members of this social identity group—this
654 CrossFit gym—were these values central to shared social identity such that members engaged in
655 associated behaviors to a higher intensity, frequency, or level not experienced previously. When
656 behaviors stemming from the group’s social identity content constituted overuse risk behaviors,
657 this group-based psychological factor was shown to be relevant to overuse injury. This finding is
658 unique given that individual (e.g., Type A personality) and inter-personal (e.g., pressure from
659 coaches to train despite pain) factors were the focus or findings of previous overuse injury
660 research (e.g., Ekenman et al., 2001; Russell & Wiese-Bjornstal, 2015; Tranaeus et al., 2014).

661 The value for being hard core was enacted, in part, by members who attended high-
662 intensity workouts more than three times per week and, in some instances, with less than 24
663 hours between workouts, which puts members at risk for overuse, orthopedic injuries (ACSM,
664 2014; Drum et al., 2014). For some CrossFit® members, the choice to engage frequently in
665 high-intensity workouts was due in part to enjoyment of intense workouts. This is aligned with
666 researchers who found that people engaged in and/or preferred high-intensity physical activity in
667 part because of the pleasure they derived from engaging in high-intensity physical activity
668 (Ekkekakis et al., 2011). However, these CrossFit® members indicated more reasons for
669 engaging in high-intensity workouts. Completing difficult, high-intensity workouts, consisting
670 of “things that I didn’t think I could do”, enabled them to earn a “badge of honor” and yielded a
671 higher confidence in abilities. CrossFit® members in other studies (e.g., Bailey et al., 2017)
672 similarly expressed a sense of accomplishment from engaging in high-intensity workouts. One
673 interpretation is that CrossFit® members who gained confidence in their abilities by participating
674 in the group’s activity—high-intensity workouts—also experienced an increase in their self-

675 competence which is an aspect of global self-esteem (i.e., positive evaluation of one's self based
676 on one's abilities; Tafarodi & Swann, 2001). The social identity content of being hard core was
677 also enacted by withholding pain reports (e.g., not whining). By doing so, members could
678 prevent negative evaluations by group members and leaders. Previous studies of overuse injury
679 revealed that athletes in sport contexts likewise tended to withhold pain reports because they
680 feared they would be negatively evaluated by team members and leaders which could affect their
681 sport careers/livelihood (e.g., team selection, winning, professional athletes' paychecks;
682 Tranaeus et al., 2014; Turner et al., 2002). The current study was unique, demonstrating that
683 members of a group exercise program exhibited the same tendencies as athletes, though careers
684 and livelihood were not at stake. Fear of negative evaluation is a commonality in both contexts.

685 In this study, we observed a desire for performance- and/or appearance-related results.
686 This desire was not captured in previous studies of CrossFit® members who primarily expressed
687 desires to be healthy, be fit, and learn new skills (Bailey et al., 2017) which do not intuitively
688 contribute to overuse risk behaviors. Here, group members' desire for results was shown to be
689 relevant to overuse risk behaviors. As indicated by a trainer, the desire for results induced
690 members to do more than the workouts prescribed by trainers. These statements mirrored the
691 findings of Montalvo and colleagues (2017) that CrossFit® members who did extra physical
692 training outside of CrossFit® workouts were at higher risk for injury than those who only did
693 CrossFit® workouts. The current findings indicate that this social identity content—the group
694 members' value for results—was an underlying reason for engaging in the extra training that
695 underlies overuse injuries.

696 Some findings pertaining to CrossFit® members' camaraderie was not exclusive to this
697 study. Other researchers (e.g., Bailey et al., 2017) have also found that the shared experience of

698 high-intensity workouts is viewed as a source of CrossFit® members' camaraderie, and that
699 encouragement between members is a common behaviour in the CrossFit® context. However, a
700 novel finding was that a way in which camaraderie is enacted—through verbal encouragement—
701 may induce higher effort. These findings in a naturalistic setting augment those of laboratory
702 settings in which researchers provided verbal encouragement to participants who then tended to
703 respond with increased effort (e.g., Moffatt et al., 1994). Together, these findings are suggestive
704 that verbal encouragement used to enact camaraderie may inadvertently be relevant to overuse
705 injury when members respond to verbal encouragement with excessive effort.

706 Throughout the findings related to social identity content, members were able to obtain
707 positive evaluations or avert negative evaluations of group members and/or leaders when
708 behaviors were aligned with social identity content. As illustrated by the member who initially
709 found another member annoying, completing high-intensity workouts enabled the 'annoying
710 member' to eventually be liked and accepted. Moreover, participants admired—or were admired
711 by—fellow Crossfit® members who enacted the social identity content via other behaviors such
712 as regular attendance, attendance despite adversity (e.g., recovering from illness), performing
713 well on a specific activity even if they were not typically one of the best performers, and
714 encouraging a struggling member. Thus, the behaviors used to enact social identity content gave
715 CrossFit® members a means for being respected and/or liked by other group members. It could
716 be that members of the group engage in these behaviors because doing so enables them to
717 experience enhanced self-liking, a form of global self-esteem that relies in part on the social
718 judgements of one's self conveyed by others (Tafarodi & Swann, 2001). Altogether enjoyment
719 and gains in self-esteem, be it in the form of self-competence or self-liking, appear to be positive
720 outcomes of adhering to the social identity content of this group. However, the overarching

721 concern is this: The behaviors that group members used to enact social identity content may
722 enable them to derive enjoyment and self-esteem from group membership, yet the same
723 behaviors put members at higher risk for overuse injury occurrence and severity.

724 **Social Threats**

725 In responding to criticisms about injury, interviewees compared CrossFit® to other
726 physical activity contexts on various dimensions. Members asserted that the injury occurrence in
727 CrossFit® was equivalent to or lower than that in other physical activities, whilst the severity of
728 injuries incurred in CrossFit® was lower. They pointed out that the health benefits of CrossFit®
729 membership were greater than that of other contexts and, as such, outweighed the drawback of
730 injuries. Members also implied superiority of the CrossFit® context in that trainers were on
731 hand to prevent injury occurrence, in contrast to gyms with no such presence. This assertion was
732 supported by previous studies which indicated that the presence of CrossFit® trainers was related
733 to lower injury rates (Weisenthal et al., 2014). In this study, specific ways in which trainers can
734 be integral to injury-prevention efforts were revealed: Trainers modified workouts when
735 members expressed pain; guided members to temper their effort when encouraged by other
736 members to try harder; and reduced fear of negative evaluation by soliciting pain reports and
737 expressing their own pain. Also, participants viewed CrossFit® members as superior to
738 participants in other physical activity programs in that they handled their injuries well instead of
739 ceasing exercise when injuries occurred. Further, the CrossFit® program was viewed as superior
740 in that it strengthened members so that their injury susceptibility decreased.

741 According to the social identity approach, through positively distinguishing one's group
742 from other groups, being a member of a group increases positive evaluations of one's own worth
743 (i.e., self-esteem; Jetten et al., 2017). When an aspect of a group is negatively evaluated by

744 others, the valued source of self-esteem is threatened (i.e., social threat). In response, group
745 members may engage in social creativity (Haslam & Reicher, 2006). Social creativity involves
746 maintaining a positive social identity through developing the group's social identity content such
747 that the group is seen as superior to other groups (i.e., achieves positive distinctiveness). For
748 example, a sport team on a losing streak cannot achieve positive distinctiveness on the dimension
749 of winning (outcome). Therefore, members may assert the teams' superiority on a dimension
750 other than outcome, such as sportsmanship or creativity. They may claim, for example, 'that
751 winning isn't everything; more important is how you play the game and playing fairly.' In this
752 sense, CrossFit® members' responses to injury criticisms resembled social creativity such that
753 injury occurrence wasn't everything; more important was how well members handled the
754 injuries, the effort they put into prevention, the health benefits, or the strength they gained.

755 The second pattern observed in CrossFit® members' responses to injury criticisms
756 involved denouncing features of those who criticize CrossFit®. This was done by dismissing
757 critics whose criticisms were products of bias from extreme examples of injury, incomplete
758 information, lack of personal experience with CrossFit®, or lack of specificity to individual
759 CrossFit® contexts. A possible interpretation of this pattern is another type of response to social
760 threats referred to as polarization (Brown & Ross, 1992). Polarization involves members'
761 defense of a social identity group by discounting the information critics provide. Of note,
762 instead of agreeing with critics, or adhering to advice and recommendations of critics, members
763 tend to react to criticisms by becoming more ensconced in their beliefs as well as a decreased
764 desire to leave the group and an increased antipathy towards other groups (Brown & Ross, 1982;
765 Hogg & Reid, 2006). Altogether, these findings demonstrated that criticisms about injury—even
766 when the critics were exercise and medical experts—did not induce members to perceive injury

767 as a problem, reflect on how to prevent injury, or change their injury-related behaviors because
768 these criticisms did not come from members of their own group.

769 Having identified some underlying values associated with a CrossFit group together with
770 associated (negative) behaviors, future research might examine how social identity content can
771 be modified by group leaders to change resultant negative behaviors (Haslam et al., 2011).
772 Injury-prevention interventions in CrossFit® contexts may consist of leaders emphasizing values
773 that are not enacted by overuse risk behaviors. Doing so can change members' perceptions of
774 group values from, for example, "We are hard core" to "We are smart about injury prevention".
775 Likewise, the basis for positive evaluations could be changed. For example, CrossFit® members
776 may be more apt to work out at a more moderate intensity, rest more, or decrease
777 effort/participation/report pain when they feel pain if they are praised for being injury-free for 20
778 months instead of only being praised for attending 20 months or for visible results. The findings
779 about social threats suggest that injury-prevention recommendations may be more effective when
780 implemented or communicated by CrossFit® leaders or members rather than experts who are not
781 members. For example, rather than experts critiquing the form of CrossFit® members, group
782 leaders may teach members to word verbal encouragement to emphasize technique (e.g., "Keep
783 good form!") instead of excessive effort (e.g., "Keep going!").

784 Despite the value of these practical implications, we acknowledge the study's limitations.
785 We limited the scope of psychological factors to identification of group values. Other factors
786 may have greater bearing on overuse injury occurrence in this context. Also, we opted to focus
787 on the utility of the social identity approach which led to us interpret data in relation to social
788 identity constructs (e.g., social identity content, social creativity, polarization). Other theoretical
789 approaches may reveal different, viable interpretations of participants' experiences and data. For

790 example, impression management theory could yield insight into findings pertaining to fear of
791 negative evaluation beyond negative evaluation by members of one's social identity group.
792 Further, our use of qualitative methodology and sampling method limited the generalizability in
793 that these findings are specific to one CrossFit® gym.

794 However, we considered the results in terms of other forms of generalizability applicable
795 to qualitative research methods (Smith, 2018), which could be viewed as a strength of this
796 project. Naturalistic generalizability involved presenting details of participants' words and
797 behaviors such that readers with no exposure to CrossFit® gyms, CrossFit® lexicon, social
798 identity, or injury could understand these results within their own personal life experiences (e.g.,
799 being amazed upon learning one can complete a difficult task; a gym where patrons do not talk
800 to each other or know each other's names). Via inferential transferability, people not involved in
801 this specific CrossFit® setting may consider adopting a new practice due to what was learned in
802 this project (e.g., other exercise group leaders may guide exercisers to temper effort when
803 encouraged by others to try harder or solicit pain reports). Analytical generalization was achieved by
804 generalizing results to an established concept or theory (e.g., discussing results in relation to
805 social identity constructs of social creativity and polarization).

806 This study is one of the first to examine social identity constructs in relation to injury,
807 psychological factors of overuse injury in exercise contexts, and psychological factors
808 underlying injury in a CrossFit® context. It provided empirical support for the proposition that
809 the social identity approach is an applicable theoretical framework for examination of injury.
810 Overall, this study is critical in understanding why exercisers engage in injury-inducing
811 behaviors and how membership in social identity groups plays a role.

812

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926 Table 1

927 *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

928

929 *Notes.* Additional information about participants is not presented to preserve anonymity. Ability level refers to participants' ability to
 930 meet assigned quantities in workouts (e.g., amount of weight or repetitions).