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## A thematic analysis of social identity and injury in CrossFit®

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1                   **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

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

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

314

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

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

### 317 **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.

465  
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.

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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

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

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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).