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**Title:** Collaboration Behaviors within Interactive Exercise Groups

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**Abstract**

1  
2 Objective: The purpose of this study was to gain a better understanding of *collaboration*  
3 behaviors within interactive exercise groups.  
4 Design: Qualitative study.  
5 Main Outcome Measures: Using semi-structured interviews, 16 individuals who exercise in  
6 small groups (e.g., workout partners, participants of interactive fitness classes) were recruited  
7 to (a) reflect on their experiences of collaboration within this context, and (b) identify  
8 behaviors that members demonstrate that help each other perform exercise tasks and achieve  
9 their exercise-related goals. Data were analyzed using thematic analysis.  
10 Results: We identified three overarching themes (and 14 subthemes) reflecting participants'  
11 perceptions and experiences of collaboration in exercise groups including 'motivation  
12 building', 'intragroup coaching', and 'personal support'. These collaboration behaviors were  
13 noted by participants as important in shaping their continued exercise adherence, enjoyment,  
14 and relatedness.  
15 Conclusion: This study advances knowledge of the specific ways in which individuals can  
16 work together effectively within interactive exercise groups and provides a novel means of  
17 understanding how the group environment might best be leveraged to support exercise  
18 behavior.  
19 *Keywords:* communication; group dynamics; group processes; physical activity;  
20 teamwork; support  
21

## 22                    **Collaboration Behaviors within Interactive Exercise Groups**

23            In light of the evidence that the majority of the world's population is insufficiently active  
24 to derive significant health benefits (e.g., Hallal et al., 2012; Rhodes et al., 2017), there is a  
25 need to better understand the factors related to participation in physical activity. For many  
26 individuals, exercising with other individuals (e.g., with an exercise partner or as part of a  
27 group fitness class) has been found to be a more preferable form of exercise compared to  
28 solitary exercise (e.g., Beauchamp et al., 2007; Burke, Carron, & Eys 2006) and may also assist  
29 with the ongoing adherence to physical activity (e.g., Burke, Carron, Eys, et al., 2006; Dishman  
30 & Buckworth, 1996). As a result, research over recent decades has been devoted to  
31 understanding how various group variables (e.g., cohesion, social support) within these groups  
32 impact exercise-related outcomes, including ongoing adherence to physical activity (cf. Harden  
33 et al., 2015).

34            One area of research that is currently lacking within this context pertains to the specific  
35 behaviors that involve group members “working together” to help each other perform exercise  
36 tasks effectively, improve their performance, and achieve their exercise-related objectives. In  
37 contrast, an extensive amount of research has been devoted to understanding these behaviors  
38 across a range of other contexts. This collection of behaviors (e.g., communication, problem  
39 solving, intrateam coaching) is commonly labelled as *teamwork* within *team* contexts (e.g.,  
40 health care, sport) wherein the primary focus is on obtaining collective team-level outcomes,  
41 with a particular emphasis on team performance (Marks et al., 2001; Rousseau et al., 2006). In  
42 addition to these team settings, research has shown that these behaviors are also relevant within  
43 other *group* contexts (e.g., academia; Hinyard et al., 2018). In these latter contexts, individuals  
44 still interact, work together, and help each other; however, the focus is not on team goals but,  
45 rather, on personal objectives and individual task performance. Within these group contexts,  
46 the behaviors are typically referred to as *collaboration* (Driskell et al., 2018; Hinyard et al.,

47 2018). Specifically, collaboration has been described as the process whereby two or more  
48 persons actively and reciprocally engage in activities to achieve a goal(s) (Bedwell et al.,  
49 2012).

50 A large collection of research has demonstrated that teamwork and collaboration are  
51 positively related to important group (e.g., team performance, cohesion) and individual (e.g.,  
52 role performance, satisfaction) outcomes (e.g., Hinyard et al., 2018; LePine et al., 2008;  
53 McEwan et al., 2017). Somewhat surprisingly though, research on teamwork and collaboration  
54 has only recently begun to receive attention within physical activity contexts, with this work  
55 presently delimited to team sport wherein the focus is predominantly on the attainment of team  
56 outcomes (e.g., McEwan et al., 2014; 2018). However, it is possible that collaboration  
57 behaviors are relevant in physical activity contexts beyond sport—namely, within exercise  
58 settings. For one, research on other constructs has found that group-level variables which were  
59 originally conceptualised within sport are also relevant within group exercise contexts. As one  
60 example, the construct of *team cohesion* was initially examined within sport teams but was  
61 later shown to be an important variable within group exercise contexts as well (where it is  
62 termed *group cohesion*). Indeed, perceptions of group cohesion have been found to predict  
63 salient individual outcomes such as adherence to exercise, self-efficacy, and health-related  
64 quality of life (e.g., Midtgaard et al., 2006; Spink et al., 2014). Moreover, there are many  
65 situations within exercise groups that provide opportunities for participants to interact and  
66 assist one another in some way. For instance, individuals who engage in resistance training  
67 together can provide each other with feedback on their technique when executing an exercise  
68 task. This could help ensure that exercises are performed safely and effectively. By  
69 understanding the specific collaboration behaviors involved in group exercise, we may in turn  
70 be better positioned to understand strategies that can be used to foster positive experiences

71 (e.g., enjoyment, self-efficacy) and behaviors (e.g., continued exercise engagement) in these  
72 contexts.

73       Theoretical frameworks focused on teamwork in other contexts (e.g., sport, business,  
74 health care) suggest that the concept of “working together” is comprised of several reciprocal  
75 behaviors between individuals that take place during ‘action’ and ‘transition’ phases (Marks et  
76 al., 2001; McEwan & Beauchamp, 2014; Rousseau et al., 2006). The action phase represents  
77 behavioral processes between individuals that transpire *during* task execution (e.g.,  
78 communication between teammates while a sports team competes, coordination during the  
79 execution of a military team’s mission), whereas the transition phase focuses on behaviors that  
80 occur *between* team tasks (e.g., helping each other prepare for upcoming tasks, post-task  
81 problem solving of issues that hindered task performance). One prominent framework was  
82 developed by Rousseau et al. (2006) based on a review and integration of 29 frameworks that  
83 encompass 14 teamwork behaviors. This framework also informed the development of a  
84 broader Input-Mediator-Outcome (IMO) model of team effectiveness by McEwan and  
85 Beauchamp (2014) for research within sport, whereby the collection of teamwork behaviors  
86 was framed as a ‘mediator’ that translates various ‘inputs’ into ‘outcomes’. Inputs are the  
87 antecedents that enable (or restrict) the interactive behaviors between members (e.g., member  
88 or group characteristics), whereas outputs are the by-products of those interactions (e.g., group  
89 performance, individual satisfaction).

90       Although existing frameworks and corresponding research may offer some initial insight  
91 into the behaviors that comprise collaboration within exercise groups, it should be reiterated  
92 that they focus on teamwork; as such, their predominant focus is on maximizing *team*  
93 outcomes. Thus, there may be behavioral dimensions that are relevant to team settings but not  
94 group exercise contexts wherein the focal referent is the *individual* (or vice versa). For  
95 example, ‘team goal setting’—whereby team members collectively specify team goals that they

96 will seek to obtain—is noted as one aspect of teamwork within various frameworks (e.g.,  
97 Marks et al., 2001; McEwan & Beauchamp, 2014; Rousseau et al., 2006). This might suggest  
98 that goal setting is relevant to group exercise contexts but in a slightly different way, since the  
99 purpose of engaging in group exercise is ostensibly to enhance one’s *personal* activity levels as  
100 opposed to achieving some collective *team* outcome. As another example, the dimension of  
101 ‘systems monitoring’ involves team members tracking important conditions such as the  
102 resources (e.g., equipment, funding) available to the team (cf. Marks et al., 2001; McEwan &  
103 Beauchamp, 2014; Rousseau et al., 2006). While this dimension has been shown to be  
104 important within various team settings, it is perhaps less likely to be relevant (or even  
105 irrelevant) within an exercise setting.

106       Research on other constructs that appear conceptually similar to collaboration and have  
107 been examined within exercise contexts may also offer insight into the nature of these  
108 collaboration behaviors. The construct of *social support* may be particularly relevant. Defined  
109 as “an exchange of resources between at least two individuals perceived by the provider or  
110 recipient to be intended to enhance the well-being of the recipient” (Shumaker & Brownell,  
111 1984, p. 13), this support could be emotional (e.g., listening to and comforting another person),  
112 esteem (e.g., aiming to enhance one’s confidence), informational (e.g., providing advice), or  
113 tangible (e.g., offering financial assistance; Russell & Cutrona, 1987). Although there is  
114 potential overlap between social support and collaboration, it would seem that the active and  
115 reciprocal engagement in an activity and focus on the behaviors between group members who  
116 “work together” in pursuit of similar goals makes collaboration unique from social support. For  
117 example, one person could conceivably provide exercise-related social support to another  
118 without the two individuals actually engaging in exercise together (e.g., offering a roommate  
119 rides to a fitness centre, a spouse communicating their belief that their partner can reach their  
120 exercise goals). In contrast, the concept of collaboration is predicated on the joint engagement

121 and mutual support between individuals in pursuit of similar objectives (e.g., roommates who  
122 work out together as a dyad, an individual who joins a group exercise class and engages with  
123 other participants).

124 In summary, existing frameworks and previous research on teamwork—and other  
125 constructs such as social support—likely offer insight into the concept of collaboration within  
126 exercise settings. However, at present, there appears to be a paucity of research on  
127 collaboration within this context, including—at a very basic level—the specific behaviors that  
128 comprise collaboration. As such, the overarching objective of the current research was to gain a  
129 better understanding of these behaviors. To do so, we conducted a qualitative study and  
130 collected data through semi-structured interviews with individuals who exercise together in  
131 small groups (e.g., dyads or interactive groups) in order to address the following primary  
132 research question: how do individuals help each other carry out exercise tasks and reach their  
133 individual exercise-related objectives? To our knowledge, this is the first study to explore the  
134 construct of collaboration within exercise contexts specifically. Building on existing theory and  
135 research on teamwork and collaboration in other settings (e.g., sport, education, business), this  
136 research is necessary as it moves beyond those contexts by highlighting the unique  
137 complexities of the interpersonal processes within exercise groups. As such, this work could  
138 provide a novel means of understanding how the group environment can best be leveraged to  
139 support exercise-related outcomes.

#### 140 **Methods**

141 Adopting a critical realist approach (Archer et al., 1998), data were gathered from semi-  
142 structured interviews and analyzed using thematic analysis (Braun et al., 2019) in order to  
143 identify how individuals help each other carry out exercise tasks and fulfil their individual  
144 exercise-related objectives. In line with critical realism, we assumed that one reality exists  
145 independent of the individual, but that we may never fully understand that reality given that it



146 is influenced by our perspectives as researchers. Accordingly, ontological realism underpinned  
147 the research in that we assumed that what participants shared with us was a direct reflection of  
148 what they valued and of their thoughts, emotions, and behaviors in relation to collaboration in  
149 exercise. Adopting a constructivist epistemology, we acknowledged that directly accessing  
150 participants' reality was only partially possible given that our perspectives and backgrounds as  
151 researchers influenced the research process (Maxwell, 2012). Our ontological realist and  
152 epistemological constructivist underpinnings are evidenced throughout the manuscript in: (a)  
153 how we devised interview questions—that is, by drawing on current theories and empirical  
154 research on teamwork as well as on participants' experiences with collaboration in exercise  
155 (see Procedure); (b) how data were analyzed—that is, by drawing on previous literature  
156 (deductive) as well as based on the participants' words (inductive) (see Data analysis); (c) how  
157 the data are presented with a focus on staying as close as possible to the participants'  
158 perspectives but also by presenting the results in a third person account to showcase that we as  
159 researchers are interpreting their experiences; and (d) how the results are discussed in relation  
160 to the existing theory and research on collaboration.

### 161 **Procedure**

162       Following University Research Ethics Board approval, (adult) participants were  
163 purposefully sampled through in-person, word-of-mouth, and snowball sampling of individuals  
164 who presently exercise with other individuals (i.e., groupmates). Potential participants were  
165 first emailed an information letter about the study which informed them of the study's  
166 objectives and noted that participation would involve a one-on-one interview focused on their  
167 experiences in exercise groups. It should be reiterated that collaboration involves the active and  
168 reciprocal engagement between two or more individuals (Bedwell et al., 2012). As such, we  
169 recruited individuals with experience in *interactive* forms of group exercise, as opposed to  
170 those who only exercised in the mere presence of other individuals with whom they do not

171 engage (e.g., a crowded fitness centre, a yoga class where members do not interact). A meeting  
172 time was set with individuals who expressed interest in participating. Those participants were  
173 then emailed a consent form, which they were asked to sign and return prior to the interview.  
174 In order to sample participants from a range of locations and to minimise participant burden  
175 (e.g., travel and associated costs), the interviews were conducted via Skype video-chat.

176 A semi-structured interview schedule was used to guide the data collection. The schedule  
177 included three main categories of questions, which were posed flexibly to participants so as to  
178 give room for them to elaborate on aspects important in the context of their lives and to allow  
179 the interviewer to probe for clarification or elaboration (Brinkmann & Kvale, 2018). First, we  
180 created general questions as a means of better appreciating participants' experiences in group  
181 exercise (e.g., "what is your background with physical activity?"; "why do you choose to  
182 exercise with other people?"). Second, we asked questions related to participants' interactions  
183 with fellow group members (e.g., "can you paint a picture of what these group exercise sessions  
184 look like?"; "what specifically do exercise partners [other members] do to 'help' each other?").  
185 Third, we developed questions related to collaboration behaviors by referring back to theoretical  
186 frameworks of these behaviors in other (team) contexts—this included the framework of 14  
187 teamwork behaviors by Rousseau et al. (2006) as well as the model by McEwan and  
188 Beauchamp (2014) which adapted that framework to the context of sport. Several questions  
189 were developed which sought to cover each of the dimensions specified within those  
190 frameworks (see Appendix A). For participants who had experiences exercising with workout  
191 partners (i.e., as a dyad) as well as in group exercise classes (consisting of  $\geq 3$  members), we  
192 asked them to compare these experiences in order to identify whether the collaboration  
193 behaviors they brought up were delimited to one type of exercise group. Participants were  
194 recruited until we had enough data to answer our research question and new data no longer  
195 changed the themes and subthemes in the results.

196 The final sample consisted of 16 participants (10 females, 6 males; median age = 36 years,  
197 range 22 – 59). All participants took part in multiple types of group exercise, including  
198 cardiovascular exercise and/or resistance training with a workout partner ( $n = 13$ ), group cross-  
199 training classes (e.g., ‘*Crossfit*’, ‘*Orange-Theory*’;  $n = 11$ ), group weightlifting classes ( $n = 8$ ),  
200 group aerobics classes ( $n = 7$ ), and cardio kickboxing classes ( $n = 4$ ). The approximate length of  
201 time in which participants had engaged in exercise groups ranged from a few months (one  
202 participant) to several years (eight participants) to over a decade (seven participants). Six  
203 participants had experience as group exercise leaders in addition to partaking in exercise groups.  
204 The interviews yielded 16 hours and 34 minutes of audio content, which were transcribed and  
205 culminated in 110 pages of single-spaced text (anonymized data available from first author upon  
206 reasonable request). Pseudonyms are used in the Results to protect participant anonymity.

### 207 **Data analysis**

208 Data were analyzed using thematic analysis (Braun et al., 2019). In line with the study’s  
209 purpose, we focused on identifying and analyzing patterns across the dataset related to how  
210 individuals helped each other carry out exercise tasks and reach their individual exercise-  
211 related goals. Data analysis was led by the first author, who began by immersing himself in the  
212 data through the reading and re-reading of transcripts after each interview. All transcripts were  
213 then coded abductively—codes were generated inductively based on the participants’ words as  
214 well as deductively guided by existing collaboration theory and research (Marks et al., 2001;  
215 McEwan & Beauchamp, 2014; Rousseau et al., 2008). In this way, we identified codes related  
216 to previous theory and research on collaboration (deductive) while also remaining aware of the  
217 new knowledge that could be gained from attending to participants’ perceptions and  
218 experiences of group exercise (inductive). This approach was in line with the study aim to  
219 better understand participants’ perceptions and experiences of collaboration in exercise  
220 settings.

221           Once all data were coded, similar codes were amalgamated into candidate themes and  
222 subthemes. Mind-maps were then drawn to consider the relationships between themes and  
223 subthemes. We also examined the candidate themes and subthemes in relation to the coded  
224 data, the entire data set, and existing research within the teamwork and collaboration literatures  
225 (Marks et al., 2001; McEwan & Beauchamp, 2014; Rousseau et al., 2008). Themes and  
226 subthemes were then reworked to ensure that they were grounded in the data and distinct from  
227 each other. Although we anticipated that various themes concerning collaboration in group  
228 exercise could differ from dimensions embedded within frameworks from other contexts (e.g.,  
229 sport, education), it was critical that the themes we developed in relation to collaboration in  
230 group exercise focused on the *behavioral processes* between members as this is a defining  
231 feature of collaboration/teamwork in any context. Indeed, conceptualizing collaboration as a  
232 collection of *behaviors* is key in separating it from other constructs that focus on affective,  
233 cognitive, or motivational states (e.g., group cohesion, belongingness, emotions) (cf. Marks et  
234 al., 2001; McEwan & Beauchamp, 2014; Rousseau et al., 2008). Candidate themes and  
235 subthemes were reworked throughout the writing process until all authors arrived at the  
236 finalized and agreed-upon three themes and 14 subthemes presented in the results.

237           In line with our critical realist underpinnings, we identified criteria throughout the  
238 research process to attend to the quality of the work (Burke, 2016). To ensure commitment,  
239 rich rigour, and transparency, as well as to deepen data analysis and interpretation, all authors  
240 discussed the findings on a consistent basis with one another (i.e., after every 1-3 interviews),  
241 questioning their assumptions about the data. In addition, the authors shared their analytical  
242 ideas with various experts who had a postgraduate degree related to exercise psychology and  
243 had previously conducted research on group exercise. This included discussions with an expert  
244 after the sixth interview, four experts in a focus group format after the ninth interview, and  
245 three experts (separately) after the twelfth, fourteenth, and sixteenth interviews (i.e.,  $n = 8$

246 experts total). Sharing one's findings with others is meant to help guard against bias and lead to  
247 fresh insights which guided the devising, reworking, and finalization of themes and subthemes.  
248 Interpretations of findings were also grounded in the data and described in depth to attend to  
249 rich rigour. The first author also kept a reflexive journal and engaged in discussions with the  
250 second author throughout the research process in order to (a) reflect upon, and attend to, his  
251 own positioning and theoretical/methodological orientations, and (b) keep track of data  
252 analysis and interpretations. Our philosophical underpinnings, methods, and  
253 discussion/presentation of findings in relation to the existing research on collaboration were  
254 aligned in order to maintain methodological coherence throughout the research process (Burke,  
255 2016).

## 256 **Results**

### 257 **Relevance of Collaboration in Exercise Contexts**

258 When describing the relevance of collaboration in exercise groups, participants indicated  
259 that it involved interactive behaviors that occur between group members, which help to  
260 facilitate exercise task performance and ongoing exercise behavior. All participants who  
261 exercised in both dyads and larger groups indicated that collaboration behaviors were relevant  
262 in both. Mei provided the following description: "I would say it's a collaborative approach to  
263 reaching a similar goal whether fitness or sport or music or whatever.... The by-product of that  
264 is that you get better outcomes—because you're interacting with other people—than just doing  
265 it yourself." Similarly, Henry suggested that "in a group fitness setting, it's having people with  
266 the same goals in mind, and trying to find a way to support each other and work together to  
267 achieve that in the most efficient way possible." All participants also noted the importance of  
268 exercising with other individuals to assist with their maintenance of regular physical activity.  
269 Larry—who described himself as being a 'couch-potato' for most of his life—remarked that he  
270 would previously "exercise once or twice a week, then stop"; however, since joining his group

271 cross-training class, he had been “exercising four-plus times per week.” He further noted that:  
272 “Before [the group exercise class], I didn’t really have much regular exercise.... This is the  
273 first time I have done a class-style workout, and I think just having everyone there doing the  
274 same thing really helps push me.... All the interactions make me want to go back. I feel like I  
275 am part of this group enough to be there and come back the next week.”

276 Collaboration behaviors were also described as not only assisting in reaching similar  
277 exercise/fitness goals, but also as helping enhance other outcomes, particularly enjoyment,  
278 relatedness, and group cohesion. Whitney noted:

279 I’m a social person so I like the camaraderie. And the group fitness classes I’m in now  
280 seems to draw a lot of that. Everyone gets along, it’s enjoyable. It’s not just a class, it’s a  
281 social outlet too. I was never one to just go to a gym and work out by myself—I find that  
282 kind of boring. I find it hard to stay motivated to do that. I like having someone to get me  
283 going and having that camaraderie as a group. I like the atmosphere; not only is it a  
284 workout but it’s something for me where I can get out, laugh, and talk with friends and  
285 people who have something in common with you.

286 Overall, the construct of collaboration was interpreted as being relevant within interactive  
287 exercise groups, as all participants indicated that collaboration behaviors were important  
288 components of their experiences in this context. To that end, in the ensuing sections, we  
289 present the three themes (and 14 associated subthemes) pertaining to the participants’ accounts  
290 of how collaboration fosters those exercise-related outcomes. These themes include (1)  
291 motivation building, (2) intragroup coaching, and (3) personal support. A summary of these  
292 themes and their subthemes, along with example quotes, are provided in Table 1 (see  
293 supplementary material).

#### 294 **Motivation Building**

295           When asked to specify the interactive behaviors that are involved in exercise contexts,  
296 each participant noted that these behaviors included assisting each other with motivation  
297 towards performing exercise tasks/workouts. Cara suggested that “the biggest thing for me is  
298 when I want to give up—I see everyone else working really hard and they look a billion times  
299 more tired than I do and it motivates me to want to push further.” Within the collaboration  
300 literature, the term “motivation” does not refer to a form of self-determined motivation (cf.  
301 Deci & Ryan, 1985) but, rather, to improving one’s energy, determination, and drive to  
302 continue putting in effort towards performing tasks (Marks et al., 2001). Henry further  
303 illustrated this theme with the following belief: “If you were given a program and did it in a  
304 group training environment versus doing it on your own, I think you’d have a quantifiable  
305 number of like 20% more intensity.... When you’re working out by yourself, you’re at the  
306 mercy of your own mood and energy and stuff—I think you can compensate for that with a big  
307 crew around you.” Indeed, a common sentiment in the interviews involved participants noting  
308 that they tend to work harder, attempt more challenging tasks, and are less likely to give up  
309 during difficult sessions when they exercise with other people compared to exercising alone.  
310 Four types of behavioral processes were interpreted as comprising motivation building:  
311 *encouragement, challenging one another, fostering persistence, and celebrating success.*

312           **Encouragement.** Providing encouragement to one another in performing exercise tasks  
313 was noted by all participants. When describing some of the specific behaviors that she sees as a  
314 group exercise class leader, Quinn remarked that “it’s kind of like a family—if they need help,  
315 [others] will help. Like, they will say ‘you got this; you can do it’, little key words like that....  
316 They’re always so encouraging.” Reflecting on her experiences in group cross-training classes,  
317 Cara suggested that encouragement can help individuals work hard and increase motivation,  
318 particularly when completing a difficult workout: “You can almost see their face change—it  
319 seems like they’ve hit a wall but there’s definitely more in the tank when they hear their friend

320 beside them cheering them on.” Mei provided an example of behaviors that she had recently  
321 witnessed in one of the exercise classes that she leads: “One of the big things I’ve seen is  
322 where they will literally verbally encourage somebody that is struggling with the move.... If  
323 someone is struggling, they always say a comment like ‘oh I know, I felt like that when I first  
324 started but now look what I can do!’ So there’s that kind of reinforcement. That’s a big thing I  
325 see—verbal support.” Offering encouragement while performing exercise tasks (e.g., “come  
326 on!”, “keep going!”, “you got this!”) appears to provide a means of positive reinforcement,  
327 which can help build motivation beyond what would be present if one were exercising  
328 solitarily.

329       **Challenge one another.** Participants also stated that their groupmates assisted with  
330 motivation by helping to challenge each other to go beyond their current perceived limits, such  
331 as attempting a more advanced/difficult exercise task. Mona remarked that in her group  
332 aerobics and group cross-training classes, “we’ll say ‘try a little bit more! What’s two more  
333 pounds?! Even if you do five [repetitions] of those and then put those down and do the lighter  
334 weights, you’re still doing a little bit more which you didn’t think you could do!’” Rocky  
335 described a recent experience of weightlifting with a workout partner:

336       Part of it too was when he [my workout partner] would be like ‘you can do more than that,  
337 let’s add some more weight’.... Most of the time it was showing me that maybe as much  
338 as I thought I was pushing myself to my limits before by myself, he would say ‘no you can  
339 do this 5% better than what you're doing right now’. That led to me being able to do a lot  
340 more things than I would have been able to do myself.

341 When asked whether challenging one another differs from ‘encouragement’, Mei opined: “I  
342 think it’s pushing or driving somebody to overcome self-efficacy barriers. They think, ‘this is  
343 my limit’.... Pushing each other is a little different than just encouraging. It is driving  
344 somebody to think beyond their own barriers”. Within the teamwork and collaboration



345 literature, the concept of “pushing each other” has been identified as way to build confidence  
346 (e.g., Marks et al., 2001).

347       It should be noted that there appears to be some nuance in this subtheme. For example,  
348 Louise suggested that challenging one another was only helpful when a positive rapport  
349 between members had been established: “It’s got to be someone who knows you and who  
350 you’re comfortable with; and they’re comfortable with you.... [Otherwise] it defeats the  
351 purpose of teamwork and the support you’re getting.” Steve also mentioned that “there is a  
352 negative side as well. Like if people are pushing [me] to do more weight and I’m not  
353 comfortable doing more weight but people are still pushing. Like ‘no that’s it, I don’t want that  
354 extra [weight]’. It’s not that I’m ‘dogging it’; I’m just not comfortable doing more.” Thus, it  
355 appears that challenging one another can help build motivation but there is likely a point  
356 whereby this behavior no longer has a positive effect on the recipient (and could potentially  
357 even have a negative impact, such as posing a risk of injury).

358       **Foster persistence.** Participants also suggested that groupmates can help each other  
359 persevere with their exercise tasks. Several individuals described instances where they likely  
360 would have given up during a workout, but their groupmates helped them continue. Some  
361 noted that when they had previously exercised by themselves, they gave up on continuing with  
362 regular physical activity altogether because they had hit a plateau and were no longer  
363 progressing as well as when they had first started exercising (e.g., no longer able to increase  
364 the amount of weight they lift in a resistance-training exercise). As a result, they would feel  
365 disheartened and ultimately stop pursuing their exercise goals. From the fitness classes that she  
366 led, Mickey observed that “others can help reinforce improvements.... Impatience is usually a  
367 reason people will give up on their fitness goals. So there’s the support to keep going and  
368 continuing to persevere.” Groupmates may also help each other maintain persistence on a  
369 consistent basis and feel motivated/re-energised towards continuing with their exercise

370 program. For instance, exercise partners might remind each other that they can still achieve  
371 their outcome goals if they continue with their process-oriented goals. Rocky highlighted this:

372 With [one of my friends], he's been less consistent lately with lifting so his weights have  
373 been a little bit lower. But he's still super strong so I would remind him like 'you just took  
374 two months off lifting and you came back and you can still bench like 350lbs so don't get  
375 too down on yourself!' So I would say there is some of that too with some people where  
376 they need a reminder that they're not that far off.

377 By fostering persistence, groupmates may help each other engage in exercise consistently; this  
378 may be particularly salient when individuals feel discouraged, such as during times when they  
379 are not performing their exercise tasks as well as they would have hoped.

380 **Celebrate success.** The final aspect of motivation building involves groupmates  
381 celebrating achievements with one another. This could include acknowledging the progress that  
382 fellow exercisers have made with certain exercise tasks or celebrating the accomplishment of  
383 an exercise-related goal. Mickey recalled that "we would notice when [someone] was stronger  
384 or toning up and see that they were getting results.... When we'd be all together, we'd say 'see  
385 you're getting it now!' or 'look how you've increased your weights and now you're sticking to  
386 those weights'. So continually pointing those [successes] out helps." Henry discussed the  
387 positive impact that groupmates had on a fellow group member who had been successful in  
388 reaching her exercise and health-related goals:

389 There's a quote that I love: 'happiness is only real when it's shared.' And I feel like with  
390 fitness goals, it's everything. We just had a 'winter reset' challenge and the girl who won it  
391 was so ecstatic when everyone was congratulating her. Even me telling her 'good job' and  
392 showing her results would have been a bit of validation but the whole gym patting her on  
393 the back and saying like 'you did awesome!' She exercised and sacrificed everything she

394 loved—alcohol, sugar, everything—for thirty days. To do that and have it go completely  
395 unnoticed is why people don't stick to things I think—you're like 'what's the point?'.  
396 Overall, the findings of this theme suggest that fellow group members can help maximise  
397 feelings of success, enjoyment, connection, and continued motivation by sharing in each  
398 other's achievements, which may not occur if one were exercising alone.

### 399 **Intragroup Coaching**

400 In addition to assisting with more affective forms of support (viz. motivation building),  
401 groupmates can also support each other with regard to instrumental/task performance.  
402 Specifically, other members can help each other perform exercise tasks correctly and safely in  
403 pursuit of one's exercise-related goals. Rocky explained: "The fact that he [my workout  
404 partner] had worked out for ten years longer than I had, he had a lot of things that he knew how  
405 to do. He had more things in his toolbox that he could lend to me and I could learn from." In  
406 the teamwork literature, this category of instrumental-support behaviors has been labelled as  
407 'intrateam coaching' (McEwan & Beauchamp, 2014; Rousseau et al., 2006). Since a collection  
408 of individuals interacting in exercise contexts are more accurately described as a 'group' rather  
409 than a formal 'team', this term has been modified slightly to the theme of 'intragroup  
410 coaching'. Six subthemes were interpreted to comprise intragroup coaching, including  
411 *preparation, physical assistance, feedback, modelling, problem solving, and innovation.*

412 **Preparation.** To help facilitate subsequent exercise task performance, participants can  
413 first help each other prepare for a workout or specific exercise task. Previous research has  
414 shown that preparation is an important component of teamwork/collaboration within contexts  
415 outside of exercise (e.g., McEwan et al., 2017; Rousseau et al., 2006). Some participants  
416 suggested that preparation might be particularly beneficial and prevalent for new group  
417 members as they may be unfamiliar with the exercise environment or group. In some cases,  
418 this could be as simple as introducing oneself to a new member and explaining what a fitness

419 class would entail, which would help the new member become more familiar with, and  
420 comfortable in, that new environment. In the interactive group aerobics classes that she leads,  
421 Quinn mentioned: “We have a member who will just go over and say ‘hi I see that you’re new,  
422 let me help you’.... She will introduce herself and tell them exactly what is going to happen.”  
423 In addition, preparation may be present in groups with experienced exercisers as well (i.e., not  
424 just new members), such as by helping each other set up equipment or providing instructions  
425 on specific exercise tasks. As described by Rianna, this might involve “suggestions of how you  
426 can [perform] an exercise.... Or, they will set up equipment for you so you can just jump into  
427 it.... Or, literally helping you carry weights or something if you can’t carry it yourself—  
428 sharing the load.” Hence, this form of assistance can help ensure that groupmates are  
429 comfortable in the exercise setting (especially new members) and well-prepared to  
430 subsequently carry out exercise tasks—this can help promote a positive group atmosphere and  
431 participation in exercise.

432       **Physical assistance.** Participants also noted that having exercise partners can allow them  
433 to complete tasks where they need some type of physical backing. Exercisers may require such  
434 assistance from others to complete the exercise safely and properly, such as when they are  
435 attempting to perform a new, more challenging, or difficult task. Quinn described how she  
436 instructs members in the fitness classes she leads to “spot” each other while learning to  
437 perform a new exercise that may be advanced for some members (e.g., *box jumps*): “Often  
438 what I’ve done, and how people have learned from me, is I’ll just lightly hold their hand in  
439 front of them [during the box jumps]... and then the next time a little less pressure, and then  
440 move my hands down the next few times so it’s less and less and less. They might not even use  
441 them but it’s the fact that they are standing right in front of them, supporting them if they need  
442 it.” Rocky described how physical assistance was helpful when learning new resistance  
443 training exercises: “It was good at the start to have that and for a long time that would be how I

444 would go about it—we would spot each other on each set. I was never nervous with the weight  
445 dropping on me or anything like that because I knew somebody would be there. That was  
446 probably the biggest thing at the start.” Rocky went on to say that even now having over ten  
447 years of experience with weightlifting, he still has a workout partner “spot” him when  
448 attempting a challenging weight and/or near his maximum strength capacity for certain  
449 exercises (e.g., bench press, squats). Those fellow members will help him lift a barbell or  
450 dumbbell if he fails to perform a repetition of the lift on his own—this allows him to push  
451 himself in his attempts to increase his strength. Hence, in comparison to exercising alone, it  
452 appears that providing support via physical assistance can enhance feelings of comfort and  
453 safety, ensure that individuals are able to properly challenge each other during exercise  
454 sessions, and can result in continual task improvement over time.

455       **Feedback.** Within exercise sessions, groupmates may also help by providing verbal  
456 feedback to each other regarding their execution of exercise tasks. Peter, the leader of a group  
457 resistance-training class, described how classmates watch each other perform an exercise and  
458 then provide feedback to one another when learning a new exercise: “When we’re introducing  
459 deadlifts, for example, we want guys to get their feedback in terms of what they are doing.... If  
460 we’re doing deadlifts, [I’ll say] ‘OK rotate and provide some feedback for him as to what he’s  
461 doing’ and ‘if somebody doesn’t understand and you’ve got some knowledge, impart that  
462 knowledge on them’.... That’s how we get better.” Along with preparation (which takes place  
463 in advance of exercise tasks), providing verbal feedback following exercise task performance  
464 can help ensure members continue to execute exercises safely and effectively. As alluded to by  
465 Rianna, other members “can see things that I just couldn’t see myself.” Henry provided an  
466 example of the benefits of verbal feedback from a recent workout where he had achieved a new  
467 personal record in terms of the amount of weight lifted for a weightlifting exercise (known as  
468 the “snatch”). He noted that after each set, his workout partner “was giving out cues like ‘pull’,

469 ‘get under it’, and it was really intense.... He gave some really good cues and actual feedback  
470 and I was like ‘huh, you probably see something that I do not’ and I just trusted him on it. He  
471 was saying ‘do this and that’—like, very direct instructions, and it worked.” Thus, providing  
472 specific and constructive feedback to one another appears to be helpful in performing exercise  
473 tasks, which can help facilitate continual improvement in pursuit of one’s exercise-related  
474 goals. It was noted, however, that the helpfulness of this feedback depends on the perceived  
475 expertise of the individual offering feedback as well as the trust between the group members.  
476 Louise suggested that for feedback to be effective, “there has to be a respectable credibility....  
477 Having guys come up to me to fix my form—it’s weird when you’re working out and you don’t  
478 ask for that.... It’s a relationship that needs to form before you can do things like that.”

479 **Modelling.** In addition to providing assistance verbally, participants suggested that a  
480 more visual form of assistance can also help individuals perform exercise tasks. That is,  
481 groupmates can physically demonstrate how to execute an exercise properly, which may be  
482 particularly important when learning new tasks. Louise noted that modelling has been  
483 beneficial to her in both group exercise classes and when exercising with workout partners:  
484 “Even last night, we were doing a complex workout with multiple exercises and I was like ‘can  
485 you show me?’. I’m not auditory, I need to see it and then go up there and do it myself. So I  
486 will often tell my workout partner to go first so I can see what it’s like.” Visual demonstrations  
487 may also help individuals modify exercise tasks if necessary. Mei noted that a member in her  
488 group exercise class used modelling to help another exerciser who was experiencing wrist pain  
489 adapt an exercise task: “They’ll say ‘watch, if I hold my hands like this, it doesn’t hurt my  
490 wrists anymore’. So they’re actually modelling for their classmate what works for them.... It’s  
491 so visual. Modelling is key in a group exercise class—it’s very empowering.” Mei later noted  
492 that this modelling helped the individual who had been dealing with wrist pain continue to take  
493 part in various portions of the exercise class by executing a modified version of the exercise

494 tasks. Hence, without the assistance of her fellow groupmate, Mei believes that individual  
495 might have withdrawn from participating in the exercise class altogether. Thus, by modelling  
496 exercise tasks for one another, groupmates can feel more confident in performing those tasks  
497 themselves, particularly when learning new, more advanced, or modified exercises.

498       **Problem solving.** In the earlier section detailing ‘motivation building’, it was noted that  
499 participants described groupmates as helping overcoming feelings of discouragement if/when  
500 they had reached some plateau or roadblock in pursuit of their exercise goals (under the  
501 subtheme labelled as ‘fostering persistence’). Whereas that subtheme referred to the *affective*  
502 type of support that members can provide in overcoming these perceived barriers, participants  
503 also mentioned that groupmates can help overcome these barriers from an *instrumental*  
504 perspective. Specifically, members can collaboratively brainstorm and implement a solution  
505 that brings their current situation closer to the desired outcomes—within the teamwork and  
506 collaboration literature, the term ‘*problem solving*’ is used to describe this type of assistance  
507 (e.g., Rousseau et al., 2006). For example, Quinn noted that “if somebody is not reaching their  
508 goal or they’re getting frustrated, people will kind of rally around them and say like ‘OK let’s  
509 try this...let’s make this happen’ and they won’t let them quit”. This subtheme also differs  
510 from ‘feedback’ which involves helping facilitate proper (i.e., safe, effective) task execution; in  
511 contrast, problem solving is specifically focused on resolving issues related to subpar task  
512 performance. The concept of problem solving further highlights how collaboration behaviors  
513 can help individuals improve beyond what they would be able to do if they were exercising  
514 alone. As Chandra notes when describing times that she was frustrated due to struggling with  
515 an exercise: “Having another set of eyes makes it a lot better.... Like the other day, we were  
516 lifting and [my partner] gave me this cue and right there with that little fix, it felt so easy. And  
517 now I try to repeat that every time to the point that it’s like ‘holy that’s exponentially better’”.

518 Hence, rather than trying to resolve problems by oneself, collaborating with others can help  
519 individuals overcome instrumental issues that are impeding one's exercise performance.

520 **Innovation.** Introducing novel approaches to task execution has also been found to be an  
521 important aspect of teamwork/collaboration, as this can help maintain or even improve  
522 performance (cf. McEwan & Beauchamp, 2014; Rousseau et al., 2006). This was also  
523 discussed by participants as being prevalent within exercise settings. This included modifying  
524 one's approaches during an exercise session, learning a novel exercise task, and providing each  
525 other with suggestions of new workout programs. In alignment with previous frameworks  
526 (McEwan & Beauchamp, 2014; Rousseau et al., 2006), this subtheme differs from 'problem  
527 solving' which involves identifying any issues that are preventing successful task execution;  
528 'innovation', on the other hand, involves obtaining and implementing novel methods to task  
529 performance (i.e., not specifically to resolve existing problems). Rocky noted: "In my  
530 experience, it just gave me more knowledge to be able to try different ways of doing things as  
531 opposed to doing the same thing the way I've been doing it and just hoping I get better.  
532 Comfort is the enemy of progress." Hence, groupmates can help each other acquire knowledge  
533 that they might not obtain if they were exercising alone. Learning new strategies to one's  
534 approaches with regard to exercise tasks can help individuals avoid plateaus, promote variety,  
535 and identify the most optimal means of progressing towards the fulfilment of exercise-related  
536 goals.

### 537 **Personal Support**

538 In addition to providing affective and/or instrumental assistance during exercise  
539 sessions, participants also described how groupmates can provide each other with support in a  
540 more indirect manner, particularly between sessions. This third theme aligns with frameworks  
541 from the teamwork literature that involve processes groups use to manage member  
542 relationships (cf. Marks et al., 2001). For example, Henry remarked that when he began



543 exercising at a group cross-training gym, exercise itself was not his primary reason for initially  
544 attending classes. Rather, it was the connections with other people that helped him get started;  
545 his continued exercise adherence was the by-product of those social connections: “I’ve met the  
546 coolest people. I had been living here in [this new city] for a year and I still had no friends. But  
547 I came to the gym and there were all these cool guys and that became the big aspect—the  
548 social club.” Hence, although this type of support is not specifically focused on exercise tasks  
549 themselves, it can nonetheless help individuals adhere to exercise and reach their exercise-  
550 related goals. In Louise’s experiences, she found that the social environment of group exercise  
551 “is the basis” for continuing with exercise beyond the initial adoption: “It’s the culture. You  
552 know who’s coming on Tuesdays so there’s that extra accountability to show up. And I want to  
553 hang out with those people! Sometimes I don’t even want to work out, but I go because they  
554 will be there. If they weren’t, then I would leave. So it’s a huge piece.” Four subthemes related  
555 to personal support were generated from the interviews: *emotional support*, *accountability*,  
556 *informational support*, and *barrier management*.

557       **Emotional support.** Participants noted that groupmates can help provide each other with  
558 emotional support and nurture a sense of well-being if they are experiencing personal  
559 difficulties. As mentioned, this support is not directly focused on exercise tasks (as within the  
560 ‘fostering persistence’ or ‘problem solving’ subthemes, for instance). However, by providing  
561 emotional support, members may be more likely to continue exercising beyond what they  
562 would without this support. Indeed, several participants noted that there were even days when  
563 they would attend a group exercise class not specifically for the exercise component, but rather  
564 to be around friends who (as many described) “were there for each other”. This type of support  
565 could include providing empathy, concern, non-judgmental listening, and comfort in response  
566 to others experiencing emotional difficulties (cf. Rousseau et al., 2006). Mona described an

567 example that had recently taken place in her group aerobics class to illustrate this form of  
568 support:

569       There was a girl that came to the class—she had breast cancer and she would say it would  
570       just feel good to come and get out. The one time she came she had missed a couple weeks  
571       and we said ‘how have you been doing?’ and she said ‘well I’ve been laying in my bed for  
572       two weeks and depressed and whatnot, [so] I got myself out here.’ That just gets us talking  
573       with her and encouraging her. So it’s not only physical but mental too I find; and it makes  
574       *us* feel good too.

575 Hence, group exercise sessions can provide opportunities for individuals to offer and receive  
576 emotional support from others; participation in physical activity then emerges as an  
577 adaptive/beneficial by-product of those gatherings.

578       **Accountability.** Another commonly-discussed form of support included the various  
579 ways in which individuals help each other stay accountable to their health-related goals and  
580 commitments between exercise sessions. Participants described interpersonal behaviors (in  
581 person or via text message, for example) such as checking in on each other, making sure they  
582 are following through with their commitments to health and exercise, and scheduling times to  
583 exercise together. Accountability was identified as particularly relevant in instances where an  
584 individual had just started becoming physically active but was not yet exercising regularly. In  
585 reflecting upon his time as a new exerciser, Rocky noted:

586       When I first started, I was working out with a buddy and basically without him I wouldn’t  
587       have continued going. There were a lot of times where he’d just show up at my door and  
588       be like “ok we’re going; let’s go”.... I think it really applied at the start to keep me  
589       accountable and vice versa—we were able to both work towards our own goals in getting  
590       more fit and working out. Without each other it would have been tougher.

591 In reflecting on what she found to be most beneficial in having a workout partner despite now  
592 being an experienced exerciser, Chandra remarked: “We literally text each other every day ‘are  
593 you working out today? What time?’ and we would coordinate our schedules. So even on bad  
594 days when you don’t want to work out but your workout partner says ‘are you working out  
595 today?’, you would think ‘I don’t really want to but I should’.... Then you *have* to go!” As  
596 highlighted in the above examples, it appears that accountability support can help individuals  
597 not only begin exercising but can also help facilitate the consistent maintenance of exercise  
598 behavior over time and ongoing commitment to one’s exercise-related objectives.

599 **Informational support.** Participants also mentioned that groupmates can provide  
600 advice/information related to other health-related behaviors outside of exercise, such as diet or  
601 injury management. For several participants, exercise was described as one part of a healthy  
602 lifestyle and that it is “intertwined” with other health behaviors. Mona described how fellow  
603 members in her group aerobics class help each other by providing advice with the management  
604 of soreness or injuries: “For some people, if they have ailments, someone will say ‘have you  
605 tried acupuncture or this or that?’ So there’s that information that comes out that is helpful as  
606 well. You wouldn’t think of that exercising by yourself.” Interestingly, several participants also  
607 brought up the topic of diet when describing how groupmates assist them. For example, Wanda  
608 stated: “My goal is to be as healthy as I can.... Obviously nutrition is a huge part. So, after a  
609 year of exercising, I saw some progress but not the dramatic progress that I wanted. What else  
610 can I do? You talk to other people and it’s kind of finding what works.... I think having other  
611 people who are fit and health-focused helps motivate you to be healthy too.” Thus, although  
612 not directly targeting exercise tasks themselves, information related to other health behaviors  
613 can nonetheless provide an indirect form of assistance in the maintenance or improvement in  
614 exercise behavior.



640 gathered from this qualitative study. First, it appears that collaboration is a relevant and  
641 potentially important topic to consider within the context of interactive group exercise, as  
642 participants suggested that it predicted a range of positive outcomes, including continued  
643 engagement in exercise, enjoyment during exercise sessions, group cohesion, and relatedness  
644 to other group members. Second, this study improves our understanding of the specific  
645 collaborative behaviors that may help facilitate those positive outcomes. Specifically, 14  
646 subthemes encompassing three overarching themes related to collaboration were identified.  
647 With regard to *motivation building*, participants suggested that groupmates can provide  
648 affective types of support during exercise sessions, which included: providing encouragement  
649 to one another; challenging each other to go beyond their perceived limitations; fostering  
650 persistence particularly if an individual feels discouraged or reaches a plateau; and celebrating  
651 successes with each other. For *intragroup coaching*, participants suggested that groupmates  
652 can assist with task performance by: helping each other prepare for workouts/specific tasks;  
653 providing physical assistance to one another; offering verbal feedback regarding task  
654 execution; modelling the proper execution of an exercise task; problem solving task  
655 performance issues; and introducing novel strategies to maintain or improve task performance.  
656 Finally, *personal support* suggested that groupmates can help each other in ways that are not  
657 specifically focused on exercise-related motivation or task performance but can nonetheless  
658 have an impact on exercise-related outcomes in a more indirect manner. These included:  
659 providing emotional support to one another; helping each other stay accountable to their  
660 health-related goals and intentions; offering advice on other health behaviors (e.g., diet, injury  
661 management); and helping overcome barriers within one's life that can impede one's  
662 engagement in exercise and other health behaviors. These results contribute to the literature by  
663 highlighting the relevance and potential benefits of collaboration in exercise contexts. This  
664 may also form the basis for future work in understanding how exercise scientists (e.g., exercise

665 psychologists, kinesiologists) and instructors (e.g., group exercise class leaders, personal  
666 trainers) can foster environments that promote exercise behavior and positive experiences.

667         In relation to previous research, we note that many of the themes and subthemes  
668 interpreted in this study align closely with various dimensions from existing frameworks on  
669 teamwork. Namely, the three themes—intragroup coaching, motivation building, and personal  
670 support—and three of the subthemes—preparation, problem solving, and innovation—are  
671 similar to dimensions within the teamwork frameworks by Rousseau et al. (2006), McEwan  
672 and Beauchamp (2014), and Marks et al. (2001). As the main differentiator of teamwork versus  
673 collaboration is in the focus on teams versus groups (respectively), it is perhaps unsurprising  
674 that many of the (sub)themes overlap with the dimensions from those teamwork frameworks.  
675 Moreover, it should be acknowledged that several themes and subthemes resemble various  
676 constructs and theoretical dimensions that have been examined to explain and promote exercise  
677 behavior. For example, within Bandura's (1977) self-efficacy theory, vicarious experiences and  
678 verbal persuasion are proposed as two ways to build self-efficacy. These two sources appear  
679 similar to the 'modelling' and 'challenging one another' themes (respectively) that were  
680 interpreted in this study. Modelling and challenging one another are also comparable to the  
681 descriptive norm and social pressure dimensions within the Reasoned Action Approach by  
682 Fishbein and Ajzen (2010). In addition, emotional support and informational support are two of  
683 the dimensions embedded within frameworks of social support (e.g., Shumaker & Brownell,  
684 1984; Russell & Cutrona, 1987). Hence, there appears to be overlap between collaboration  
685 behaviors with other constructs and dimensions from other theories. Notwithstanding these  
686 similarities, the present study makes a unique contribution to the exercise psychology literature  
687 by focusing specifically on the reciprocal behaviors of individuals who exercise in groups and  
688 by understanding the various ways in which those individuals can work together effectively in  
689 pursuit of exercise goals/objectives.

690           As it does not appear that a comprehensive examination of collaboration behaviors  
691 within exercise contexts has yet been conducted, this topic is ripe for further inquiry. It should  
692 be noted that this study provides an initial foundation or “starting point” upon which further  
693 research on collaboration in exercise could be built. The collaboration behaviors interpreted  
694 within this study can be refined as a result of new insights in future empirical research. In  
695 particular, it is prudent to reiterate that the study findings are based on (a) the experiences of 16  
696 adult participants (10 of whom were recruited as personal contacts to the researchers, while the  
697 remaining six were recruited via snowball sampling) across a wide age range, and (b) the  
698 interpretations of data from our research team. It could also be argued that our findings might  
699 represent an “ideal” version of the possible experiences that arise from group exercise. For  
700 example, since the participants in this study currently exercised in groups, a somewhat narrow  
701 sample of participants may have been obtained—namely, those who only (or at least  
702 predominantly) had positive experiences in group exercise. Indeed, it is recognized that the  
703 majority of the data gleaned from the interviews offered positive perspectives of collaboration.  
704 Moreover, the findings were interpreted based on participants’ experiences within two broad  
705 types of contexts: dyads and larger group classes. It should be acknowledged that the specific  
706 types of exercise groups within those two categories vary in terms of the level of  
707 interdependency amongst members, which could result in some collaboration behaviors being  
708 more relevant in some specific groups compared to others (e.g., ‘physical assistance’ would  
709 likely be less prominent in groups with lower levels of interdependency). Furthermore, the  
710 approximate length of time in which the participants in this study had participated in exercise  
711 groups ranged from a few months (one participant) to several years (eight participants) to over  
712 a decade (seven participants).

713           In summary, there are limitations in terms of the sample in this study, and the findings  
714 may not generalise to all participants and/or types of exercise groups. Indeed, future research

715 may demonstrate extended or alternative perspectives of collaboration as data from a greater  
716 range of exercisers and exercise groups continues to be collected. Part of this research could  
717 involve obtaining a sample of participants who had less positive experiences in exercise groups  
718 (e.g., those who do not adhere to or enjoy group exercise, those who prefer solitary forms of  
719 exercise)—this could provide a fresh perspective on group exercise and greater nuance to our  
720 understanding of collaboration. It would also be worth investigating whether individuals’  
721 experiences differ when considering other/more narrow age ranges (e.g., grade school physical  
722 education students), the level of interdependency and interaction between members (e.g.,  
723 comparing exercise groups with frequent interactions and/or overt contingencies for  
724 collaboration during workouts versus those with fewer opportunities for collaboration), as well  
725 as the specific length of time in which an individual has been part of their exercise group.  
726 Finally, moving beyond a ‘drive-by-interviewing’ approach (cf. Chamberlain, 2012) and,  
727 instead, interviewing participants on multiple occasions could help deepen our understanding  
728 of participants’ perceptions of exercise groups and experiences of collaboration.

729 Another potential area of future research could involve the development of a measure of  
730 exercise-related collaboration, which would allow for quantitative examinations of this  
731 construct and its relationships to other salient constructs in exercise. In particular, although  
732 each participant in the current study suggested that collaboration behaviors generally had a  
733 positive impact on various outcomes (e.g., adherence, enjoyment, relatedness), it would be  
734 worth quantifying the extent of these potential relationships. Should such support for the  
735 importance of collaboration within group exercise be found, this might also suggest that  
736 additional research focused on identifying the ways in which collaboration behaviors can be  
737 improved (e.g., via interventions with leaders of exercise groups) should be conducted. Taken  
738 together, this line of research could provide a novel approach to understanding and potentially  
739 improving exercise behavior.



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## Supplementary Materials

Table 1

*Summary of themes and subthemes.*

<u>Theme/subtheme</u>	<u>Description</u>	<u>Example quote</u>
<b><i>Motivation Building: Affective forms of support during exercise sessions. Helping foster drive, energy, effort, and determination towards exercise.</i></b>		
-Encouragement	-Providing positive reinforcement; cheering/urging on groupmates	<i>-When you're training with someone else or somebody is watching you and you've got a cheer squad while you're doing something, it's a very fulfilling feeling.</i>
-Challenging one another	-Persuading others to attempt new challenges; fostering belief in groupmates that they can perform beyond their current levels or self-imposed limits	<i>-Part of it too was when [my workout partner] would be like "yeah you can do more than that, lets add some more weight." It was things like that where I probably wouldn't have done it by myself.</i>
-Fostering persistence	-Helping groupmates overcome discouragement and persevere with their exercise-related goals and intentions	<i>-Overcoming discouragement is such a big piece for motivation. If I think to my class, if someone is on their sixth week and they are discouraged because the person beside them has had a lot of improvement but they're not, I think helping them bounce back is huge.... Others can help reinforce improvements that you might not see.</i>
-Celebrating success	-Pointing out others' accomplishments; sharing in excitement when a groupmate has reached their goals	<i>-Others will be excited for them when they get [their goal]. They'll go up to others and say "hey look what I got for my time" and everyone will be excited for them that they got that.</i>
<b><i>Intragroup Coaching: Instrumental forms of support during exercise sessions. Helping others perform exercise tasks correctly and safely in pursuit of exercise-related goals.</i></b>		

-Preparation	-Helping groupmates get setup and ready (mentally and physically) for exercise tasks	<i>-Getting set up for a class or workout, being oriented on equipment or a facility or where to go. I think of someone who goes to aquatic classes—I just went to my first class. I had no clue what I was doing when I got to the pool. I didn't know whether it was in deep water, shallow water. Its environment, its exercises, equipment, mental support—the actual mental preparation, like “you fit in here, it's OK”, it's like a support system to get you going. Now once you get into things, I think preparation is more about execution of things for the program that they are already in, like learning how to do a deadlift.</i>
-Physical assistance	-Providing groupmates with physical backing while they complete an exercise task as a means of facilitating safe and effective execution	<i>-They might not even use them but the fact that they're standing right in front of them, supporting them if they need it. Like the bench press, we don't actually lift the bar but we're there in case you get stuck. So it's like a mental support.</i>
-Feedback	-Verbally commenting/feeding back on a groupmate's performance or task execution (e.g., technique)	<i>-Having another set of eyes makes it a lot better. It's always welcome. Well, it's welcome from people I know are good lifters. If someone has [poor] technique but think they're awesome and they go around trying to give you cues, it's like “OK shut up!”. But if it's my friends then yeah that's great. Or somebody I know is one of the top lifters—if I know they're good, I totally welcome it.</i>
-Modelling	-A visual form of assistance—showing others how to execute an exercise task; learning/developing through observation of groupmates	<i>-You can lean on others if you think “how do I do that again?” and then they show you.... You include modelling when you teach someone something new but then modelling can also be something that is part of any program forever.</i>
-Problem solving	-Finding and implementing solutions to task-related problems (e.g., subpar performance, failing to reach one's goals) with groupmates	<i>-Part of it is knowing that [my exercise partners] have gone through that same struggle like “yeah I plateaued too and couldn't figure out how to get out of it; this is what I tried and it ended up working”.... Like, I used to hate front squats because I couldn't understand how anyone could do it. I literally would think “there is no way, I can't figure it out”.... He could show me things like “well this is what I do, why don't you try that?”</i>
-Innovation	-Introducing novel/varied approaches to exercise sessions (e.g., learning new	<i>-There are thousands of programs out there and usually when you've had someone who has done different programs, they can give you an</i>

exercises, trying different workout programs) as a means of maintaining or improving exercise adherence/ performance

*idea like “this is something that I did for a bit”. It gives you a bit more knowledge and experience that you haven’t had yet.*

***Personal Support: Interpersonal forms of support. Helping nurture the overall well-being of other members (as opposed to focusing on the execution of tasks during exercise sessions).***

-Emotional support

-Providing empathy, concern, non-judgmental listening, and comfort in response to groupmates experiencing personal difficulties

*-One [group member] has a drug addicted husband and they just got divorced, and she’s got two kids; she can come to boot camp and know that everyone is happy and there for her, and if she needs to talk to someone she’ll talk to us. So she’ll talk to me, she’ll talk to other people in the class.... She told me “I don’t know what I would do without these classes, it’s my hour away from everything else”.*

-Accountability

-Helping groupmates maintain, and follow through on, their health- and exercise-related goals and commitments between exercise sessions

*-To have that accountability now is huge. My fitness really declined when [my former workout partner] left because I was really reliant on her. I was drained and juggling a lot; you’re dieting, low on energy but to have someone be like “hey, we have got to go train”, that accountability is super important.*

-Informational support

-Providing advice to groupmates on other behaviours that impact overall health and well-being

*-When I tore my rotator cuff, I just kept trying to push through it and eventually things were going off the rails, my weights were starting to go down and so my friend... said “why don’t you go see this guy; he does physio and can help you get right back on track”. So I did and it took awhile but having a program from that guy was able to help me get back on track and now I’m back to benching.*

-Barrier management

-Helping groupmates deal with/overcome obstacles that could prevent them from following through on their exercise- and health-related commitments/goals

*-Hands on support—they’ll say “I know she’s probably going to bail on class today so I’m going to offer to go pick her up”.... It’s that support in having them continue.*

## Appendix A: Semi-structured interview guide

### BACKGROUND

- What is your background with physical activity?
- Have you always been active? or is your participation more recent?
- What type of exercise do you currently do?

### GROUP EXERCISE EXPERIENCE

- How long have you been involved in some form of group exercise? Where you exercise with one or more other people?
- Can you paint a picture of what these group exercise sessions look like?
- In what ways is group exercise helpful to you?
- What do your interactions with other exercisers look like in these sessions?

### PERCEPTIONS OF COLLABORATION

#### -Collaboration in class?

- As I mentioned before, I'm interested in this concept of "teamwork" aka "collaboration"... so if you were to define teamwork/collaboration to someone who had never heard of this term before, how would you describe it?
- Based on that definition, do you see this applying to group exercise situations at all?
  - If yes... how so exactly?
- Have you seen, or had any experiences yourself, where you'd say members of your exercise group have 'worked well together' or 'helped each other' in some way?
- Is there anything that fellow group members do to help you while you're exercising? when you're in the middle of an exercise session?
  - *ask to elaborate, provide examples*
- Are there things that members say to help each other during exercise?
  - *ask to elaborate, provide examples*
- Do you ever seek out assistance from fellow group members in some way or have others ever asked you for help?
  - Or do you see this taking place with other members? what did that look like? in what ways did it help?
- Have there been times when you'd say you experience "good" teamwork/collaboration?
  - Maybe to contrast that point, have there been times where you experienced poorer teamwork/collaboration? What sorts of things stand out to you that differentiate these two situations?

#### -Collaboration outside of class?

- May I ask...what is your overall reason or specific goals for participating in group exercise?
- If you think back to your past experiences, have other members of your exercise groups helped you set or modify these goals or purposes or were these always created on your own?
  - *if they say others have, ask to elaborate—what did they do? how did they do that?*
- Do you prepare for your group exercise sessions in some way or more so just show up for them?
  - *if they say they do, ask if other members help you prepare in some way*

- Do you keep track of how you're doing in your group exercise in some way? how you're performing the tasks? whether you're progressing? and so on *(if they say they do, ask if other members help them monitor in some way)*
- Do you ever think about the things that might affect your performance or progress in some way?
  - *if they say they do, ask if other members help them with this in some way*
  - what are some examples of things that have come up in the past?
- Have there been times in the past where you've hit some sort of roadblock with your training, where something was preventing you from being successful or reaching your goals? What do you do to resolve these problems?
  - *ask if other members help them problem solve in some way?*
- Do you ever modify your approaches to your group exercise class? For example, if you find that something is not working say in your preparation or in your actual performance during these exercise classes, do you mix things up in some way?
  - *if they say they do, ask if other members help them come up with innovative solutions*

### **-Interpersonal Support**

Up to this point, we've talked a lot about the ways that group members help each other in terms of exercise specifically. I want to switch gears slightly and think about other ways your exercise partners might help you.

- Have you ever had times where group members provided emotional support in some way, such as helping you get through a difficult personal time? *(If yes, ask for examples)*
- Do you find that members do or say things that "build you up"--not in terms of exercise but as a person in general? *(If yes, ask for examples)*
- How about in terms of giving personal advice? So again not so much in terms of exercise itself, but other things that you find is helpful information? *(If yes, ask for examples)*
- Are there any other things that members could do that is helpful to others? *(If yes, ask for examples)*

### **To wrap up...**

- *Summarize the main description that they've given regarding collaboration*
- *Ask if there is anything else that I may have missed*
- *Would you say that if an exercise group is doing these things that they're showing "good" teamwork/collaboration? Or are there any other things?*