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Research article

The Effects of Two Self-Regulation Interventions to Increase Self-Efficacy and Group Exercise Behavior in Fitness Clubs

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Abstract
Studies on the adoption and maintenance of group exercise behavior are scarce. The objective of this study is to test two self-efficacy based interventions to increase barrier self-efficacy and group exercise behavior. In total 122 participants (M_{age} 42.02 yr.; SD 12.29; 67% females) were recruited and randomly assigned to one control and two experimental groups. The control group was limited to participate in one virtual group exercise program only (group 1). The first experimental group was able to self-set their activities and participate in multiple group exercise programs (group 2). The second experimental group received an additional monthly coaching protocol to manage self-set goals (group 3). A validated scale for barrier self-efficacy was used, group exercise sessions were measured and drop-out rates were registered. An ANOVA indicated that mean amount of sessions of group 1 and 3, and 2 and 3 differed significantly ($p < 0.05$) in 12 weeks. Descriptive statistics demonstrate mean group exercise sessions over the total of 12 weeks of 2.74 (SD 4.65) in the control group; 4.75 (SD 6.08) in the first experimental group, and 12.25 (SD 9.07) for the second experimental group. Regression analysis indicated that self-efficacy at 8-weeks explained the highest variance in overall group exercise sessions ($R^2 = 0.18$; $p < 0.05$). Overall drop-out rates were 88% in group 1, 78% in group 2 and 48% in group 3. The results showed that group exercise behavior can significantly be improved by a coaching protocol on self-set goals. Future research should address the effectiveness of self-set activities and self-set goals for a longer period of time and in other types of exercise programs.

Key words: Fitness, adoption, maintenance, adherence, drop-out.

Introduction

It is well documented that physical activity and exercise are beneficial for health (American College of Sports Medicine, 2010; Dishman et al., 2013). Physical activity includes all bodily movements produced by skeletal muscles resulting in energy expenditure. The current study focusses on exercise (behavior) only, defined as planned, structured, repetitive bodily movements with the intention to improve or maintain (physical) fitness or health (Buckworth et al., 2013). According to the International, Health, Racquet and Sportsclub Association (IHRSA, 2015), approximately 144 million individuals exercise in fitness clubs worldwide. In regards to exercising in a fitness club, three kinds of behavior are relevant. First, an individual has to enter the facility, denoted as attendance behavior. Second, the individual has to attend the program, labeled as program attendance. Third, the person needs to exercise according to certain standards or minimums in terms of frequency, duration and intensity, in short exercise behavior. Research on attendance and exercise behavior in fitness clubs is limited (Middelkamp and Steenbergen, 2015), but there are strong indications that the frequencies are low. Middelkamp et al. (2016) reported low amounts of exercise sessions in fitness clubs, using a database of 259,000 ex members with an average of 1.1 session per month over 24-months, including a mix of individual and group exercise behavior. Health effects based on these frequencies will be marginal at best. In regards to types of exercises, a Dutch study (Hover et al., 2012) reports that most males (60%) and females (45%) combine individual and group exercises, but 31% of the females only participate in group exercise programs. The study also reports that most individuals participate in two or more types of programs; about 50% participate in at least one group exercise program and 23% participate only in group exercise classes with instructor. Several studies report large ranges of program attendance and exercise behavior in fitness clubs. Annesi et al. (2011) found a range in program attendance spanning 31 to 49%, when measuring the actual attendance of the program. Annesi (2003) tested the effect of a multiple component behavior change treatment package (for 36 weeks), partly based on the constructs of self-efficacy. The package included strategies like relapse prevention, self-reinforcement, and contracting. All studies (US, Great Britain and Italy) showed a significantly higher attendance (13 to 30%) and less drop-out (30 to 39%) for the treatment group. Seghers et al., (2014) examined the effectiveness of a 15-minute self-efficacy coaching at the start of a 12-week lifestyle physical activity program and reported significant effects on physical activity behavior, self-efficacy and program adherence. These and other studies (Buckworth et al., 2013; Middelkamp and Steenbergen, 2015) indicate that the adoption of new exercise behavior and the maintenance of existing behavior (adherence) is challenging but can be improved by self-efficacy based interventions.

Studies on group exercise behavior in general and more specific within fitness clubs are also limited (Middelkamp et al., 2016), but again studies indicate positive correlations with exercise attendance and adherence. Burke et al. (2006) conducted a meta-analysis and examined home-based programs not involving contact with

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researchers or health-care professionals, home-based programs that involved some contact, standard exercise classes, and exercise classes where group dynamics principles were used to increase cohesiveness (true group). The search produced 44 studies containing 214 effect sizes with results demonstrating that exercising in a true group was superior to exercising in a standard exercise class, although it remains unclear what defines a true group in real-life exercise settings (in fitness clubs). In the context of fitness clubs, Annesi (1999) reported a significant positive relationship between a small group exercise protocol for 15-weeks, including warming up and cooling down, and (higher) attendance resulting in reduced drop-out rates. Kovačova et al. (2011) analyzed group exercise behavior of participants to a half year dance aerobics and step aerobics program in a fitness setting under supervision of an expert instructor. None of the participants showed 100% adherence with an average for the whole group of 70.42%. Mean attendance values of the group gradually decreased from 85.39% to 68.35% during the first four months of the intervention. The results demonstrate higher attendance values for the dance aerobics group compared to the step aerobics group, concluding that the type of exercise can influence attendance and adherence. Remers et al. (1995) identified mediating factors for the relationship between group size and attendance. They investigated member's perception of class environment, instructor and classmates, members' satisfaction with the environment, instructor and exercise, and group cohesion in relationship to group size and adherence. First, they found that members of large class sizes (70-90 persons) had better attendance than members of medium sized classes (18-26). Furthermore, they found that members of the large sized classes exerted themselves more than the members of medium sized classes.

To systematically study and understand (group) exercise behavior, several social-cognitive theories have been put forward like the self-efficacy theory (SET) (Bandura, 1997). Multiple studies demonstrate that the concept of self-efficacy (Bandura, 1997), a construct also incorporated in the Transtheoretical model of behavior change (TTM) (Buckworth et al., 2013), is strongly related to exercise behavior (Ashford et al., 2010; Poag-DuCharme and Brawley, 1993). Self-efficacy is a person's belief in capabilities to overcome personal, social and environmental barriers to exercise. Self-efficacy is a situational defined concept which should be measured depending on the type of behavior. According to self-efficacy theory, two important factors can influence the confidence to adopt and maintain exercise behavior. The first is efficacy expectations, that is one's belief about their own competence. The second factor is outcome expectations, one's belief in regards to the perceived result or outcomes of exercise behavior. According to self-efficacy theory, human behavior is strongly influenced by self-regulation (Bandura, 1991). Annesi and Gorjala (2010) investigated relations of self-regulatory skill use with self-efficacy for exercise and appropriate eating, and the resulting change in weight associated with participation in a nutrition and exercise treatment supported by cognitive-behavioral methods. They concluded that concerning exercise behavior, changes in self-regulation were associated with self-efficacy change. The self-regulative mechanisms operate through three sub-functions, namely: Self-monitoring of one's behavior on determinants and consequences; Judgment of one's behavior in relation to personal standards and circumstances; Affective self-reaction. According to Bandura, people can't influence their behavior and actions in an optimal way if they don't pay adequate attention to their own performances, the conditions under which they occur, and the immediate and distal effects they produce.

Based on tenets of SET, the present research operationalizes self-regulation in terms of self-set activities and self-set goals. In regards to self-set activities, people who have the ability to execute different options to exercise and are able to regulate their own exercise behavior, will have greater freedom to support their own exercise behavior which can improve the adoption and maintenance of the behavior. They can visualize outcomes and match the activity that is perceived the best towards the desired outcome. Self-set goals are initiated by the importance of outcome expectancies. When people set their own goals, based on desired outcomes of for example a group exercise program, it will help them to execute this specific kind of behavior (Annesi, 2002). Bandura (1997) states that goal intentions do not automatically activate behavior, but need some structures to be effective. Goal specificity is a crucial structure that helps to guide behavior. Clear, specific and attainable goals produce higher levels of performance than general intentions. Another factor is goal challenge, meaning that goals should be realistic, so not too easy, and not too difficult and accepted by the person. Finally, goal proximity should be taken into account. Proximal goals are more effective than distal goals, so distal goals can be made more effective by creating subgoals that provide indications of mastery and enhance efficacy beliefs. Usually, new exercisers need to develop skills to use and manage goalsetting techniques in an optimal way and coaching can be used to support this process. The influence of self-regulation by self-set activities and coaching on self-set goals has hardly been studied, even though the effect on respectively self-efficacy and group exercise behavior seems promising (Ashford, Edmunds and French, 2010). In a systematic review of 33 studies on exercise behavior of members in fitness clubs only four of those addressed self-efficacy (Middelkamp and Steenbergen, 2015). Thus it seems that the effects of self-efficacy on (group) exercise behavior in fitness clubs need further investigation.

This study is guided by the following research question: What is the effect of self-set activities and a coaching protocol on self-set goals on self-efficacy and group exercise behavior of members in fitness clubs? Group exercise behavior is defined as exercising in the same structured program in the same environment (group exercise room) with a minimum of two individuals. The following hypotheses were tested. 1. Providing self-set activities in group exercise programs increases group exercise behavior in the experimental group compared to the control group in 12 weeks; 2. Providing self-set activities and a coaching protocol on self-set goals increases

group exercise behavior in the second experimental group compared to the control group and first experimental group. 3. Self-efficacy predicts group exercise behavior after 4, 8 and 12 weeks; 4. Providing self-set activities and coaching on self-set goals in group exercise programs increases self-efficacy in the experimental groups compared to the control group in 12 weeks.

Methods

Participants

Two fitness clubs were approached, one in the South and one in the East of the Netherlands. Inclusion criteria were: Clubs need to have a dedicated group exercise room; Virtual group fitness equipment available; Staff willing to execute coaching sessions; Pre-scripted group exercise programs to provide equal levels of quality between group exercise programs; Willing to offer free memberships for three months to the participants. Participants for the study were recruited in two ways. First, an advertisement was published in a local newspaper explaining the purpose and program of the study and describing a list of inclusion and exclusion criteria. Second, existing members were motivated by an internal newsletter to bring in referrals to participate. Criteria were: Age above 18 years and no older than 70; No health conditions; No member of a fitness club for the last six months. Health conditions were screened via a Physical Activity Readiness Questionnaire (PAR-Q), which is a standard protocol, used in qualified fitness clubs in The Netherlands (LERF, 2012). A total of 122 participants volunteered to join the study, and signed two consent forms: one with the fitness club confirming to agree to the terms and conditions; and one specific for the purpose of the study, including a Dutch human subject protection statement. The study was performed in line with the principles of the declaration of Helsinki. In the randomization process, the participants were ranked first on gender and second on age, starting with the youngest males and ending with the oldest female. The youngest male was classified to group 1, the next male on the list in group 2, the next in group 3, the fourth man again in group 3, the next in group 2, according to the following schedule: 1-2-3-3-2-1-1-2-3-3-2, et cetera. As a result, 42 participants were assigned to group 1 (13 males and 29 females), a total of 40 to group 2 (13 males and 27 females), and 40 subjects to group 3 (13 males and 27 females), with overall 67% females and 33% males. The participants in the three groups had an average age of 42.24 (SD 12.17) in group one, 41.53 (SD 12.55), in group two and 42.35 (SD 12.16) in the third group.

Procedure

For this study and for all groups, the group exercise-to-music programs of Les Mills were used. These programs were selected because they are pre-scripted and follow a standardized format, performed equally by all instructors. These facets ensure the controllability of this ‘real life’ intervention study. The Les Mills programs consist of 8 to 10 music tracks per class and for each track specific exercises are pre-scripted matching the music. Instructors can teach the programs after they received certification by a national trainer (who are trained by international master trainers). In addition, they have to follow an ongoing educational program every three months. Furthermore, the quality of instructors is regularly checked by video assessment. The programs are developed by a team of experts in New Zealand and released every three months and used in the same format in 17,000 fitness clubs worldwide, including 850 clubs in the Netherlands. The Les Mills programs were also selected because multiple research studies provide detailed physiological profiles. Consequently, next to frequency and duration, data on exercise intensity is available (Harvey, 2012; Khan et al., 2008; Oliveira et al., 2009; Rixon et al., 2006). Rixon et al. (2006) tested the intensity of four Les Mills programs (Bodypump, Bodycombat, Bodystep and RPM) which are also used in the current study, and reported a %HR-max in the range of 60 (SD 6.5) (BodyPump) to 74 (SD 6.7) (RPM). The energy expenditure ($kcal \cdot min^{-1}$) ranged from 8.0 (SD 1.6) for Bodypump to 9.9 (SD 1.7) for RPM. Oliveira et al. (2009) profiled the Bodypump program in more detail, reporting HR ranges of 84 BPM (SD 14.05) at warming up (track number 1) to 164 BPM (SD 20.14) at track number 7. The intensity of the body and mind program named Bodybalance is 137 BPM (SD 17.6), measured by Khan et al. (2008). Les Mills provides live classes, with live coaching by a certified instructor and virtual classes. In virtual classes the exercise program is broadcasted on a big screen using a beamer and sound system. All classes were limited to a maximum of 30 participants.

After been assigned to one of the three groups, participants started to exercise from April or May 2015. Group 1: The control group, this group could only exercise using a Les Mills virtual indoor cycling program, named RPM virtual, with 15 scheduled classes available per week plus an unlimited amount of on-demand classes. This group was not able to self-set their activities. The RPM virtual program (releases 68 and 69) was selected as a control program and was available for all groups. This program was chosen because it has the lowest participation barriers (close to 100% of the Dutch population above 18 years is able to cycle) and because of controllability: due to the virtual component the execution of the program was similar for all participants during the complete intervention period. Group 2: The first experimental group, this group is provided with self-set activities by giving multiple options to participate in group exercise programs. They could choose between Les Mills RPM virtual indoor cycling (idem as group 1 with 15 scheduled virtual classes per week), and Les Mills live classes (instructor teaches) (30 additional live classes per week), different types of classes (cardio-based; strength-based; dance-based; body/mind-based, named, Bodycombat, Bodystep, Bodypump, Bodyjam and Bodybalance), and multiple instructors. Group 3: This is the second experimental group. This group is provided with the same group exercise programs of group 1 and 2, but additionally received a coaching protocol on self-set goals. The coaching sessions took place in small groups of 2 to 6 participants, organized by in total three exercise professionals.

The sessions were at baseline; after 4 weeks; after 8 weeks; and 12 weeks. At all four moments, in both fitness clubs, the first session was executed by an exercise professional (the third author of this study); the two other exercise professionals (one per club) shadowed this session and received detailed instructions to perform exactly the same procedures. In total 4x4 sessions per club of approximately 30 minutes were conducted, of which 24 sessions were delivered by the third author of this study and 8 by the other two exercise professionals. These monthly scheduled coaching sessions worked according to the following protocol. During the sessions the participants work with an individual coaching form for self-set goals. For the purpose of goal setting, participants filled in a practical and standardized form (one page) concerning their self-efficacy expectations (which group exercise program fits best to their level of fitness and the perceived self-efficacy; different options in Les Mills programs were presented), outcome expectations (what goals a participant expects to achieve in six months and how can he or she set goals, divided in short term monthly subgoals). Two types of goals were registered. First, results-oriented goals, for example losing 12 kg of body weight in 12 weeks. Second, process-oriented goals, for example exercising 2x per week with a minimum of 30 minutes. Finally, outcome values were discussed (what is the importance of these outcomes for the participant). During the sessions it was also discussed what the confidence of the participant was to achieve the subgoals and what could be done to increase that level of confidence. The participants of all groups had to register at every visit before stepping into a group exercise program and actual group participation was checked. The group exercise programs had a duration of 30, 45 or 60 minutes. All participants performed the full duration of the program. As discussed above, the intensity of the group exercise programs differs per program and was manageable by the participants, for example by using more or less weight or resistance, even though the basic design of each program was standardized as developed by Les Mills in New Zealand.

Measures

A validated scale for barrier self-efficacy was selected (Geller et al., 2012), and translated into Dutch. The scale consists of 6-items including statements like ‘’how confident are you to exercise in the following situations’’ for example, ‘’when you have to exercise alone’’. Participants scored on a 5-point scale to indicate how confident they are, ranging from ‘’not at all confident’’ till ‘’completely confident’’. Exploratory factor analysis (principal component analysis) confirmed the internal validity of the Dutch version of the scale for barrier self-efficacy (scores on Q1 to Q6 were respectively: 0.70, 0.73, 0.63, 0.61, 0.66 and .62). Reliability analysis on self-efficacy at P0, P1, P2 and P3 were acceptable (Cronbach’s Alpha 0.74 to 0.87) (Field, 2009). Measurements were obtained at baseline (P0) and after approx. 4 weeks (P1), 8 weeks (P2) and 12 weeks (P4), via an online survey system (NETQ). Group exercise behavior was measured continuously by registration of actual group exercise participation. During the intervention drop-outs were registered. Drop-outs were defined as not participating in a group exercise program for 4 weeks in a row. Data was analyzed using SPSS. An ANOVA was performed to test whether group means differed and a regression analysis was used to investigate whether self-efficacy could be used to predict exercise behavior. Alpha level was set at .05 (Cohen, 1988).

Results

Descriptive statistics demonstrate mean group exercise sessions over the total of 12 weeks of 2.74 (SD 4.65) in the control group (group 1); 4.75 (SD 6.08) in the first experimental group (group 2), and 12.25 (SD 9.07) for the second experimental group (group 3). Overview of data is presented in Table 1 and Figure 1. The average amount of group exercise sessions per week was respectively 0.23 (group 1), 0.40 (group 2) and 1.02 (group 3). In group 1 (control), the following drop-out pattern was reported: 20 in week 1-4, 12 in week 5-8 and 5 in week 9-12. The pattern in group 3 was: 4 in week 1-4, 6 in week 5-8 and 9 in week 9-12. In group 1, 2 and 3, respectively a total amount of drop-outs in 12 weeks were 37, 31 and 19, resulting in an overall drop-out rate of 88% in group 1, 78% in group 2 and 48% in group 3. The overall response on the scales for self-efficacy at P0, P1, P3 and P4, were respectively 117, 106, 100, 90. At P3 the response rates of group 1, 2 and 3 were 67%, 75% and 80%.

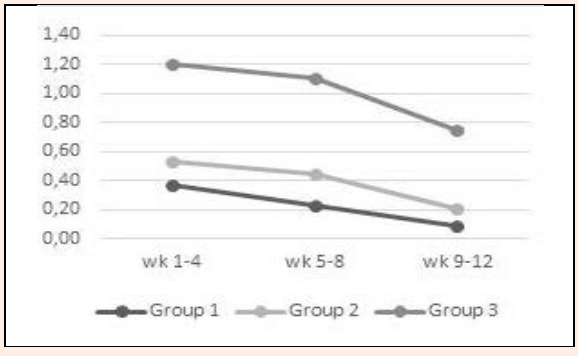

Figure 1. Development of group exercise behavior per group over time.

Table 1. Overview of main data.

	Control (n =42)	Experimental 1 (n = 40)	Experimental 2 (n =40)
Age	42.24 (SD 12.17)	41.53 (SD 12.55)	42.35 (SD 12.16)
% Females	69	68	68
Mean total visits in 12 weeks	2.74 (SD 4.65)	4.75 (SD 6.08)	12.25 (SD 9.07)
Drop-outs in 12 weeks	37 (88%)	31 (78%)	19 (48%)
Response rates of total per group at P3	67%	75%	80%

An ANOVA test rejected the first hypothesis; providing self-set activities in group exercise programs increases group exercise behavior in the experimental group compared to the control group in 12 weeks. The total amount of sessions in 12 weeks differed between group 1 and 2 with 2.01 but was not significant ($p > 0.05$). The second hypothesis was supported: providing self-set activities and a coaching protocol on self-set goals increases group exercise behavior in the second experimental group compared to the control group and first experimental group. ANOVA demonstrated significant ($p < 0.05$) differences between group 1 (control) and 3, and group 2 and 3. The third hypothesis, self-efficacy predicts group exercise behavior after 4, 8 and 12 weeks, was tested at all three measurement moments. Regression analysis indicated that self-efficacy at 8-weeks (P2) explained the highest amount of variance in group exercise sessions in 12-weeks, with self-efficacy predicting 18% of the group exercise sessions ($R^2 = 0.18$; $p < 0.05$). Hypothesis 4 revealed no significant effects. Nor self-set activities, nor coaching on self-set goals significantly increased self-efficacy.

Discussion

The guiding question of this intervention study was: what is the effect of self-set activities and coaching on self-set goals on self-efficacy and group exercise behavior of members in fitness clubs? In terms of sessions per week the first intervention group almost doubled the amount of sessions compared to the control group and the second intervention group scored approximately four times the amount of sessions compared to the control group over 12 weeks (0.23 to 1.02). The coaching protocol seems to be an intervention with a high return in group exercise sessions. It increases the amount of sessions substantially with a relatively low investment of time. In fitness clubs, 23% of the members only participate in group exercise programs, usually without additional coaching on goal setting (Hover et al., 2012). Their exercise behavior can be significantly increased by adding monthly coaching sessions in small groups. In fact, the current study demonstrates clearly that participants in group exercise need additional support to maintain their exercise behavior. Fitness and health professionals should add small group coaching sessions on goalsetting to every group exercise program. This is also clearly an effective strategy for drop-out prevention, with a drop-out rate decreased by almost 50%. Other than hypothesized and expected, providing self-set activities and self-set goals, in short self-regulatory skills, did not increase barrier self-efficacy. Self-efficacy appeared to be a limiting factor in increasing group exercise behavior with the highest prediction at 8-weeks of 18%. This result does not match with other research findings (Ashford et al., 2010; Poag-DuCharme and Brawley, 1993). Multiple other factors seem to influence this kind of behavior. Therefore, it is suggested to use a mix of behavioral strategies to increase group exercise behavior, like Annesi (2003), testing the effect of a multiple component exercise behavior change treatment package, partly based on the constructs of self-efficacy including strategies like relapse prevention, self-reinforcement, and contracting.

The current study had some limitations. First, although the coaching protocol was strictly defined and procedures for the sessions were clearly set and executed, the quality and the coaching skills of the individual coaches was not completely controlled. Individual skill-sets or personality traits could have influenced the effectiveness of the coaches. Second, the study started in April and May, so the program partly took place in the summer period. It is perceived that this resulted in lower amounts of group exercise sessions in all three groups because it is known that members of fitness clubs in the Netherlands exercise less in the summer, for a variety of reasons, such as taking holidays. This could have contributed to the large amount of drop-outs. Third, in this intervention a specific type of group exercise program was tested; the exercise-to-music classes (live and virtual). Of course there are many types of group exercise programs, and the results cannot be generalized to all different types. For example, what is the influence of music or no-music and what is the effect of a live instructor compared to a virtual instructor? Fourth, the group sizes were not registered during this study, although a minimum of two and a maximum of 30 participants applied to this study. Remers et al. (1995) reported that group-size is associated with attendance in group fitness, so it could be that the differences in group exercise behavior between the three groups are affected by this factor. Fifth, although the duration of each session had a minimum of 30 minutes, some sessions lasted 45 to 60 minutes, which could have influenced the group exercise experience. It would have been more consistent to use programs with the same duration, but this would have decreased the real-life approach of the study and limited the options for self-set activities.

Future research should investigate which factor of the coaching protocol is contributing the most to the effect on group exercise behavior. This could be the goal-setting process itself, but also confounding factors like a scheduled meeting, small group setting, additional attention and the live support of a professional. More research is warranted on the influence of a ‘’true group’’, as reported by Burke et al. (2006), on group exercise behavior in fitness clubs. Exercising in a group exercise program does not automatically provide group dynamic principles that increase cohesiveness. This study made it clear that self-efficacy only explains a small proportion of the variance on group exercise behavior in fitness clubs. This is understandable for complex types of behaviors like exercise. From literature it is known that self-efficacy is strongly associated with exercise behavior, so other strategies to increase self-efficacy should be tested, like individual coaching, more extensive coaching (60 minutes and more) or induction programs were exercisers can try and test different types of programs. Future research should also address the effectiveness of self-set activities and self-set goals for a longer period of time, for example 12 or 24 months. The current 12-weeks could be crucial for starting exercise behavior and long term maintenance of behavior, but time-effects on how long does a coaching session increases group exercise behavior, should be

investigated.

Conclusion

This study demonstrates that group exercise behavior in fitness clubs can be improved significantly by a coaching protocol on self-set goals based on tenets of self-efficacy theory. Additional research is needed to test long term effects, ultimately to improve the health and fitness levels of the 144 million individuals exercising in fitness clubs worldwide.

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Key points

- Approximately 144 million individuals exercise in fitness clubs worldwide.
- About 50% participate in at least one group exercise program and 23% participate only in group exercise classes with instructor.
- Research on attendance and exercise behavior in fitness clubs is limited but there are strong indications that the frequencies are low.
- This study demonstrates that group exercise behavior in fitness clubs can be improved significantly by a coaching protocol on self-set goals based on tenets of self-efficacy theory.

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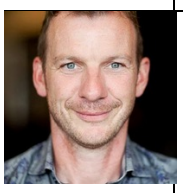

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