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Research article

## The Effects of a Self-Efficacy Intervention on Exercise Behavior of Fitness Club Members in 52 Weeks and Long-Term Relationships of Transtheoretical Model Constructs

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### Abstract

The transtheoretical model of behavior change (TTM) is often used to understand changes in health-related behavior, like exercise. Exercise behavior in fitness clubs is an understudied topic, but preliminary studies showed low frequencies and large numbers of drop-out. An initial 12-week self-efficacy intervention reported significant effects on exercise behavior. The objective of this follow up study is testing effects on exercise behavior over 52 weeks and the long-term relationships of all TTM constructs. In total 122 participants ( $M_{\text{age}} 42.02$  yr.;  $SD 12.29$ ; 67% females) were recruited and randomly assigned to group 1 (control), group 2 (self-set activities) and group 3 (self-set goals coaching). All participants were monitored 52-weeks. Measurements at baseline, 4, 8, 12, 26 and 52 weeks, using validated scales for stages of change, self-efficacy, decisional balance and processes of change. Exercise behavior and drop-outs were registered. An ANOVA revealed that group 3 significantly ( $p < 0.05$ ) differed in exercise sessions from group 1 and 2 during the 12 weeks. A chi-square test indicated significant differences for continuing exercising after the intervention: 7 of group 1; 6 of group 2; 19 of group 3. In total 5 demonstrated regular exercise behavior at 26 weeks, and 3 at 52 weeks. Self-efficacy, decisional balance, and processes of change showed limited long-term changes over the later stages of change. At all measurements, participants reported more pros than cons and used more behavioral than cognitive processes. Exercise behavior of members in fitness clubs demonstrated dramatic developments in 52 weeks. The frequencies of sessions were so low that health effects will be minimal. The integrative character of the TTM appears to be weak; the data indicated limited relationships. More research is needed to understand exercise behavior and define optimal strategies to increase exercise attendance and decrease drop-outs in the long term.

**Key words:** Health, programs, maintenance, attendance, adherence, drop-out.

### Introduction

Studies demonstrated that exercise is medicine and necessary for health (American College of Sports Medicine, 2014; Dishman et al., 2013; Lavie et al., 2013; Ross et al., 2016). In fitness clubs, members predominantly exercise for health benefits (Baart de la Faille et al., 2012). The International, Health, Racquet and Sportsclub Association (IHRSA, 2016), estimated that 151 million individuals exercise in 187.000 fitness clubs worldwide. Towards exercising in a fitness club, Middelkamp et al. (2016)

distinguish three kinds of behavior: attendance behavior (this occurs when an individual enters the facility), program attendance (an individual attends a specific program), and finally exercise behavior (the individual needs to exercise towards certain standards or minimums in terms of frequency, duration and intensity). Research on attendance and exercise behavior in fitness clubs is limited (Middelkamp and Steenbergen, 2015), but preliminary studies indicated low amounts of exercise sessions in fitness clubs with an average of 1.1 session per month over a 24-month period for a sample of 259.000 ex-members. Only 10% demonstrated regular exercise behavior for six consecutive months and 2.3% never relapsed in two years (Middelkamp et al., 2016). These frequencies will hardly impact health (ACSM, 2014; Dishman et al., 2013). Other studies reported low attendance figures as well, mainly for the first 36 weeks (Annesi et al., 2011; Annesi, 2003).

The transtheoretical model of behavior change (TTM) is frequently used to systematically describe and understand a wide range of health behaviors and changes therein, such as smoking cessation, safer sex, quitting cocaine, or the adoption and maintenance of exercise (Prochaska and DiClemente, 1983; Prochaska et al., 1994). Although interventions demonstrated that physical activity and exercise are necessary for health (American College of Sports Medicine, 2014; Dishman et al., 2013), studies on different populations (USA and Europe) showed that less than 5% of adults exercise the minimum amount to impact health (Cavill et al., 2006; Garber et al., 2011). Furthermore, research indicated that 50% of the exercisers drop-out in the first six months (Berger et al., 2002). To study exercise behavior, the TTM is often applied for an in-depth understanding of the development of this specific behavior and its change over time (Buckworth et al., 2013; Reed, 2001). In various populations and settings, the existence of significant relationships between the TTM and exercise behavior have been demonstrated (Fallon et al., 2005; Marshall and Biddle, 2001; Spencer et al., 2006). The current model describes four key constructs; 1. stages of change; 2. decisional balance; 3. self-efficacy; and 4. processes of change. The stages of change are the organizing construct of the TTM and hypothesize that individuals move cyclically through the stages with periods of progression and relapse. The stages of change contain five main stages (Dishman et al., 2010) to cease an unhealthy (like smoking) or adopt a

healthy behavior (like exercise), or six stages if the termination/relapse stage is also included (Cardinal, 1998; Fallon et al. 2005; Prochaska and Marcus, 1994;). The stages are summarized in Table 1.

**Table 1. The stages of change.**

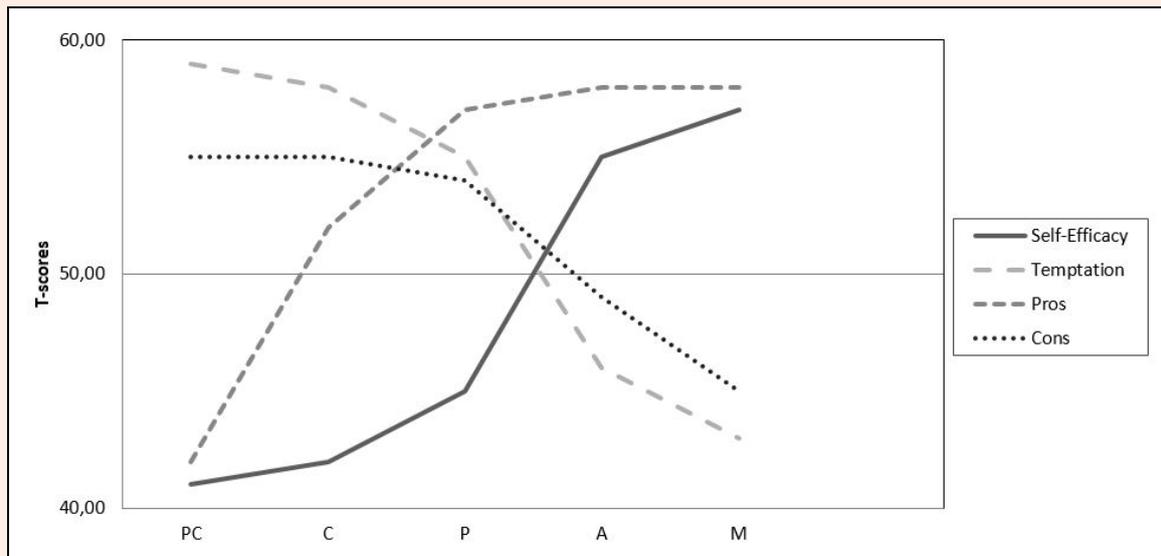
Stage	Name	Description
1	<b>Pre-contemplation</b>	People who aren't currently thinking of changing their behavior. In short: I WON'T and I CAN'T stage.
2	<b>Contemplation</b>	People who aren't currently changing their behavior, but do intent to change in the next six months. In short: I MIGHT stage.
3	<b>Preparation</b>	People who are preparing to change their behavior within the next 30 days. In short: I WILL stage.
4	<b>Action</b>	People who made a change in their behavior, but have changed recently (up to six months but no longer). In short: I AM stage.
5	<b>Maintenance</b>	People who have changed for some time, at least six months. The behavior has become a reasonably stable characteristic. In short: I HAVE stage.
6	<b>Relapse</b>	On the one hand, people can maintain their behavior, on the other hand, they can relapse into the previous behavior and return to earlier stages.

The decisional balance is the second construct of the TTM and contains two main scales of pros and cons for changing behavior (Janis and Mann, 1977). There are four dimensions for pros: useful benefits for the self; useful benefits for others; self-approval; approval of others. There are also four dimensions for cons: useful losses for the self; useful losses for others; self-disapproval; disapproval of others. The pros and cons are important for influencing persons in an early stage (pre-contemplation – preparation) to the action stage (Velicer et al., 1998). The third construct is self-efficacy (Bandura, 1997), which involves the degree of confidence a person has that he or she will not engage in a problem behavior in tempting situations. In short, self-efficacy is a person's belief in capabilities to overcome personal, social and environmental barriers to exercise. There are two important aspects that will influence the confidence to adopt and maintain exercise behavior. The first is efficacy expectations; one's belief about their own competence. The second is outcome expectations; one's belief in regards to the perceived results or outcomes of exercise. According to self-efficacy theory, human behavior is strongly influenced by self-regulation, for example by options to self-set (choose) exercise activities and self-set exercise goals (Bandura, 1991). A high level of (perceived) self-efficacy makes it more likely that an individual will initiate and maintain the behavior. Temptation to not exercise describes urges to engage in a specific habit for example remaining sedentary. It is conceptually related to self-efficacy. Dishman et al. (2010) reported that construct validity of temptation has been supported by significantly lower levels of temptation in the later stages but question whether temptation predicts physical activity independently of barrier self-efficacy. The fourth construct

measures ten processes of change, divided in five experimental or cognitive processes and five behavioral processes. The five cognitive processes are: consciousness raising; dramatic relief; environmental reevaluation; self-reevaluation and social liberation. The five behavioral processes are: counter conditioning; helping relationship; reinforcement management; self-liberation and stimulus control (Dishman et al., 2010; Prochaska and DiClemente, 1983; Reed, 2001).

The TTM supposes to be an integrative model (Velicer et al., 1998) meaning that individual constructs are related. This contains primarily the relationship of decisional balance, self-efficacy, temptation and processes of change with the stages of change. Prochaska et al. (1994) studied twelve problem behaviors and ordered the usage of pros and cons to the stages of change participants claimed to be in. The outcomes showed that pros and cons develop over time over the stages of change, and variations per problem behavior were observed. Concerning processes of change, Prochaska and DiClemente (1983) indicated that self-changers are using the fewest processes of change during precontemplation and emphasize consciousness raising at contemplation. They emphasized self-reevaluation in contemplation and action stage, and reported increased usage of self-liberation, helping relationships, plus reinforcement management in the action and maintenance stage. Velicer et al. (1998) mentioned that the cognitive processes are mostly used in the early stages, and the behavioral processes in the later stages of change. Dishman et al. (2010) reported contrary results; people appear to use both cognitive and behavioral processes while they attempt to increase or maintain their physical activity. The integrative nature of the TTM has also been applied to self-efficacy and temptations. Based on theory, self-efficacy mainly starts to increase at preparation and remains stable in action and maintenance stage. Temptation decreases in the preparation, action and maintenance stage (Velicer et al. 1998; Dishman et al. 2010). A schematic overview of the relationship between stage and self-efficacy, temptation, pros and cons for a healthy behavior such as exercise, is demonstrated in Figure 1, based on Velicer et al. (1998).

Spencer et al. (2006) reviewed 150 studies that applied the TTM to exercise behavior, of which 38 interventions, 70 population studies, and 42 validation studies. From the intervention studies, 32 stage-matched programs were reviewed, plus 6 non-stage matched, with 29 using self-report exercise measures. 25 studies were shown to be successful in motivating participants towards higher stages and increased amounts of exercise. Although the applicability of the TTM to exercise behavior seems promising, the current state of literature is inconclusive. For example, Dishman et al. (2009) concluded that the TTM failed to predict change in regular physical activity in a multiethnic cohort. Fallon et al. (2005) and Spencer et al. (2006), reported that TTM studies have important limitations: lack of diverse and representative participants; lack of longitudinal studies; different definitions of exercise; most studies rely on self-reports instead of objective measurements; some studies do not include all TTM constructs; lack of validity for several constructs;



**Figure 1.** Schematic overview of the relationship between stage and self-efficacy, temptation, pros and cons for a healthy behavior (Velicer et al., 1998).

most studies addressed middle-class, white, female populations, thereby limiting the generalizability of the studies. More research on specific populations is needed. In a systematic review, 33 studies were found on exercise behavior of members in fitness clubs, and only eight addressed one or more constructs of the TTM (Middelkamp and Steenbergen, 2015), meaning that the TTM is hardly tested in this population. This supports the need for specific research in this setting. In an initial 12-week study (Middelkamp et al., 2016), only the effects of a self-efficacy (manipulating two options for self-regulation) intervention were investigated. This intervention demonstrated significant effects on (increased) exercise behavior. This initial project was the start of a 52-weeks study measuring all TTM constructs, guided by the following two research questions. What are the effects of a 12-week self-efficacy intervention on exercise behavior of members in fitness clubs after 12, 26 and 52 weeks? What are the long-term relationships of TTM constructs over 12, 26 and 52 weeks?

## Methods

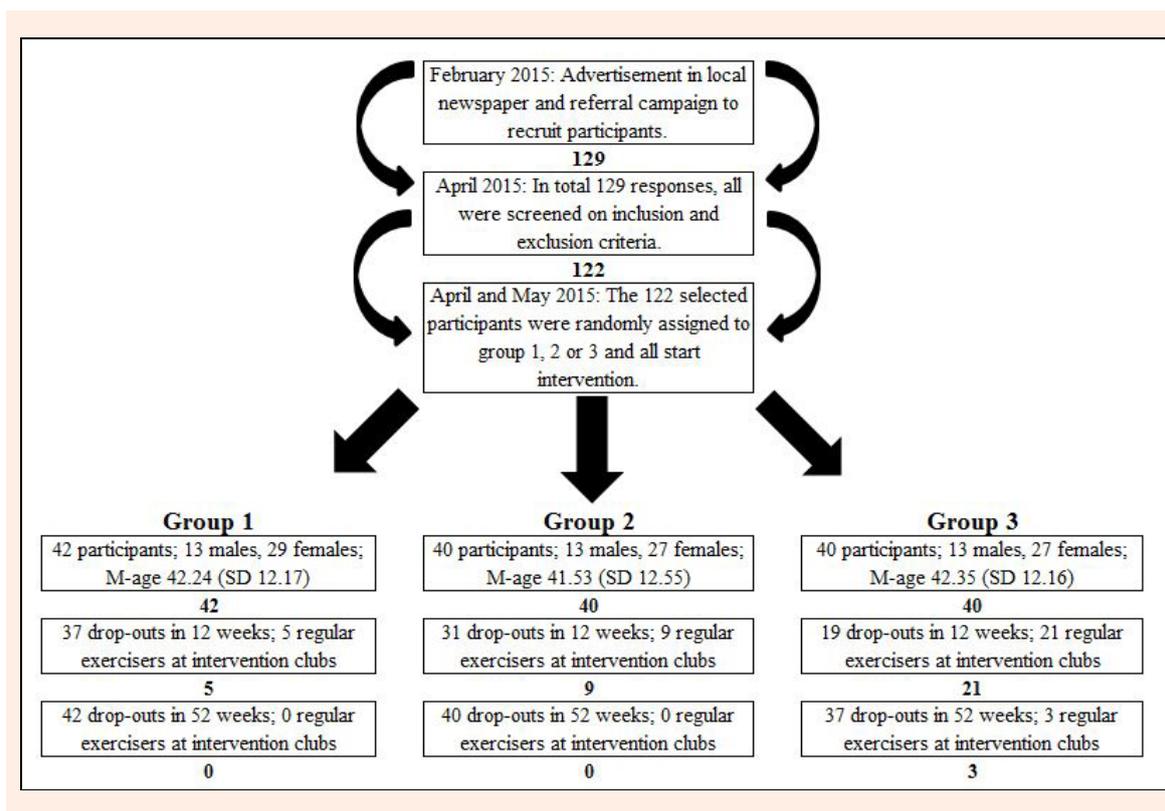
### Participants

In February 2015, two fitness clubs in The Netherlands were approached for the initial project, testing the effects of two self-efficacy (self-regulation) interventions on group exercise behavior in 12 weeks, reported in Middelkamp et al. (2016). Participants were recruited in two ways; by an advertisement in a local newspaper, and via existing members recruiting referrals. Criteria were: age 18+ and <70 years; no health conditions; no member of a fitness club for six months. Health conditions were screened via a PAR-Q. Finally, 122 participants were included and agreed with all terms and conditions, signed a Dutch human subject protection statement, aligned with the principles of the declaration of Helsinki, and participated voluntarily. In the randomization process, the par-

ticipants 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, per the following schedule: 1-2-3-3-2-1-1-2-3-3-2, et cetera. Thus, 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 1, 41.53 (SD 12.55), in group 2 and 42.35 (SD 12.16) in group 3. Figure 2 summarizes the flow of participants during the intervention.

### Procedure

All participants started to exercise from April or May 2015. The group exercise-to-music programs of Les Mills were used in all three groups, because they are prescribed and follow a standardized format, performed equally by all instructors. This was done to ensure the controllability of this ‘real-life’ intervention. The programs consist of 8 to 10 music tracks per class and for each track specific exercises are pre-scripted matching the music. Instructors only teach the programs after certification, and follow an ongoing educational program. The programs are used in the same format in 17,000 fitness clubs worldwide, including 850 clubs in the Netherlands. Multiple scientific studies provided physiological profiles of the programs (Harvey, 2012; Khan et al., 2008; Oliveira et al., 2009; Rixon et al., 2006), so next to frequency and duration, data on exercise intensity was available for the intervention. The programs demonstrated a %HR-max in the range of 60 (SD 6.5) to 74 (SD 6.7) and an energy expenditure (kcal/min) from 8.0 (SD 1.6) to 9.9 (SD 1.7). Les Mills provides live classes, with live coaching by a certified instructor and virtual classes. In virtual classes, the exercise programs are broadcasted on a big



**Figure 2.** Participant flow diagram.

screen using a beamer and sound system. All classes were limited to a maximum of 30 participants.

During the intervention, the three groups followed strictly defined programs. Group 1: the control group, could only exercise using a Les Mills virtual indoor cycling program, named RPM virtual, releases 68 and 69 (15 scheduled classes per week plus unlimited amounts of on-demand classes). The RPM virtual program was selected as a control program and was available for all groups because it has the lowest participation barriers (close to 100% of the Dutch can 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 was provided with self-set activities by giving multiple options to participate in group exercise programs. They could choose between virtual indoor cycling (idem as group 1), 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: the second experimental group, was provided with the same group exercise programs of group 1 and 2, but additionally received a monthly coaching protocol on self-set goals, in small groups of 2 to 6 participants, organized by three exercise professionals at baseline; after 4 weeks; after 8 weeks; and 12 weeks. The first session was executed by an exercise professional (the third author of this study); the two other exercise professionals (one per club) received detailed instructions to perform the same procedures, with in total four thirty minute sessions per club per four weeks,

of which 24 sessions by the third author. The coaching followed a strict protocol for goal setting and participants filled in a standardized form (one page) concerning; 1. their self-efficacy expectations to participate in group exercise programs; 2. their outcome expectations; goals to achieve in six months, divided in short term monthly subgoals, including two types of goals; a. results-oriented goals (e.g. losing 12 kg of body weight in 12 weeks), and b. process-oriented goals (e.g. exercising 2x per week with a minimum of 30 minutes). Outcome values were also discussed (what is the importance of these outcomes for the participant). 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 programs. After the initial intervention, the participants could decide to maintain to exercise in the current fitness club by paying a membership fee, or choose to exercise in another fitness club, or exercise in another setting, or not exercise at all. All 122 participants were included in the follow up study and monitored at 12 weeks, 26 weeks and 52 weeks.

### Measures

The TTM constructs were measured using validated scales of Geller et al. (2012), using a 1-factor construct with 6-indicators for barrier self-efficacy. Temptation was represented by two correlated latent factors; affect (3-indicators) and competing demands (4-indicators). The decisional balance construct used two correlated latent factors; pros and cons with 5- and 4-indicators, respectively. For processes of change (cognitive/experimental

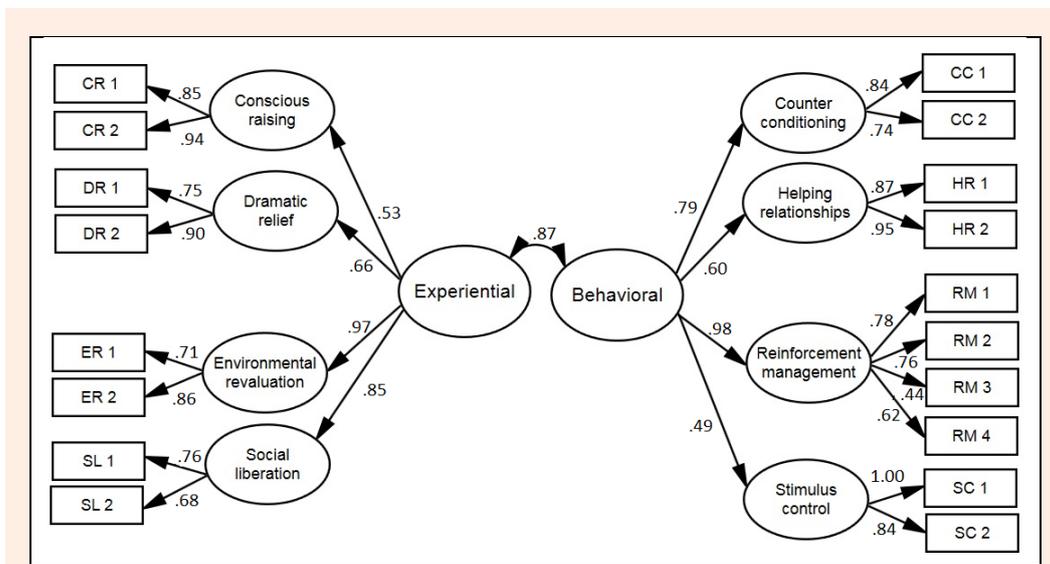
and behavioral) a scale that represented 8 of the original 10 processes was used (with 18 indicators). Scales consisted of statements like (in case of barrier self-efficacy) “how confident are you to exercise in the following situations” for example, “when you must exercise alone”. Participants reported on a 5-point Likert scale to indicate how confident they are, ranging from “not at all confident” till “completely confident”, with exception of the temptation scale (0-100%). All scales were translated into Dutch. Measurements were obtained at baseline (M0) and after 4 weeks (M1), 8 weeks (M2), 12 weeks (M3), 26 weeks (M6) and 52 weeks (M12), via an online survey system (NETQ). Confirmatory factor analysis (CFA) confirmed the internal validity of the Dutch version of the scales. Reliability analysis were acceptable at all measurements (Field, 2009): Cronbach’s Alpha ranges for self-efficacy from 0.74 to 0.86, for temptation from .82 to .86, for decisional balance pros from 0.76 to 0.89, for decisional balance cons from .71 to .83 and processes of change from 0.86 to 0.92. A Structural Equating Modeling (SEM) was performed at M3 (12-weeks) to evaluate the relationships (fits) of processes of change right after the initial intervention, using AMOS 24 (Arbuckle, 2016). The fit indices  $\chi^2$ , Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Tucker Lewis coefficient (TLI) were used to evaluate the fit of the models. The chi-square index is a badness-of-fit-index and should be non-significant ( $p > 0.05$ ). RMSEA values smaller than 0.08, and CFI or TLI values higher than 0.90 indicate a good fit (Kline, 2005). The fit indices showed a sufficient fit of the model ( $\chi^2(127) = 201.44$ ,  $p < 0.001$ , RMSEA = 0.07, CFI = 0.91, TLI = 0.88). There is a high correlation between the latent factors experiential and behavioral ( $r = 0.87$ ). The factors environmental reevaluation ( $\beta = 0.97$ ) and social liberation ( $\beta = .85$ ) are strongly related to the experiential latent factor, whereas conscious raising and dramatic relief showed lower regression coefficients ( $\beta = .53$ , and  $\beta = 0.66$ , respectively). Concerning the behavioral latent factor, reinforcement

management ( $\beta = 0.98$ ) showed the strongest relation in comparison to stimulus control ( $\beta = 0.49$ ) and helping relationships ( $\beta = 0.60$ ). See Figure 3.

Exercise behavior was measured continuously by registration of actual exercise participation, which consisted of group exercise sessions only in the first 12 weeks, but included individual exercise sessions as well from week 13 to 52. Group exercise behavior was defined as exercising in the same structured program in the same environment (group exercise room) with a minimum of two individuals. Regular exercise behavior was defined as exercising with a minimum one time per week on average. Drop-outs were registered during the full 52 weeks, and defined as not exercising in the intervention clubs for four weeks in a row (Middelkamp et al., 2016). Because it was known from previous studies that exercise behavior in fitness clubs is low and drop-outs are high, an additional measurement was performed after 52 weeks, using an online version of the stages of change scale (short version) (Marcus et al., 1992). This scale was modified to the current study and defined regular exercise towards the participants as: any planned physical activity performed to increase physical fitness, on average once a week for minimum of 30 minutes per session; exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat. Data was analyzed using SPSS. An (repeated measure) ANOVA and chi-square tests were performed. Alpha level was set at .05 (Cohen, 1988).

**Results**

The first research question focused on the effects of a 12-week self-efficacy intervention on exercise behavior of members in fitness clubs after 12, 26 and 52 weeks. Table 2 summarizes descriptive statistics including mean group exercise sessions of 2.74 (SD 4.65) in group 1; 4.75 (SD 6.08) in group 2; 12.25 (SD 9.07) in group 3 over the initial 12-week intervention.



**Figure 3.** Structural Equation Model (SEM) of Processes of Change at 12 weeks (simplified version; all numbers above the arrows are standardized regression coefficients).

**Table 2. Overview of participants, response rates, exercise sessions and drop-out.**

	Control (n = 42)	Experimental 1 (n = 40)	Experimental 2 (n = 40)
Age (years)	42.24 (SD 12.17)	41.53 (SD 12.55)	42.35 (SD 12.16)
% Females	69	68	68
Range of response rates online TTM scales	93% (T0) – 55% (T12)	100% (T0) – 60% (T12)	95% (T0) – 70% (T12)
Total exercise sessions week 1 - 12	115	190	490
Drop-outs in 12 weeks	37 (88%)	31 (78%)	19 (48%)
Total exercise sessions week 13 - 52	114	126	264
Drop-outs in 52 weeks	42 (100%)	40 (100%)	37 (93%)

**Table 3. Percentages of participants in stages of change after 52 weeks (n=86) based on self-report.**

Exercise in general	PC	C	P	A	M
Control	28.6%	14.3%	7.1%	7.1%	42.9%
Experimental 1	26.9%	7.7%	0.0%	11.5%	53.8%
Experimental 2	6.3%	18.8%	6.3%	12.5%	56.3%
Exercise in (any) fitness club	PC	C	P	A	M
Control	53.6%	10.7%	10.7%	0.0%	25.0%
Experimental 1	61.5%	7.7%	0.0%	7.7%	23.1%
Experimental 2	31.3%	15.6%	6.3%	3.1%	43.7%

PC = pre-contemplation; C = contemplation; P = preparation; A = action; M = maintenance.

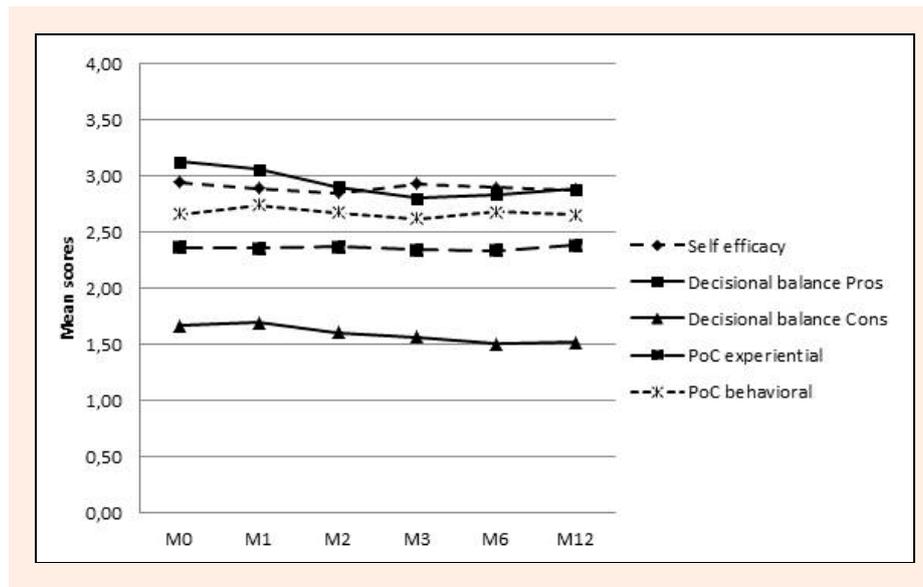
An ANOVA at 12 weeks, after finalizing the intervention, demonstrated significant differences between group 1 and 3, and group 2 and 3 in exercise sessions over the total 12 weeks,  $F(2, 119) = 13.30$ ,  $p < 0.001$ ,  $\eta^2 = 0.18$ . In the follow up stage of the intervention, participants first had to decide if they wanted to continue to exercise in the current fitness club by paying a membership fee, choose to exercise in another fitness club, exercise in a different setting, or not exercise at all. A chi-square test indicated significant ( $p < 0.05$ ) differences with 7 participants of group 1, 6 of group 2 and 19 participants of group 3 purchasing a membership in the same fitness club to continue their exercise program. Exercise sessions in the total follow up period (week 13 – 52) demonstrated the following; the participants of respectively group 1, 2 and 3 executed 114, 126 and 264 exercise sessions for the total period of 40 weeks. The average amount of sessions per participant per week per group was 0.41 (1), 0.53 (2) and 0.35 (3). Based on the definition of regular exercise behavior, 5 of the in total 122 participants reached the maintenance stage at 26 weeks and 3 at 52 weeks, for exercise sessions in the intervention clubs only. The 3 regular exercisers were all from group 3. In Table 3, the scores on the stages of change scales after 52 weeks are presented per group and for two questions: do you exercise in general, and do you exercise in (any) fitness club? On average 51% reported to be in the maintenance stage for regular exercise in general, with no significant differences between the three intervention groups. For exercise in a fitness club, 43.7% of group 3 reported maintenance stage, compared to 25% and 23% in group 1 and 2.

The second research question studied the long-term relationships of TTM constructs over 12, 26 and 52 weeks. The response rates on the TTM scales over the total of 52 weeks ranged from 55% – 100% and differed per group (see Table 2). As visualized in Figure 4, self-efficacy, decisional balance (pros and cons), and processes of change (cognitive/experimental and behavioral) showed limited developments over time and changes related to the later stages of change (action and maintenance). Barrier self-efficacy demonstrated almost no

changes over the stages of change. Temptation is not included in the Figure 4 because the ranges in values differ from the other scales, but showed no significant changes. At all measurements, participants reported more pros than cons, starting at M0 (preparation). Over 52 weeks, participants used more behavioral processes than cognitive processes. A repeated measure ANOVA indicated one significant difference ( $p < 0.05$ ) between group 1 and 2 combined, and group 3; the coaching group used more behavioral processes. On other factors, there were no differences between the groups on TTM constructs.

## Discussion

Although the outcomes of the first research question on the long-term effects of a 12-week self-efficacy intervention showed statistical significant results on (group) exercise behavior in 12 weeks (Middelkamp et al., 2016), the effects were diminished at 26 and 52 weeks, with respectively only 5 and 3 participants maintaining regular exercise behavior in fitness clubs. This implies that exercise behavior of members in fitness clubs demonstrated dramatic decreases in 52 weeks and indicated that exercise adherence is very weak. The frequencies of exercise sessions are so low that health effects will be minimal to nonexistent (ACSM, 2014). As concluded by Middelkamp et al. (2016), self-efficacy only explains a small proportion of the variation (18% at best) in exercise behavior of members in fitness clubs. The effects of the coaching protocol (group 3) on exercise behavior were terminated fast after the end of the program, even when the coaching protocol stimulated significantly more participants to continue exercising in the same fitness clubs (3x as much compared to group 1 and 2). Although the coaching group showed less drop-out in 12-weeks, the average attendance in week 13 to 52 is not higher and drop-out on 52 weeks also showed small differences. Other studies that conducted similar self-efficacy based interventions with significant results did not test the long-term effects of a coaching program, after ending the program (Seghers et al., 2014; Annesi, 2002). Based on the current results, the TTM constructs explain limited



**Figure 4.** Developments of TTM constructs over 52 weeks (MO=baseline; M1=4-weeks; M2=8-weeks; M3=12-weeks; M6=26-weeks; M12=52-weeks).

variations towards exercise behavior of members in fitness clubs. In line with theory, participants reported using more behavioral than cognitive processes in the later stages of change. Other than theory suggests; pros and cons stayed stable from preparation to maintenance stage. The same for temptation; the TTM suggests that temptation decreases during action and maintenance, but this could not be confirmed in the current study. This challenges the integrative character of the TTM. In fact, the data indicated that constructs are to some exceptions not related as theory suggests. For the fitness sector, there is another memorable result since approximately 50% of the participants reported to still exercise in general after 52 weeks, with about 30% in another fitness club. This could indicate that overall exercise frequencies are not that low and demonstrate that different exercise settings are used by the participants, but studies on this topic are lacking.

The current real-life study demonstrated multiple challenges. The first is typical for this kind of research; the large number of drop-outs. The frequencies on exercise behavior at 26 and 52 weeks were so low that multiple statistical tests for longitudinal studies could not be conducted. The self-report on stages of change after 52-weeks provided additional data, but is a less objective measurement and was conducted only once. A second flaw is the limited control on the exercise program from week 13 to 52. During the initial intervention of 12 weeks, frequency, duration and intensity of the group programs was fully controlled. In the follow up period, only frequency and duration were checked, but for the levels of intensity only indications could be used because participants also exercised individually in a non-prescribed program. There is a third limitation: the study mainly focused on the later stages of change. With only a small proportion of the participants making it to the maintenance stage, the later stages of change of the TTM model seems to be a difficult one to investigate. Even when criticism exists, the current study was the first TTM based study of 52 weeks on exercise behavior of members

in fitness clubs and provides important insights for future research. Additional studies are needed to understand this complex kind of behavior and define optimal strategies to increase exercise attendance and decrease drop-outs. Special focus is recommended on the long-term effects of programs preferably stretched towards multiple years because health benefits will mainly occur by maintaining exercise behavior lifelong.

## Conclusion

The transtheoretical model of behavior change demonstrated limited usability to understand and promote exercise behavior of members in fitness clubs over 52 weeks. A self-efficacy intervention provided positive short term results, but did not bring long-term changes in exercise behavior within this specific population. Self-efficacy, temptation, decisional balance, and processes of change showed limited longitudinal changes over the later stages of change, challenging the integrative character of the TTM.

## References

- ACSM. (2014) *ACSM's guidelines for exercise testing and prescription*. American College of Sports Medicine. 9th revised edition. Williams & Wilkins.
- Annesi, J.J. (2002) Goal-setting protocol in adherence to exercise by Italian adults. *Perceptual and Motor Skills* **94**, 453-458.
- Annesi, J.J. (2003) Effects of a Cognitive Behavioral Treatment Package on Exercise Attendance and Drop-Out in Fitness Centers. *European Journal of Sport Science* **3**(2), 1-16.
- Annesi J.J., Unruh, J.L., Marti, C.N., Gorjala, S. and Tennant, G. (2011) Effects of the coach approach intervention on adherence to exercise in obese women: assessing mediation of social cognitive theory factors. *Research Quarterly for Exercise and Sport* **82**(1), 99-108.
- Arbuckle, J.L. (2016) *IBM SPSS Amos 24 User's guide*. Chicago, IL: SPSS.
- Ashford, S., Edmunds, J. and French, D.P. (2010) What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal of Health Psychology* **15**(2), 265-288.

- Baart de la Faille, M., Middelkamp, J. and Steenbergen, J. (2012) *The state of research in the global fitness industry*. BlackBox-Publishers, the Netherlands.
- Bandura, A. (1991) Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes* **50**, 248-287.
- Bandura, A. (1997) *Self-efficacy: The exercise of control*. New York: Freeman.
- Berger, B.G., Pargman, D. and Weinberg, R.S. (2002) *Foundations of exercise psychology*. Morgantown, WV: Fitness Information Technology.
- Buckworth J., Dishman, R.K., O'Conner, P.J. and Tomporowski, P.D. (2013) *Exercise Psychology*. 2nd Edition. Human Kinetics, Champaign, USA.
- Burke, S.M., Carron, A.V., Eys, M.A., Ntoumanis, N. and Estabrooks, P.A. (2006) Group versus Individual Approach? A meta-analysis of the effectiveness of interventions to promote physical activity. *Sport & Exercise Psychology Review* **2(1)**, 13.
- Cardinal, B.J. (1998) Interaction between stage of exercise and history of exercise relapse. *Journal of Human Movement Studies* **34**, 175-185.
- Cavill, N., Kahlmeier, S. and Racioppi, F. (2006) *Physical activity and health in Europe: Evidence for action*. Copenhagen, Denmark: World Health Organization.
- Cohen, J. (1988) *Statistical power analysis for the behavioral sciences*. 2nd edition. Hillsdale: Lawrence Erlbaum.
- Dishman, R.K., Thom, N.J., Rooks, C.R., Mot, R.W., Horwath, C. and Nigg, C.R. (2009) Failure of post-action stages of the transtheoretical model to predict change in regular physical activity: a multiethnic cohort study. *Annual Behavioral Medicine* **37**, 280-293.
- Dishman, R. K., Vandenberg, R. J., Motl, R. W. and Nigg, C. R. (2010) Using Constructs of the transtheoretical model to predict classes of change in regular physical activity: a multi-ethnic longitudinal cohort study. *Annals of Behavioral Medicine* **40(2)**, 150-163.
- Dishman, R. K., Jackson, A. S. and Bray, M. S. (2010). Validity of processes of change in physical activity among college students in the TIGER study. *Annals of Behavioral Medicine*, **40(2)**, 164-175.
- Dishman, R.K., Heath G.W. and Lee, I-M. (2013) *Physical activity epidemiology*. 2nd edition. Human Kinetics Publishers, Champaign, USA.
- Field, A. (2009) *Discovering Statistics Using SPSS*. Sage Publications Ltd.
- Garber, C.E., Blissmer, B., Deschenes, M.R., Franklin, B.A., Lamonte, M.J., Lee, I.M., Nieman, D.C. and Swain, D.P. (2011) Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine & Science in Sports & Exercise* **43**, 1334-1359.
- Geller, K.S., Nigg, C.R., Motl, R.W., Horwath, C.C. and Dishman, R.K. (2012) Transtheoretical model Constructs for physical activity behavior are invariant across time among ethnically diverse adults in Hawaii. *Psychology of Sport and Exercise* **13**, 606-613.
- Harvey, A. (2012) Quantifying and comparing activity in group exercise classes: A literature review. *Journal of Fitness Research* (2012) **1**: 50-65.
- IHRSA (2016) *The IHRSA Global Report 2016*. International Health Racquet & Sports club Association, Boston.
- Janis, I.L. and Mann, L. (1977) *Decision making: A psychological analysis of conflict, choice, and commitment*. New York: Free Press.
- Kim, Y. H. (2006) Application of the transtheoretical model to identify psychological Constructs influencing exercise behavior: A questionnaire survey. *International Journal of Nursing Studies* **44(2007)**, 936-944.
- Khan, R.S., Marlow, C. and Head, A. (2008) Physiological and psychological responses to a 12-week Bodybalance training programme. *Journal of Science and Medicine in Sport* **11**, 299-307.
- Kline, R. B. (2005) *Principles and practice of structural equation modeling*. 2nd edition. New York, NY: The Guilford Press.
- Lavie, C.J., Johannsen, N., Swift, D., Sénéchal, M., Earnest, C., Church, T., Hutber, A., Sallis, R. and Blair, S.N. (2013) Exercise is Medicine: The Importance of Physical Activity, Exercise Training, Cardiorespiratory Fitness, and Obesity in the Prevention and Treatment of Type 2-Diabetes US. *Endocrinology* **9(2)**, 95-100.
- Marcus, B.H., Selby, V.C., Niaura, R.S. and Rossi, J.S. (1992) Self-Efficacy and the stages of exercise behavior change. *Research Quarterly for Exercise and Sport* **63**, 60-66.
- Marshall, S. J. and Biddle, S. J. H. (2001) The transtheoretical model of behavior change: A meta-analysis of application to physical activity and exercise. *Annals of Behavioral Medicine* **23**, 229-291.
- Middelkamp, J. and Steenbergen, B. (2015) The transtheoretical model and exercise behavior of members in fitness clubs: Systematic review. *Journal of Fitness Research* **4(2)**, 43-54.
- Middelkamp, J., Van Rooijen, M. and Steenbergen, B. (2016) Attendance behavior of ex-members in fitness clubs: A retrospective study applying the stages of change. *Perceptual and Motor Skills* **122(1)**, 350-359.
- Middelkamp, J., Van Rooijen, M., Wolfhagen, P. and Steenbergen, B. (2016) The Effects of Two Self-Regulation Interventions to Increase Self-Efficacy and Group Exercise Behavior in Fitness Clubs. *Journal of Sports Science and Medicine* **15**, 358-363.
- Oliveira, A.S., Greco, C.C., Pereira, M.P., Figueira, T.R., De Araujo Ruas, V.D., Goncalves, M. and Denadai, B.S. (2009) Physiological and neuromuscular profile during a Bodypump session: Acute responses during a high-resistance training session. *Journal of Strength and Conditioning Research* **23(2)**, 579-586.
- Poag-DuCharme, K. A. and Brawley, L. R. (1993) Self-efficacy theory: Use in the prediction of exercise behavior in the community setting. *Journal of Applied Sports Psychology* **5**, 178-194.
- Prochaska, J.O. and DiClemente, C.C. (1982) Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice* **19**, 276-288.
- Prochaska, J.O. and DiClemente, C.C. (1983) Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology* **51**, 390-395.
- Prochaska, J.O. and Marcus, B. (1994) The transtheoretical model: applications to exercise. In: *Advances in exercise adherence*. Ed: Dishman, R.K. Human Kinetics, Illinois. 161 - 180.
- Prochaska, J.O., Velicer, W.F., Rossi, J.S., Goldstein, M.G., Marcus, B.H., Rakowski, W., Fiore, C., Harlow, L.L., Redding, C.A., Rosenbloom, D. and Rossi, S.R. (1994) Stages of change and decisional balance for 12 problem behaviors. *Health Psychology* **13**, 39-46.
- Reed, G.R. (2001). Adherence to exercise and the transtheoretical model of behavior change. *Bull S.* (2001) Adherence issues in sport and exercise, 19 - 45.
- Rixon, K.P., Rehor, P.R. and Bembem, M.G. (2006) Analysis of the assessment of caloric expenditure in four modes of aerobic dance. *Journal of Strength and Conditioning Research* **20(3)**, 593-596.
- Ross, R., Blair, S.N., Arena, R., Church, T.S., Despr R, J.P., Franklin, B.A., Haskell, W.L., Kaminsky, L.A., Levine, B.D., Lavie, C.J., Myers, J., Niebauer, J., Sallis, R., Sawada, S.S., Sui, X. and Wisl, S, U. (2016) Importance of Assessing Cardiorespiratory Fitness in Clinical Practice: A Case for Fitness as a Clinical Vital Sign. *Circulation* **134(24)**, 653-699
- Seghers, J., Van Hoecke, A.S., Schotte, A., Opdenacker, J. and Boen, F. (2014) The added value of a brief self-efficacy coaching on the effectiveness of a 12-week physical activity program. *Journal of Physical Activity and Health* **11(1)**, 18-29.
- Spencer, L., Adams, T. B., Malone, S., Roy, L. and Yost, E. (2006) Applying the transtheoretical model to exercise: a systematic and comprehensive review of the literature. *Health Promotion Practice* **7(4)**, 428-443.
- Velicer, W.F, Prochaska, J.O., Fava, J.L., Norman, G.J. and Redding, C.A. (1998) Smoking cessation and stress management: Applications of the Transtheoretical Model of behavior change. *Homoestasis* **38**, 216-233.

### Key points

- Approximately 151 million individuals exercise in 187.000 fitness clubs worldwide, mainly for health benefits.
- The transtheoretical model of behavior change is often used to understand changes in health-related behavior, like exercise, but was never applied to this understudied population.
- An initial 12-week self-efficacy intervention reported significant effects on (increased) exercise behavior.
- The effects of this intervention were diminished at 26 and 52 weeks, with respectively only five and three participants maintaining regular exercise behavior in fitness clubs.
- The integrative character of the TTM in this population appears to be weak; the data indicated limited relationships.

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