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Research article

Stay True to Your Workout: Does Repeated Physical Testing Boost Exercise Attendance? A One-Year Follow-Up Study

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Abstract
No prospective studies have investigated if repeated testing of physical performance and body composition are associated with exercise attendance or patterns in fitness club members. This study aimed to investigate if repeated physical testing was associated with exercise attendance and patterns in gym members and to report prospective data on use of the fitness club`s facilities and products. Untrained new members were recruited and divided into a test group (n = 125) and as controls (n = 125). All participants answered a survey including exercise involvement, at onset, and after 3, 6, and 12 months follow-up. The test group also measured body composition, maximal oxygen uptake, and maximal muscle strength (onset, and after 3 and 12 months). In total 73.6% answered all surveys, and in the test group, 44.8% completed all physical tests. Regular exercise attendance was defined as ≥2 sessions/week. Repeated testing showed no association with long-term regular exercise attendance (test group: 19.6%, controls: 19.8%; p = 0.638). At 3 months, a lower proportion in the test group reported engagement in resistance exercise (35.3% and 60.2%; p = 0.003) and had lower exercise frequency (2.0 and 2.6 days/week; p = 0.008) than controls. The test group had higher participation in group exercise classes (28.0% and 13.6%; p = 0.040). Exercise frequency decreased from onset to 12 months (from 2.6 to 2.2 days/week; p = 0.025) At 3, 6, and 12 months, 51.8%, 37.6%, and 37.4% reported regular exercise attendance, and 16.9% at all follow-ups. At all time-points, most common workout mode was individual resistance exercise (43.8% to 46.3%). Few attended group exercise classes (7.5% to 13.8%) or used a personal trainer (22.5% to 27.5%). Repeated physical testing did not improve exercise attendance, and we found no changes in members` use of the fitness club`s facilities and products. Only 16.9% reported regular exercise attendance throughout the first year of membership.

Key words: Exercise behavior, exercise patterns, fitness club members, fitness testing.

Introduction

To date, there are 210 000 fitness clubs and 183 million members worldwide, representing a 54% increase over the last decade (IHRSA, 2020). A fitness club may be seen as an indoor arena that holds equipment for the purpose of exercise, and that aim to accommodate our "modern" way of living, with limited time to engage in leisure-time exercise. Most major gyms are located where people live, work, and travel, have long and flexible opening hours, and several exercise options, such as intense group exercise classes of 30 minutes (IHRSA, 2020). Even though, less than 40% of fitness club members manage to adhere to a long-term commitment of regular exercise (Sperandei et al., 2016, Middelkamp et al., 2016, Gjestvang et al., 2020), a subset of physical activity that is planned, structured, and repetitive with the aim of improvement or maintenance of physical fitness (Caspersen et al., 1985). Most research has focused on psychosocial factors that may affect exercise and fitness club attendance (Kathrins and Turbow, 2010, Thogersen-Ntoumani and Ntoumanis, 2006, Jekauc et al., 2015, Sas-Nowosielski and Szopa, 2015, Gjestvang et al., 2020, Heiestad et al., 2020). In this context, attendance could be seen as a subset of adherence and may be a simple count of exercise sessions (visits at the gym) over a set period, or a number of exercise sessions attended over a follow-up period (Hawley-Hague et al., 2016). It is shown that motives driven by internal sources (Gjestvang et al., 2020, Kathrins and Turbow, 2010, Thogersen-Ntoumani and Ntoumanis, 2006) and higher levels of self-efficacy (Jekauc et al., 2015) and social support (Jekauc et al., 2015, Sas-Nowosielski and Szopa, 2015) contribute to regular attendance at the gym. However, fitness clubs offer additional services, such as physical testing. Hence, it is also of interest to investigate how physical testing influences members` exercise behaviour, an under-explored field.

Reasons for membership are varied, but the most common reported motives are increased physical fitness and health (Gjestvang et al., 2019a, Mullen and Whaley, 2010). A traditional simplified distinction of motivation is that individuals are driven by external incentives such as a reward, or from inner sources that derive from personal interest and joy in engaging in a specific task (Standage, 2012). It is suggested that personal inner sources rather than external incentives are associated with regular exercise (Ingledew et al., 2009). However, since most individuals who join a gym have extrinsic reasons for exercise, testing of strength, endurance, and body composition is common at fitness clubs, especially for clients of personal trainers. The tests are an important part of personal training to assess a client`s progress towards an external reward (Nelson and Asplund, 2016) or an exercise goal. We have previously reported a moderate improvement in maximal oxygen uptake (VO_{2max}), but no changes in maximal muscle strength and body composition during the first year at a fitness club (Gjestvang et al., 2019a). These were the results despite an increase in physical fitness as the main motive for exercise among the participants. Even though there is limited knowledge, it could be questioned if poor test results may negatively influence exercise attendance, and as such make exercise less pleasing and motivating (Wrench and Garrett, 2008).

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To our knowledge, no studies have investigated if repeated physical testing is associated with exercise attendance or patterns in beginner recreational exercisers in this specific setting. Several authors have investigated youths` motivational reactions to physical testing (e.g. Multistage Fitness test); however, few have examined if testing influences exercise frequency or habits (Cale and Harris, 2009). One study among middle-aged adults in Finland found that a fitness test battery demonstrated associations with exercise patterns (Suni et al., 1999). E.g., resistance exercise and physical activity levels were associated with the results of a push-up test and a walk-test, respectively (Suni et al., 1999). However, these associations were probably due to the participants` previous exercise behaviour, and it is largely unknown whether performing repeated testing of physical performance and body composition influences future exercise attendance or patterns among new exercisers. Testing in a fitness club setting has limitations in terms of feasibility and cost. It is time-consuming, requires qualified test personnel, and may not be suitable for individuals with different health challenges (Gosselink et al., 2004). Such testing may also give imprecise results due to poor equipment maintenance and insufficient standardized test-procedures (Gosselink et al., 2004). Therefore, an understanding of repeated physical testing and associations with exercise attendance and patterns are needed to better tailor physical testing and to improve the knowledge for whom testing is suited for in a fitness club setting.

The several workout options at a gym may be important to encourage members to long-term commitment to exercise and to increase member satisfaction (Freitas and Lacerda, 2019). However, there is a lack of prospective data on use of the fitness club and its facilities, and no studies have investigated this in untrained individuals starting a gym membership. Most of the studies in this field are cross-sectional (Kathrins and Turbow, 2010, Ready et al., 2005, Gonçalves et al., 2016, Schroeder et al., 2017, Waterman et al., 2014), or have not considered membership length (Hata and Umezawa, 1995, Kathrins and Turbow, 2010, Ready et al., 2005, Gonçalves et al., 2016).

This study aimed to investigate if repeated testing of body composition, VO_{2max}, and maximal muscle strength (as one repetition maximum (1RM)) at three time-points (at onset, and after 3 and 12 months of fitness club membership) were associated with exercise attendance and patterns in new recreational exercisers. Secondary, we wanted to report prospective data on use of the fitness club, its facilities, and products.

Methods

Study design and participants

This is a secondary analysis of data collected as a part of the broader research project *Fitness clubs - a venue for public health?,* a 12 months prospective study, aiming to investigate factors associated with exercise attendance and dropout in a group of new recreational exercisers in a fitness club setting (Gjestvang et al., 2019a, Gjestvang et al., 2017, Gjestvang et al., 2019b). The data set used in this study are original for publication and have not yet been used yet. Healthy, untrained new fitness club members were recruited from 25 gyms in Norway. The multipurpose fitness club chain had mid to high membership fees and focused to a large extent on customer satisfaction. The fitness clubs offered resistance and cardio exercise options, group exercise classes, and personal training, and also long reception opening hours and childcare. Members had purchased a 12-month contract that could not be cancelled or a "pay as you go" contract. Eligibility criteria were ≥18 years, ≤four weeks membership, classified as untrained (exercise <60 min once a week at moderate or vigorous intensity the last 6 months) (Garber et al., 2011), and no chronic disease considered to hinder exercise (i.e. heart disease, or severe hypertension).

All new members between October 2015 and November 2017 received an email invitation from the fitness club chain. A total of 676 new fitness club members responded. We excluded 270 that had exercised >60 min once a week at moderate or vigorous intensity the last 6 months and eight individuals with chronic disease. A total of 148 did not respond after the first email correspondence. Hence, the sample for the present study included 250 equal numbers of men and women, with 125 in a test group that underwent a physical test battery, and 125 as controls. Among all participants, 66 participants dropped out of the study. Losses to follow-up included life situation (n = 16), injury/disease (n = 6), relocation (n = 1) and unknown reasons (n = 43). A flow-chart of the study and participants is shown in Figure 1.

Ethical approval

The study sample received information about the project's purpose and procedures, and all participants gave their written consent before participating in the study. Concluded by the Regional Committee for Medical and Health Research Ethics (REK 2015/1443 A), the study did not require a full review. The study was approved by the Norwegian Social Science Data Service (NSD 44135) and conducted according to the Declaration of Helsinki.

Procedures

The test group underwent a test battery including assessment of body composition, VO_{2max}, and 1RM at onset, and after 3 and 12 months follow-up and a total of 56 (44.8%) underwent all physical tests. Body composition was determined with Inbody 720 (Biospace, USA), VO_{2max} was measured with a cardiopulmonary exercise test (Evans et al., 2015) and 1RM (McMaster et al., 2014) was performed in two different exercises (leg press and bench press in Smith-machine). All measurements were performed by qualified personnel following standardized procedures and took approximately 60 minutes to complete. More details of the test battery are published elsewhere (Gjestvang et al., 2017, Gjestvang et al., 2019a).

All included participants answered an online questionnaire (SurveyXact) to examine exercise attendance, exercise patterns, and use of the fitness club, its facilities, and products. A total of 184 (73.6%) answered at all follow-ups. The questionnaire section used in the present study was derived from a multidimensional survey that is previously described (Gjestvang et al., 2020, Heiestad et al., 2020, Gjestvang et al., 2017). The specific questions for the present study were primarily based on a previous study in

a Danish fitness club setting (Pedersen et al., 2011 in Danish), and all questions were close-ended. The data and analysis of the current study focused on exercise attendance and patterns at the fitness club, and we asked the participants to report over only the last four weeks, due to potential recall bias associated with the use of self-report (Sallis and Saelens, 2000). At all time-points, the questionnaire took approximately 25 minutes to complete. The main variables and questions for this study are shown in Table 1.

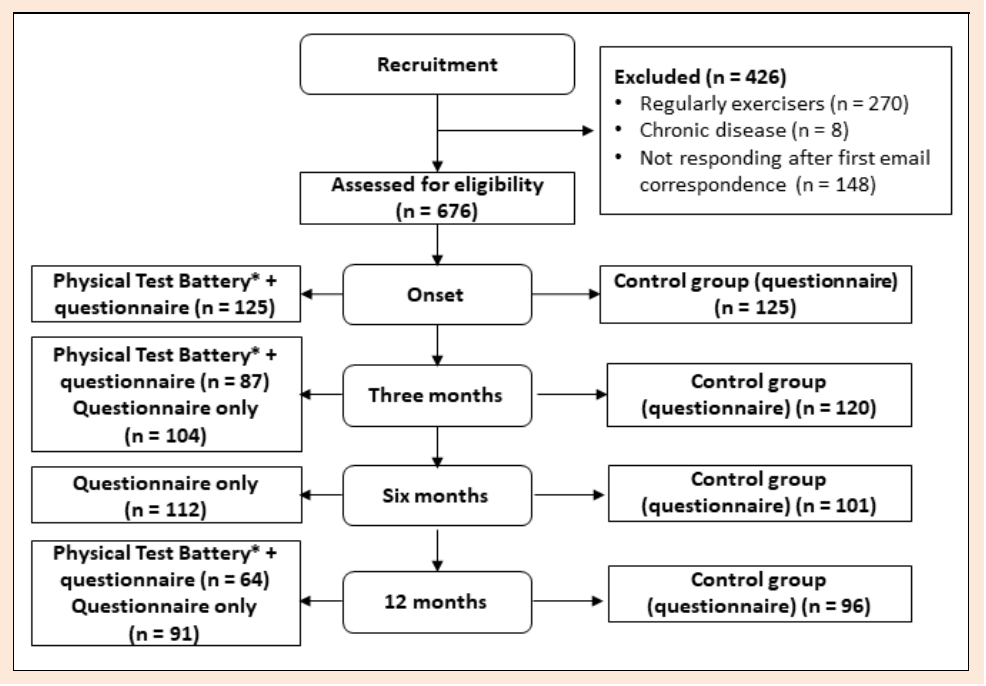

Figure 1. Flow-chart of the study and participants. *Assessment of maximal oxygen uptake, maximal muscle strength and body composition.

Table 1. Main variables and questions used to answer this study`s research aims.

Dimensions assessed	Main variables and questions used
Sociodemographic variables*	Age, gender, body weight, smoking, level of education, total household income, cohabitation and occupation.
Membership †	Assessed using the question: Are you still a member? Response options: "Yes" or "No".
Exercise attendance and drop-out †	Assessed using the questions: Exercise is a subset of physical activity that is planned, structured, and repetitive, and has the improvement or maintenance of physical fitness as a final or an intermediate objective. With respect to this, have you been exercising? Response options: "Yes" or *"No"*, How often have you exercised per week on average at the fitness club? Response option: *"Number of sessions"*.
Exercise patterns at the fitness club †	Assessed using the questions: What is your average exercise duration at the fitness club (do not include time used for shower and travel)? Response option: *"Minutes"*, Do you usually exercise individually (e.g. tread mill or resistance exercise) or at group exercise classes (e.g. aerobic or cycling)? Response options: *«Exclusively individually»*, *«Mainly individually»*, *«Both individually and at group exercise classes»*, *«Mainly group exercise classes»*, *«Exclusively group exercise classes»* or *«My choice of exercise mode is varied and random»*, Do you usually do resistance (e.g. use of machines or free weights) or endurance exercise? Response options: *«Exclusively resistance exercise»*, *«Mainly resistance exercise, but supplemented with endurance exercise»*, *«Equally distributed between the types of exercise methods»*, *«Mainly endurance exercise, but supplemented with resistance exercise»*, *«Exclusively endurance exercise»* or *«My choice of exercise method is varied and random»*, Have you attended group exercise classes? Response options: *«Yes»* or *«No»*, How often have you attended the following group exercise classes: Yoga/Pilates, Aerobic/Zumba, Resistance exercise, Cycling, Circuit exercise? Response options: *«rarely or never»*, *«once a month»*, *«two to three times a month»*, *«once a week»*, *«two to three times a week»*, *«four to five times a week»* or *«six to seven times a week»*.
Use of a personal trainer †	Assessed using the questions: Have you used a personal trainer (PT) to achieve your exercise goals? Response options: *«Yes»* or *«No»*, How many PT-sessions did you bought on your last purchase? Response option: *«Numbers of sessions»*.
Use of the fitness club`s childcare †	Assessed using the question: Have you used the fitness club`s childcare? Response options: *«Yes»*, *«No»* or *«I do not have children»*.
Exercise patterns outside the fitness club †	Assessed using the questions: Have you been exercising outside the fitness club? Response options: "Yes" or "No" and How often have you exercised per week on average outside the fitness club? Response option: *"Number of sessions"*.

*Answered at onset of fitness club membership, †Answered after three, six and 12 months follow-up.

To investigate if repeated testing was associated with exercise attendance at the fitness club, the participants were divided into regular or non-regular exercise attendance, or exercise dropout at each follow-up. In line with definitions suggested by Garber et al. regular exercise attendance was based on that ≥2 exercise sessions/week is suggested to improve factors such as VO_{2max} or 1RM, non-regular exercise attendance as ≤one exercise session/week, and exercise dropout as no exercise the last month. In participants who underwent the physical test battery (n = 56) and controls who answered the questionnaire (n = 96) at onset, and at 3 and 12 months follow-up, we classified exercise attendance throughout the first year of fitness club membership. We also analyzed one-year changes in use of the fitness club, its facilities, and products among participants reporting exercise at the fitness club at both 3, 6, and 12 months follow-up (n = 80).

Statistical analysis

Full details of sample size calculations regarding the test battery have been reported previously (Gjestvang et al., 2019a). For the present study, sample size considerations were based on our previous findings showing that around 40% were classified with regular exercise attendance at 12 months follow-up (Gjestvang et al., 2019a, Gjestvang et al., 2019b), as well as what the research group hypothesized as a relevant difference in exercise attendance between those who underwent a test battery with those who did not. We calculated that with 49 participants in each group, we would be able to detect a 25% difference in numbers reporting regular exercise attendance, with a power of 80% at the 0.05 level. To account for losses to follow-up and be able to do subgroup analyses, we aimed to recruit 125 participants into the test group (October 2015 to April 2016), and 125 as controls (October 2016 to October 2017).

Results are presented as means with standard deviations (SD) and range, or frequencies (n) and percentages. To compare differences between the test group and controls in background variables, we used an independent t-test or χ^2. To examine differences and changes in exercise attendance and patterns, and use of the fitness club, its facilities, and products, independent t-tests, χ^2, a one-way repeated measures ANOVA with Bonferroni correction or Cochran`s Q test were used as appropriate. For changes in the use of the fitness club, its facilities, and products the first year of fitness club membership, completers only were included in the analyses. The level of significance was set as $p \leq 0.05$.

Results

Descriptive data of general characteristics at onset of fitness club membership divided into the test group and controls are summarized in Table 2. Four out of ten (38.8%) were single, one third (32%) had children, and 36.0% were classified as overweight (BMI ≥ 25). Regarding BMI ≥ 30, controls were more likely to be obese compared with the test group (19.2% and 9.6%; p = 0.048). The groups were balanced in other background variables. There were fewer daily smokers compared with national statistics (12.0%) (Statistics Norway, 2019a), otherwise, socioeconomic status was comparable with the general adult population in Norway (Statistics Norway, 2019b). Participants` physical fitness and physical activity level are described previously (Gjestvang et al., 2019a, Gjestvang et al., 2017, Gjestvang et al., 2019b).

Is repeated testing associated with exercise attendance and patterns?

We did not find that repeated testing of body composition, VO_{2max}, and 1RM were associated with exercise attendance in new fitness club members (Table 3). In both groups, 54.2% and 39.9% reported regular exercise attendance at three and 12 months follow-up, respectively (p ≥ 0.05). However, fewer participants were classified with regular exercise attendance at the fitness club throughout all follow-ups (test group: 19.6%; controls: 19.8%).

Table 2. General characteristics of participants at onset of fitness club membership divided into physical fitness testing and control group.

	Physical fitness testing (n = 125)			Control group (n = 125)			
Variables	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**p**
Age (years)	36.8	11.0	18.0 – 71.0	36.0	11.5	18.0 – 64.0	0.606
Mean BMI (kg/m²)	25.0	3.9	19.2 – 45.2	26.2	4.8	17.6 – 46.7	0.041
	n	**%**		**n**	**%**		
Middle aged (45 to 65 years)	26	20.8		29	23.2		0.760
Gender (men)	62	49.6		63	50.4		1.000
BMI (kg/m²) ≥25 (overweight)	45	36.0		45	36.0		1.000
BMI (kg/m²) ≥30 (obese)	12	9.6		24	19.2		0.048
High educational level (≥4 years of higher education)	57	45.6		45	36.0		0.157
High household income (≥100 000 US dollar per year)	41	32.8		51	40.8		0.238
Spouse/partner	82	65.6		71	56.8		0.194
Have children	41	32.8		39	31.2		0.892
Full-time employed	69	55.2		72	57.6		0.799
Current smoker (yes)	7	5.6		12	9.6		0.340
Previously member at another fitness club	81	64.8		83	66.4		0.247

Table 3. Exercise attendance at the fitness club divided into physical test battery and control group after three and 12 months of fitness club membership, and throughout the follow-up period.

	Three months				12 months				Exercise attendance throughout the follow-up period*			
	Physical test battery (n = 87)		Control group (n = 120)		Physical test battery (n = 64)		Control group (n = 96)		Physical test battery (n = 56)		Control group (n = 96)	
Exercise attendance	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Regular exercise attendance (≥two sessions/week)	45	51.7	68	56.7	27	42.2	36	37.5	11	19.6	19	19.8
Non-regular exercise attendance (≥one session/week)	23	26.4	20	16.7	15	23.4	27	28.1	43	76.8	70	72.9
Drop-out (no exercise)	19	21.8	32	26.7	22	34.4	33	34.4	2	3.6	7	7.3

*Participants who underwent the physical test battery and controls answering the questionnaire at both onset, 3 and 12 months follow-up. There

At three months, we found that more controls reported to exercise individually (62.5% and 41.2%; p = 0.013) with resistance exercise as the most popular mode (60.2% and 35.3%; p = 0.003), and controls had a higher exercise frequency compared with the test group (2.60 and 2.00 days/week; p = 0.008). The reverse results were found for group exercise classes, where a higher proportion in the test group participated, compared with controls (28.0% and 13.6%; p = 0.040). At 12 months, no differences were found.

Use of the fitness club, its facilities, and products

A total of 224, 213, and 187 participants answered the questionnaire at 3, 6 and 12 months follow up. Few reported membership cancellation throughout the year (3 months: 1.8%, 6 months: 5.2%, 12 months: 13.4%). More than half of the members reported to use the fitness club (3 months: 73.7%, 6 months: 68.5%, and 12 months: 63.6%). However, fewer participants reported ≥2 exercise sessions/week at the gym (3 months: 51.8%, 6 months: 37.6%, and 12 months: 37.4%), and out of 184 answering the questionnaire at all follow-ups, 16.9% reported to do so throughout the first year of membership. Throughout the follow-up, exercise frequency decreased with 0.4 days/week (p = 0.025) (Table 4). In the first year of membership, the most common workout mode was resistance exercise (30.7%), whereas endurance exercise and group exercise classes were reported by 16.6% and 14.0%, respectively.

At all follow-ups, 6.8% reported participation ≥two days/week in group exercise classes, and 25.5% to 34.2% participated ≤2 days/month (Table 5). The most common group exercise classes were cycling, followed by resistance exercise, Yoga/Pilates, and Aerobic/Zumba. Participation and type of most popular class remained unchanged throughout the follow-up period. At 3 months follow-up,

Table 4. Use of the fitness club, and its facilities after three, six and 12 months, and among participants reporting exercise at the fitness club at all three time-points.

	Participants answering the questionnaire						
	Three months (n = 224)		Six months (n = 213)		12 months (n = 187)		
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Exercise frequency at the fitness club (days/week)	2.3	1.4	2.1	1.3	2.1	1.3	
Exercise duration at the fitness club (minutes/session)	65.7	19.2	69.5	22.8	65.4	24.9	
	n	**%**	**n**	**%**	**n**	**%**	
Satisfied with their exercise volume	32	14.3	24	11.3	24	12.8	
Exercised mainly individually	85	38.0	79	37.0	74	39.6	
Exercised mainly group exercise classes	33	14.7	34	16.0	21	11.2	
Exercise mode							
Mainly resistance exercise	80	35.7	63	29.6	50	26.7	
Mainly endurance exercise	32	14.3	38	17.8	33	17.7	
	Reporting exercise at the fitness club at all three time-points						
	Three months (n = 80)		**Six months (n = 80)**		**12 months (n = 80)**		**Changes from three to 12 months**
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p**
Exercise frequency at the fitness club (days/week)	2.6	1.5	2.3	1.4	2.2	1.4	0.025
Exercise duration at the fitness club (minutes/session)	64.7	18.1	68.0	20.9	66.4	22.2	0.296
	n	**%**	**n**	**%**	**n**	**%**	**p**
Satisfied with their exercise volume	21	26.3	19	23.8	17	21.3	0.889
Exercised mainly individually	40	50.0	45	56.3	45	56.3	0.304
Exercised mainly group exercise classes	19	23.8	15	18.8	16	20.0	0.444
Exercise mode							
Mainly resistance exercise	37	46.3	36	45.0	35	43.8	0.887
Mainly endurance exercise	18	22.5	23	28.8	21	26.3	0.438

Table 5. Use of the fitness club`s facilities and products after three, six and 12 months, and among participants reporting exercise at the fitness club at all three time-points.

	Participants answering the questionnaire						
	Three months (n = 224)		Six months (n = 213)		12 months (n = 187)		
Variable	n	%	n	%	n	%	
Group exercise classes (≥two days/week)	21	9.4	13	6.1	9	4.8	
Cycling	10	4.5	7	3.3	6	3.2	
Resistance exercise (such as Body Pump)	6	2.7	4	1.9	3	1.6	
Yoga/Pilates	3	1.3	6	2.8	1	0.5	
Aerobic/Zumba	4	1.8	3	1.4	2	1.1	
Bootcamp	4	1.8	1	0.5	1	0.5	
Use of a personal trainer	43	19.2	27	12.7	24	12.8	
	Reporting exercise at the fitness club at all three time-points						
	Three months (n = 80)		Six months (n = 80)		12 months (n = 80)		Changes from three to 12 months
Variable	n	%	n	%	n	%	p
Group exercise classes (≥two days/week)	11	13.8	6	7.5	8	10.0	0.387
Cycling	9	11.3	7	8.8	5	6.3	0.247
Resistance exercise (such as Body Pump)	5	6.3	2	2.5	3	3.8	0.607
Yoga/Pilates	0	0.0	2	2.5	1	1.3	0.368
Aerobic/Zumba	4	5.0	3	3.8	1	1.3	0.717
Bootcamp	2	2.5	1	1.3	0	0.0	0.223
Use of a personal trainer	22	27.5	18	22.5	21	26.3	0.595

more women than men reported use of group exercise classes (9.0% and 3.6%; p = 0.041). One of four reported use of a personal trainer at 3, 6, and 12 months follow-ups, with 4.4% having a personal trainer throughout the first year of fitness club membership. The most common purchase was ten sessions (40.0% to 41.9%). At 12 months follow-up, a higher proportion of regular adherers (≥2 exercise sessions/week) reported use of a personal trainer, compared with non-regular adherers (≤1 exercise session/week) (20.6% and 3.7%; p = 0.073).

At all follow-ups, in addition to working out at the fitness club, about 53.7% reported exercise in other areas, especially outdoors (40.3%) such as in the forest, parks, or country roads, with an exercise frequency of 1.56 (± 1.05) to 1.67 (± 1.19) days/week. The most common exercise mode was endurance (37.5%) by running (23.6%) or walking (18.3%).

Discussion

Even though physical testing is common for clients of personal trainers, this activity was not associated with exercise attendance or patterns. Exercise frequency decreased from 2.6 days/week at three months to 2.2 days/week at 12 months in those exercising at the gym at all follow-ups (n = 80). Of 184 answering at all time-points, <17% exercised ≥2 days/week the first year of membership. Individual resistance exercise (30,7%) was most reported throughout the year. Few attended group exercise classes (6.8%) or used a personal trainer (4.4%).

We have previously reported that an increase in physical fitness was the most common reason for fitness club membership (Gjestvang et al., 2019a). Hence, we hypothesized that regular testing three times throughout the first year as a fitness club member would motivate the test participants to higher exercise levels because of regular follow-up. We did not find that the test group exercised more compared with control. This is consistent with an RCT (Hoj et al., 2018), concluding that measurement of cardiorespiratory fitness did not affect physical activity behavior among middle-aged adults. Fitness testing is commonplace within the physical education context, and several studies have examined youths` motivational responses to fitness testing, with mixed evidence if such testing promotes an active lifestyle (Cale and Harris, 2009). Hence, the role physical testing plays on exercise attendance and motivation in new fitness club members may be questionable. Physical testing may not be an enjoyable experience, due to maximal exhaustion exercise, and it may be essential to consider how testing influences each individuals` subsequent exercise behavior (Ekkekakis et al., 2011). Yet again, a physical test provides information for planning and evaluation of exercise programs and a foundation for goal setting, which is shown to motivate individuals for behaviour change (Lollgen and Leyk, 2018, Epton et al., 2017). Hence, fitness club members may benefit from physical testing due to supervision concerning goal setting after a test (Epton et al., 2017). In the present study, the participants did not receive any supervision in goal setting for future follow-up testing. This may have affected our results since the physical test did not serve one of the purposes for which a test is intended (Nelson and Asplund, 2016).

At 3 months, there was a difference in types of exercise performed by the test group and control group, with a higher number of test participants reporting use of group exercise classes, and more participants in the control group reported to work out individually. It can be speculated if this difference may be explained by that when the test group visited our laboratory, we interacted with the participants and asked questions concerning exercise habits at the gym. Hence, this may have affected the test groups` choice of workout mode. Still, the difference was not present at 12 months, and we cannot conclude if physical testing influences exercise patterns, as our study is not an RCT,

where an equal number of participants are randomly allocated into a test group or a control group. Dissimilarities in workout mode may be explained by other confounding factors, such as personality, not measured in the present study (Teixeira et al., 2012), and also the various exercise options offered at the gym. In a recent study, long-term members from a similar multipurpose fitness club chain as in our study reported that the numerous possibilities for exercise was a main reason for regular use of the gym, and that personal factors such as motivation, self-efficacy, and lifestyle habits were explanations for their use of the different gym facilities (Riseth et al., 2019).

Overall weekly exercise frequency at the gym was 2.4 throughout the follow-up. Another one-year study reported an average of 1.2 sessions/week in new members (Hooker et al., 2016), consistent with other studies among new members in different fitness club segments with follow-ups from 3 to 8 months (Armitage, 2005, Seelig and Fuchs, 2011, Jekauc et al., 2015). Contrary to self-report in our study, these researchers obtained objectively data on exercise frequency by membership card swipes (Hooker et al., 2016, Armitage, 2005, Seelig and Fuchs, 2011, Jekauc et al., 2015). Exercise frequency is shown to vary from 3.0 (Thogersen-Ntoumani and Ntoumanis, 2006) to 4.4 (Tappe et al., 2013) sessions/week by self-report, and 0.25 (Middelkamp et al., 2016) to 1.6 (Armitage, 2005) sessions/week by membership card swipes independently of membership length. Hence, self-reported data may be one explanation for a higher exercise frequency in our study, since self-report may yield social desirability bias, and as such over-reporting of weekly exercise sessions (Sallis and Saelens, 2000). A visit at the gym may differ from use of the sauna to running at the treadmill; hence, reporting membership card swipes only may also give limited estimates of exercise behavior. For future studies, we recommend combining objectively data (membership card swipes) and self-report to get the member`s total exercise behavior. However, regardless of whether exercise attendance is measured objectively or by self-report, we believe that it may be challenging for fitness club members to sustain their levels of exercise to maintain factors such as physical fitness and health. This may be supported by our finding that exercise frequency declined from 2.6 to 2.2 days/week throughout the year, and that other studies also have found a decreasing trend in exercise attendance among gym members (Seelig and Fuchs, 2011, Middelkamp et al., 2016, Vlachopoulos and Neikou, 2007). On the other side, Jekauc et al. (2015) found an increase in fitness club attendance from 0.6 to 1.6 days/week from onset to seven weeks, but this went back to the start level after 20 weeks. In our study, a decline of 0.4 days/week may be considered a minor change. Yet, less than 17% reported long-term regular exercise (≥2 days/week), and we believe that average exercise frequency at each time-point was influenced by outliers and some members with high exercise levels (12 participants exercised ≥4 days/week at all time-points). Despite a financial commitment and access to exercise facilities, few managed to maintain regular exercise and our findings raise the question of why some succeed to maintain exercise, while others cannot. Since many fitness club members are shown to report extrinsic reasons and goals for exercise (such as weight loss or increase in physical fitness) (Gjestvang et al., 2019a, Mullen and Whaley, 2010), it could be questioned if such reasons negatively influence exercise attendance, especially if physical tests reveal lack of improvement. It is suggested that individuals driven by personal inner sources are more likely to maintain regular exercise attendance, since they may have an inherent enjoyment of the exercise (Standage, 2012). Hence, personal trainers and instructors may direct members toward observing the intrinsic rewards from exercise (such as more energy), instead of extrinsic rewards (such as a more muscular body) (Brown, 2011). That said, this is a simplified distinction of how individuals may be motivated to exercise, since extrinsic reasons are also shown to contribute to exercise attendance (Standage, 2012). It is proposed that it depends on how the individual personally values the outcome, and the cause why an individual has a certain reason for exercise that may results in exercise attendance, whether the reason in itself (Standage, 2012, Teixeira et al., 2012). Although, based on the evidence available, there is a critical need for research investigating long-term interventions and strategies aiming to increase exercise attendance among fitness club members.

Individual resistance exercise was reported as the most common workout mode, consistent with what Kathrin and Turbow (2010) found among American members. Two studies have reported that 54% to 60% of members preferred endurance exercise (Ready et al., 2005, Hata and Umezawa, 1995), and the Japanese study also found that more than 50% favored both resistance and endurance exercise (Hata and Umezawa, 1995). In two out of the three studies mentioned above we do not know which fitness club segment that was used under study, however, we believe that dissimilar fitness club segments may affect the members mode of exercise. Also, cultural differences in workout mode may be explained by society, individual factors such as personality and motivation (Box et al., 2019), and that fitness trends around the world may not be equal. Even though, facilities and products at multipurpose fitness clubs globally are more or less similar (Andreasson and Johansson, 2018).

At 12 months follow-up, a higher number of members using a personal trainer managed to exercise ≥2 days/week, compared with those who did not use a personal trainer. Other authors have also shown higher exercise frequency in clients of personal trainers, compared with those exercising individually (Rustaden et al., 2017, Jeffery et al., 1998). A personal trainer may positively influence their clients` exercise motivation and stimulate them to exercise more, due to implementation of behavior change techniques (McClaran, 2003). Having conversations about the client`s goals and emphasis process (such as completing three exercise sessions a week) instead of outcome goals (such as weight loss), may foster the clients` behaviour change over time (Brown, 2011). Still, in our study, we found that only 4.4% used a personal trainer during the first year of membership. Also, few participants attended weekly group exercise classes (6.8%). Hence, we

believe there may be a huge potential to increase exercise attendance in a fitness club setting by encouraging members to use these additional products.

Strengths and limitations

To our knowledge, no studies have investigated if repeated testing is associated with exercise attendance or patterns in untrained new fitness club members. Recruitment of "matching" participants with no differences in socioeconomic variables, sex, and age may be considered a strength in the present study. We also used valid and reliable physical tests, had three follow-ups the first year of membership and an equal distribution of men and women. Most previous studies in this field have been cross-sectional or with a 6 months follow-up only. Another strength in the present study is the use of an electronic survey with a high response rate at all time-points (73.6% (n = 184)). Our one-year prospective design made it possible to examine changes in a longer time frame than previous research in this field, as well as investigate associations over time between physical testing and exercise behavior. However, the real impact of a fitness club membership would possibly have to be verified in two or three years.

A limitation is that participants were recruited from one multipurpose gym chain, with middle to high membership fees. Hence, the generalizability of our results to other gym chains may be limited. Fitness clubs differ a lot in profile and this may have affected our results. For instance, boutique clubs are small gyms in the high budget segment, focusing on member satisfaction and only one or two exercise options. On the other side, gyms in the low budget segment appeal broadly to customers that do not want to pay for services that they do not use and have less focus on membership satisfaction. Hence, due to dissimilar membership models possibly influencing exercise attendance, it may be differences between members in our study compared with members from other gyms. Selection bias may therefore be present. Another limitation is that the test group visited our laboratory to conduct testing on all occasions. The laboratory context is different from testing in a fitness club setting; hence, this may have to some degree decreased the real-life approach. Also, data concerning exercise behavior were self-reported, and the participants were aware of our study aims, hence we cannot rule out social desirability bias. The risk of over-reporting may be high by self-report and substantially higher compared to objectively measures (Sallis and Saelens, 2000, Steene-Johannessen et al., 2016). Although very few (17%) reported exercise two days a week at all time-points, exercise attendance may be potentially lower than our findings.

Conclusion

In an age-diverse group of new fitness club members, repeated testing of physical performance and body composition was not associated with exercise attendance, and no changes in members` use of the fitness clubs facilities and products were found. With only 17% exercising two days or more per week during the first year of membership, our results indicate that there is a need to develop strategies to improve exercise attendance among new recreational exercisers. Responses to our survey indicate that individual resistance exercise is the most common workout mode.

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Key points

- To the authors knowledge this is the first study investigating if repeated physical testing was associated with exercise attendance and patterns in fitness club members.
- The results showed that repeated testing of physical performance and body composition was not associated with exercise attendance.
- With only 17% exercising two days or more per week during the first year of membership, our results indicate that there is a need to develop strategies to improve exercise attendance among new recreational exercisers.

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