DISSERTATION FROM THE
NORWEGIAN SCHOOL OF
SPORT SCIENCES
2022

Christina Gjestvang

Fitness clubs. A venue for public health?

NIH NORWEGIAN SCHOOL
OF SPORT SCIENCES

nih.no

Christina Gjestvang

Fitness clubs. A venue for public health?

DISSERTATION FROM THE NORWEGIAN SCHOOL OF SPORT SCIENCES • 2022

ISBN 978-82-502-0599-4

"If you want to succeed, you must work to overcome the obstacles on your path."

- Lailah Gifty Akita

Table of contents

Acknowledgements

The opportunity to do a Ph.D. and a research study within my field of interest has been a privilege. This project was funded and carried out by the Norwegian School of Sports Sciences` Department of Sports Medicine and NIH Aktiv. A special thanks to the Head of the Department, Prof. Sigmund A. Andersen and Head of Office at NIH Aktiv, Annette Hilde, who gave me this opportunity. Without your precious support it would be impossible to conduct this project.

This dissertation is a result of great teamwork and support, and I would like to extend my sincerest gratitude to all of you. First and foremost I am extremely grateful to my supervisor and dearest friend Assoc. Prof. Lene A. H. Haakstad who developed the idea for this project and who believed in me. Thank you for your invaluable advice, continuous support, and abundant knowledge during my Ph.D. Your guidance helped me in all the time of research and writing of this thesis. Thank you for all the numerous comments and constructive criticism related to our papers that helped me mature as an academic. I could not have imagined having a better advisor and mentor. Also, I am forever grateful that you understand that life is more than doing a Ph.D. Thank you for laughter, trips, evenings with your family, and numerous hikes to Vettakollen.

My co-supervisor Prof. Trine Stensrud, thank you for being an important contributor to all the papers and in the completion of this thesis. Thank you for your continuous support and supervision, immense knowledge, and friendliness. It has been a true privilege to work with you.

I would also express my sincere gratitude to my co-authors and research group, Prof. Bjørge H. Hansen, Assoc. Prof. Elin Kolle, Assoc. Prof. Gøran Paulsen, Assoc. Prof. Frank Abrahamsen, Prof. Tron Krosshaug, Hege Heiestad, M. Sc. Charlotte Jakobsen, Ph.D. student Runar B. Solberg, and post-doc Christine Sundgot-Borgen. Thank you for your insightful comments and suggestions at every stage of this project, and your efforts to read and share feedback on my papers. A special thanks to Frank Abrahamsen, for contributing your expertise in motivation and applied sport psychology in two of the papers. I have got inspired and learned from every of your comment. Thanks also to the research assistants Fredrik Kristiansen and Lasse Bækken, and Prof. Ingar Holme and Assoc. Prof. Morten Fagerland for their statistical support and important guidance with power considerations and data analysis.

I am very proud of what the research group has achieved in recent years. To date, the overall research project has resulted in eight publications. I have had the privilege and opportunity to be first author in five papers, last author in one paper, and second author in two papers. I have

learned a lot! Also, one publication (paper V) is re-submitted with minor revision and three papers are in writing process.

I am truly grateful for being surrounded by fantastic colleagues and friends at "IIM" and NIH Aktiv. Thank you for a good time spent together at NIH, at congresses, and in social settings. A special thanks to Anne Mette Rustaden. Since I started as a master-student in your Ph.D.-project, you have inspired and influenced my academic journey.

Also, a sincere gratitude to all participants who generously shared their time and gave us insight into their exercise behavior. This project would not be possible without your participation. SATS, thank you for the collaboration and for helping me to reach out to possible participants.

To Nils, who came into my life after my first year as a Ph.D. student. I am deeply grateful for your never-ending encouragement and for always being there for me. Your support has meant more to me than you could realize. I love you and look forward to the future with you and "lillegull". You will always be my first priority.

Last but not the least, I would like to thank my Mom and Dad for their endless love and for always believing in me. Without your incredible support and encouragement, it would be impossible for me to start and complete this Ph.D. I love you, and I dedicate my thesis to you.

Christina Gjestvang

Oslo, May 2021

List of papers

The present dissertation is based on the following five original research papers (sorted by theme and not publication year), which are referred to in the text by their Roman numerals:

I. **Gjestvang, C.,** Stensrud, T., Hansen, BH., Kolle, E., Haakstad, LAH. (2019) Are fitness club members likely to meet the current PA recommendations? Translational Sports Medicine, 3(2), 75-83.

II. Haakstad, LAH, Jakobsen, C., Solberg, RB., Sundgot-Borgen, C., **Gjestvang, C.** (2021) Mirror, mirror - does the fitness club industry have a body image problem? Psychology of Sport & Exercise, 53, 1-7.

III. **Gjestvang, C.,** Stensrud, T., Paulsen, G., Haakstad, LAH. (2021) Stay True to Your Workout: Does Repeated Physical Testing Boost Exercise Attendance? A One-Year Follow-Up Study. Journal of Sports Science and Medicine, 20, 35-44.

IV. **Gjestvang, C.,** Abrahamsen, F., Stensrud, T., Haakstad, LAH. (2020) Motives and barriers to initiation and sustained exercise adherence in a fitness club setting - a one-year follow-up study. Scandinavian Journal of Medicine & Science in Sports, 30(9), 1796-1805.

V. **Gjestvang, C.,** Abrahamsen, F., Stensrud, T., Haakstad, LAH. (2021) What makes individuals stick to their exercise regime? A one-year follow-up study among novice exercisers in a fitness club setting. Under revision in Frontiers of Psychology (April 2021).

Definitions

Adherence. A longer-term commitment to physical activity/exercise, such as maintaining an exercise regimen for a prolonged period of time following the initial adoption phase, or meet the physical activity recommendations [1].

Attendance. A subset of adherence; a simple count of exercise sessions (e.g. visits at the fitness club) over a set period, or number of exercise sessions attended over a follow-up period [1].

Body mass index (BMI). A person`s weight in kilograms divided by the square of his height in meters (kg/m2) [2].

Dropout. No longer participating in exercise, where the dropout is definite (terminated physical activity). Dropout should be distinguished from exercise relapsing (short periods of nonparticipation in exercise).

Exercise. A subset of physical activity that is planned, structured and repetitive, with a final or intermediate objective; the improvement or maintenance of physical fitness [3].

Exercise relapse. E.g. Maintaining exercise for a period, then dropping out for a short-term, and then returning to previous exercise behavior [4, 5].

Maintenance. A course of action sustained over a specified period of time [6], or a continuous process which is accompanied by variation in physical activity behavior over time [7].

Novice exerciser. A person new to and inexperienced in exercise.

Obesity. A BMI equal to or higher than 30.0 kg/m^2 [2].

Overweight. A BMI equal to or higher than 25.0 kg/m^2 [2].

Physical activity. Any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity can be performed in several domains, including occupational, transportation, or leisure-time [3, 8]. Total volume of physical activity includes duration (units of time), frequency (number of sessions per time unit), and intensity (duration x frequency x intensity) [9].

Physical inactivity. An insufficient physical activity level to meet current physical activity recommendations [9, 10].

Sedentary behavior. Any waking behavior with an energy expenditure ≤1.5 METs, in a sitting, reclining or lying posture [9, 11].

Thesis summary

Background: The health benefits of regular physical activity (PA) are well known. Still, about 70% of European adults are insufficiently physically active. Thus, a further understanding of how modifiable factors such as socioeconomic status and psychosocial variables (e.g. body image, self-efficacy, social support, perceived motives and barriers) differ between those who choose to participate in PA and those who do not is warranted. This is essential for successful PA promotion and to enhance public health. Also, it is not only important to understand the differences between active and inactive individuals, but also the settings where PA occurs, which may make PA participation more or less likely. A fitness club represents one PA setting. Yet, <40% of members exercise at the fitness club regularly and the dropout rates are high. Despite this, research on exercise participation, especially of new members (at a high risk of dropout) is limited in quantity and quality. Thus, it is important to gain in-depth knowledge of those adults who choose to be fitness club members and are able to exercise regularly.

Aims: The principal aim of the present PhD-project was to gain an increased understanding of those individuals who choose to join a fitness club, and are able to stay active, and continue with, regular exercise in a group of novice exercisers in their first year of a fitness club membership.

Methods: This thesis is based on the research project "Fitness clubs. A venue for public health?", a 12 months prospective study with four follow-ups conducted from October 2015 to November 2018. Participants were 250 fitness club members (<4 weeks of membership) classified as novice exercisers (structured exercise <60 min./week the last six months). All participants responded to an electronic questionnaire, including body image, motives and barriers, self-efficacy, social support, life satisfaction, exercise attendance, use of the fitness club, and customer satisfaction. Half of the participants (n = 125) underwent repeated measures of total PA level (two follow-ups), body composition, maximal oxygen uptake, and maximal muscle strength (three follow-ups).

Main results: I) Total PA level or numbers meeting PA recommendations did not change from start-up to 12 months (38% versus 46%). Socioeconomic status was not associated with regular use of the fitness club. **II)** Body area evaluation and appearance satisfaction improved in all members, and regular exercise was associated with a more positive body image, appearance and body area satisfaction across the follow-up. At start-up, being male and having a BMI<25 was associated with reporting a more positive body image. **III)** Repeated physical testing was not associated with regular exercise attendance. Across the year, only 17% reported regular exercise attendance at the fitness club. The most common workout mode was individual resistance

exercise (50%). Few attended group exercise classes (23%) or used a personal trainer (4%). **IV)** Less than half (37%) exercised regularly (at both the fitness club and in other settings) across the follow-up. Most members were motivated by factors such as "positive health", "increase in physical fitness" and "mobility", and the most common barrier was "priority" (such as lack of time). Regular exercisers rated the motives "enjoyment" and "challenge" as more important than non-regular exercisers. **V)** Those exercising regularly at each follow-up had higher scores of "enjoyment" and self-efficacy ("sticking to it"). Social support from family and friends was also greater in those reporting regular exercise.

Conclusions: A fitness club membership was not associated with increase in total PA level or numbers meeting PA recommendations. Regular exercise attendance was associated with higher scores in body image total score, appearance and body area satisfaction, "enjoyment" and "challenge", self-efficacy "sticking to it", and social support from family/friends. Most new members use the fitness club intermittently and do not achieve regular exercise behavior. With only 17% exercising two days or more weekly across the first year of membership, there is a need to develop strategies to improve exercise attendance among novice exercisers.

Key words: Barriers, body image, body mass index, customer satisfaction, exercise, exercise attendance, exercise behavior, exercise patterns, fitness club, fitness club members, health, life satisfaction, motives, new members, novice exercisers, physical activity, physical fitness testing, self-efficacy, social support.

Sammendrag på norsk

Bakgrunn: Regelmessig fysisk aktivitet (FA) kan forebygge en rekke sykdommer, deriblant hjerte- og karsykdom, diabetes type 2, overvekt og fedme. Selv om helsegevinstene av FA er godt kjent er 70% av den europeiske voksne befolkningen i dag utilstrekkelig fysisk aktiv (mindre enn 150 minutters aktivitet med moderat til høy intensitet per uke). Treningssenterbransjen er en mulig bidragsyter til å øke befolkningens FA-nivå, men av de som starter på et treningssenter er det kun i underkant av 40% som klarer å trene regelmessig over tid. Til tross for dette eksisterer det svært lite forskningsbasert kunnskap av god metodisk kvalitet om medvirkende årsaker til bruk av treningssenteret og hva som kjennetegner de som klarer å trene regelmessig. En økt forståelse av ulike faktorer som fremmer eller hemmer FA på et treningssenter, kan styrke utviklingen av tiltak som kan få flere fysisk aktive, og på sikt bedre folkehelsen.

Hensikt: Hovedhensikten med denne avhandlingen var å tette kunnskapshull om hva som kjennetegner de som klarer, og ikke klarer å opprettholde trening over tid på et treningssenter, og undersøke faktorer (f.eks. bakgrunnsvariabler, kroppsbilde, motiver, barrierer, mestringsfølelse og sosial støtte) som kan påvirke treningsatferd hos nye utrente treningssentermedlemmer.

Metode: "Treningssenterbransjen. En arena for folkehelse?", var en 12 måneders prospektiv studie, gjennomført på Norges idrettshøgskole (NIH) fra oktober 2015 til november 2018. Totalt ble 250 deltakere fra 25 SATS-treningssentre i Oslo-området rekruttert. Inklusjonskriterier var: nytt medlem (under 4 ukers medlemskap), nybegynner (mindre enn 60 minutters trening per uke siste seks måneder), over 18 år og frisk (ingen sykdom som hindret treningsdeltakelse). Datainnsamling ved bruk av spørreskjema ble gjort ved fire tidspunkt (oppstart, og etter tre, seks og 12 måneder). Alle deltakere besvarte spørsmål som kartla blant annet bakgrunnsvariabler, kroppsbilde, motiver, barrierer, mestringsfølelse, sosial støtte, livskvalitet, treningsdeltakelse, bruk av treningssenteret og kundetilfredshet. Ved oppstart og etter 12 måneder gjennomførte halvparten av deltakerne (n = 125) objektive målinger av FA-nivå. I tillegg utførte samme gruppe fysisk testing av kroppssammensetning og fysisk form (maksimalt oksygenopptak og maksimal muskelstyrke) ved oppstart, og etter tre og 12 måneder. Vi definerte regelmessig trening som to eller flere økter per uke.

Hovedresultater: I) Vi fant ingen signifikant endring i totalt FA-nivå eller oppfyllelse av FA-anbefalinger (38% versus 46%) i løpet av året. Sosioøkonomisk status var ikke assosiert med regelmessig trening. **II)** I løpet av året fant vi at alle nye medlemmer fikk et mer positivt kroppsbilde i form av at de evaluerte ulike kroppsdeler mer positivt og var mer tilfreds med sitt utseende. De som trente regelmessig var enda mer tilfreds med både kroppsdeler og utseende

sammenlignet med ikke-regelmessig trenende. **III)** Vi fant ingen forskjell i treningsdeltakelse mellom de som gjennomførte regelmessig fysisk testing og de som ikke ble testet. I løpet av året rapporterte kun 17% ≥2 treningsøkter per uke på treningssenteret. Av de som brukte treningssenteret én dag i uken eller mer, rapporterte halvparten at de trente styrketrening i studio (50%), mens færre deltok på gruppetimer (23%), og mindre enn 5% benyttet seg av en personlig trener. **IV)** Da vi slo sammen trening både på og utenfor senteret fant vi at under halvparten (37%) trente regelmessig i løpet av året. Viktigste motiver for trening hos alle nye medlemmer var «positiv helse», «bedre fysisk form» og «bedre bevegelighet». Den hyppigst rapporterte barrieren blant de som falt fra treningen var «prioritet» (f. eks. mangel på tid). Sammenlignet med ikke-regelmessig trenende, rapporterte de som trente regelmessig en høyere skår på motiver som «det gir meg glede» og «jeg vil gi meg selv en utfordring». **V)** Motivet «det gir meg glede», en mestringsfølelse av å klare å trene regelmessig og opplevd sosial støtte fra familie/venner var sterkest assosiert med regelmessig trening i løpet av det første året som treningssentermedlem.

Konklusjoner: Vi fant ingen assosiasjon mellom et treningssentermedlemskap og økt aktivitetsnivå eller tilfredstillelse av FA-anbefalinger. Et treningssentermedlemskap var assosiert med et forbedret kroppsbilde, og regelmessig treningsatferd ga en enda større tilfredshet med både kroppsdeler og utseende. Ved alle tidspunkt rapporterte regelmessig trenende at de trente fordi de opplevde glede og utfordring. Samme gruppe oppga også økt mestringsfølelse av å klare å trene regelmessig og rapporterte mer sosial støtte fra familie og venner. Svært få etablerte en regelmessig treningsrutine og de fleste medlemmene brukte treningssenteret sporadisk. I et folkehelseperspektiv er det derfor hensiktsmessig å utvikle tiltak som kan få flere treningssentermedlemmer til å finne både tid og interesse for trening i deres hverdag.

Stikkord: Barrierer, fysisk aktivitet, fysisk testing, helse, kroppsbilde, kroppssammensetning, livskvalitet, medlemstilfredshet, mestringsfølelse, motiver, nybegynnere, nye medlemmer, sosial støtte, trening, treningsatferd, treningsdeltakelse, treningssenter, treningssentermedlemmer og treningsvaner.

Introduction

Regular physical activity (PA) reduces the risk of several non-communicable diseases and all-cause mortality, and also supports the prevention of mental health challenges (depression and anxiety) [12-14]. Promotion of regular PA is one important strategy to enhance public health [9, 15-17]. The World Health Organization (WHO) recommends 150 to 300 minutes of moderate or 75 to 150 minutes of vigorous-intensity physical activity per week for adults [9]. It is also advised to do muscle-strengthening activities ≥2 days/week and reduce time spent being sedentary [9]. Even though the PA recommendations are achievable for most individuals, recent estimates indicate that 27.5% of adults globally are insufficiently physically active [18]. Data based on device-measured PA show even higher numbers, with 67% to 72% of European adults not complying with the recommendations [19, 20]. Thus, two public health priorities are to motivate inactive individuals to become physically active and to encourage already active individuals to maintain or increase their PA level.

PA is a complex behavior affected by fixed factors such as age, sex, and ethnicity, and modifiable factors such as environment, community settings, socioeconomic status, and psychosocial factors (e.g. self-efficacy, social support, satisfaction with life, perceived motives, and barriers) [21-27]. A further understanding of how these factors differ between those individuals who choose to participate in PA and those who do not is needed to develop successful PA promotion strategies in adults [23, 28]. However, it is not only important to understand the differences between active and inactive individuals in what influences PA level, but also the PA setting (e.g. fitness clubs or sports clubs). The different PA settings appear to be distinct social phenomena [29-31], and these may make PA participation more or less likely [32].

A fitness club holds equipment for group and individual exercise and represents one setting to be physically active. However, <40% of members achieve regular exercise attendance (≥1 weekly session) and the dropout rates are high [33-37]. Despite this, research on exercise participation of fitness club members is limited in quantity and quality, and it is important to identify factors that influence the use of the fitness club as a means for PA. New members classified as novice exercisers are an especially interesting group as they are at risk of low attendance rates. Thus, the focus of this thesis is to gain in-depth knowledge of fitness club members that exercise regularly across the first year of a membership.

The fitness club industry

For several years, the "typical gym" only contained equipment for bodybuilding. In the 1990s, the fitness club industry changed focus from bodybuilding to having fun at group exercise classes with music, and this new trend expanded the exercise opportunities for adults [31, 38]. This industry is an important setting for leisure-time PA, with about 185 million members and 210 000 clubs worldwide, representing a 54% increase over the last decade [39]. In 2018, almost one-third of Norwegian adults reported having a fitness club membership, compared to 8% in 1987 [40, 41], and the number of clubs grew from 477 in 2008 to 1179 in 2018 [41]. Despite this substantial growth, little is known about those that choose to be a member.

The increasing popularity of fitness clubs may be associated with our "modern" way of living. To date, most multipurpose fitness clubs offer a wide range of exercise equipment, group exercise classes, long and flexible opening hours, childcare, and personal trainers. The group exercise classes contain different concepts and durations designed to encourage individuals of all ages and PA levels to participate in regular exercise. Also, fitness clubs are located where people live and travel. In Norway, about 70% of adults report access to a fitness club within a distance of three kilometers [42], and availability of exercise settings are assumed important when promoting PA [30, 43-45]. Fitness clubs are also described by Norwegian members as a comfortable place for PA, because they are indoors they allow members to avoid bad weather and winter darkness [45].

The Norwegian Directorate of Health`s action plan for PA 2020-2029 highlights that fitness clubs may be a leading ally against physical inactivity [46] and two-thirds of those who completed a previous Norwegian survey reported low levels of PA before joining a fitness club [47]. Still, the scarce scientific literature shows low attendance rates (10% to 37%) [35, 36], and 40% to 65% of members are predicted to drop out in the first three to eight months after they sign up [37, 48]. There is also a trend of exercise relapse (49% to 71%) [48-50], where an individual exercises regularly for a period, then drops out for a short-term, and then returns to exercise [4]. It is a knowledge gap in the literature, why some members adhere to regular exercise, while others drop out or relapse.

Review of the literature

Before the present project was initiated, a literature search on Pubmed and Web of Science was done. The following terms were used: Fitness clubs OR health clubs OR fitness centers OR fitness facilities OR fitness centre AND adherence OR compliance OR loyalty OR attendance OR dropout OR exercise behavior OR usage OR participation. The search revealed 18 quantitative studies in full-text and in English (Table 1). The study designs were: Cross-sectional (n = 11) [31, 50-59], longitudinal (prospective) (n = 5) [49, 60-63], and non-randomized interventions (n = 2) [37, 64]. The longitudinal and non-randomized studies had follow-up periods from 12 to 36 weeks. The studies included samples from North America (n = 10) [51-53, 55-59, 63, 64], Western Europe (n = 5) [31, 50, 60-62], Southern Europe (n = 1) [49], and Australia (n = 1) [54]. One study included participants from three countries (USA, England, and Italy) [37]. Sample size ranged from: 88 [55] to 2787 [31] in the cross-sectional studies, 94 [60] to 228 [49] in the longitudinal studies, and 164 [64] to 1762 [37] in the non-randomized interventions. Six of the studies included more women than men [50, 53, 55, 57, 61, 63], and one study included women only [54]. Six studies included new members only [37, 60, 61, 63, 64], while two studies did not report length of membership [50, 57]. Only two studies reported recruiting novice exercisers [37, 64], however, seven studies did not report the participant`s PA level [31, 51-53, 55, 60, 62].

A comparison of results is difficult since the studies examined different psychosocial factors and exercise attendance. Overall, greater social support [51], self-efficacy [53], intrinsic motivation [50, 56], perceived behavioral control [58-62], and a positive attitude towards exercise [60, 62] were positively related to exercise attendance, whereas several barriers were negatively associated with exercise attendance [50, 55]. Also, both long- and short-term personalized feedback and support were found to improve exercise attendance in the two non-randomized interventions [37, 64]. All 18 studies found different weekly exercise attendance at the fitness club. Further, some studies found a trend of exercise relapsing. Nevertheless, this may be a positive sign, indicating that an exercise relapse does not necessarily lead to permanent termination of exercise [4, 5]. However, several studies indicated that a fitness club membership does not automatically lead to regular exercise sufficient to achieve the health benefits of PA. Given that there are 185 million fitness club members worldwide [39], it is important to gain an increased understanding concerning member characteristics and factors that may positively influence exercise behavior and use of the fitness club.

Table 1. Overview of studies examining member characteristics and/or exercise behavior among fitness club members (studies up to September 2015). The studies are presented in order to study design, and after publication year.

Study	Study design	Aim	Main outcomes	Sample	Sex, age, country	Main findings
Unger & Johnson, 1995 [51]	Cross-sectional	Examine the relationships between social factors and exercise behavior/satisfaction	Attendance (Q), dropout, satisfaction with exercise, and social factors	200 current members	Men: 52%, M_{age} = 39, USA	Social factors (exercise with a friend, having friends at the club, and socializing outside the club with people met at the club) were related to exercise behavior and satisfaction. Average weekly attendance was 4.5 days/week.
Ready et al., 2005 [52]	Cross-sectional	Compare PA level, health and health behaviors between FC members and non-members	PA level (Q), SES, health, nutrition, and health responsibility	236 current members and 302 non-members	Men: 52%, Age= 18-65, Canada	Members reported higher PA level compared with non-members (88.0% vs. 53.5%). Both active members and non-members exercised 4 days/week (members exercised at higher intensities and longer duration).
Thøgersen-Ntoumani & Ntoumanis, 2006 [50]	Cross-sectional	Examine the role of different motivational regulations to understand exercise-related behaviors	Attendance (Q), exercise relapse, motivation, stages of change, intention to exercise, barriers, self-efficacy, and social physique anxiety	375 member.	Men: 32%, M_{age} = 39, England	Self-determined motivational regulations were higher in more advanced stages of change and predicted fewer relapse and stronger intentions to sustained attendance. Weekly attendance was 3 days/week. Of all, 47.5% reported no exercise relapse and 40.3% 1 to 3 exercise relapse. Most frequently chosen reason for relapse was work demands, injury/illness and lack of time.
Kaphingst et al., 2007 [53]	Cross-sectional	Assess health behaviors and related characteristics of FC members	PA level (Q), SES, dietary behaviors, BMI, exercise motivation,	134 new and current members	Men: 38%, Age= 29-60, USA	The majority of members (89% to 94%) met PA recommendations. PA level was inversely associated with age and education. Most members had high levels of self-efficacy to change behavior. New members had less education and lower household incomes than current members.

			and self-efficacy			
Prichard & Tiggeman, 2008 [54]	Cross-sectional	Investigate exercise mode, exercise motivation and body image in a FC environment	FC attendance (Q), SES, BMI, exercise motivation, self-objectification, body esteem, and disordered eating symptoms	571 current members	Men: 0%, M_{age} = 36, Australia	Attendance at the FC was more related to body image and eating disturbance than exercise attendance outside the FC. Participation in cardiovascular exercise was related to negative body image, while yoga was related to lower self-objectification and more health/fitness motives. Appearance-focused motives were found to mediate the relationship between exercise mode and body image. Average weekly attendance was 4.8 days/week.
Schwetschenau et al., 2008 [55]	Cross-sectional	Investigate associations between barriers and FC attendance and membership between FC members and non-members	FC attendance (Q), exercise duration, SES, and exercise barriers	51 current members and 37 non-members	Men: 26%, M_{age} = 37, USA	Internal barriers influenced weekly FC attendance and external barriers affected exercise duration in members. External barriers (membership fee) higher for non-members.
Ulseth, 2008 [31]	Cross-sectional	Gain an understanding of what factors explain motivation in different exercise settings	SES and exercise motivation	2787 current FC members and 1202 sports club members	Men: 40%, Age = 18+, Norway	There were substantial differences in the way members within the two settings experience their PA. Motives such as pleasure, social factors and achievement was associated with sports clubs, and a group largely constituted by men. Motives such as fitness, mental recreation, and appearance was associated with FC, a group largely composed of women.
Kathrins & Turbow, 2010 [56]	Cross-sectional	Health self-determinism and background factors ability to predict adherence to resistance exercise	Adherence to resistance exercise (Q), SES, and health self-determinism	185 current members	Men: 45%, M_{age} = 39, USA	Health self-determinism predicted adherence to resistance exercise. In total, 68.1% met recommendations for resistance exercise.

Mullen & Whaley, 2010 [57]	Cross-sectional	Gain knowledge regarding factors contributing to initiation and sustained participation at the FC	PA level (Q), PA motivation, and customer satisfaction	326 members	Men: 29%, Age= 25-55, USA	There were age and sex differences in motives and customer satisfaction for initiation and sustained participation at the FC. Only 12.0% met PA recommendations.
Tappe et al., 2013 [58]	Cross-sectional	Examine habit formation among members with regular attendance	FC attendance (Q), exercise duration, mode, experiences, seasonal variations, and habits	174 current members	Men: 44%, Mdn_{age}= 28, USA	High habit formation among many exercisers. Majority of members reported that environmental cuing (location and time) triggered exercise behavior. Average weekly attendance was 4.4 days/week.
Amireault & Godin, 2014 [59]	Cross-sectional	Provide validity evidence for using FC attendance (ER) to objectively assess the frequency of leisure-time PA	FC attendance (ER), PA level, Theory of Planned Behavior, BMI, body fat %, and maximal oxygen uptake	100 current members	Men: 55%, M_{age} = 46, Canada	Perceived behavioral control, maximal oxygen uptake, and leisure-time PA were associated with FC attendance. Average weekly attendance was 1.9 days/week
Armitage, 2005 [60]	Longitudinal (prospective, 12 weeks)	Theory of Planned Behavior`s ability to predict attendance	FC attendance (ER), SES, Theory of Planned Behavior	94 new members	Men: 44%, M_{age} = 38, England	Theory of Planned Behavior was a significant predictor of attendance. After 12 weeks, 29.4% reported regular attendance, 70.7% dropped out and relapsed at some point. Maintenance of attendance the first 5 weeks increased the chance of sustained attendance.
Vlachopoulos & Neikou, 2007 [49]	Longitudinal (prospective, 6 months)	Investigate determinants of exercise adherence	FC attendance (ER), SES, and basic	228 current members	Men: 47%, M_{age} = 28, Greece	Psychological needs for competence was predictor of both attendance and dropout. After 6 months, 33.8% had regular attendance and 42.1% had dropped out.

		and dropout in the FC	psychological needs			
Seelig & Fuchs, 2011 [61]	Longitudinal (prospective, 32 weeks)	Examine if prediction of attendance differed when choosing a categorical instead of a continuous variable of exercise behavior	FC attendance (ER), SES, and behavioral control, expectations, goal intentions	174 new members	Men: 36%, M_{age} = 37, Germany	A categorical criterion variable does not automatically result in better predictions of attendance. Attendance decreased during follow-up. Revealed four different attendance patterns: maintainers, fluctuators, early and late dropouts.
Jekauc et al., 2015 [62]	Longitudinal (prospective, 20 weeks)	Theory of Planned Behavior, Social Cognitive Theory, and PA Maintenance Theory`s ability to predict attendance	FC attendance (ER), SES, Theory of Planned Behavior, Social Cognitive Theory, and PA Maintenance Theory	101 current members	Men: 48%, M_{age} = 24, Germany	Theory of Planned Behavior, Social Cognitive Theory, and PA Maintenance Theory were significant predictors of attendance. Attendance increased up to week 7, and then decreased up to week 20.
Kaushal & Rhodes, 2015 [63]	Longitudinal (prospective, 12 weeks)	Investigate behavioral requirements for exercise habit and what predicts habit by testing a habit antecedent model	Attendance (Q), SES, exercise frequency, exercise habit, intention to exercise, exercise experience	111 new members	Men: 30%, M_{age} = 48, Canada	Exercising ≥4 days/week for 6 weeks was minimum requirement to establish an exercise habit. Exercise habit and intention were parallel predictors of exercise behavior. The habit antecedent model showed that consistency, low behavioral complexity, environment and affective judgments all predicted changes in habit formation over time.
Annesi, JJ., 1998 [64]	Non-randomized	Test the effect of computer feedback (enhanced tracking,	FC attendance and adherence (ER)	93 new members in treatment	Men: 46%, Age= 20-60, USA	Computer feedback had 18% higher attendance and 31% less dropout compared with the control group.

	intervention (32 weeks)	goal setting, and feedback) compared with standard exercise tracking and feedback		group and 71 new members in a control group		
Annesi, JJ., 2003 [37]	Non-randomized intervention (36 weeks)	Test the effect of a cognitive behavioral treatment protocol (such as goal setting, relapse prevention, and self-reinforcement) on new and returning FC members	FC attendance (ER) and adherence to an exercise plan	897 new members in treatment group and 865 new members in a control group	Men: 49%, Age= 20-60, USA, United Kingdom, and Italy	The cognitive behaviour treatment protocol improved attendance and demonstrated higher attendance (13–30%) and less dropout (30–39%) for treatment groups, compared to respective controls.

BMI = Body mass index, ER = Electronically Recording (e.g. members swipe their membership card at each visit), FC = Fitness Club, Physical activity = PA, Q = Questionnaire, SES = socioeconomic status.

Limitations of former research and knowledge gaps

There are several knowledge gaps to fill. Only two former studies have examined socioeconomic factors among fitness club members [52, 55]. However, neither of these studies investigated factors concerning exercise behavior, even though socioeconomic status can be a facilitator or barrier to PA among adults [32, 65, 66]. Further, several of the previous studies included ≥70% women [55, 57, 63, 67]. Previous research has suggested that men are more motivated for, and dedicate more time to exercise (except in older age) than women who perceive more barriers to exercise [66, 68-70]. There are several sex differences that may influence exercise attendance, so there is a need for equal sex distribution in this research area.

Only five out of 18 studies included new members [29, 44, 45, 47, 48], and only two studies recruited previous non-exercisers [37, 64]. Novice exercisers joining a fitness club are a study population of which there is limited knowledge. Hence, it is of interest to identify factors that may differ between those who manage to exercise regularly, with those who do not, so we can better promote PA in this specific group. Even though it has been proposed that the fitness club industry makes a significant contribution to public health, only three cross-sectional studies investigated PA level by self-report [52, 53, 57]. Cross-sectional studies have limitations for drawing precise conclusions [71, 72]. Hence, there is a need for research investigating prospective changes in device-measured PA, a valid and reliable measure of PA in adults [73].

Fitness clubs are appearance orientated environments, with an increased focus on bodily appearance compared with sports clubs [67]. It is well-known that the environment affects an individual's body image attitudes [74, 75], however only one out of 18 studies have explored this phenomenon [54]. Thus, it remains unclear how the fitness club environment itself influences body image among novice exercisers in their first year of fitness club membership. Novice exercisers may not feel confident in this appearance orientated environment and may have a reduced self-efficacy for exercise [76]. Also, research in this field has largely focused on women and there is a knowledge gap in the area regarding body image and men [77-79].

Only three cross-sectional studies have examined exercise patterns at the fitness club [52, 54, 56], even though the wide range of workout options may encourage members to commit long-term to exercise and increase customer satisfaction [80]. These studies recruited current members only

[52, 54, 56]. Whether an individual joins a group exercise class or works out individually may come down to exercise status or personal preferences. Thus, we need prospective data on how use of the fitness club, including additional services such as physical testing, influences exercise behavior in individuals starting a fitness club membership. None of the 18 studies have investigated the association between repeated physical testing and exercise attendance/patterns in fitness club members.

Seven of the 18 studies investigated how motivation affected exercise attendance [31, 49, 50, 54, 56, 57, 62]. None of these studies recruited untrained new members, five were cross-sectional [31, 50, 54, 56, 57], and four had outdated data-collection [31, 49, 50, 54]. A challenge when interpreting previous findings is the cross-sectional study design; only two studies were prospective. Also, there is a need for research with a longer time-frame than 20 to 26 weeks, as the motives to initiate exercise may differ from the ones that lead to sustained exercise [49, 62]. Finally, former research used a piecewise approach, including data of only one or two psychosocial factors in the statistical analysis. Exercise is a complex behavior with several psychosocial factors (self-efficacy, social support, life satisfaction, motives) that can affect exercise habits [21-25, 81]. Hence, there is also a need for studies with multivariate statistics, including analysis of more than one psychosocial factor at a time.

Only one study investigated customer satisfaction concerning exercise attendance [57]. Individuals likely seek fitness clubs that will satisfy their specific needs (opening hours, equipment, childcare, price of membership fees) and satisfied members attend the fitness club more regularly than non-satisfied members. Hence, customer satisfaction is a key factor for understanding exercise behavior in fitness club members, particularly in novice exercisers with limited fitness club experience. The studies reported recruiting members from multipurpose (a wide range of exercise concepts, resistance and cardio-exercise rooms, group exercise classes, and personal training) [49, 53, 59], fitness-only (resistance and cardio-exercise rooms only, low-budget) [55], and college/university fitness clubs [62]. Thirteen studies did not report the type of fitness club [31, 37, 50-52, 54, 56-58, 60, 61, 63, 64]. There are differences between the segments, for example a multipurpose fitness club may focus more on customer satisfaction to keep the members active compared with fitness-only. It is therefore of interest to investigate members in this specific fitness club segment.

Methodological quality of the revealed studies

The *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) is a checklist consisting of 22 items and has been developed to ensure high-quality reporting of observational studies [82, 83] (https://www.strobe-statement.org). Even though the STROBE checklist is not necessarily an instrument to evaluate the methodological quality [82], it is the most common guideline tool for observational research [83-85]. The *Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies* has been developed for quality appraisal [86]. The checklist is a 14 item list, designed to rate the methodological quality and focus on key concepts that are critical for the internal validity of a study [86]. Both these checklists were used to consider the methodological quality of the 16 observational studies.

PEDro rating scale (https://pedro.org.au/english/resources/pedro-scale/), a common checklist used to evaluate intervention studies [37, 64, 87], was used to rate the methodological quality of the two non-randomized interventions. This rating scale has demonstrated a broad application across different healthcare interventions [88]. The scale contains 11 items about internal validity (item 2 to 9) and statistical reporting (items 10 to 11). Each item is equal to one point that is used to generate a total score (0 to 10 points). Item 1 relates to external validity and is not used in the total score https://pedro.org.au/english/resources/pedro-scale/) [87, 88].

Even though there is a lack of a verified quantitative scoring of the STROBE checklist, ≥70% fulfillment of possible checklist items was considered appropriate to rate the observational studies as having "good" methodological quality [89]. Only three [53, 56, 59] out of 11 cross-sectional studies and one out of five longitudinal studies [63] fulfilled ≥22 of 32 and 33 possible items, respectively (Appendix 1). According to the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies, no studies met the cut-off of ≥9 of 14 possible items (Appendix 1). Most of the observational studies were therefore categorized as "poor" or "fair" methodological quality, with increased risk of bias and reduced internal validity. Only six studies reported eligibility criteria [52, 53, 56, 59, 62, 63], while none reported the number of eligible participants. If <50% of eligible individuals participate in a study, the sample may not represent the target population. A homogenous sample may also ensure that findings are based on measured outcomes and not confounding factors. Further, no authors reported sample size calculations or how the study size was determined. Insufficient sample size may cause type II error, meaning that an association or a possible difference is not revealed, even though it exists

[90, 91]. Lastly, less than half of the studies reported potential confounding factors measured and any efforts made to address sources of bias. A measure to strengthen the internal validity may be to control for key variables that may affect the outcome (confounding factors) in the statistical analysis [92, 93].

A scoring of 5 to 6 and 7 to 8 on the PEDro rating scale reflect a "moderate" to "high" methodological quality in intervention studies, respectively [87]. The two non-randomized interventions scored 4 out of 11 items and had "low" methodological quality (Appendix 1). The participants were not randomly allocated to the groups which increases the risk of systematic error, and baseline differences between participants are likely to affect the results [94]. Also, the authors did not report the number of participants that completed the intervention as allocated or an intention to treat analysis. Thus, we know little about study dropouts, a common issue in research [90]. Study dropouts may differ systematically from those participating, and this potentially introduces bias that increases with the proportion of participants not followed up [95].

Past work may be limited by methodological problems. Eleven studies were cross-sectional and from these it is not possible to draw causality [96, 97]. We cannot conclude that a fitness club membership leads to increased exercise attendance or less dropout. Also, a cross-sectional study only gives a snapshot and not a long-term picture [96, 97]. Findings from cross-sectional studies may be difficult to interpret and it is suggested that accurate predictions cannot be guaranteed and may be misleading [96-99]. Of the five longitudinal studies, only one study had more than two follow-ups. Although, that particular study only lasted 12 weeks [63], which may be insufficient to investigate changes in exercise behavior. Currently, there has not been a one-year prospective longitudinal study conducted in this field and this is needed to gain more in-depth knowledge of exercise determinants important for both initiation and sustained exercise attendance among novice exercisers. Lastly, one major concern regarding the intervention studies is the lack of randomization, which causes potential biases and reduces the potential to ascertain causality.

Factors associated with PA and exercise attendance

Leisure-time activity contributes the most to total PA level in high-income countries and is performed during an individual`s free-time, based on personal needs or interest [23, 100]. PA can be divided into structured or incidental, that vary in intensity and duration [3, 8, 100]. Incidental PA may be daily activities at work/home, or as active transportation, where the intensity and duration may be lower than structured PA [8, 100]. Structured PA is often referred to as sport or exercise, and may be PA performed at a fitness club [3]. Still, due to low attendance [35, 36], and high dropout rates among fitness club members [37, 48], it is essential to gain an understanding of factors that facilitate or hinder exercise adherence and attendance.

In the general exercise literature, the terms "adherence" and "attendance" are often used interchangeably [1]. The definition of adherence often relates to regular exercise needed to improve or maintain physical fitness or health [1, 101]. Attendance is a subset of adherence, and may be a simple count of exercise sessions over a set period, or a number of exercise sessions attended over a follow-up period [1]. In this Ph.D. thesis, the term "attendance" is used consistently. Below is a description of different factors that may influence adult's initiation of and sustained exercise attendance in a fitness club setting. As discussed previously, there is a lack of studies with high methodological quality in this field.

Demographic and socioeconomic status

Much research has focused on how demographic and socioeconomic factors influence PA behavior [23, 32, 65, 102]. Socioeconomic status may be defined as the social status or class that an individual or group has in the social hierarchy [103], and differences in socioeconomic status may affect individuals` ability to engage in different behaviors, such as PA [65, 103, 104].

Individuals with high socioeconomic status are more likely than those with low socioeconomic status to participate in PA, and more specifically in a sport setting [32, 65]. Household income, education, occupation, sex, and age have shown the greatest association with PA participation, that is being wealthy, highly educated, employed full-time, male and young are associated with high levels of PA [23, 65, 102, 105]. Socioeconomic status may also affect an individual`s

perception of several psychological factors (self-efficacy, perceived behavioral control, or personal attitudes) related to health behaviors such as PA [65].

It is still unknown if a high socioeconomic status influences exercise attendance in fitness club members compared with other population samples. Taking only household income into consideration, most households are able to spend money on extra services such as fitness clubs due to increased welfare in Norway. Those joining a fitness club voluntarily pay a monthly fee, and this commitment may positively influence exercise attendance. Yet, it may be that fitness clubs reflect the over-consumption of today`s society, since members freely pay membership fees, even though it is shown that they attend the fitness club infrequently [35, 36].

Motivation

Perceived motives are key factors influencing exercise behavior, and the role motivation plays in facilitating long-term exercise participation is unquestionable [106]. To be motivated means to "be moved by something", a psychological construct that energizes, directs, and regulates behavior [107, 108]. A common theoretical framework of motivation is the Self-determination theory (SDT) [109], simply divided into intrinsic and extrinsic motivation [107, 109]. Intrinsically motivated individuals may exercise solely because they enjoy it and get personal satisfaction from it, while extrinsically motivated individuals may exercise to gain an external reward. Intrinsic motivation may have the greatest potential to predict long-term behavior [107, 109, 110]. A more differentiated perspective of motivation is autonomous and controlled motivation, and amotivation which lies along a continuum of different degrees of autonomy [109, 111]. The latter approach highlights the importance of quality, rather than the amount of motivation [109, 112].

Autonomous motivation encompasses integrated and identified regulation, where individuals may exercise because they value exercise as an activity (integrated regulation) or because exercise is an important part of their identity (identified regulation) [107, 109]. Controlled motivation includes introjected and external regulation, where individuals may exercise because of internal pressure/sense of guilt (introjected regulation) or to satisfy the wishes of some external pressure such as family/physician (external regulation) [107, 109]. SDT proposes that individuals may change the quality of their motivation and move back and forth on the continuum between

autonomous motivation and amotivation [107, 109]. Autonomous motivation is more likely when the individual perceives a feeling of competence, relatedness, and autonomy [106, 109, 112]. Rodrigues et al. (2018) concluded that there is good evidence that more autonomous motivation strongly influences long-term exercise behavior compared with controlled motivation or amotivation [106]. Further details regarding exercise motivation are outside the scope of this thesis but can be found in the textbook by Standage & Ryan (2012) [109].

Many fitness club members report appearance-related motives [31, 57], and exercise has often been promoted in relation to these outcomes at fitness clubs [113, 114]. The fitness club industry has evolved greatly over the last decade and shifted towards a more health-related focus [113, 114]. The "typical gym" offers exercise options that should make you feel good, instead of "looking good.". Still, we do not know whether this shift has also influenced the motives of those who choose to join a fitness club, especially new recreational exercisers. Individuals' motives to initiate exercise may differ from the motives that lead to sustained exercise adherence. Hence, there is a knowledge gap of motives that contribute to regular use of the fitness club.

Barriers

The perception of barriers encompasses how individuals weigh the consequences of a behavior, such as the pros and cons of initiating exercise as a lifestyle [115, 116]. Perceived barriers may inhibit leisure-time exercise and are negatively associated with PA [117]. Barriers comprise internal (e.g., "I do not have time and energy") and external components (e.g., practical or environmental causes) [117]. Internal barriers are related to personal aspects, unlike external barriers like infrastructure in communities and practical barriers. There is consensus in the literature that internal barriers such as lack of time, motivation, social support, and energy inhibit exercise behavior [27, 55, 115, 118-120]. Several studies have also shown that barriers differ between socioeconomic status, age, and sex [120-123]. For example, women score higher on health, practical, and priority barriers, and experience a higher number of barriers than men [123].

It may be that barriers vary across activity settings. Hence, to develop effective behavior change programs promoting exercise, it is important to understand the perception of barriers in different subgroups of a population, and how the barriers are linked to exercise attendance. Compared to

other exercise settings, the fitness club industry may have considered potential obstacles that could interfere with regular exercise behavior (such as "lack of time"), as evidenced by long/flexible opening hours, short and intense group exercise classes, and easy accessibility. Also, it may be that fitness club members experience greater embarrassment than individuals in other settings while exercising, because of mirrors in key areas of the fitness club. However, we do not know if these factors affect the attendance rates among fitness club members and there is a need for increased knowledge regarding the reasons for low participation rates.

Self-efficacy

The importance of self-efficacy concerning regular PA in adults is unquestionable [124]. Self-efficacy is defined as an individual's belief in their capacity to perform a particular behavior and mirror the confidence an individual has in the ability to exercise regularly [23, 125]. As such, to exert control over his or her own motivation, behavior, and social environment. Individuals with high levels of self-efficacy may interpret barriers as manageable and stay committed to exercise despite obstacles, and have the confidence to plan exercise sessions when pressed for time [124]. Hence, self-efficacy affects behavior both directly and indirectly by influencing other psychosocial and environmental factors [117].

Since fitness clubs are conveniently located and accessible, starting a membership requires little effort, possibly increasing self-efficacy to exercise. Still, a membership does not automatically lead to regular attendance at the fitness club. Low attendance rates in fitness clubs may reflect low self-efficacy regarding the member`s ability to exercise, since self-efficacy is believed to influence an individual's activity preferences and the effort expended in those activities [125, 126]. However, there is no scientific evidence for this. Also, self-efficacy may be influenced by the exercise experience, both the exercise setting and session in itself [125]. For instance, if the individual achieves a sense of mastery, both acute and long-term bouts of exercise have been shown to enhance the perception of self-efficacy among healthy individuals [124]. One study found that the participants who had the greatest increase in self-efficacy following a single session of walking also showed the largest changes in PA level [127].

Increasing self-efficacy is considered to be important when promoting exercise. To develop appropriate strategies to increase exercise participation in fitness club members, there is a need to

fill the knowledge gap regarding new member`s self-efficacy to exercise and its association to regular exercise attendance.

Satisfaction with life

Satisfaction with life may be an indicator of both mental and physical subjective well-being [25, 81, 128], or as an evaluative judgment of the quality of one's life as a whole [129]. Greater satisfaction with life is associated with a reduced risk of chronic diseases, mortality, and enhanced mental and physical health in adults [130-132]. As such, determining how to increase or maintain life satisfaction is important for public health.

It is well established that satisfaction with life is positively associated with PA [25, 81, 133-135]. Further, it is shown that leisure-time PA such as exercise at a fitness club have greater potential to affect well-being compared to activities in the domains of occupation and transport [136]. Individuals may therefore start and continue to be active because it contributes to their perceived satisfaction with life. Although, psychosocial factors such as social interactions while exercising and group cohesion at a fitness club, and also self-efficacy may mediate this association [137]. Several studies among older adults have shown that increased levels of PA are associated with improvements in both self-efficacy, self-worth, positive affect (e.g. to interact with others and with life's challenges in a positive way), and mental health, all influencing satisfaction with life [132, 138-140]. Further, a meta-analysis has proposed that the effect of exercise on mental well-being plays an important role in an individual`s perception of satisfaction with life [141]. Despite a large body of evidence supporting the positive influence of PA on satisfaction with life, there is less knowledge regarding how exercise at a fitness club may mediate this relationship.

Social support

Social support is also one important mechanism to consider when promoting PA and exercise [21-23]. Even though various definitions are used to describe the complexity of social support, it may be defined as "*aid and assistance exchanged through social relationships and interpersonal transactions*" [142], commonly distinguished between the support an individual receives and the subjective perception of the received support [21, 143, 144]. The various sources of social support include family, friends, and significant others, and consist of instrumental (such as providing financial assistance or babysitting), informative (such as providing advice and suggestions), emotional

(such as offering empathy or encouragement), and appraisal (such as offering companionship) support [142, 145]. The various sources may influence the quantity and quality of social support available and further affect exercise behavior [21].

Individuals who receive social support may become more interested and engaged in being physically active, especially women [21-23, 146, 147]. Two studies suggest that social support is associated with higher PA levels in women than men [148, 149]. Further, Bauman et al. (2012) [23] found that social support from family was associated with regular PA, while Tamers et al. (2011) [150] found that perceived social support from the workplace was linked with increased PA levels. Social support is therefore received in different settings. In certain situations, social support may also negatively influence PA level, for example if the individual perceives the support as social pressure to become physically active [151]. There is evidence that when individuals feel pressure to exercise by friends or significant others, they shy away from PA [151]. Considering fitness clubs are a social PA phenomenon, it is of interest to investigate how social support perceived by fitness club members is associated with exercise behavior at the fitness club.

Body image

Negative body image is a global phenomenon, with a large proportion wanting to alter their physical appearance in one way or another [152-156]. Body image can be described as *"the subjective picture of our own body which we form in our mind; that is to say, the way in which the body appears to ourselves"* [157], and is an important component of a person's identity, health, and satisfaction with life [158-160]. A negative body image is most common in women [161-163]. It seems like women of all ages value aesthetic ideals rather than the functionality of their bodies [164]. This is a public health concern since a negative body image is shown to be detrimental to mental health (depression, anxiety, and eating disorders) [165]. BMI is also influencing body image, where body dissatisfaction tends to be more common in those with overweight/obesity than normal-weight individuals [166-168]. Additional factors associated with body image are age, personality traits, and interactions with significant others, as well as culture, media and experiences [74, 75].

Exercise has been associated with both a negative and positive body image. Among young women, body satisfaction has been found to decrease with increasing amounts of exercise [169, 170]. Research has shown that when motives for exercise are appearance-based, a negative body image is associated with regular exercise [79]. Exercise may therefore be a strategy for weight loss

and toning the body, and associated with increased body dissatisfaction [67]. Contrary, intervention studies have shown that participants randomized to exercise have greater improvements in body image compared with controls [79, 171, 172]. Thus, a more positive body image may also be a consequence of exercise, possibly due to changes in body-esteem and self-esteem, leading to a more positive body image [173]. The scoping review of Sabiston et al. (2019) concluded that individuals participating in leisure-time PA had a less negative body image [174]. Yet, the causal, directional association between body image and exercise is still unknown.

An individual's body image may be sensitive to different environments and certain situations [75]. Even though a fitness club is considered a health-promoting setting, it is also an appearance orientated environment containing numerous full-length mirrors, posters idealizing the toned and athletic body, and the opportunity for direct comparison with other individuals [54, 67]. However, to date no studies have examined how the fitness club environment influences body image. Since a large proportion long for a well-shaped and athletic body and a fitness club membership may be linked to the symbolism of attractiveness, research should prospectively monitor changes in body image in new fitness club members in their first year of membership.

Customer satisfaction

Members seek fitness clubs that will satisfy their specific needs, such as opening hours, equipment and exercise concepts, and customer satisfaction may be a key driver of member`s loyalty [175-177]. The club managers are forced to focus on customer service and provide quality service for a satisfactory experience, and thus retain members [178]. Service quality includes providing services/products that members want, and create a competitive advantage for the fitness club [179]. Even though the literature is mixed [180-185], customer satisfaction should be considered when understanding exercise attendance among fitness club members.

Several authors have shown that a satisfied member is more likely to attend the fitness club regularly [180-184], while Gonçalves et al. (2016) [185] did not find an association between exercise attendance at the fitness club and customer satisfaction. However, former research in this field primarily focused on the fitness club`s profits, with little or no attention on public

health. Thus, from a public health perspective, research is needed on the association between customer satisfaction and exercise attendance in fitness club members.

Physical testing

Fitness club members mainly exercise for health benefits, improvement in physical fitness and appearance, and progress towards goals [35, 57, 186, 187]. Since most members have these extrinsic reasons for exercise, fitness clubs offer additional services, such as physical testing. The most common is testing of strength, endurance and body composition, especially for clients of personal trainers. The tests are an important part of the personal trainers` methods to assess progress towards an exercise goal [188], as well as to increase a client`s exercise motivation. Achievement of these goals may be desired since it is shown that goal-reaching, such as weight loss or increase in muscle mass, may motivate individuals to sustain regular exercise [35, 110, 117, 189, 190]. Contrary, despite limited knowledge, poor test results may negatively influence exercise attendance. For instance, individuals who do not meet their goals and expectations may experience exercise as less pleasing and motivating [35, 110, 117, 189-191].

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 members with different health challenges [192]. Such testing may also give imprecise results due to poor equipment maintenance and insufficiently standardized test procedures [192]. To our knowledge, no studies have investigated the influence of physical testing on exercise behavior among fitness club members.

Several authors have investigated adolescent`s motivational reactions to physical testing (e.g. Multistage Fitness test), revealing that the role testing plays in promotion of PA is questionable [193]. Yet, few studies have examined if testing influences exercise attendance or habits [193]. One Finnish study among middle-aged adults found that a fitness test battery was associated with exercise patterns [194]. Resistance exercise and PA level were related to the results of a push-up test and a walk-test, respectively [194]. These relations were probably due to the participants` previous exercise behavior, and it is still unknown whether performing repeated physical testing affects future exercise attendance or patterns in novice exercisers.

Need for new knowledge

Increasing participation in regular PA is a national health priority [46]. It is therefore important to generate an increased understanding of adults who choose to be members of a fitness club, one of the most popular activity settings [39]. To date, there is little research in this field and a review of the literature revealed that past work is limited by methodological challenges. Also, as discussed earlier, authors have reported low attendance rates the first months after individuals sign up for membership. This may indicate that it is easier to sign up for membership and initiate exercise than to maintain regular exercise attendance. Reasons for low attendance rates and why some members adhere to exercise and others do not are poorly described in previous literature. The results from this project may serve as a framework for future research and provide a reference material for anyone working within the field of physical activity and public health. Also, to develop effective exercise promotion strategies, fitness club employees need to gain an increased understanding based on empirical knowledge. Hence, it is important to prospectively monitor factors associated with exercise attendance in a group of novice exercisers in their first year of membership.

Aims of the thesis

The principal aim of the present PhD-project was to gain an increased understanding of those individuals who are able to stay active and continue with regular exercise in a group of novice exercisers in their first year of a fitness club membership. This thesis includes prospective studies following a group of new fitness club members in Oslo, Norway, with repeated measures of a wide range of psychosocial and physiological parameters, including PA level, background and health variables. The specific aims of this thesis were as follows:

- Paper I
    - *Primary aim:* Assess total PA level and prevalence of meeting PA recommendations at start-up and 12 months
    - *Secondary aim:* Identify demographic and socioeconomic variables and compare these in participants with regular (≥2 exercise sessions/week) and non-regular (one exercise session/week, or no exercise) exercise attendance at 12 months
- Paper II
    - *Primary aim:* Report prospective data on body image
    - *Secondary aim:* Compare body image in participants with regular and non-regular exercise attendance at three, six, and 12 months, and between sex and BMI (BMI<25 and BMI≥25) at start-up
- Paper III
    - *Primary aim:* Investigate if repeated testing of body composition, maximal oxygen uptake, and maximal muscle strength at start-up, three and 12 months were associated with exercise attendance and patterns
    - *Secondary aim:* Report prospective data on the use of the fitness club
- Paper IV
    - *Primary aim:* Report prospective data of regular and non-regular exercise attendance, exercise dropout, and perceived motives and barriers to exercise
    - *Secondary aim:* Compare motives in participants with regular and non-regular exercise attendance at three, six, and 12 months
- Paper V
    - *Primary aim:* Investigate different psychosocial factors (self-efficacy, social support, motives, and life satisfaction), and customer satisfaction that might increase the likelihood of reporting regular exercise across the follow-up

Methods

Study design and recruitment

The five papers which form the basis of this thesis are based on the research project "Fitness clubs. A venue for public health?", a 12 months prospective study with four follow-ups conducted at the Norwegian School of Sport Sciences (NSSS). The overall project gathered repeated measures of total PA level, psychosocial factors (body image, perceived motives and barriers, self-efficacy, social support, and life satisfaction), physiological factors (body composition, maximal oxygen uptake, and maximal muscle strength), exercise attendance, use of the fitness club, and customer satisfaction among new fitness club members.

Power calculations and sample size

Since many factors influence PA participation [23, 24, 146] we emphasized several psychosocial and physiological factors when calculating our initial sample. Power calculations were done in 2015 together with a professor in biostatistics, Ingar Holme, and were based on findings in other studies [195-198], as well as what the research group hypothesized to be relevant changes in psychosocial and physiological variables for new fitness club members, or differences between regular and non-regular exercisers across 12 months follow-up. With 200 participants, we would be able to detect a 5% to 10 % change in psychosocial variables, while for physiological variables we would need ≥55 participants to detect changes/differences from 3% to 5%, with a power of 85 % at the 0.05 level. Further, there are high losses to follow up in novice exercisers, and high exercise dropout rates in the first months in adults initiating exercise [35, 36, 90, 199]. Thus, to account for losses to follow-up, allow subgroup analyses and adjustments of other factors, the research group assumed recruitment of an additional 25% of participants as appropriate. We therefore aimed to recruit a total of 250 participants, with equal numbers of men and women.

We also conducted power calculations for each paper based on the studies of Hansen et al. (2012) [198] and Schroeder et al. (2017) [200] (paper I), Loland (1998) [201] (paper II), Gjestvang et al. (2019) [202] and Gjestvang et al. (2019) [203] (paper III), Kulavic et al. (2013) [196] and

Roberts et al. (2015) [204] (paper IV). Sample size in paper V was considered appropriate based on previously published papers from the Ph.D. project and a mixed effects logistic regression.

The following equation was used for paper I, II, III, and IV:

$(N = \frac{\sigma^2(z_{1-\beta} + z_{1-\alpha/2})^2}{(\mu_0-\mu_1)^2})$, where μ_0 = population mean and σ = variance of the population in the studies the calculations were based on, and μ_1 = anticipated mean for our participants.

Power calculations to detect changes/differences from start-up to 12 months follow-up for each paper were:

- Paper I.
    - We needed 80 participants to detect a 15% change in numbers meeting the PA recommendations.
- Paper II.
    - We needed 87 to 182 participants to reveal a 10% change in different body image statement.
- Paper III.
    - Based on findings in paper I, with about 40% of the participants reporting regular exercise attendance at 12 months follow-up, we needed 98 participants divided into two groups (49 participants in each group) to reveal a 25% difference in exercise attendance between a group performing physiological measurement and a control group.
- Paper IV.
    - We needed 137 to 154 participants to detect a 10% change in different motive statements.
- Paper V
    - Using a mixed effects logistic regression with eight independent variables, a minimum of ten participants per variable was considered appropriate and we needed 80 participants to conduct the analysis.

Participants

A collaboration with SATS ELIXIA was initiated in 2015, a Nordic fitness club chain consisting of 40 multipurpose fitness clubs in Oslo, Norway (www.sats.no), including a wide range of exercise concepts, resistance and cardio-exercise rooms, group exercise classes, and personal training. The membership fees are from mid (469 NOK) to high (999 NOK), depending on membership profile, and members purchase either a 12-month contract that cannot be canceled or a "pay as you go" contract. The fitness clubs have long reception opening hours (6am to 10pm), childcare, and focus on customer satisfaction.

In the recruitment process, all new members (<4 weeks of membership) from 25 SATS ELIXIA fitness clubs received an email invitation. Interested participants contacted the research group. At first contact, the aims and implications of the study were explained, and eligibility criteria were checked (Table 2). Participants were recruited during two periods: Group A) October 2015 to April 2016: n = 125, and Group B) September 2016 to November 2017: n = 125.

Table 2. Inclusion and exclusion criteria`s.

Inclusion criteria's	Exclusion criteria's
Less than 4 weeks fitness club membership	Regular PA (structured exercise ≥60 minutes/week at moderate or vigorous intensity or brisk walking ≥150 minutes/week the last six months)
≥18 years	Chronic disease or pathology (e.g. heart disease, severe hypertension, or lung disease such as asthma) hindering exercise
Ability to speak, read and understand Norwegian	Pregnant at inclusion (group A)
Prepared to fulfil all measurements (three visits) at NSSS over a period of 12 months (group A)	

A total of 676 fitness club members responded to the email invitation, of whom 148 did not respond to the research group after the first e-mail correspondence. We then excluded 278 who did not meet the eligibility criteria (regular physical activity n = 270, chronic disease/illness n = 8). The final sample therefore included 125 in group A and 125 in group B. Group A answered a questionnaire four times (at start-up, and after three, six and 12 months) and performed physiological measurements three times (at start-up, and after three, and 12 months), whereas

group B answered the survey at four times (at start-up, and after three, six and 12 months). Across the follow-up, 63 participants dropped out of the study. Losses to follow-up included life situation (group A: n = 7, group B: n = 7), injury/disease (group A: n = 4, group B: n = 1), relocation (group A: n = 1), and unknown reasons (group A: n = 22, group B: n = 21). Up to three emails and one telephone reminder were directed to participants who did not respond. Flow of participants and data collection are shown in Figure 1.

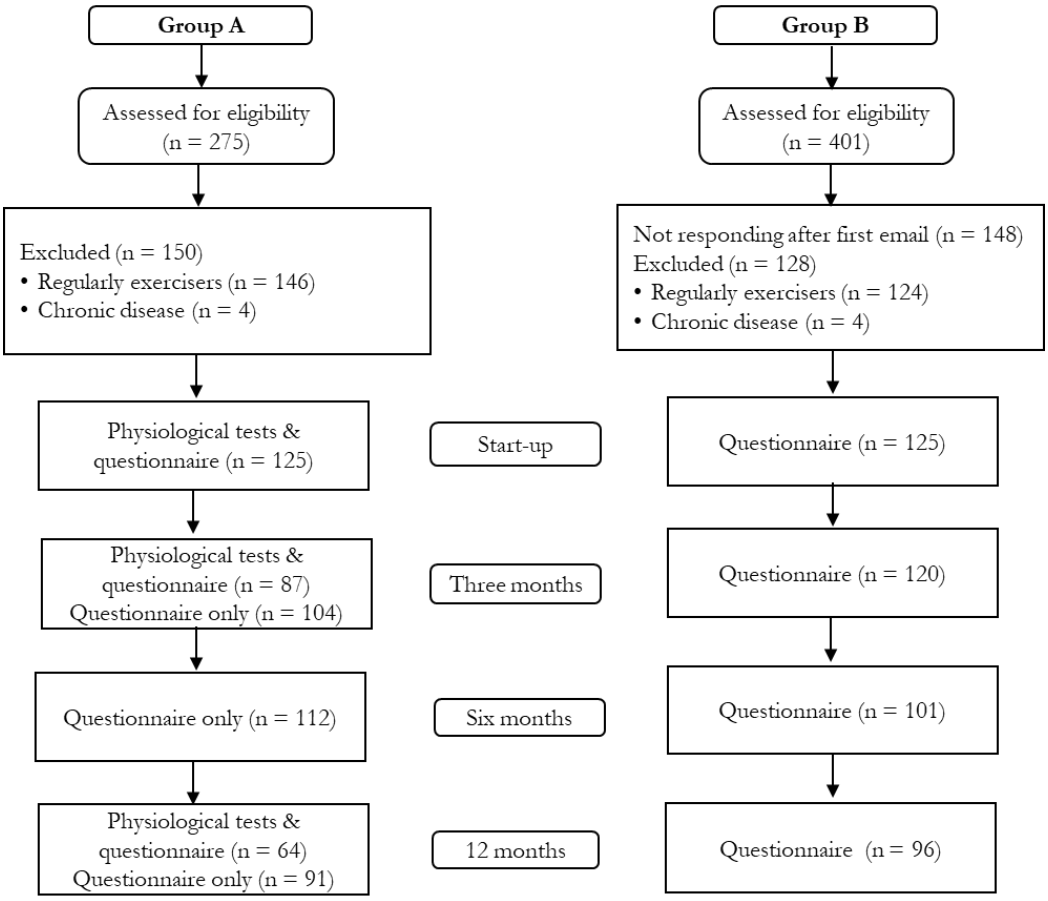

Figure 1. Flow-chart of the study and participants in group A and B.

Measures

We collected data from October 2015 to April 2017 (group A), and from September 2016 to November 2018 (group B).

Electronic questionnaire

Data concerning demographic and socioeconomic factors, psychosocial variables (body image, perceived motives and barriers, self-efficacy, social support, and life satisfaction), use of the fitness club, exercise attendance, and customer satisfaction was collected by a standardized electronic questionnaire (appendix 2 and 3), and 250, 224, 213, and 187 in group A and B answered at start-up, and after three, six and 12 months, respectively. A total of 184 (men, n = 94 and women, n = 90) answered at all four time-points (73.6%).

The online questionnaire (SurveyXact) was developed using existing validated questionnaires, and also included questions about demographic and socioeconomic status, health factors, and exercise involvement. The survey contained 52 questions at start-up and 65 questions after three, six, and 12 months, and took 20 to 30 minutes to complete. All questions were close-ended. On every question, the participants could tick "Does not apply" or "I do not want to answer", which in paper II and V were treated as missing data in the analysis, whereas in paper I, III, and IV were excluded from the data set. Concerning psychosocial factors, use of the fitness club, and exercise attendance we asked the participants to answer questions over the last four weeks, due to potential recall bias associated with self-report [71, 205].

The questionnaire sections concerning body image, perceived motives for exercise, self-efficacy, social support, and quality of life (paper II, IV, and V) were originally in English language. These sections were translated into Norwegian by three members of the research group, using a forward-backward translation technique. A bilingual Australian Associate Professor with English as mother tongue checked the final questionnaires by comparing the "new" English version with the original version. Based on this, some adjustments were made in the final version. A pilot test of the whole electronic questionnaire was also conducted, where four volunteers were asked to provide feedback. This led to minor changes in format and wording to provide a shorter and more accurate survey, making interpretation for the respondents easier.

Exercise attendance

For all five papers, all participants answered questions concerning exercise attendance at three, six, and 12 months. The following four questions were used:

1) *"Exercise is a subset of PA that is planned, structured, and repetitive, and has an 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"
2) *"How often have you exercised per week on average at the fitness club?"*. Response options: "Number of sessions"
3) *"Have you been exercising outside the fitness club?"*. Response options: "Yes" or "No"
4) *"How often have you exercised per week on average outside the fitness club?"*. Response options: "Number of sessions"

In line with definitions proposed by Hawley-Hague et al. [1] and Garber at al. [101], the participants were divided into regular and non-regular exercise attendance at the fitness club. Regular exercise attendance was categorized as ≥2 sessions/week, since a minimum of two sessions weekly is suggested to improve physiological factors such as maximal oxygen uptake or maximal muscle strength in novice exercisers [101]. Non-regular exercise attendance was categorized as ≤1 exercise session/week, exercise relapse or dropout, or membership withdrawal. In paper IV we also included exercise outside the fitness club, using the same definition of ≥2 sessions/week.

Paper I

In paper I, we assessed device-measured PA in group A at start-up and at 12 months, and demographic and socioeconomic factors in group A and B at start-up.

Device-measured PA

The measurement followed the same protocol as another Norwegian study and was assessed with ActiGraph GT1M (ActiGraph, LLC, Pensacola, FL), a valid and reliable measure of PA in adults [73, 198]. The accelerometer was lightweight and small (27 g., 3.8 x 3.7 x 1.8 cm), comprising a solid-state monolithic accelerometer using microprocessor digital filtering. The accelerometer

registered vertical acceleration in units called counts and sampled data at a rate of 30 times per second in user-defined sampling intervals (epochs).

At both time-points, the participants received a preprogrammed accelerometer and standardized instructions (paper-based and on-site) (appendix 4), including how to wear the accelerometer over the right hip in an elastic band while awake and to remove it for water activities such as swimming. The participants wore the accelerometer for seven consecutive days and at the end of the measurement period, the participants returned the accelerometer by prepaid mail and reported if they had done other activities such as strength training, cycling or swimming (explained below). ActiGraph GT1M is not waterproof and primarily measures vertical accelerations of the body when worn on the hip. All forms of PA may therefore not be measured accurately (e.g., upper body movement, resistance training, isometric muscle contractions, and cycling) [206]. Hence, the participants answered questions regarding swimming, muscle-strengthening activities, and cycling in a standardized form (appendix 5): *"Have you been doing swimming, cycling, resistance exercise, or cross-country skiing during the measurement period?":* "yes" or "no." If the participants had performed some of the activities, frequency and duration were obtained.

All participants accumulating a minimum of 10 hours of activity recording/day for ≥4 days were included in the data analysis. The accelerometers were initialized and downloaded using ActiLife software provided by the manufacturer (ActiGraph LLC). The data were collected in 10-s epochs. For comparison with other studies, the 10-s epochs were collapsed into 60-s epochs using a specialized accelerometer analytical software (Kinesoft, version 3.3.80, Saskatoon, Canada). To identify PA of different intensities, count thresholds corresponding to the energy cost of the given intensity were applied to the data set:

• Sedentary activity was defined as all activity below 100 cpm, a threshold corresponding to sitting or lying down [198, 207, 208].

• Low-intensity PA was defined as counts between 100 and 2019, counts corresponding to lifestyle activity (e.g., slow walking, grocery shopping and child care) [198, 209, 210].

• Moderate to vigorous PA (MVPA) was defined as all activity ≥2020 cpm (e.g., walking at speeds of ≥ 4.7 km/h as well as more vigorous activities), equivalent to an energy expenditure of ≥3 METs (metabolic equivalent) [198, 209, 211].

Number of minutes per day at different intensities was determined by summing all minutes where the count met the criterion for that intensity, divided by the number of valid days. Steps per day was registered as number of intervals (epochs), which was claimed to be representative of the number of steps taken [198, 212]. Device-measured PA is presented as:

1. Total PA level (mean counts per minute (cpm)). Cpm is a measure of overall PA and was expressed as the total number of registered counts for all valid days divided by wearing time.

2. Number of minutes spent in intensity-specific categories.

3. Number of steps registered per day.

4. Percentage of the participants accumulating ≥10,000 steps per day.

5. Percentage of the participants meeting the national PA recommendations.

Adherence to PA recommendations was determined as accumulating a minimum of 150 minutes of weekly MVPA (mean >21.4 minutes/day) in bouts of ≥10 minutes (with allowance for interruptions of 1-2 minutes) [20, 213]. MVPA was then divided by the number of valid days to examine whether PA recommendations were met. This definition allowed participants to have longer bouts of activity on certain days and still meet the recommendations. Due to self-reported swimming, muscle-strengthening activities, and cycling, we also determined combined weekly PA: Combined weekly PA = (accelerometer measured weekly PA + (days of self-reported activity * duration)).

Demographic and socioeconomic factors

Questions related to demographic and socioeconomic factors were answered once at the start of the study (also start-up of membership; Table 3).

Table 3. Questions and corresponding response options used to obtain data on background variables.

Dimension assessed	Question	Response options
Age	*What is your age?*	Age in years
Sex	*What is your sex?*	”Male” or “Female”
Body weight	*What is your current body weight in kilograms (kg)?*	Body weight in kg
Body height	*What is your body height in centimeters (cm)?*	Body height in cm
Smoking	*Do you currently smoke?*	“Yes” or “no”
Educational level	*What is the highest grade or level of school you have completed?*	"Primary school", "high school", "college/university <4 years", "college/university >4 years", or "other education"
Total household income	*Which of these categories best describes your total combined family income for your household for the past 12 months?*	“Below $15 000", "$15 000-24 999", "$25 000-37 999", "$38 000-59 999", "$50 000-69 999", "$70 000-87 999", "$88 000-106 999", or "over $107 000"
Cohabitation	*What is your current marital status?*	“Single without children”, “single with children”, “married or domestic partnership without children”, “married with children”, or “other”
Occupation	*What is your currently employment status?*	“Employed in public administration”, “employed in a private company”, “self-employed”, “student or a trainee”, “unable to work”, “out of work and looking for work”, “homemaker”, “retired”, or “other”

In the analysis, the participants were characterized with either low (<4 years of higher education) or high (≥4 years of higher education) educational level, and low (paper I and II: <87 499$, paper III, IV, and V: <100 000$) or high (paper I and II: ≥87 500$, Paper III, IV, and V: ≥100 000$) annual household income.

Paper II

Body image

In paper II, we gathered data on body image in group A and B at start-up, and at three, six, and 12 months follow-up. The questionnaire section was based on the validated Multidimensional Body Self Relations Questionnaire Appearance Scales (MBSRQ-AS), and is applicable for different age groups, populations, and both sexes [214-219]. MBSRQ-AS comprises five subscales, with a total of 34 statements [214]. Each subscale contains two to 12 statements and the individual`s rate how they think, feel, or behave regarding different body image dimensions, on a five-point scale [214, 220].

To simplify the questionnaire, the research group decided to exclude 13 statements due to similar wording (e.g. "I dislike my physique" and "I am physically unattractive"), retaining 21 statements from the original MBSRQ-AS. We also changed the response options for "Self-classified weight" (*"I think I am* …), agreeing to the World Health Organization (WHO) BMI classification: "underweight (< 18.5 kg/m2)", "normal weight (18.5 to 24.9 kg/m2)", "overweight (25 to 29.9 kg/m2)" and "obese (≥ 30 kg/m2)". Table 4 summarizes the subscales and the number of statements for body image evaluation.

A sum score for each subscale was calculated by adding scores from each statement, divided by the number of statements. We also calculated a body image total score by adding all 21 statements. For some of the subscales items, the statements had a negatively worded query, where a lower score was considered positive for body image attitudes. In the dataset, negatively framed statements were then reversed so that a higher sum score reflected a more positive body image.

MBSRQ-AS has good validity and reliability [214-219]. In this study, Cronbach's α for the subscales used ranged from 0.85 to 0.89 (appearance satisfaction), 0.79 to 0.86 (BASS), 0.50 to 0.79 (appearance investment) and 0.60 to 0.72 (weight related attitude) across follow-up. Internal consistency of the modified version of MBSRQ-AS as a whole was high, as determined by the Cronbach's α: 0.78, 0.83, 0.81 and 0.78 at start-up, three, six and 12 months of membership, respectively.

Table 4. Statements and subscales used to gather body image evaluation.

Subscale	Description of subscale	No. of statements	Statements	Response options
			"Below are a series of statements about how people might think, feel, or behave. You are asked to indicate the extent to which each statement pertains to you personally"	
Appearance satisfaction	Feelings of physical attractiveness/ unattractiveness; satisfaction or dissatisfaction with one's looks	6	"My body is sexually appealing", "I like my looks just the way they are", "Most people would consider me good-looking", "I like the way I look without my clothes on", "I like the way my clothes fit me", and "I dislike my physique"	From 1 (definitely disagree) to 5 (definitely agree)
Appearance investment	Extent of investment in one's appearance	5	"I check my appearance in a mirror whenever I can", "It is important that I always look good", "I don't care what people think about my appearance", "I never think about my appearance", and "I am always trying to improve my physical appearance"	From 1 (definitely disagree) to 5 (definitely agree)
Weight-related attitude	Reflecting fat anxiety, weight vigilance, dieting, and eating restraint	3	"I constantly worry about being or becoming fat" and "I am very conscious of even small changes in my weight"	From 1 (definitely disagree) to 5 (definitely agree)
			"I have tried to lose weight by fasting or going on crash diets"	From 1 (never) to 5 (very often)
Self-classified weight	Reflecting how one perceives and labels one's body weight	1	*"I think I am"*	From 1 (underweight) to 4 (obese)

Body Areas Satisfaction Scale (BASS)	Satisfaction with specific body areas	6	*"From 1 to 5, indicate how dissatisfied or satisfied you are with each of the following aspects of your body:"* "Lower torso (buttocks, hips, thighs, legs)", "Mid torso (waist, stomach)", "Upper torso (chest or breasts, shoulders, arms)", "Muscle tone", "Body Weight", and "Overall appearance"	From 1 (very dissatisfied) to 5 (very satisfied)

Paper III

In paper III, body composition, maximal oxygen uptake (VO_{2max}), and maximal muscle strength at start-up, and at three and 12 months were measured in group A. A total of 56 participants (44.8%) completed all physical tests. The measurements were performed by qualified personnel following standardized procedures and took 60 minutes to complete. At all time-points, the time-schedule was as follows: 1) measurement of body composition (10 minutes), 2) measurement of VO_{2max} (25 minutes), and 3) measurement of maximal muscle strength (20 minutes). In addition, both group A and B answered questions related to use of the fitness club at start-up, and at three, six, and 12 months.

Body composition

Body composition was measured by bioelectrical impedance analysis, a valid method to assess body composition, when following strict pretest guidelines [221, 222]. The measurement was done with Inbody 720 (Biospace, USA), in light clothing without shoes and after 2 hours fasting. Body weight was measured to the nearest 0.1 kg and height was measured with a fixed stadiometer (Seca scale, Mod: 8777021094, S/N: 877248124885) to the nearest 0.5 cm. Before each measurement, the device was set to subtract 0.5 kg for the participant's clothes.

Maximal oxygen uptake

VO_{2max} was measured with a cardiopulmonary exercise test [223] on a treadmill using an incremental modified Balke protocol until exhaustion [224, 225]. The protocol started with a 3 minute warm-up at an initial speed of 4.5 km/hour with no inclination [224]. Then, the treadmill inclination increased by 5% every minute up to 20%, while the speed was kept constant (4.8 km/hour). During the final stage, the speed increased every minute with 0.5 km/hour, while inclination was constant (20%) [224]. The Borg scale (from 6 to 20) was used to rate perceived exertion [226]. The exercise test was stopped when the participants reached maximal exhaustion (≥19 on Borg scale), and a respiratory exchange ratio between 1.10 and 1.30 according to age [225]. The highest VO_{2max} and highest respiratory exchange ratio measured before or corresponding to the last 30 seconds were registered. Assessment of VO_{2max} was measured with indirect calorimetry (Oxycon Pro; Jaeger) with the 'breath-by-breath' method. The participants breathed through a Hans Rudolph two-way breathing mask (2700 series; Hans Rudolph, Kansas City, Kansas, USA), covering both mouth and nose, attached to a non-rebreathing hose. Expired air/gases were continuously sampled and registered each 30 seconds during the exercise test. A heart rate monitor (Polar RS800) was used to record heart rate. Before each test day, all analyzers were calibrated following the manufacturers guidelines, and all tests were supervised by the Ph.D. student.

Maximal muscle strength

We also assessed maximal muscle strength using a one repetition maximum (1RM), a common method to assess maximal muscle strength in a non-laboratory situation [227, 228]. The measures of 1RM were completed in bench press (Smith machine) and leg press. Before test procedures were initiated, the participants received verbal instructions and a practical demonstration of the two exercises. The test protocol started with three warm-up series with decreasing repetitions (e.g. 7-5-3), while the load was gradually increased on an individual basis. Thereafter, the load for each participant was increased by 2% to 5% until failure. Rest periods between attempts were 1 to 2 min with a maximum of four attempts. The highest load with appropriate technique was registered as 1RM. Measurement of 1RM were supervised by a research fellow.

Use of the fitness club, its facilities and products

In paper III, we obtained data on use of the fitness club. The questionnaire section was based on questions developed by Pedersen et al. (2011), used in a Danish study among fitness club members [229]. In the present Ph.D. project, the questions were answered by participants reporting exercise at the fitness club at three (n = 165), six (n = 146) and 12 (n = 119) months follow-up. Table 5 summarize questions for use of the fitness club.

Table 5. Questions and corresponding response options used to obtain data on use of the fitness club, facilities and products.

Dimension assessed	Question	Response options
Membership	*Are you still a member?*	"Yes" or "No"
Exercise patterns	*What is your average exercise duration at the fitness club (do not include time used for shower/travel)?*	Duration in minutes
	Do you usually exercise individually (e.g. tread mill or resistance exercise) or at group exercise classes (e.g. aerobic or cycling)?	«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/random»
	Do you usually do resistance (e.g. use of machines or free weights) or endurance exercise?	«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/random»
	Have you attended group exercise classes?	«Yes» or «No»
	How often have you attended the following group exercise classes: Yoga/Pilates, Aerobic/Zumba, Resistance exercise, Cycling, Circuit exercise?	«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	*Have you used a personal trainer (PT) to achieve your exercise goals?*	«Yes» or «No»

	How many PT-sessions did you buy on your last purchase?	Number of sessions
Use of childcare	*Have you used the fitness club`s childcare?*	«Yes», «No» or «I do not have children»

Paper IV

In paper IV, we gathered data on perceived motives in group A and B at start-up, and at three, six, and 12 months follow-up. Barriers to exercise were answered by both groups at start-up, and by participants reporting exercise dropout at three (n = 43), six (n = 53) and 12 (n = 65) months.

Perceived motives for exercise

Perceived motives for exercise was based on Exercise Motivations Inventory-2 (EMI-2) [190], assessing a broad range of exercise motives, valid for different populations, both sexes, and both exercisers and non-exercisers. The original EMI-2 comprises 14 subscales, with a total of 51 statements [190]. Each subscale contains one to four statements where the individuals rate the significance of each statement as a personal motive for exercise on a six-point scale. A sum score (from 0 to 5) for each subscale is calculated by adding scores from each statement, divided by the number of statements.

The research group excluded 16 statements due to similar wording or because it was not considered relevant in a fitness club setting (e.g., "Because I like trying to win in physical activities" and "Because I enjoy physical competition"). Hence, only 35 statements from the original EMI-2 were used. Table 6 summarize subscales and the number of statements for perceived motives.

EMI-2 has good validity and reliability, with Cronbach's α ranging from 0.69 to 0.95 for all fourteen subscales [190]. In this study, Cronbach's α for the subscales ranged from 0.76 to 0.86 (stress management), 0.56 to 0.62 (revitalisation), 0.85 to 0.87 (enjoyment), 0.82 to 0.86 (challenge), 0.58 to 0.73 (social recognition), 0.73 to 0.83 (affiliation), 0.48 to 0.69 (health pressures), 0.53 to 0.71 (ill-health avoidance), 0.61 to 0.81 (positive health), 0.81 to 0.87 (weight

management), 0.76 to 0.80 (appearance), and 0.38 to 0.60 (strength and endurance) across follow-up. As expected, Cronbach's α was lowest for the subscales with only two items, and these subscales should be interpreted with care. Internal consistency of the modified version of EMI-2 as a whole was high, as determined by the Cronbach's α: 0.88, 0.89, 0.91, and 0.92 at start-up, and at three, six and 12 months of follow-up, respectively.

Table 6. Statements and subscales used to gather perceived motives for exercise.

Subscale	**No. of statements**	**Statements**
		"Below are a number of statements concerning the reasons people often give when asked why they exercise. Whether you currently exercise regularly or not, please read each statement carefully and indicate whether or not each statement is true for you personally. From 0 (not true for me) to 5 (very true for me), personally, I exercise (or might exercise)…"
Stress management	3	"To give me space to think", "Because it helps to reduce tension", and "To help manage stress"
Revitalisation	2	"Because it makes me feel good", and "To recharge my batteries"
Enjoyment	4	"Because I feel at my best when exercising", "For enjoyment of the experience of exercising", "Because I find exercising invigorating and satisfying in and of itself", and "Because I enjoy the feeling of exerting myself"
Challenge	3	"To give me goals to work towards", "To give me personal challenges to face", and "To develop personal skills"
Social recognition	2	"To gain recognition for my accomplishments and accomplish things that others are incapable of", and "To show my worth to others"
Affiliation	3	"To make new friends", "To spend time with friends and enjoy the social aspects of exercising", and "To have fun being active with other people"
Competition	1	"Because I enjoy competing"
Health pressures	3	"Because my doctor advised me to exercise", "To help prevent an illness that runs in my family", and "To help recover from an illness/injury"
Ill-health avoidance	3	"To avoid ill-health", and "To prevent health problems", and "To avoid heart disease"

Positive health	2	"To have a healthy body and maintain good health", and "To feel healthier"
Weight management	3	"To stay slim and help control my weight", "To lose weight", and "Because exercise helps me to burn calories"
Appearance	3	"To look more attractive and improve my appearance", "To help me look younger", and "To have a good body"
Strength and endurance	2	"To increase my endurance", and "To get stronger and build up my strength"
Mobility	1	"To stay or become flexible"

Perceived barriers to exercise

Perceived barriers to exercise were based on questions and identified barriers in a previous study among a Norwegian adult population (n = 12 504) [123]. Fourteen barriers in that study were included in the present research project, and we also added four barriers assumed to be an issue for fitness club members. We categorized the 18 barriers into four subscales, and included two to nine statements in each subscale [123]. The participants rated how limiting they perceived each barrier to be on a three-point scale. By adding the score from each barrier divided by the number of statements, a sum-score (from 1 to 3) for each subscale was calculated. Table 7 summarizes the subscales and the number of statements for perceived barriers.

Barrier subscales in the former Norwegian study [123] were shown to have Cronbach's α values above 0.70 for the practical, health-related, and affective/cognitive subscales, but were lower for the priority subscale. In our study, Cronbach's α for the four subscales ranged from 0.34 to 0.57 (priority), 0.63 to 0.69 (practical), 0.49 to 0.67 (health-related), and 0.76 to 0.90 (affective-cognitive) from start-up to 12 months follow-up. As expected, Cronbach's α was lowest for subscales with the fewest items, and these subscales should be interpreted with care. Internal consistency of the barrier questionnaire as a whole was high, as determined by the Cronbach's α: 0.88 at start-up, 0.87 at three months, 0.92 at six months, and 0.92 at 12 months follow-up.

Table 7. Statements and subscales used to obtain perceived barriers to exercise.

Subscale	No. of statements	Statements
		"Below are a number of statements concerning the reasons people often give when asked why they don't exercise. Please read each statement carefully and indicate from 0 (not important to me) to 3 (very important to me) whether or not each statement is true for you personally"
Priority	2	"I feel more like doing other things", and "I do not have time and energy"
Practical	4	"I lack an adequate opportunity and have nobody to do it with", "I do not dare to exercise", "I lack transport", and "It is too expensive for me"
Health-related	3	"Health problems hinder me", "I need more rest and relaxation", and "I am bothered by dizziness"
Affective-cognitive	9	"I do not think I will get anything out of it", "I do not think it is of importance for my health", "I do not like to be physically active", "I do not see myself as a physically active person", "I am afraid of injuries", "I do not know how to exercise", "I am embarrassed for others to see me exercise", "I am afraid to do the exercises wrong", and "I consider myself as sufficiently physically active"

Paper V

In paper V, in addition to perceived motives for exercise, we gathered data on self-efficacy, social support, and life satisfaction in group A and B at start-up, and at three, six, and 12 months. Customer satisfaction was also obtained in both groups at three, six, and 12 months.

Self-efficacy

Self-efficacy for exercise was based on an abbreviated validated version of the Self-Efficacy Survey developed by Sallis et al. (1988) [230]. The questionnaire assesses how confident an individual is to increase or continue with regular exercise in a wide range of conditions. The original scale consists of two subscales, with a total of 12 statements [230]. Each subscale covers four to eight statements where participants rate each statement on a five-point scale. For each subscale, a sum score (from 1 to 5) was calculated by adding scores from each statement and then

dividing by the number of statements. Table 8 summarizes the subscales and the number of statements for self-efficacy.

Table 8. Statements and subscales used to obtain self-efficacy for exercise.

Subscale	No. of statements	Statements
		"Whether you exercise or not, please rate from 1 (I know I cannot) to 5 (I know I can) how confident you are that you could really motivate yourself to do things like these consistently, for at least six month"
Sticking to it	8	"Stick to your exercise program after a long, tiring day at work", "Exercise even though you are feeling depressed", "Continue to exercise with others even though they seem too fast or too slow for you", "Stick to your exercise program when undergoing a stressful life change (e.g., divorce, deaths, moving)", "Stick to your exercise program when your family is demanding more time from you", "Stick to your exercise program when you have household chores to attend to", "Stick to your exercise program even when you have excessive demands at work", and "Stick to your exercise program when social obligations are very time consuming"
Making time for exercise	4	"Get up early, even on weekends, to exercise", "Set aside time for a PA program; that is walking, jogging. swimming, biking, or other continuous activities for at least 30 minutes, 3 times per week", "Attend a party only after exercising", and "Read or study less in order to exercise more"

The Self-Efficacy Survey has good test–retest reliability and internal consistency [230]. In our study, Cronbach's α for the two subscales for self-efficacy ranged from 0.76 to 0.88 (sticking to it) and 0.35 to 0.63 (making time for exercise) across follow-up. Cronbach's α was lowest for the subscale with four items and this subscale should be interpreted with care. Internal consistency of the Self-Efficacy Survey was high, as determined by the Cronbach's α: 0.81 at start-up, 0.87 at three months, 0.87 at six months, and 0.83 at 12 months follow-up.

Social support

Social support for exercise was based on a validated survey developed by Sallis et al. (1987) [231], consisting of 13 statements. The individual`s rated each statement on a five-point scale, on how often their family or friends had been supportive of them exercising.

Seven statements were excluded because of similar wording (such as "Asked me for ideas on how they can get more exercise" and "Discussed exercise with me"). Six out of the total 13 statements were retained in the present Ph.D. project. The two sections (family and friends) were merged. The question asked in the current study was: *«If you currently exercise or not, read the list below and give an answer to every statement below. How often, during the last four weeks, have family or friends said or done what is described. Please choose a number from 1 (never) to 5 (very often)"*. The six statements were as following:

1) "Exercised with me"
2) "Gave me encouragement. to stick with my exercise program"
3) "Complained about the time I spend exercising"
4) "Planned for exercise on recreational outings"
5) "Helped plan activities around my exercise"
6) "Asked me for ideas on how they can get more exercise"

A total social support score was calculated (from 6 to 30) using a sum of scores from each of the six statements, where higher scores demonstrated greater social support for exercise.

The survey developed by Sallis et al. (1987) has acceptable test–retest reliability and internal consistency [231]. In our study, Cronbach's α for the six statements concerning social support were: 0.74, 0.77, 0.76, and 0.86 at start-up, and after three, six and 12 months of follow-up, respectively.

Life satisfaction

The questionnaire section regarding life satisfaction was based on the Satisfaction of Life Scale (SWLS) [232]. It is a short survey assessing satisfaction with the individuals` life as a whole and is valid for different ages and populations [233-235]. SWLS contains five statements that the individual rated on a seven-point scale, and a total score was calculated by adding scores from each statement (from 5 to 35), where higher scores meant higher life satisfaction.

The question asked was: *"Below are five statements which you may agree or disagree with. Please indicate from 1 (strongly disagree) to 7 (strongly agree) whether or not each statement is true for you personally"*. The five statements were as following:

1) "In most ways, my life is close to my ideal"
2) "The conditions of my life are excellent"
3) "I am satisfied with my life"
4) "So far I have gotten the important things I want in life"
5) "If I could live my life over, I would change almost nothing"

SWLS has high internal consistency, with Cronbach's α ranging from 0.79 to 0.89 [233]. In our study, internal consistency was high, as determined by the Cronbach's α: 0.87, 0.91, 0.90, and 0.91 at start-up, and after three, six and 12 months of follow-up, respectively.

Customer satisfaction

Data on customer satisfaction was based on a questionnaire used in a Danish fitness club setting [229], containing 15 statements. We categorized the statements into four subscales, including two to five statements in each subscale. The participants rated on a five-point scale how satisfied they were with the fitness club`s functioning. By adding the score from each statement divided by number of statements, a sum-score (from 1 to 5) for each subscale was calculated. Table 9 summarize subscales and the number of statements for customer satisfaction.

Table 9. Statements and subscales used to obtain customer satisfaction of the fitness club.

Subscale	No. of statements	Statements
		"On a scale from 1 (very dissatisfied) to 5 /very satisfied), how satisfied are you with the following conditions at your fitness club?"
Service	5	"Introduction and guidance", "Opening hours", "Price of membership fee", "Service quality", and "The atmosphere"
Facilities	5	"Square meters", "Wardrobes", "Parking conditions", "Maintenance and cleaning", and "Quality of equipment"
Group exercise classes/instructors	3	"Group exercise instructors", "Quality of group exercise classes", and "Group exercise class schedule"
Personal trainers	2	"Personal trainers", and "Quality of personal trainers"

In our study, Cronbach's α for the subscales ranged from 0.63 to 0.84 (service), 0.58 to 0.81 (facilities), 0.91 to 0.92 (group exercise classes/instructors), and 0.95 to 0.97 (personal trainers) from three to 12 months follow-up. Internal consistency of the customer satisfaction survey as a whole was high, as determined by the following Cronbach's α: 0.81, 0.87, and 0.91 at three, six, and 12 months, respectively.

Statistics

In paper I, III, and IV, the statistical analyses were done using SPSS 24.0 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). In paper II and V, we also applied some additional analyses using STATA 16.0 (StataCorp. 2019. Stata Statistical Software: TX: StataCorp LP.). A two-tailed alpha level of 0.05 was used for statistical significance and adjusted for a mixed effects logistic regression in paper II and V ($p = \leq 0.01$).

To investigate differences in background variables between sex, exercise attendance groups, and group A and B, an independent t test for continuous data or chi-square test for categorical data was used as appropriate. Depending on outcomes in each paper, results are presented as means

with standard deviations (SD), or frequencies (n) and percentages, as well as 95% confidence intervals (CI), mean change, correlations coefficient (r), odds ratio (OR), or effect sizes (d). Effect sizes were interpreted as small (0.20), medium (0.50), and large (0.80) (paper II and V) [236].

Paper I

To examine changes in total PA level and the prevalence of meeting PA recommendations, a paired t-test and a McNemar's test was used, respectively. Univariate analysis revealed no other significant changes or differences, except for an increase in the proportion of participants meeting >10 000 steps/day from start-up to 12 months. Hence, no further analysis was performed.

Only participants who underwent measurement at both time points (completers, n = 61) were included in the prospective analysis. A comparison analysis was conducted with participants lost to follow-up to evaluate whether the present participants at 12 months were representative of our initial study population.

Paper II

To investigate changes in body image total score and subscales across the four time-points, a linear mixed model adjusting for baseline, sex and BMI was used. The model included a random intercept, thereby ascribing all differences at baseline to the individual level. The results from the mixed model were expressed as estimated mean difference in change with 95% confidence interval (CI) for comparison, representing mean differences in change from onset to the respective follow-ups. Few reported regular exercise at all follow-ups (n = 31). Hence, we decided to do cross-sectional analyses using a two-sided independent sample t-test to compare body image between those with regular and non-regular exercise attendance at three, six and 12 months of follow-up. This was also done for sex, age groups, and participants with a BMI ≥25 or < 25. As these analyses revealed differences in some of the MBSRQ subscales and body image total score between BMI groups, age groups, and sex, we decided to conduct a standard multiple regression to explore the impact of age, sex and BMI on body image total score.

Paper III

To investigate if repeated physical testing were associated with exercise attendance or patterns, independent t-tests or chi-square test were used as appropriate. For analyzing changes in the use of the fitness club, its facilities, and products a one-way repeated measures ANOVA with Bonferroni correction was used for continuous data, or Cochran`s Q test for categorical data.

Paper IV

A one-way repeated-measures ANOVA with Bonferroni correction was used to examine changes in motives and barriers from start-up to three, six, and 12 months follow-up. A one-way between-groups ANOVA or independent t-test was used as appropriate to compare motives between regular and non-regular exercise attendance. In addition to a p-value ≤0.05, a cut-off value of $P = \leq 0.012$ for the Bonferroni correction was used to indicate statistical significance.

Paper V

An independent t-test for proportions, chi-squared test for proportions or a repeated measures ANOVA were used as appropriate for the univariate analysis to investigate which psychosocial factors and aspects of customer satisfaction that increased the likelihood of reporting regular exercise across the follow-up. Further, Pearson's correlation coefficients were calculated to determine the association between the psychosocial factors, customer satisfaction and exercise attendance. Across all time-points, Pearson's correlation coefficients revealed correlations between regular exercise attendance and six psychosocial factors, and we decided to use a mixed effects logistic regression with exercise attendance as a binary response variable (1 = regular exercise attendance, 0 = non-regular exercise attendance), to estimate the odds of regular exercise attendance associated with the six psychosocial factors as independent variables [237]. Independent variables tested in the full model were: self-efficacy ("sticking to it" and "making time for exercise"), social support, and three motivational subscales ("revitalisation", "enjoyment", and "challenge"). Based on significant differences between regular and non-regular exercisers, the model was adjusted for two background factors (sex and BMI classification). The model included a random intercept to account for unmeasured individual differences in the probability of exercise attendance. Few (n = 31) were categorized as regular exercisers throughout all the follow-ups, so this sample size was not large enough for the regression

analysis. The mixed effects logistic regression therefore contained data from three, six, and 12 months, including 228 participants with 2.6 observations (time-points) on average.

Ethics

The project was reviewed by the Regional Committee for Medical and Health Research Ethics (REK 2015/1443 A), who concluded that, according to the Act on medical and health research (the Health Research Act 2008), the study did not require full review by REK (appendix 6). The project was approved by the Norwegian Social Science Data Service only (NSD 44135) (appendix 7). According to the Declaration of Helsinki [238], all participants received written information about the project´s purpose and procedures and gave consent to participate (appendix 8 and 9). Data was anonymous and confidentiality was maintained in accordance to the law. Participation in the project did not involve any harmful or invasive investigations. It was emphasized that participation was voluntary and that everyone who chose to participate could withdraw partially or fully from the project at any time without further explanation. No economic compensation was given.

Results

This chapter presents the main results from each of the five papers.

Characteristics of the study sample

Fitness club members (n=250) from Oslo, Norway, were mainly of Norwegian descent (78.4%), with a mean age of 36.4 ± 11.3 years. More than half were employed full-time (56.4% n = 141) and lived with a spouse/partner (61.2% n = 153), whereas 36.8% (n = 92) had an annual household income of ≥100 000 US dollar and 40.8% (n = 102) higher education (≥4 years). Except for fewer daily smokers (7.6%) compared with national statistics (12.0%) [239], socioeconomic status was comparable with the general Norwegian adult population [240]. In terms of BMI, 45.6% (n = 57) of men and 26.4% (n = 33) of women had a BMI ≥25 (p = 0.002), and 16.0% (n = 20) of men and 12.8% (n = 16) of women had a BMI ≥30 (p = 0.589). Those with a BMI ≥30 tended to be older (5.4 years, p = <0.010) and men (20.0% more men than women, p = <0.010). A larger proportion in group B had a BMI ≥30 compared with group A. The groups were balanced in all other background variables (occupation, cohabitation, household income, and educational level). Also, we found no differences in background variables between those lost to follow-up (63 out of 250, 25.2%) and the study sample at 12 months (n = 187, p = ≥0.050).

The participants VO_{2max} (group A) were classified as low to medium (men: 40.5 ± 7.2 ml/min/kg, women: 35.0 ± 6.0, p = < 0.001), and men and women had 16.5% and 9.6% lower VO_{2max} than the general adult population in Norway, respectively [241]. Abdominal obesity (waist hip ratio ≥0.90 for men and ≥0.85 for women) was found in 53.2% (n = 33) men and 68.3% (n = 43) women [242] (p = 0.152). Five out of ten (47.2%, n = 59) were above reference values for fat percentage (>20% for men and >30% for women), with no sex differences (p = 1.000).

Exercise attendance

Of all participants, more than half (65.6%) had previously been a member of another fitness club. The proportion reporting regular exercise attendance (≥2 sessions/week) at the fitness club decreased by 14.4% across the follow-up and was as follows: 51.8% (three months), 37.6% (six months), and 37.4% (12 months) ($p = 0.003$). In this group, mean weekly exercise sessions were 2.9 ±1.2 at three months, 2.9 ± 1.1 at six months, and 3.0 ± 1.5 at 12 months. For the other participants (non-regular exercise attendance), weekly sessions at the fitness club ranged from 0.5 ± 0.5 to 1.1 ± 0.3, which was lower than those attending regularly ($p = \leq 0.050$). At three, six, and 12 months, exercise dropout was reported by 22.8%, 31.5%, and 29.4%, respectively. Sixteen participants (13.8%) did not start exercising at all. Lastly, 1.8% (three months, n = 4), 5.2% (six months, n = 11), and 13.4% (12 months, n = 25) reported membership withdrawal. A total of 86.6% (162 out of 187) were still a fitness club member at 12-months.

When including exercise outside the fitness club (paper IV), a higher proportion reported regular exercise attendance (three months: 63.4%, six months: 59.6%, 12 months: 57.2%) compared with exercise at the fitness club only. Across all follow-ups, 37.0% reported regular exercise attendance, with an average of 3.9 ± 1.7 weekly exercise sessions.

Summary of the papers

Paper I (PA level and socioeconomic status)

A total of 61 out of 125 participants in group A had data for device-measured PA at both start-up and at 12 months, with a mean of 6.4 ± 1.6 and 6.0 ± 1.5 days of valid activity recordings, respectively. Mean accelerometer wear time was 13.8 ± 1.2 hours/day.

No changes in total PA level (cpm: 359.3 ± 109.5 versus 375.8 ± 123.1, $p = 0.226$), sedentary time (566.8 ± 58.8 versus 549.9 ± 73.2 min/day, $p = 0.062$), low-intensity PA (237.0 ± 63.2 versus 234.7 ± 66.8 min/day, $p = 0.743$), MVPA (19.4 ± 14.8 versus 21.3 ± 17.9, $p = 0.358$), or numbers meeting PA recommendations (37.7% versus 45.9%, $p = 0.383$) were found between the two time-points (Table 10). Adding self-reported muscle-strengthening activities, swimming,

and cycling to device-measured PA increased the prevalence to 57.4% (p = <0.001). The prevalence of meeting >10 000 steps per day increased from 14.8% to 19.5% from start-up to 12 months (p = 0.022). At 12 months, muscle-strengthening activity according to the recommendations (≥2 days/week) was followed by about 13% of the participants. No differences in total PA level or the prevalence of meeting PA recommendations were found at start-up between those lost to follow-up and the study sample at 12 months (data not shown).

Table 10. Total PA level, steps per day, number of minutes spent in intensity-specific categories, time spent in bouts of MVPA, prevalence of meeting current PA recommendations, and >10 000 steps per day at start-up and at 12 months (all: n = 125, completing both measurements: n = 61)

Variables	**At start-up**	**At start-up**	**At 12 months**			
	All	**Completers**	**Completers**			
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Chg***	**95% CI**	**p**
Total PA level (cpm)	357.0 (113.6)	359.3 (109.5)	375.8 (123.1)	16.5	−10.5, 43.5	0.226
Steps/day	7705.0 (2254.3)	7934.0 (2309.8)	8256.5 (2571.5)	322.5	−247.0, 892.0	0.262
Sedentary time (min/day)	549.0 (65.8)	566.8 (58.8)	549.9 (73.2)	-16.9	−34.7, 0.8	0.062
Low-intensity PA (min/day)	236.7 (66.0)	237.0 (63.2)	234.7 (66.8)	-2.3	−16.0, 11.5	0.743
Accumulated MVPA (min/day)	37.3 (16.0)	37.3 (16.0)	42.2 (19.5)	4.0	−0.4, 8.4	0.071
Bouts of MVPA (min/day)	18.1 (15.0)	19.4 (14.8)	21.3 (17.9)	1.9	−2.2, 5.9	0.358
	%	**%**	**%**			
>150 min/week of MVPA**	37.6	37.7	45.9	8.2	−13.0, 16.0	0.383
>150 min/week of combined PA***	59.2	68.9	57.4	-11.5	-23.0, 12.0	0.281
>10 000 steps/day	13.6	14.8	29.5	14.8	2.8, 26.0	0.022

PA, Physical activity; MVPA, moderate to vigorous PA. *Mean change from start-up to 12 months, **Objectively accelerometer measure, ***Objectively accelerometer measure added with minutes of self-reported muscle-strengthening activities, swimming, cycling, and/or cross-country skiing.

At 12 months, crude analysis revealed no differences in demographic and socioeconomic variables between those achieving regular exercise attendance and those who did not. Excluding participants reporting exercise dropout did not change these findings.

Paper II (body image)

We found significant differences in body image total score reported at six months when compared with onset (mean diff: 0.04, 95% CI: 0.005, 0.078, p = 0.024) (Table 11). When examining the subscale appearance satisfaction, we found significant differences at three (mean diff: 0.08, 95% CI: 0.015, 0.164, p = 0.018), six (mean diff: 0.11, 95% CI: 0.039, 0.197, p = 0.003) and 12 (mean diff: 0.10, 95% CI: 0.021, 0.179, p = 0.013) months when compared with start-up. Also for the subscale BASS, there were significant differences at three (mean diff: 0.17, 95% CI: 0.009, 0.255, p = <0.001), six (mean diff: 0.21, 95% CI: 0.127, 0.301, p = <0.001) and 12 months (mean diff: 0.26, 95% CI: 0.143, 0.388, p = <0.001), whereas appearance investment was lower at three months (mean diff: 0.06, 95% CI: -0.124, 0.002, p = 0.041) compared with start-up.

Table 11. MBSRQ subscales and participants body image evaluation across four timepoints: At start-up (n = 250), three (n = 224), six (n = 213) and 12 (n = 187) months of fitness club membership, adjusted for sex and BMI.

Variables	**Start-up (men, n = 125 women, n = 125)**	**Three months (men, n = 108 women, n = 116)**	**Six months (men, n = 106 women, n = 107)**	**12 months (men, n = 96 women, n = 91)**
	Mean (95% CI)	**Mean (95% CI)**	**Mean (95% CI)**	**Mean (95% CI)**
Body image total score	2.87 (2.83, 2.91)	2.89 (2.84, 2.94)	2.91 (2.87, 2.96)*	2.88 (2.83, 2.93)
Appearance satisfaction	2.93 (2.83, 3.03)	3.02 (2.91, 3.13)*	3.05 (2.94, 3.15)*	3.03 (2.93, 3.13)*
Appearance investment	2.69 (2.63, 2.74)	2.62 (2.57, 2.67)*	2.67 (2.61, 2.72)	2.64 (2.59, 2.70)
Weight related attitude	3.48 (3.37, 3.60)	3.48 (3.37, 3.60)	3.43 (3.31, 3.55)	3.42 (3.29, 3.55)
Self-classified	2.53 (2.46, 2.59)	2.43 (2.37, 2.49)	2.46 (2.39, 2.53)	2.41 (2.36, 2.47)

weight				
Body Areas Satisfaction Scale (BASS)	2.74 (2.66, 2.83)	2.92 (2.82, 3.02)*	2.96 (2.86, 3.06)*	3.01 (2.89, 3.13)*

*Indicates significant differences when compared with data at onset.

At three and 12 months, regular exercise attendance was associated with a more positive score on appearance satisfaction (three months: 3.16 ± 0.9 versus 2.87 ± 0.9, p = 0.020, 12 months: 3.26 ± 0.8 versus 2.92 ± 0.8, p = 0.004) and body image total score (three months: 2.94 ± 0.4 versus 2.83 ± 0.4, p = 0.027, 12 months: 2.97 ± 0.4 versus 2.85 ± 0.4, p = 0.028) compared with non-regular exercise attendance. Regular exercise was also associated with positive scores on self-classified weight (2.36 ± 0.6 versus 2.52 ± 0.7, p = 0.049) and body area satisfaction (BASS) (3.06 ± 0.8 versus 2.75 ± 0.9, p = 0.008) at three months, and positive scores on appearance investment (2.54 ± 0.4 versus 2.71 ± 0.4, p = 0.005) and weight-related attitude (3.60 ± 1.0 versus 3.27 ± 1.1, p = 0.042) at 12 months. A higher body image total score was also found when analyzing those who (n = 31, 17%) reported regular exercise attendance at all follow-ups, compared with those reporting non-regular attendance (3.02 ± 0.3 versus 2.86 ± 0.4, p = 0.018).

At start-up of membership, women reported lower values on body image total score (2.76 ± 0.3 versus 2.99 ± 0.4, p = <0.001), weight-related attitude (3.13 ± 1.1 versus 3.85 ± 0.9, p = <0.001), and BASS (2.62 ± 0.8 versus 2.88 ± 0.7, p = 0.007) than men. Participants with overweight or obesity (BMI ≥25) had lower appearance satisfaction (2.67 ± 0.9 versus 3.19 ± 0.8, p = <0.001), self-classified weight (2.89 ± 0.6 versus 2.19 ± 0.5, p = <0.001), and BASS (2.51 ± 0.8 versus 2.98 ± 0.7, p = <0.001) compared with normal-weight participants (BMI <25). In the linear regression model, being a man (p = <0.001) and having a BMI<25 (p = 0.003), had the strongest associations with reporting a higher score on total body image.

Paper III (repeated physical fitness testing and use of the fitness club)

Repeated testing of body composition and physical fitness at three time-points were not associated with regular exercise attendance in new members. A total of 51.7% (n = 45) and 42.2% (n = 27) in group A (repeated testing), and 56.7% (n = 68) and 37.5% (n = 36) in group B (controls) reported regular exercise attendance at three (p = 0.221) and 12 (p = 0.765) months,

respectively. Across all follow-ups, about 20% reported regular exercise attendance (group A: 19.6%; group B: 19.8%). At three months, less participants in group A reported individual exercise (41.2% versus 62.5%, p = 0.013) and had a lower exercise frequency than group B (2.00 versus 2.60 days/week, p = 0.008). The reverse results were found for group exercise classes, where a higher proportion in group A participated than group B (28.0% versus 13.6%, p = 0.040). No other differences in exercise patterns were found, at three or 12 months.

A total of 80 out of 184 (43.5%) participants reported using the fitness club weekly (≥1 day/week) at all follow-ups. Of these, 54.2% reported mainly individual exercise and 23.0% reported group exercise classes. The most common workout mode was resistance exercise (45.0%), followed by endurance exercise (such as treadmill running) (25.9%). One out of ten (10.4%) reported participation ≥2 days/week in supervised group exercise classes, with cycling (8.8%), resistance exercise (4.2%), and Aerobic/Zumba (3.4%) as the most visited. At three months, more women than men reported use of group exercise classes (9.0% and 3.6%; p = 0.041), with no sex differences at 12 months. A total of 4.4% reported having a personal trainer throughout the year. The most common purchase was 10 sessions (40.0% to 41.9%). At 12 months, a higher proportion of those classified with regular attendance than non-regular attendance reported use of a personal trainer, (20.6% and 3.7%; p = 0.073). No changes were found across follow-up in use of the fitness club.

In addition to working out at the fitness club, 53.7% reported exercise in other areas, especially outdoors (40.3%) in the forest, parks, or country roads. Mean exercise frequency ranged from 1.56 ± 1.05 to 1.67 ± 1.19 days/week at the different measurement points. The most common exercise mode was endurance (37.5%) by running (23.6%) or walking (18.3%).

Paper IV (motives and barriers)

Across the year, we found an increase in six subscales of motives: appearance (d = 0.13), enjoyment (d = 0.13), challenge (d = 0.06), stress management (d = 0.10), health pressures (d = 0.19), and social recognition (d = 0.11), with 0.26-0.52 higher scores at three, six, and 12 months, compared with start-up (Table 12). We also found a decrease in the strength and endurance subscales from midway (mean 0.22-0.24 lower scores) to 12-months. The score at 12 months was

also lower compared with start-up. Positive health (4.37-4.51), increase in strength/endurance (3.76-4.00), and mobility (3.63-3.92) were the highest rated motives at all time-points, with no sex differences.

At three, six, and 12 months, priority was the highest rated internal barrier among exercise dropouts (2.03-2.32). All barrier subscales remained relatively unchanged across the year, with no sex differences (Table 12).

Participants with regular exercise attendance rated the enjoyment (3.30 ± 1.22 versus 2.52 ±1.46, p = <0.001) and challenge (2.70 ±1.45 versus 1.92 ±1.54, p = 0.004) subscales higher than those with non-regular exercise attendance at all four measurements points. At six months, the stress management (2.63 ± 1.57 versus 2.07 ±1.55, p = 0.020), affiliation (1.31 ± 1.35 versus 0.87 ±1.24, p = 0.031), and revitalisation (3.52 ± 1.16 versus 2.93 ±1.29, p = 0.002) subscales were also rated highest among regular exercisers, whereas only a higher score in the revitalization subscale (3.36 ± 1.19 versus 2.89 ±1.37, p = 0.015) was found in regular exercisers at 12 months.

Table 12: Subscales of motives and barriers at all time-points in all participants (n = 184) and in those with exercise dropout at three (n = 43), six (n = 53), and 12 (n = 65) months.

Motives (0 to 5)	**Start-up**	**Three months**	**Six months**	**12 months**		
	Mean ± SD (95% CI)	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Cohen`s d**	**p**
Positive Health	4.47 ±0.82 (4.34, 4.58)	4.51 ±0.82 (4.38, 4.62)	4.41 ±0.80 (4.30, 4.53)	4.37 ±0.82 (4.25, 4.49)	0.02	0.217
Strength/Endurance	3.84 ±1.01 (3.69, 3.99)	4.00 ±1.20 (3.85, 4.13) **	3.98 ±1.12 (3.81, 4.15) **	3.76 ±1.10 (3.58, 3.93)	0.06	0.012
Mobility	3.63 ±1.39 (3.42, 3.83)	3.92 ±1.24 (3.75, 4.11) *	3.83 ±1.39 (3.61, 4.04)	3.74 ±1.36 (3.55, 3.92)	0.04	0.028
Ill-Health Avoidance	3.56 ±1.18 (3.38, 3.73)	3.82 ±0.91 (3.68, 3.95) *	3.76 ±1.05 (3.60, 3.90)	3.69 ±1.12 (3.52, 3.86)	0.04	0.028
Weight Management	3.18 ±1.61 (2.95, 3.41)	3.39 ±1.44 (3.18, 3.60)	3.54 ±1.46 (3.33, 3.75) *	3.46 ±1.48 (3.24, 3.67) *	0.08	0.001
Appearance	2.98 ±1.41 (2.76, 3.18)	3.30 ±1.40 (3.09, 3.50) *	3.37 ±1.38 (3.17, 3.57) *	3.25 ±1.37 (3.05, 3.45) *	0.13	<0.001
Revitalisation	2.97 ±1.28 (2.78, 3.16)	3.10 ±1.30 (2.91, 3.28)	3.14 ±1.27 (2.96, 3.33)	3.06 ±1.32 (2.86, 3.25)	0.02	0.187
Enjoyment	2.47 ±1.40 (2.25, 2.66)	2.83 ±1.42 (2.60, 3.03) *	2.87 ±1.39 (2.66, 3.06) *	2.74 ±1.47 (2.53, 2.95) *	0.13	<0.001
Competition	1.11 ±1.56 (0.90, 1.34)	1.11 ±1.51 (0.90, 1.33)	1.18 ±1.57 (0.97, 1.42)	1.29 ±1.76 (1.05, 1.56)	0.01	0.320
Challenge	1.91 ±1.43 (1.72, 2.13)	2.20 ±1.49 (1.99, 2.42) *	2.19 ±1.59 (1.98, 2.43) *	2.25 ±1.58 (2.02, 2.48) *	0.06	0.006
Stress Management	1.94 ±1.45 (1.73, 2.15)	2.20 ±1.46 (2.00, 2.43) *	2.28 ±1.58 (2.04, 2.52) *	2.36 ±1.52 (2.13, 2.60) *	0.10	<0.001
Health Pressures	1.11 ±1.23 (0.94, 1.30)	1.63 ±1.33 (1.44, 1.82) *	1.49 ±1.45 (1.29, 1.70) *	1.55 ±1.51 (1.33, 1.79) *	0.19	<0.001
Social Recognition	0.64 ±1.01 (0.51, 0.79)	0.90 ±1.12 (0.73, 1.07) *	1.00 ±1.27 (0.82, 1.18) *	0.99 ±1.33 (0.81, 1.19) *	0.11	<0.001
Affiliation	0.87 ±1.05 (0.72, 1.04)	0.96 ±1.16 (0.79, 1.14)	1.03 ±1.29 (0.84, 1.23)	1.10 ±1.34 (0.91, 1.30)	0.03	0.107
Barriers (1 to 3)	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**		**p†**
Priority	2.03 ±0.63 (1.71, 2.35)	2.17 ±0.69 (1.78, 2.53)	2.32 ±0.46 (2.07, 2.57)	2.17 ±0.54 (1.89, 2.42)	0.32	0.206
Practical	1.50 ±0.51 (1.28, 1.82)	1.39 ±0.41 (1.21, 1.62)	1.41 ±0.36 (1.23, 1.60)	1.37 ±0.37 (1.19, 1.58)	0.11	0.714
Health related	1.52 ±0.33 (1.35, 1.69)	1.64 ±0.49 (1.38, 1.90)	1.57 ±0.35 (1.38, 1.76)	1.45 ±0.33 (1.30, 1.64)	0.24	0.365
Affective-cognitive	1.35 ±0.30 (1.12, 1.57)	1.38 ±0.32 (1.16, 1.62)	1.44 ±0.25 (1.24, 1.61)	1.29 ±0.31 (1.11, 1.55)	0.56	0.424

†Participants reporting exercise drop-out at all time-points (n = 16) were included in the analysis, * sig. different from start-up, ** sig. different from 12 months.

Paper V (psychosocial factors and customer satisfaction)

At all follow-ups, the self-efficacy subscales "sticking to it" (mean diff: 0.60 to 0.74, d = 0.28 to 0.71) and "making time for it" (mean diff: 0.41 to 0.54, d = 0.32 to 0.55), social support (mean diff: 2.15 to 2.54, d = 0.17 to 0.54), and three motivational subscales (("revitalisation" (mean diff: 0.45 to 0.69, d = 0.38 to 0.59), "enjoyment" (mean diff: 0.85 to 0.91, d = 0.48 to 0.70), and "challenge" (mean diff: 0.74 to 0.79, d = 0.45 to 0.56)) were rated higher among those with regular exercise attendance compared with those not exercising regularly (p = ≤0.01). Pearson's correlation coefficients also revealed that these six psychosocial factors were positively associated with regular exercise attendance, with correlations (r) ranging from 0.17 to 0.38 (p = <0.050). Further, a mixed effects logistic regression revealed that the strongest predictor of reporting regular exercise attendance at each time-point was higher levels of the motive "enjoyment" (OR = 1.84), followed by self-efficacy "sticking to it" (OR = 1.73) and social support (OR = 1.16) (Table 13).

All participants were generally pleased with the member service with scores ranging from 3.24 to 4.04 across the follow-up and satisfaction with "Group exercise classes/instructors" (3.7 to 4.0) and "personal trainers" (3.5 to 3.9) were rated highest at each time-point. There was, however, a drop in satisfaction score for "service" (3.6 and 3.4, mean diff: 0.21, p = <0.001) and "group exercise classes/instructors" (4.0 and 3.7, mean diff: 0.26, p = 0.045) from three to 12 months follow-up. No differences were found between those with regular and non-regular exercise attendance at the different time-points.

*Table 13. Mixed Effects Logistic Regression and Odds Ratio (OR) for reporting regular exercise attendance** (n = 228).*

Factor	OR	p	95% CI* for OR	
			Lower	Upper
Sex (female)	0.92	0.772	0.52	1.63
BMI classification	0.97	0.450	0.90	1.05
Self-efficacy				
Sticking to it	1.73	0.002	1.22	2.46
Making time for exercise	1.09	0.563	0.81	1.47
Social support	1.16	<0.001	1.09	1.23
Motives				
Enjoyment	1.84	<0.001	1.35	2.50
Challenge	1.04	0.716	0.83	1.30
Revitalisation	0.76	0.079	0.56	1.03
Constant	0.01	<0.001	0.00	0.13

*Confidence interval, **regular exercise attendance = ≥2 exercise sessions/week

General discussion

This thesis presents data from a prospective study on PA level, demographic and socioeconomic factors, psychosocial factors, exercise attendance and patterns, and customer satisfaction in a sample of new fitness club members the first year of membership. The following general discussion focuses on the main findings and methodological and ethical considerations.

Main results

Few participants managed to achieve regular exercise attendance across the first year of membership. Only 17% had regular exercise attendance at the fitness club at all follow-ups and participants exercising ≥2 days/week decreased from 52% to 37% from three to 12 months, consistent with other studies in this field [33, 34]. In novice exercisers, a fitness club membership was either associated with increased PA level or meeting the PA recommendations. The present findings raise the question why some succeed in maintaining exercise, while others do not use the membership to the fullest, despite a financial commitment and access to exercise equipment.

Seasonal variation can influence fitness club attendance, that is a member may have higher exercise attendance at the fitness club during fall/winter due to low outdoor temperature, with lower attendance in spring/summer because of participation in outdoor activities. This is shown in the general US adult population with a higher participation rate in outdoor activities during spring/summer than fall/winter [243]. However, when comparing attendance at the fitness club between participants recruited in fall/winter and spring/summer we did not find any differences.

In all members, we found a positive change in body image (BASS and appearance satisfaction), suggesting that members felt more satisfied with specific body areas and improved their feelings of physical attractiveness across the year. Most members were motivated to exercise by factors such as positive health and increase in physical fitness. Reporting regular exercise at each follow-up was associated with a more positive body image, and higher levels of the motives "enjoyment" and "challenge", self-efficacy ("sticking to it"), and social support.

Paper I (PA level and socioeconomic status)

Paper I provide novel prospective data of device-measured PA level in novice exercisers across the first year of a fitness club membership. Even though we did not find any association between a fitness club membership and PA level, a higher proportion (46%) of the members met the PA recommendations at 12 months follow-up, which is higher compared to Norwegian data (33%) and other studies in the general adult population with device-measured PA (5%-33%) [19, 20, 244]. When adding self-reported muscle-strengthening activities, swimming, and cycling to the objective measurements, the prevalence increased to 57.4%.

The different findings between studies may be due to device placement, data protocols, how data were analyzed (e.g., cut-points), and how prevalence estimates of PA recommendations were determined [245]. However, the higher prevalence found in this thesis may indicate a higher motivation for PA among novice exercisers joining a fitness club, compared with the general adult population [52, 246]. The monthly cost of a membership at a multipurpose fitness club in Norway is from $55 to $120, and our participants voluntarily paid this fee to use the fitness club. Our initial hypothesis was that a financial commitment, as well as access to exercise equipment, group exercise classes, and childcare, may aid compliance to PA and exercise. Yet, we did not find that the membership contributed to a more active lifestyle. This is in accordance with a study reporting that total weekly step counts were not higher in older adults who regularly used a fitness club compared with older adults not using a fitness club [247]. Contrary, two cross-sectional studies have shown that fitness club members had significantly higher PA levels compared with non-members [52, 200]. Another study found high prevalence, with 89% of short-term and 94% of long-term members reporting meeting the PA recommendations [53]. These three studies were based on self-report, therefore social desirability may have led to over-reporting PA level [72]. For example, Kopp et al. (2020) found that new members overestimated their self-reported fitness club attendance by 39% compared to membership card swipes [33]. Lastly, the global PA recommendations have been updated since the analyses were run for this study, to include PA performed in bouts less than 10 minutes [9, 248]. Using this updated criterion, about 80% of our participants met the PA recommendations at 12 months.

An individual`s PA level may vary daily, and the intra-individual day-to-day variability of PA may have affected our results [249]. We only measured PA during two periods and our findings may only give a glance of the participant`s PA level from that particular measurement week. Even

though the length of the measurement period is considered appropriate, it may be too short to reflect the member`s actual PA level [250, 251]. The participants were probably also more aware of their PA levels during the measurement period, described as reactivity [252]. There is scarce evidence that reactivity influences the numbers meeting the PA recommendations [252, 253], however, it may be that the member`s PA level was even lower under normal circumstances since measurement of PA is associated with increased PA in intervention studies [206].

We gathered data on the frequency of resistance exercise and other activities (such as cycling and rowing), since the type of ActiGraph used in Paper I is likely to underestimate upper body movement and horizontal accelerations of the body because it only measures movement in the vertical axis [206]. As such, when adding accelerometer measures with self-reported activities, not surprisingly, more participants met the PA recommendations. This is in line with Sallis et al. (2016) [254], suggesting that a higher number meet the PA recommendations when obtaining self-reported PA. Muscle-strengthening activities ≥2 days/week according to the recommendations [9] were reported by as few as 13% of our participants at 12 months. This is consistent with prevalence estimates in other studies in the general adult population (3.4%-29.3%) [255-258]. A fitness club hypothetically facilitates the implementation of muscle-strengthening activities due to available equipment. In addition, resistance exercise is also suggested to be the most common exercise mode among fitness club members [56, 259, 260]. Other studies examining participation in resistance exercise among fitness club members differ from our findings, showing that 68.0% to 84.0% meet the recommendations of weekly muscle-strengthening activities [56, 200]. In contrast to paper I in the present thesis, these studies did not include a group of novice exercisers and experienced exercisers may have different PA patterns.

We found that socioeconomic variables did not differ between members with regular and non-regular exercise attendance, nor members with exercise dropout, which is in contrast to the hypotheses that socioeconomic status, age, and BMI may act as facilitators or barriers to PA [32, 65, 261, 262]. It is shown that individuals with higher socioeconomic status are more likely to participate in PA than those with lower socioeconomic status [32, 65]. Our findings may be related to two aspects. The fitness club chain used for recruitment has a relatively high membership fee, possibly explaining why about 80% of the participants had middle to high household income, and more than 78% had a college/university education. So, there was little variation in socioeconomic status among our participants. However, our sample might be considered representative for urban Norwegian novice exercisers joining a multipurpose fitness

club. Studies in the general adult population have shown that higher education levels reflect more favorable lifestyle habits, including participation in regular exercise [65, 263]. Yet, nearly 60% did not exercise regularly at 12 months follow-up. The scarce evidence in this field is mixed, showing both low (12%) and high (88%) [52, 57] prevalence in members meeting the recommendations. This demonstrates that PA participation is a complex behavior influenced by several psychosocial factors (such as social support, self-efficacy, motives, and barriers) [24, 27].

Paper II (body image)

To our knowledge, **paper II** is the first study investigating changes in body image attitudes among novice exercisers joining a fitness club. The findings were in line with our hypothesis, suggesting that those with regular exercise attendance would report a more positive body image than those not exercising regularly. Thus, in novice exercisers, exercise may affect body image positively, in that body image attitudes improve with exercise participation. We also confirmed our second hypothesis, that body image dissatisfaction would be higher in women than in men, and among those with overweight/obesity compared with normal-weight participants.

A negative body image may be both a motivator and barrier to exercise [264]. Experimental studies have, however, shown that sustained exercise participation may positively affect body image [79, 171, 172]. In all participants, we found a positive change in BASS and appearance satisfaction from start-up to three, six, and 12-months. This suggests that regardless of sex and BMI, members generally felt more satisfied with specific body areas and improved their feelings of physical attractiveness across the follow-up period. Also, body image total score was rated higher at six months compared with start-up. A potential key moderator is, of course, the individual's motivation for regular exercise. According to the review by Panão & Carraça (2020) [265], the reasons underlying one's motives for exercise might influence the association between exercise and body image evaluation. E.g. appearance and weight-related exercise motives have been associated with lower body image, whereas exercising for enjoyment and interest for the activity in itself have been associated with several positive body image markers [265].

Also, subgroup analyses between those with regular and non-regular exercise attendance showed that regular exercise was associated with a more positive overall body image and appearance

satisfaction (three and 12 months), as well as more favorable scores on self-classified weight and BASS (three months), and appearance investment and weight-related attitude (12 months). In a recent review [216], higher appearance investment was found to be associated with poorer psychological outcomes (body image disturbance, depression, and eating pathology). Our results show that appearance investment is changeable over time, given that those exercising regularly had more positive scores in appearance investment than those not exercising regularly. This was significantly different at 12 months, and borderline significant at three months. Hence, this lends further credibility to the hypothesis that exercise has the potential to influence body image in a positive way [266]. However, due to our study design, we cannot conclude that exercise contributes to a more positive body image or if it is the other way around. Ginis et al. (2012) [173] have summarized mechanisms that might explain the effects of exercise on body image evaluation, reporting that while objective changes in body composition played a relatively small role, self-perceived changes in body composition, and changes in self-efficacy were likely to have a profound effect. In the present study we had limited statistical power to estimate possible underlying mechanisms concerning body image attitudes and exercise.

Of all participants, about 50% had a BMI ≥25 and these members were less satisfied with their body image at start-up compared with normal-weight participants. Consistent with our findings, there is evidence that individuals with obesity report lower body image, and that increased BMI is a predictor of body dissatisfaction [156, 167, 266]. Among both the general adult population and female fitness club members, studies have found a higher BMI and also lower PA participation in those with body dissatisfaction than those satisfied with their body image [267-269]. Lastly, body image in men is an area that has received little attention [77-79]. Our results showed that men reported a more positive total body image than women. Thus, paper II adds to the literature and gives a better understanding of body image evaluation in men starting a fitness club membership.

Paper III (repeated physical fitness testing and use of the fitness club)

Paper III provides data of repeated physical testing and its association to exercise attendance. We hypothesized that testing at three time-points would motivate the test participants to participate in regular exercise because of regular follow-up and that the main motive for membership was an increase in physical fitness. We did not find that group A (repeated testing) exercised more than group B (controls), nor did we find differences in exercise patterns. This is

consistent with an RCT of Hoj et al. (2018) [270], concluding that cardiorespiratory fitness measurement did not affect PA behavior in middle-aged adults. Fitness testing is also common in the physical education setting. Several studies have examined youths` motivational responses to fitness testing, with mixed evidence if such testing promotes an active lifestyle [193]. Physical testing may not be an enjoyable experience, due to maximal exhaustion exercise [271]. Yet, a test provides information for planning and evaluation of exercise programs and is also a foundation for goal setting, which is shown to motivate individuals for behavior change [272, 273]. Novice exercisers may benefit from physical testing due to exercise supervision and goal setting after a test [273]. In the present project, the participants did not receive any supervision in exercise or goal setting, even though they were informed about test results. This may have affected our findings since the test did not serve one of the purposes for which a test is intended [188].

We found differences regarding types of exercise performed, with a higher number in group A reporting use of group exercise classes, and more participants in group B reported to work out individually at three months. Still, the difference was not present at 12 months, and we cannot conclude if physical testing influenced these exercise patterns. Observed differences in exercise mode may be explained by chance, confounding factors (such as personality) [110], and also the various exercise options offered at the fitness club. Riseth et al. (2019) [45] found that the many possibilities for mode of exercise were the main reason for regular use of the fitness club among long-term members. Personal factors such as motivation, self-efficacy, and lifestyle habits were explanations for their use of the different fitness club facilities [45]. There are a lack of studies in this field, and it is still unclear whether repeated testing is appropriate, especially among novice exercisers.

Overall exercise attendance at the fitness club was 2.4 days/week across follow-up. This is different than another study among new members, reporting an average of 1.2 days/week over one year [274], but consistent with three studies with shorter follow-up periods (three to eight months) [60-62]. These researchers obtained exercise attendance data by membership card swipes [60-62, 274], contrary to this study which used self-report. Exercise frequency is shown to vary from 3.0 [50] to 4.4 [58] days/week when measured by self-report, and 0.25 [36] to 1.6 [60] days/week when measured by membership card swipes, independent of membership length. Hence, self-reported data may be one explanation for higher exercise attendance in paper III, since self-report may yield social desirability bias [71]. Using self-report, the participants may report visits at the fitness club, instead of their actual exercise behavior. A visit at the fitness club

may differ from use of the sauna to running on the treadmill. Yet, to increase the probability that our participants reported exercise and not other fitness club activities, we explained and defined exercise in the questionnaire. We speculate that few members only shower or use the sauna at the fitness club, however this may have reduced the likelihood of misinterpretation of questions concerning exercise attendance.

Exercise attendance declined from 2.6 to 2.2 days/week across the year, consistent with other studies among fitness club members [36, 49, 61]. A decline of 0.4 days/week may be considered a minor change. Yet, we believe that average exercise attendance 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). Rand et al. (2020) [34] found a greater reduction in exercise attendance among new members when measuring membership card swipes, from 1.7 to 0.2 days/week across a 12 months follow-up. Jekauc et al. (2015) [62] 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.

Individual resistance exercise was reported as the most common workout mode, consistent with one study among American fitness club members [56]. Two studies from Canada and Japan have reported that 54% to 60% of members preferred endurance exercise [52, 259], and that >50% combined both resistance and endurance exercise [259]. Cultural differences in workout mode may be explained by societal influences, individual factors such as personality, and motivation [275], and that fitness trends around the world may vary. However, fitness facilities at multipurpose fitness clubs globally are almost identical [114]. Also, our study examined new fitness club members and it may be that there are differences in mode of exercise between new and more experienced members. When members engage in individual resistance exercise, they are left to work out on their own, and as shown in this thesis, this may contribute to non-regular exercise attendance in novice exercisers.

We found that only 4.4% used a personal trainer across the year, which is possibly explained by the high price level. A personal trainer may positively influence clients` exercise motivation, due to implementation of behavior change techniques [276]. In this thesis, we found that a higher number of members using a personal trainer were classified as having regular exercise attendance, compared with those who did not use a personal trainer at 12 months. Other authors have also shown higher exercise frequency in clients of personal trainers, compared with those who exercise individually [199, 277]. Unexpectedly, few participants attended weekly group exercise

classes (6.8%). We believe there is huge potential to increase exercise attendance by encouraging members to use these additional products. A group exercise class is a social setting with supervision and encouragement from instructors which may contribute to regular exercise attendance. Front desk employees may play a role in guiding members to use different exercise options at the fitness club by keeping information regarding group exercise class schedule and PT offerings easily available at the front desk [278].

Paper IV (motives and barriers)

Paper IV showed that most members reported positive health, increase in physical fitness, and mobility as motives for exercise, consistent with other studies among fitness club members [35, 45, 57, 279]. Before we initiated this project, we hypothesized that motives for exercise may change over time and differ from motives at initiation of exercise. This was, however, not supported in our findings. At three, six, and 12 months, regular exercisers rated the motives enjoyment and challenge as more important than non-regular exercisers, however, the differences in means and magnitude of the effect sizes were small. Lastly, among exercise dropouts, the main barrier to exercise was priority (such as lack of time/energy), which is in agreement with studies among both fitness club members [45, 55, 119] and the general adult population [120, 123].

It is suggested that individuals join a fitness club to keep their bodies fit and to develop a healthy lifestyle [113, 114]. Fitness club members are more likely to report appearance-related motives than social motives and enjoyment, compared with those exercising at sports clubs or in public spaces [31, 280]. Therefore, many fitness clubs typically market exercise benefits (such as positive health) as the same as a good-looking body and have group exercise classes with names such as "bootylicious" and "cardio burner". However, fitness club members are a diverse group. Even though we did not find any gender differences concerning perceived motives, others have found that appearance-related motives were rated higher among young and middle-aged women, than older members and men [57].

We hypothesized that regular exercisers would score higher on motives considered as intrinsic than non-regular exercisers. This was partially supported since we found that regular exercise was associated with higher scores on the motives, enjoyment and challenge. This is consistent with Kopp et al. (2020) [33], who showed that those visiting the fitness club most frequently were

more intrinsically than extrinsically motivated. However, it is unlikely that individuals will engage in sustained regular exercise, with all the commitment it requires, for enjoyment alone [107, 281]. For instance, one study among fitness club members found that for regular exercisers, using the fitness club had become a habitual routine, and finding motivation to exercise was no longer a difficult task [58]. Some individuals may also continue exercising despite motives with external outcomes. One study showed that regular exercisers reported both intrinsic and extrinsic exercise motives, compared with inactive individuals who mainly reported extrinsic motives [246].

Even though we measured motives and not motivation, it may be that regular exercisers were more autonomously motivated than non-regular exercisers. SDT proposes that individuals may exercise to obtain outcomes separate from the behavior itself, such as physical fitness, and may value their exercise goals differently [107, 109, 282]. To achieve positive changes in physical fitness, a novice exerciser must complete >1 session/week over 12 weeks [101]. If progress is lacking and the individual's motive has a controlled foundation (e.g., external pressure), this may lead to exercise dropout. In contrast, more autonomous motives (e.g., the individual values physical fitness) may predict sustained exercise [111], and it may be the reason why an individual has a particular exercise motive that results in exercise behavior [109]. All motives have an autonomous or controlled foundation, and the strongest predictor of exercise maintenance is whether the outcome is personally valued, or consistent with an individual's ambitions in life [110].

Despite paying monthly fees and having access to exercise equipment and group exercise classes, 23% to 35% of our participants dropped out during the follow-up period. As most fitness clubs are conveniently located and offer practical solutions for regular exercise (such as intense group exercise classes of 30 minutes and childcare), "lack of time" is both a barrier and perhaps an excuse. Further, most barriers were rated below or around the midpoint on the scale, and we believe that these may be viewed as non-limiting barriers. It has also been proposed that the total number of perceived barriers is likely to be more important, because it may be easier to overcome one or a few barriers rather than many [123]. It may therefore be valuable if fitness clubs implement an education session for new members, and aim to get an overview of possible barriers and provide practical methods in how to overcome these barriers [283].

The relative impact of motivation may vary over time since the quality of motivation can change [112]. Fitness club employees are in a unique position to influence members' attitudes and

exercise behavior, hence, personal trainers and instructors may benefit by paying attention to the members' motivation attributed to exercise goals [282]. It should be highlighted to fitness club employees that knowledge of SDT and how to translate theoretical principles into "real-life" may be valuable in promoting regular exercise attendance among members. An instructor with knowledge of the relationship between motives and behavior may know how to educate members on why they have a particular exercise motive and guide them to create more autonomous motivation [106].

Paper V (psychosocial factors and customer satisfaction)

Paper V mirrors studies of general PA among all ages in that motivation, self-efficacy, and social support are three of the strongest factors associated with participation in PA [15, 21-24, 147]. Comparable results are found in the scarce literature of the fitness club industry [33, 56, 62]. Kopp et al. (2020) [33] found that intrinsic motivation and Jekauc et al. (2015) [62] that higher levels of self-efficacy and social support predicted attendance at the fitness club. That said, we cannot determine whether participants reported regular exercise because they had higher levels of self-efficacy, or whether they scored higher on self-efficacy since they exercised, and thus perceived a feeling of mastery. It is suggested that the psychological effects of completing an important and strenuous task, like regular exercise, may bring a feeling of mastery which may elevate self-efficacy [14]. Higher levels of perceived self-efficacy are also positively associated with exercise participation [62]. The findings in paper V propose that regular exercise requires self-discipline, due to the commitment exercise entails, and it is therefore unlikely that individuals exercise only for fun and enjoyment [281].

The way members perceive social support by significant others may create a strong normative support, and past experience with exercise might influence self-efficacy for exercise [15]. It is also proposed that social support positively influences exercise attendance by improving self-efficacy for exercise [22]. One explanation for a decline in PA level or exercise attendance in individuals who experience a decrease in social support from significant others is a decrease in self-efficacy to cope with barriers [23, 284, 285]. In one study, participants reported that loss of a training partner proved to be the main reason for exercise dropout [76]. Further, novice exercisers joining a fitness club may feel less confident and have reduced self-efficacy for exercise in this specific setting. Based on studies mentioned above and our findings, we believe that even minor changes

in motivation, self-efficacy, and social support may affect exercise attendance. One study found higher exercise adherence in participants conducting a 12-week resistance exercise program with supervision from a personal trainer, compared with individual exercise [199]. A personal trainer may support member`s in setting up achievable goals, which may then help improve self-efficacy, in addition to focusing on exercise "enjoyment" [286]. However, the evidence is scarce regarding a personal trainer`s influence on an individual's exercise behavior. We believe that novice exercisers may have a low level of knowledge on how to perform endurance and resistance exercise and how to implement exercise habits in their everyday life. Annesi (2003) [37] investigated new fitness club members receiving a 36-week cognitive-behavioral change treatment (guidance in goal setting, relapse prevention, and self-reinforcement) or typical exercise counseling (guidance around types and dose of exercise). The findings showed that the treatment group had higher exercise attendance (55% versus 36%) and less dropout (20% versus 55%) compared to those receiving typical exercise counseling [37].

We did not find any association between customer satisfaction and regular exercise at the fitness club, which is consistent with one study carried out in a Portuguese fitness club [185]. However, several studies have found that regular use of the fitness club reflects the members` satisfaction with the services offered [180-182, 184]. Contrary findings may be explained by differences in the variables used (such as attendance versus membership retention) or the fitness club segments (such as multipurpose versus fitness-only) where studies were done. Our participants were members of a fitness club chain that focuses largely on customer satisfaction to provide strong customer relationships. Thus, we were not surprised that most participants reported medium to high customer satisfaction, which could also explain the low membership dropout at 12 months follow-up (13%). It may be that customer satisfaction influences membership retention to a greater extent than fitness club attendance [185], and thereby the profitability of the fitness club.

Methodological considerations

General strengths and limitations

Filling knowledge gaps concerning the association between PA level, body image, repeated physical testing, and several psychosocial factors and exercise attendance in this research field is a strength of this PhD-project. Other strengths include recruiting an age-diverse group with an equal distribution of men and women, collecting data as it happened in a real-life setting, and using an electronic questionnaire with validated instruments and "gold standard" measurements of PA level and physical fitness. We also had four follow-ups and a high response rate on the questionnaire at all time-points across the year (n = 184, 73.6%).

The use of an accelerometer to assess PA level in novice exercisers at two time-points is a major strength of paper I. Device-measured PA eliminates biases associated with self-reported PA [71, 287]. ActiGraph GT1M accelerometer is uniaxial and likely to underestimate upper body and horizontal movements, hence, another strength in paper I was that participants also reported on muscle-strengthening activities, swimming, and cycling. Hence, we were able to combine self-reported activities with device-measured PA to determine the prevalence of meeting PA recommendations. Although, even if other studies [20, 198] have used the same questions, the validity of these questions is unknown. We had a high accelerometer wear compliance with a mean accelerometer time of 13.8 ± 1.2 hours/day at both time-points, and gathered the accelerometer data by 10-second epochs, which allows a more accurate recording of intermittent and spontaneous MVPA and reduces misclassification error of PA estimates [288].

Former studies have shown that men and women report different motives and barriers for PA participation [289]. Hence, especially in paper II and IV, the inclusion of both sexes is a strength. Up until recent years, body image in men has been less spoken about than body image in women, and paper II adds to the scientific literature and allows for a better understanding of body image evaluation in men joining a fitness club [77-79]. Also, to our knowledge, paper I, II, III, and V are the first studies exploring PA level, body image, repeated physical testing, and several psychosocial factors and their association with exercise attendance in a group of new fitness club members, all considered novice exercisers at start-up. Previous studies reporting on motives or barriers in fitness club members are cross-sectional, hence, a strength in paper IV is that we had

several follow-ups, allowing us to investigate prospective changes in these factors. Lastly, in paper I and II we also included a non-response analysis and found no differences between responders and non-responders in demographic and socioeconomic variables, nor PA level or total body image evaluation at start-up, which further strengthen the external validity and confidence in the study results [290].

Several limitations in this Ph.D.-project need to be addressed. Data were only obtained from one fitness club chain (SATS). This is the major fitness club chain in Norway with 27% of the total turnover in the fitness club industry, and a large proportion (about 700 000 members) of members use these fitness clubs [47, 291]. SATS consists of multipurpose fitness clubs with middle to high monthly costs, focusing to a large extent on customer satisfaction. Still, fitness clubs differ a lot in profile and may attract different individuals. For example, boutique clubs such as Crossfit are small fitness clubs in the high-budget segment, focusing on customer satisfaction and only one or two exercise options. There are also fitness clubs in the low-budget segment, appealing broadly to customers that do not want to pay for services they do not use and have less focus on membership satisfaction. There may be differences in background factors (such as age, household income, and occupation), motivation, and self-efficacy between those joining different fitness club segments. Thus, due to differing membership models and segments, the generalizability of our findings to other fitness club chains may be limited. We cannot rule out selection bias, since inclusion of other fitness clubs may have given other results.

We defined regular exercise attendance as ≥2 sessions/week, since this frequency is recommended to improve physical fitness in novice exercisers [101]. This cut-off does not reflect whether the participants met the PA recommendations regarding intensity, duration, and mode of activity. While it is possible to meet the recommendations by two sessions/week with vigorous intensity or longer bouts of aerobic exercise, intensity was not measured in this study.

We believed that more participants would exercise regularly across the year. Yet, <17% reported ≥2 sessions/week at the fitness club at all follow-ups and we did not have statistical power for a meaningful comparison between those with one-year regular exercise attendance and those not exercising regularly. We also considered comparison analysis between those with regular attendance, non-regular attendance, and exercise dropout since there may have been differences

between those exercising once a week compared with those who do not. Unfortunately, our sample size was too small to statistically compare more than two groups.

Exercise attendance was obtained by self-report. Thus, we cannot rule out recall and social desirability bias [71, 72, 287, 292]. After the first approval from The Norwegian Social Science Data Service (appendix 7), we did apply to include both self-report and membership card swipes to obtain a more realistic picture of the member`s exercise behavior. Unfortunately, we did not get approval before 50% of the participants had completed the study and therefore we chose to not include membership card swipes in our analysis.

Overall, the use of a questionnaire to gather data on psychological factors is considered an appropriate measurement instrument. However, some key terms (such as body image and exercise) may have different meanings for the participants, including how they interpret the wording of questions. Self-report may also be biased by the individual's feelings at the time they fill out the questionnaire [205] and the absence of an interviewer or someone present to help interpret questions is a limitation in this project. However, using interviews would be time-consuming and limit the feasibility.

Study dropout was higher than expected, 61 out of 125 participants in group A did not participate in accelerometer measurements, and 64 out of 125 participants did not attend physical testing at 12 months, respectively. This may have increased the risk of attrition bias, type 2 error, and systematic differences between current participants and study dropouts. One explanation for the high dropout in group A may be the choice of the physical tests. For example, several participants reported that measurement of Vo_{2max} was painful, having to exercise to volitional exhaustion. We believe this feedback is important knowledge for future research among novice exercisers.

Study design

All papers (I-V) and presented findings are based on a prospective longitudinal design following the same fitness club members for 12 months. This is a longer time frame than previous research,

and so we were able to evaluate changes and associations over time [293, 294]. However, we cannot establish the direction of causality. The real impact of a fitness club membership would possibly have to be verified in two or three years [92]. The prospective longitudinal design also allowed investigation without any interference from the research group. Hence, we believe that our study findings have high ecological validity and may be generalized to a real-life setting [295]. Still, group A visited our university laboratory on all occasions. A laboratory setting is different from testing in a fitness club setting which is a more "real life" setting.

In paper III, we compared exercise attendance between group A (repeated physical testing and questionnaire) and group B (questionnaire only). However, there was no random allocation to the groups at start-up [293]. To limit the influence of confounding factors, we included covariates that may influence exercise attendance (such as socioeconomic status, or sex and BMI in papers II and V) in the analyses. Even though we found no differences in socioeconomic status, sex, and age between the groups, the participants may have differed in other unmeasured confounding factors (such as personality) that could have influenced the measured outcome [296].

Prospective longitudinal studies are prone to losses to follow-up [293, 294]. In this PhD-project, 49% in group A and 23% in group B were lost to follow-up at 12 months. Concerning questionnaire data, 25% of the whole sample (group A and B) were lost to follow-up at 12 months. During enrollment, even though we tried to exclude individuals at risk of dropping out (such as those planning to move) and maintained periodic contact by mail and telephone with all participants, we could not prevent the loss to follow-up. Yet, we considered losses to follow-up and recruited 25% more participants than needed after the power calculations. It is recommended that the dropout rate should not exceed 20% of the sample to ensure the internal validity of the study and statistical power, and to reduce the risk of measurement bias [297]. However, in prospective studies, a follow-up sample of 50% has been proposed as adequate [298]. Thus, there is reason to believe that our follow-up sample is acceptable. A high dropout rate may mean that the follow-up sample is not representative of the initial sample. Findings in paper I (device-measured PA) and paper III (physical testing) should be interpreted with caution, even though we found no differences in background variables between the follow-up sample at 12 months and those who dropped out of the study.

Paper II and V are based on cross-sectional data from each time-point to ensure statistical power. Also, in paper IV, only those reporting exercise dropout answered statements regarding barriers at three, six, and 12 months. Since many participants were relapsing in and out of exercise, we could not conduct a longitudinal analysis of perceived barriers, making causal inference challenging [96, 97]. In cross-sectional data there is also no random allocation, and unmeasured confounding variables may influence the association between exercise behavior and other factors.

Participants and sample size

Of 6115 new fitness club members invited to participate in this PhD-project, 676 expressed interest to participate, and after a screening for eligibility a total of 250 were recruited. Even though we were interested in novice exercisers only (a study population of which there is limited knowledge), due to practical reasons, the invitation was sent to all new members regardless of exercise status. One explanation for the low response rate may be that all newly registered members received the invitation email, regardless if they met the eligibility criteria (of the 676 interested, 40% (n = 270) were excluded due to regular exercise). However, the low response rate increases the risk of selection bias (there may be differences between members who participated in the study and those who did not). It is unclear whether the representativeness of our sample compares with the population of interest, novice exercisers joining a fitness club, or if our sample is at risk of sampling bias [290, 299]. It may also be that the low response rate for participation in research is influenced by personal interest, and that individuals have to check their email frequently [300]. It could be that members dismissed our invitation as one of many emails from the fitness club, since members receive several emails regarding their membership.

Even though we recruited an age-diverse group with an equal sex distribution, the sample was homogenous (relatively high socioeconomic status and of Norwegian descent). This may lower the external validity of our findings. Still, given that participants were comparable with Norwegian adults, we believe that our findings are representative of novice exercisers in an urban Scandinavian area [240]. Individuals who choose to be members of a fitness club might differ from those who initiate and sustain PA and exercise in other settings. Even though novice exercisers joining a fitness club was the study sample of interest, a larger and more diverse sample might have given different results.

Our sample size at start-up are consistent with other studies with comparable aims [33, 49, 51, 52, 56, 58, 61]. However, even though our initial sample size calculations considered losses to follow-up, there were several sub-group analyses that we could not perform after the data collection. For instance, in Paper I, we wanted to compare demographic and socioeconomic factors between those who were still members at 12 months with those reporting membership withdrawal. However, few reported membership withdrawals and the sample size for this subgroup was too small for comparison analysis. Likewise, very few (17%) had regular exercise attendance at all follow-ups, hence, the statistical power to conduct prospective analyses was limited. In Paper II, we assumed that a 10% change in body image evaluation was a relevant change for our participants based on results from a former study of adults in Norway [201] and that the research group wanted to detect small changes (such as going from 3.00 to 3.50 on the Body image total score). We observed smaller changes in the body image subscales from start-up to three, six, and 12 months, with increase in BASS and appearance satisfaction (3% to 10%), and decrease in appearance investment, weight-related attitude, and self-classified weight (0.7% to 5%). Also, only small differences were found for body image total score (0.4%–1.4%). In Paper II and IV, the sample size was adequate for comparison analysis between regular and non-regular exercisers and allowed us to investigate the influence of body image and perceived motives on exercise attendance. Recruiting a larger sample size would have allowed us to do additional subgroup analysis, as well as reveal smaller changes/differences in the different investigated factors. This also may have made it possible to adjust the analyses for even more covariates.

Ethical considerations

Below are some ethical aspects considered in this PhD-project.

In a study, it is necessary to clarify why you want a specific sample and why certain individuals are excluded [301, 302]. We included new fitness club members classified as novice exercisers. We believed this sample was appropriate for the project`s main purpose (to gain an understanding of those who can stay active and continue with regular exercise in a group of novice exercisers). However, our participants came from only one fitness club chain and as discussed previously the fitness club industry contains several segments. In retrospect, we should therefore have included members from other fitness club segments such as fitness-only and boutique fitness clubs (e.g. Crossfit). This could have given a more complete picture of today`s fitness club industry. Thus,

after completion of this Ph.D.-project, we have initiated a new data collection: *"Are we different? A comparison of different fitness clubs"*. This new study aims to compare background and health variables, exercise attendance, motivation, barriers, self-efficacy, and social support between members from different fitness club segments.

All participants must consent to participate, be fully informed about the study, and also not feel any pressure to partake in the study, including any type of encouragement to gain a participant's trust [301, 302]. In this Ph.D.-project the participants were aware of the project`s purpose, that the Norwegian School of Sports Sciences fully funded the project, and of potential adverse impacts of participation (group A). In hindsight, we should have included information concerning how the findings were planned to be used (such as publications and presentations at congresses) and who would have access to the findings. Concerning participants who did not respond after study start-up, up to three emails and one telephone reminder were directed. Thus, it may be that some participants felt pressure to participate in the study and that explanations for study dropout were required.

The anonymity of participants must be respected and identifying information should be kept confidential [301, 302]. We ensured anonymity by keeping the identity (such as name and age) of the participants from the research team. However, this was not possible for group A since we met the participants and interacted with them on test days. Still, identifying information was not made available to, or accessed by anyone but the Ph.D.-student. Before sharing any findings, all identifying information, such as participant ID number, was excluded from the data set.

A study should address specific research aims, and conclusions must be drawn from the questions posed and findings revealed [301, 302]. The methods used must relate to the research aims [301, 302]. We believe that the methods used were the most appropriate to address the aims of this Ph.D.-project. However, regarding our study design (especially in the cross-sectional analysis), we should have drawn conclusions based on associations only and not tried to imply causality.

Researchers have a responsibility to search for truth, which includes objectivity and transparency about any conflicts of interest [303]. Objectivity is to critically search for new knowledge that should depend on the nature of what was studied, instead of the researchers' personality and beliefs [304]. Further, having multiple interests (e.g., personal views or financial conflicts) in the same field may involve working against one interest [305, 306]. Being aware of these two factors may minimize the risk of personal bias when interpreting and communicating the results [92]. I am a researcher in the daytime and work as a personal trainer and group instructor in the evening. Regarding my subjective experience from the practical field, how do I conduct research that aims to be objective? For example, my initial personal opinion was that when an individual joins a fitness club, he or she might be motivated to use the membership, especially when they were interested in engaging in this Ph.D.-project. However, our findings show that a membership in itself may not be sufficient for regular exercise attendance or increasing PA level. Hence, I must communicate the scientific results in the best way, regardless of my personal experiences and views. I have to be objective and critical, regardless of my strong relationship to the field and "search for truth" in public science communication and research articles [303]. When presenting the findings, I have to distinguish between current scientific knowledge and my personal views. When I talk to the media, it is also important that I interpret the results with caution, simplify the scientific knowledge, and do not leave this to the journalists since it is important to reduce any miscommunication. To act objectively and minimize the risk of personal bias I have tried to 1) understand the research field beyond my point of view, 2) be objective when analyzing and interpreting the data, 3) stick with what the data shows, and not under any circumstances manipulate the results, and 4) only draw conclusions based on what the results indicate, not affected by my personal views.

Conclusion

Based on the previous chapters, the following main conclusions can be drawn:

- A fitness club membership is not associated with increases in total PA level or numbers meeting the PA recommendations.
- Most members were motivated to exercise because of factors such as positive health, increase in physical fitness and mobility, while the most reported barrier was priority (such as lack of time).
- A fitness club membership is associated with improved body area evaluation and a more positive rating of appearance satisfaction.
- Regular exercise attendance was associated with higher scores in body image total score, appearance and body area satisfaction, the motives "enjoyment" and "challenge", self-efficacy ("sticking to it"), and social support from family and friends.
- Demographic and socioeconomic factors and repeated testing of physical fitness and body composition were not associated with regular exercise attendance or patterns.
- No prospective changes in use of the fitness clubs facilities were found. Individual resistance exercise was the most common workout mode.

Our results show that most new fitness club members use the fitness club intermittently and do not achieve regular exercise attendance. With only 17% exercising two days or more per week across the first year of membership, this thesis indicates that there is a need to develop strategies to improve regular exercise attendance among novice exercisers.

Further research

This thesis provides an update to the current scientific literature about one of the most popular activity settings for adults. Findings indicate that many fitness club members have difficulty maintaining, rather than initiating, regular exercise. If we can find ways to increase participation in PA and exercise, this may have a major impact on public health in the general adult population.

Many questions have arisen from this dissertation and should lead to future research:

- Helping new members to increase their autonomous motivation and self-efficacy in the first months of membership may be important to promote regular exercise attendance. Thus, there is a need for RCTs in a fitness club setting, such as relevant behavioral interventions targeted to increase autonomous motivation and self-efficacy.
- At fitness clubs, exercise is most often performed individually, and the members are then left to be active on their own. There is a need for RCTs to examine the effects of individual exercise compared with supervised group activities on exercise attendance.
- Psychosocial factors influencing exercise attendance cover multidimensional aspects, and the quantitative design in this thesis with numeric results may be too narrow to explain the complex aspects of exercise behavior. Qualitative research is needed to study this in more depth.
- A wide range of adults are fitness club members; both sexes of all ages, novice and experienced exercisers, with different psychological prerequisites, physical fitness, health, and BMI. Hence, there is a need for research on which factors influence exercise attendance in different sub-samples.
- The recruited fitness club chain and sample may differ from other fitness clubs and populations. Studies on other fitness club segments and in more rural areas outside of Oslo are needed.

References

1. Hawley-Hague, H., et al., *Review of how we should define (and measure) adherence in studies examining older adults' participation in exercise classes.* BMJ Open Sport & Exercise Medicine, 2016. **6**: p. 6.
2. Branka, F.E., Nikogosian, H.E., Lobstein, T.E., *The challenge of obesity in the WHO European Region and the strategies for response: Summary.*, W.H. Organization., Editor. 2007, World Health Organization.: Copenhagen, Denmark.
3. Caspersen, C.J., K.E. Powell, and G.M. Christenson, *Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research.* Public Health Rep, 1985. **100**(2): p. 126-31.
4. Reed, G.R., *Adherence to exercise and the transtheoretical model of behavior change.*, S. Bull, Editor. 2001, John Wiley & Sons Ltd.: England. p. 19-45.
5. Buckworth, J., Dishman, R. K., O`Conner, P.J., and Tomporowski, P.D., *Exercise Psychology.*, in *Exercise Psychology.* 2013, Champaign, IL: Human Kinetics.
6. Rothman, A.J., *Toward a theory-based analysis of behavioral maintenance.* Health Psychology, 2000. **19**(1): p. 64-69.
7. Burton, L.C., S. Shapiro, and P.S. German, *Determinants of physical activity initiation and maintenance among community-dwelling older persons.* Prev. Med., 1999. **29**: p. 422-430.
8. Howley, E.T., *Type of activity: resistance, aerobic and leisure versus occupational physical activity.* Medicine and Science in Sports and Exercise, 2001. **33**(6): p. S364-S369.
9. Bull, F.C., et al., *World Health Organization 2020 guidelines on physical activity and sedentary behaviour.* British Journal of Sports Medicine, 2020. **54**(24): p. 1451-1462.
10. Tremblay, M.S., et al., *Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome.* International Journal of Behavioral Nutrition and Physical Activity, 2017. **14**.
11. Barnes, J., et al., *Letter to the Editor: Standardized use of the terms "sedentary" and "sedentary behaviours".* Applied Physiology Nutrition and Metabolism-Physiologie Appliquee Nutrition Et Metabolisme, 2012. **37**(3): p. 540-542.
12. Ekelund, U., et al., *Physical activity and all-cause mortality across levels of overall and abdominal adiposity in European men and women: the European Prospective Investigation into Cancer and Nutrition Study (EPIC).* Am J Clin Nutr, 2015. **101**(3): p. 613-21.
13. Warburton, D.E.R. and S.S.D. Bredin, *Health benefits of physical activity: a systematic review of current systematic reviews.* Current Opinion in Cardiology, 2017. **32**(5): p. 541-556.
14. Mikkelsen, K., et al., *Exercise and mental health.* Maturitas, 2017. **106**: p. 48-56.
15. Rhodes, R.E., et al., *Physical activity: Health impact, prevalence, correlates and interventions.* Psychology & Health, 2017. **32**(8): p. 942-975.
16. Lewis, B.A., et al., *Future directions in physical activity intervention research: expanding our focus to sedentary behaviors, technology, and dissemination.* J Behav Med, 2017. **40**(1): p. 112-126.
17. Lavie, C.J., et al., *Sedentary Behavior, Exercise, and Cardiovascular Health.* Circulation Research, 2019. **124**(5): p. 799-815.

18. Guthold, R., et al., *Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants.* Lancet Glob Health, 2018. **6**(10): p. e1077-e1086.

19. Loyen, A., et al., *Sedentary Time and Physical Activity Surveillance Through Accelerometer Pooling in Four European Countries.* Sports Med, 2017. **47**(7): p. 1421-1435.

20. Hansen, B.H., et al., *Monitoring population levels of physical activity and sedentary time in Norway across the lifespan.* Scand J Med Sci Sports, 2019. **29**(1): p. 105-112.

21. Scarapicchia, T.M.F., et al., *Social support and physical activity participation among healthy adults: a systematic review of prospective studies.* International Review of Sport and Exercise Psychology, 2017. **10**(1): p. 50-83.

22. Ayotte, B.J., J.A. Margrett, and J. Hicks-Patrick, *Physical Activity in Middle-aged and Young-old Adults The Roles of Self-efficacy, Barriers, Outcome Expectancies, Self-regulatory Behaviors and Social Support.* Journal of Health Psychology, 2010. **15**(2): p. 173-185.

23. Bauman, A.E., et al., *Correlates of physical activity: why are some people physically active and others not?* Lancet, 2012. **380**(9838): p. 258-71.

24. Choi, J., et al., *Correlates associated with participation in physical activity among adults: a systematic review of reviews and update.* BMC Public Health, 2017. **17**(1): p. 356.

25. Bize, R., J.A. Johnson, and R.C. Plotnikoff, *Physical activity level and health-related quality of life in the general adult population: a systematic review.* Prev Med, 2007. **45**(6): p. 401-15.

26. Jones, S.A., et al., *Correlates of US adult physical activity and sedentary behavior patterns.* J Sci Med Sport, 2016.

27. Burgess, E., P. Hassmen, and K.L. Pumpa, *Determinants of adherence to lifestyle intervention in adults with obesity: a systematic review.* Clin Obes, 2017. **7**(3): p. 123-135.

28. Bauman, A.E., et al., *Toward a better understanding of the influences on physical activity: the role of determinants, correlates, causal variables, mediators, moderators, and confounders.* Am J Prev Med, 2002. **23**(2 Suppl): p. 5-14.

29. Duncan, M.J., J.C. Spence, and W.K. Mummery, *Perceived environment and physical activity: a meta-analysis of selected environmental characteristics.* Int J Behav Nutr Phys Act, 2005. **2**: p. 11.

30. Wendel-Vos, W., et al., *Potential environmental determinants of physical activity in adults: a systematic review.* Obesity Reviews, 2007. **8**(5): p. 425-440.

31. Ulseth, A., *New opportunities - Complex Motivations: Gender Differences in Motivation for Physical Activity in the Context of Sports Clubs and Fitness Centers.* IJAASS, 2008. **20**(1): p. 44-66.

32. Eime, R.M., et al., *Participation in sport and physical activity: associations with socio-economic status and geographical remoteness.* BMC Public Health, 2015. **15**: p. 434.

33. Kopp, P.M., et al., *Achievement motive, autonomous motivation, and attendance at fitness center: A longitudinal prospective study.* Psychology of Sport and Exercise, 2020. **51**.

34. Rand, M., et al., *Why do new members stop attending health and fitness venues? The importance of developing frequent and stable attendance behaviour.* Psychology of Sport and Exercise, 2020. **51**.

35. Sperandei, S., M.C. Vieira, and A.C. Reis, *Adherence to physical activity in an unsupervised setting: Explanatory variables for high attrition rates among fitness center members.* Journal of Science and Medicine in Sport, 2016. **19**(11): p. 916-920.

36. Middelkamp, J., Rooijen M., and S. B., *Attendance Behavior of Ex-members in Fitness Clubs: A Retrospective Study Applying the Stages of Change.* Perceptual and Motor Skills, 2016. **122**(1): p. 350-359.

37. Annesi, J.J., *Effects of a Cognitive Behavioral Treatment Package on Exercise Attendance and Drop Out in Fitness Centers.* European Journal of Sport Science., 2003. **3**(2): p. 1-16.

38. Wollebæk, D., P. Selle, and H. Lorentzen, *Frivillig innsats. Sosial integrasjon, demokrati og økonomi. [Voluntary work. Social Integration, democracy and economy].* . Bergen, Norway: Fagbokforlaget., 2000.

39. IHRSA. 2020: The International Health Racquet & Sportsclub Association. The IHRSA Global Report 2020. Available from: https://www.ihrsa.org/publications/the-2020-ihrsa-global-report/#.

40. Ommundsen Y., A., A. A., *Fysisk inaktive voksne i Norge. Hvem er inaktive - og hva motiverer til økt fysisk aktivitet?* Oslo: Helsedirektoratet, Kreftforeningen og Norges Bedriftsidrettsforbund, 2009.

41. Virke Trening, *Treningssenterbransjen 2019*. 2019.

42. Breivik G, R.K., *Fysisk aktivitet; omfang, tilrettelegging og sosial ulikhet. –en oppdatering og revisjon.* Oslo: Norges idrettshøgskole, 2017.

43. Mason, K.E., N. Pearce, and S. Cummins, *Associations between fast food and physical activity environments and adiposity in mid-life: cross-sectional, observational evidence from UK Biobank.* Lancet Public Health, 2018. **3**(1): p. E24-E33.

44. Wong, B.Y., et al., *Longitudinal relations of perceived availability of neighborhood sport facilities with physical activity in adolescents: an analysis of potential moderators.* J Phys Act Health, 2014. **11**(3): p. 581-7.

45. Riseth, L., et al., *Long-term members' use of fitness centers: a qualitative study.* Bmc Sports Science Medicine and Rehabilitation, 2019. **11**.

46. The Norwegian Directorate of Health, *Sammen om aktive liv. Handlingsplan for fysisk aktivitet 2020-2029*. 2020: https://www.regjeringen.no/no/dokumenter/sammen-om-aktive-liv/id2704955/.

47. VIRKE, T., *Treningssenterbransjen 2017*. 2017.

48. Middelkamp, J., et al., *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.* J Sports Sci Med, 2017. **16**(2): p. 163-171.

49. Vlachopoulos, S. and E. Neikou, *A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout.* The Journal of Sports Medicine and Physical Fitness, 2007. **47**(4): p. 475-482.

50. Thogersen-Ntoumani, C. and N. Ntoumanis, *The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations.* Journal of Sports Science and Medicine, 2006. **24**(4): p. 393-404.

51. Unger, J.B. and C.A. Johnson, *Social Relationships and Physical-Activity in Health Club Members.* American Journal of Health Promotion, 1995. **9**(5): p. 340-343.

52. Ready, A.E., et al., *Fitness centre membership is related to healthy behaviours.* The Journal of Sports Medicine and Physical Fitness, 2005. **45**(2): p. 199-207.

53. Kaphingst, K.A., et al., *Body mass index, physical activity, and dietary behaviors among members of an urban community fitness center: a questionnaire survey.* BMC Public Health, 2007. **7**: p. 181.

54. Prichard, I. and M. Tiggemann, *Relations among exercise type, self-objectification, and body image in the fitness centre environment: The role of reasons for exercise.* Psychology of Sport and Exercise, 2008. **9**(6): p. 855-866.

55. Schwetschenau, H.M., et al., *Barriers to Physical Activity in an On-Site Corporate Fitness Center.* Journal of Occupational Health Psychology, 2008. **13**(4): p. 371-380.

56. Kathrins, B. and D. Turbow, *Motivation of fitness center participants toward resistance training.* The Journal of Strength & Conditioning Research, 2010. **24**(9): p. 2483-90.

57. Mullen, S. and D. Whaley, *Age, gender, and fitness club membership: Factors related to initial involvement and sustained participation.* International Journal of Sport and Exercise Psychology, 2010. **8**(1): p. 24-35.

58. Tappe, K., et al., *Habit Formation Among Regular Exercisers at Fitness Centers: An Exploratory Study.* Journal of Physical Activity and Health, 2013. **10**(4): p. 607-613.

59. Amireault, S., and Godin, G., *Validation of Using Fitness Center Attendance Electronic Records to Assess the Frequency of Moderate/Vigorous Leisure-Time Physical Activity Among Adults.* Measurement in Physical Education and Exercise Science., 2014. **18**(1): p. 13-30.

60. Armitage, C.J., *Can the theory of planned behavior predict the maintenance of physical activity?* Health Psychology Journal, 2005. **24**(3): p. 235-245.

61. Seelig, H. and R. Fuchs, *Physical exercise participation: A continuous or categorical phenomenon?* Psychology of Sport and Exercise, 2011. **12**(2): p. 115-123.

62. Jekauc, D., et al., *Prediction of attendance at fitness center: a comparison between the theory of planned behavior, the social cognitive theory, and the physical activity maintenance theory.* Frontiers in Psychology, 2015. **6**: p. 1-10.

63. Kaushal, N. and R.E. Rhodes, *Exercise habit formation in new gym members: a longitudinal study.* Journal of Behavioral Medicine, 2015. **38**(4): p. 652-663.

64. Annesi, J.J., *Effects of computer feedback on adherence to exercise.* Percept Mot Skills, 1998. **87**(2): p. 723-30.

65. Schuz, B., et al., *Socioeconomic status as a moderator between social cognitions and physical activity: Systematic review and meta-analysis based on the Theory of Planned Behavior.* Psychology of Sport and Exercise, 2017. **30**: p. 186-195.

66. Wennman, H., et al., *Gender, age and socioeconomic variation in 24-hour physical activity by wrist-worn accelerometers: the FinHealth 2017 Survey.* Sci Rep, 2019. **9**(1): p. 6534.

67. Prichard, I. and M. Tiggemann, *Objectification in fitness centers: Self-objectification, body dissatisfaction, and disordered eating in aerobic instructors and aerobic participants.* Sex Roles, 2005. **53**(1-2): p. 19-28.

68. Portela-Pino, I., et al., *Gender Differences in Motivation and Barriers for The Practice of Physical Exercise in Adolescence.* Int J Environ Res Public Health, 2019. **17**(1).

69. Matud, M.P. and A. Diaz, *Gender, exercise, and health: A life-course cross-sectional study.* Nursing & Health Sciences, 2020. **22**(3): p. 812-821.

70. Joseph, R.P. and J.E. Maddock, *Observational Park-based physical activity studies: A systematic review of the literature.* Preventive Medicine, 2016. **89**: p. 257-277.

71. Sallis, J.F. and B.E. Saelens, *Assessment of physical activity by self-report: Status, limitations, and future directions.* Research quarterly for exercise and sport, 2000. **71**(2): p. 1-14.

72. Steene-Johannessen, J., et al., *Are Self-report Measures Able to Define Individuals as Physically Active or Inactive?* Medicine and Science in Sports and Exercise, 2016. **48**(2): p. 235-244.

73. Hansen, B.H., et al., *Validity of the ActiGraph GT1M during walking and cycling.* J Sports Sci, 2014. **32**(6): p. 510-6.

74. Cash, T., *Body image: Past, present, and future.* Body Image, 2004. **1**: p. 1-5.

75. Holland, G. and M. Tiggemann, *A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes.* Body Image, 2016. **17**: p. 100-110.

76. Pridgeon, L.G., S. , *Understanding exercise adherence and dropout: an interpretative phenomenological analysis of men and women's accounts of gym attendance and non-attendance.* Qualitative Research in Sport, Exercise and Health., 2012. **4**(3): p. 382-399.

77. Bassett-Gunter, R., D. McEwan, and A. Kamarhie, *Physical activity and body image among men and boys: A meta-analysis.* Body Image, 2017. **22**: p. 114-128.

78. Sklar, E.M., *Body Image, Weight, and Self-Concept in Men.* American Journal of Lifestyle Medicine, 2017. **11**(3): p. 252-258.

79. Campbell, A. and H.A. Hausenblas, *Effects of Exercise Interventions on Body Image A Meta-analysis.* Journal of Health Psychology, 2009. **14**(6): p. 780-793.

80. Freitas, A. and T. Lacerda, *Fitness Centers: What Are the Most Important Attributes in This Sector?* International Journal for Quality Research, 2019. **13**(1): p. 177-192.

81. Gillison, F.B., et al., *The effects of exercise interventions on quality of life in clinical and healthy populations; a meta-analysis.* Social Science & Medicine, 2009. **68**(9): p. 1700-10.

82. Cuschieri, S., *The STROBE guidelines.* Saudi Journal of Anaesthesia, 2019. **13**: p. 31-34.

83. von Elm, E., et al., *The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies.* J Clin Epidemiol, 2008. **61**(4): p. 344-9.

84. Adams, A.D., et al., *Use of the STROBE Checklist to Evaluate the Reporting Quality of Observational Research in Obstetrics.* Obstetrics and Gynecology, 2018. **132**(2): p. 507-512.

85. von Elm, E., et al., *The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies.* Lancet, 2007. **370**(9596): p. 1453-1457.

86. National Institutes of Health (2014), *Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies.* Available online at: https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort.

87. Moseley, A.M., et al., *Evidence for physiotherapy practice: A survey of the Physiotherapy Evidence Database (PEDro).* Australian Journal of Physiotherapy, 2002. **48**(1): p. 43-49.

88. Cashin A.G. and J.H. McAuley, *Clinimetrics: Physiotherapy Evidence Database (PEDro) Scale.* Journal of Physiotherapy, 2020. **66**(1): p. 59-59.

89. Limaye, D., et al., *Development of a Quantitative Scoring Method for Strobe Checklist.* Acta Poloniae Pharmaceutica, 2018. **75**(5): p. 1095-1106.

90. Suresh, K. and S. Chandrashekara, *Sample size estimation and power analysis for clinical research studies.* J Hum Reprod Sci, 2012. **5**(1): p. 7-13.

91. O`Keefe, D.J., *Brief report: Post Hoc Power, Observed Power, A Priori Power, Retrospective Power, Prospective Power, Achieved Power: Sorting out appropiate uses of statistical power analyses.* Communication Methods and Measures, 2007. **1**(4): p. 291-299.

92. Grimes, D.A. and K.F. Schulz, *Bias and causal associations in observational research.* Lancet, 2002. **359**(9302): p. 248-52.

93. Levin, K.A., *Study design VII. Randomised controlled trials.* Evid Based Dent, 2007. **8**(1): p. 22-3.

94. Egbewale, B.E., *Random allocation in controlled clinical trials: a review.* J Pharm Pharm Sci, 2014. **17**(2): p. 248-53.

95. Elkins, M.R. and A.M. Moseley, *Intention-to-treat analysis.* J Physiother, 2015. **61**(3): p. 165-7.

96. Grimes, D.A. and K.F. Schulz, *Descriptive studies: what they can and cannot do.* Lancet, 2002. **359**(9301): p. 145-9.

97. Levin, K.A., *Study design III: Cross-sectional studies.* Evid Based Dent, 2006. **7**(1): p. 24-5.

98. Hanis, S.M. and K. Mansori, *Is Determination of Predictors by Cross-Sectional Study Valid?* American Journal of Medicine, 2017. **130**(10): p. E455-E455.

99. Kamper, S.J., M.J. Hancock, and C.G. Maher, *Optimal Designs for Prediction Studies of Whiplash.* Spine, 2011. **36**(25): p. S268-S274.

100. Strath, S.J., et al., *Guide to the Assessment of Physical Activity: Clinical and Research Applications A Scientific Statement From the American Heart Association.* Circulation, 2013. **128**(20): p. 2259-2279.

101. Garber, C., et al., *American College of Sports Medicine position stand. 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, 2011. **43**(7): p. 1334-59.

102. Kirk, M.A. and R.E. Rhodes, *Occupation Correlates of Adults' Participation in Leisure-Time Physical Activity A Systematic Review.* American Journal of Preventive Medicine, 2011. **40**(4): p. 476-485.

103. American Psychological Association, *Report of the APA task force on socioeconomic status.* Washington, DC: American Psychological Association., 2007.

104. Gidlow, C., et al., *A systematic review of the relationship between socio-economic position and physical activity.* Health Education Journal, 2006. **65**(4): p. 338-367.

105. Pardo-Crespo, M.R., et al., *Comparison of individual-level versus area-level socioeconomic measures in assessing health outcomes of children in Olmsted County, Minnesota.* Journal of Epidemiology and Community Health, 2013. **67**(4): p. 305-310.

106. Rodrigues, F., et al., *Can Interpersonal Behavior Influence the Persistence and Adherence to Physical Exercise Practice in Adults? A Systematic Review.* Frontiers in Psychology, 2018. **9**.

107. Ryan, R.M. and E.L. Deci, *Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions.* Contemp Educ Psychol, 2000. **25**(1): p. 54-67.

108. Roberts, G.C., *Motivation in sport and exercise from an achievement goal theory perspective: After 30 years, where are we?* , in *Advances in motivation in sport and exercise, (3rd ed., pp. 8).* , I.H.K. Champaign, Editor. 2012.

109. Standage, M., Ryan, ED, *Self-Determination Theory and Exercise Motivation: Facilitating Self-Regulatory Processes to Support and Maintain Health and Well-Being.*, in *Advances in motivation in sport and exercise. G. C. Roberts and D. C. Treasure.* 2012, Champaign, IL., Human Kinetics, Inc. p. 233-270.

110. Teixeira, P., et al., *Exercise, physical activity, and self-determination theory: a systematic review.* International Journal of Behavioral Nutrition and Physical Activity, 2012. **9**: p. 78.

111. Ingledew, D.K., D. Markland, and E. Ferguson, *Three Levels of Exercise Motivation.* Applied Psychology-Health and Well Being, 2009. **1**(3): p. 336-355.

112. Ryan, R.M. and E.L. Deci, *Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being.* Am Psychol, 2000. **55**(1): p. 68-78.

113. Andreasson, J.J., T., *The Fitness Revolution. Historical Transformations in the Global Gym and Fitness Culture.* Sport Science Review, 2014. **33**(3-4): p. 91-112.

114. Andreasson, J. and T. Johansson, *Glocalised fitness: the franchising of a physical movement, fitness professionalism and gender.* Leisure/Loisir, 2018. **42**(3): p. 301-321.

115. Andre, N. and N.F. Agbangla, *Are Barriers the Same Whether I Want to Start or Maintain Exercise? A Narrative Review on Healthy Older Adults.* International Journal of Environmental Research and Public Health, 2020. **17**(17).

116. Janis, I. and L. Mann, *Decision Making: A Psychological Analysis of Conflict, Choice, and Commitment.* Free Press: New York, NY, USA., 1977.

117. Bandura, A., *Health promotion by social cognitive means.* Health Educ Behav, 2004. **31**(2): p. 143-64.

118. Baert, V., et al., *Motivators and barriers for physical activity in the oldest old: a systematic review.* Ageing Res Rev, 2011. **10**(4): p. 464-74.

119. Stankowski, C.L., N.E. Trauntvein, and S.L. Hall, *I Use the Student Recreation Center, but I Would Use It More if...: Understanding Male and Female Constraints to Student Recreation Center Use.* Recreational Sports Journal, 2017. **41**(1): p. 55-66.

120. Herazo-Beltran, Y., et al., *Predictors of perceived barriers to physical activity in the general adult population: a cross-sectional study.* Braz J Phys Ther, 2017. **21**(1): p. 44-50.

121. Seefeldt, V., R.M. Malina, and M.A. Clark, *Factors affecting levels of physical activity in adults.* Sports Med, 2002. **32**(3): p. 143-68.

122. Gray, P.M., et al., *Motives and Barriers to Physical Activity Among Older Adults of Different Socioeconomic Status.* J Aging Phys Act, 2016. **24**(3): p. 419-29.

123. Sorensen, M. and D.L. Gill, *Perceived barriers to physical activity across Norwegian adult age groups, gender and stages of change.* Scand J Med Sci Sports, 2008. **18**(5): p. 651-63.

124. McAuley, E. and B. Blissmer, *Self-efficacy determinants and consequences of physical activity.* . Exercise and Sport Sciences Reviews., 2000. **28**: p. 85-88.

125. Bandura, A., *Self-efficacy: toward a unifying theory of behavioral change.* Psychol Rev, 1977. **84**(2): p. 191-215.

126. White, S.M., T.R. Wojcicki, and E. McAuley, *Social cognitive influences on physical activity behavior in middle-aged and older adults.* J Gerontol B Psychol Sci Soc Sci, 2012. **67**(1): p. 18-26.

127. Darker, C.D., et al., *An intervention to promote walking amongst the general population based on an 'extended' theory of planned behaviour: A waiting list randomised controlled trial.* Psychology & Health, 2010. **25**(1): p. 71-88.

128. Pavot W, D.E., *Review of the Satisfaction With Life Scale.* Physiological Assessment, 1993. **5**: p. 164-172.

129. Diener, E., *Subjective well-being.* Psychological Bulletin., 1984. **95**: p. 542–575.

130. Koivumaa-Honkanen, H., et al., *Self-reported life satisfaction and 20-year mortality in healthy Finnish adults.* American Journal of Epidemiology, 2000. **152**(10): p. 983-991.

131. Strine, T.W., et al., *The associations between life satisfaction and health-related quality of life, chronic illness, and health behaviors among US community-dwelling adults.* Journal of Community Health, 2008. **33**(1): p. 40-50.

132. McAuley, E., et al., *Physical activity and quality of life in older adults: Influence of health status and self-efficacy.* Annals of Behavioral Medicine, 2006. **31**(1): p. 99-103.

133. Gill DL., et al., *Physical activity and quality of life.* J Prev Med Public Health, 2013. **46**: p. 28-34.

134. Awick, E.A., et al., *Effects of a randomized exercise trial on physical activity, psychological distress and quality of life in older adults.* General Hospital Psychiatry, 2017. **49**: p. 44-50.

135. Vagetti, G.C., et al., *Association between physical activity and quality of life in the elderly: a systematic review, 2000-2012.* Revista Brasileira De Psiquiatria, 2014. **36**(1): p. 76-88.

136. White, R.L., et al., *Domain-Specific Physical Activity and Mental Health: A Meta-analysis.* American Journal of Preventive Medicine, 2017. **52**(5): p. 653-666.

137. Young, M.D., et al., *Social cognitive theory and physical activity: a systematic review and meta-analysis.* Obesity Reviews, 2014. **15**(12): p. 983-995.

138. Elavsky, S., et al., *Physical activity enhances long-term quality of life in older adults: Efficacy, esteem, and affective influences.* Annals of Behavioral Medicine, 2005. **30**(2): p. 138-145.

139. McAuley, E., et al., *Pathways from physical activity to quality of life in older women.* Annals of Behavioral Medicine, 2008. **36**(1): p. 13-20.

140. Mudrak, J., et al., *Physical activity, self-efficacy, and quality of life in older Czech adults.* European Journal of Ageing, 2016. **13**(1): p. 5-14.

141. Netz, Y., et al., *Physical activity and psychological well-being in advanced age: A meta-analysis of intervention studies.* Psychology and Aging, 2005. **20**(2): p. 272-284.

142. Heaney, C. and B. Israel, *Social networks and social support.* In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), Health behavior and health education (4th ed., pp. 189–210). San Francisco: Jossey-Bass., 2008.

143. Haber, M.G., et al., *The relationship between self-reported received and perceived social support: A meta-analytic review.* American Journal of Community Psychology, 2007. **39**(1-2): p. 133-144.

144. Uchino, B.N., *Understanding the Links Between Social Support and Physical Health: A Life-Span Perspective With Emphasis on the Separability of Perceived and Received Support.* Perspectives on Psychological Science, 2009. **4**(3): p. 236-255.

145. Tay, L., et al., *Social Relations, Health Behaviors, and Health Outcomes: A Survey and Synthesis.* Applied Psychology-Health and Well Being, 2013. **5**(1): p. 28-78.

146. Trost, S.G., et al., *Correlates of adults' participation in physical activity: review and update.* Med Sci Sports Exerc, 2002. **34**(12): p. 1996-2001.

147. Greaves, C.J., et al., *Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions.* BMC Public Health, 2011. **11**.

148. Molloy, G.J., et al., *Social support and regular physical activity: Does planning mediate this link?* British Journal of Health Psychology, 2010. **15**: p. 859-870.

149. Oliveira, A.J., et al., *Gender differences in social support and leisure-time physical activity.* Revista De Saude Publica, 2014. **48**(4): p. 602-612.

150. Tamers, S.L., et al., *The association between worksite social support, diet, physical activity and body mass index.* Preventive Medicine, 2011. **53**(1-2): p. 53-56.

151. Martire, L.M. and M.M. Franks, *The Role of Social Networks in Adult Health: Introduction to the Special Issue.* Health Psychology, 2014. **33**(6): p. 501-504.

152. Ginsberg, R.L., et al., *Prevalence and correlates of body image dissatisfaction in postmenopausal women.* Women & Health, 2016. **56**(1): p. 23-47.

153. Runfola, C.D., et al., *Body Dissatisfaction in Women Across the Lifespan: Results of the UNC-SELF and Gender and Body Image (GABI) Studies.* European Eating Disorders Review, 2013. **21**(1): p. 52-59.

154. Swami, V., L. von Nordheim, and D. Barron, *Self-esteem mediates the relationship between connectedness to nature and body appreciation in women, but not men.* Body Image, 2016. **16**: p. 41-44.

155. Vandervoort, J., A. Aime, and I. Green-Demers, *The monster in the mirror: reasons for wanting to change appearance.* Eating and Weight Disorders-Studies on Anorexia Bulimia and Obesity, 2015. **20**(1): p. 99-107.

156. Weinberger, N.A., et al., *Body Dissatisfaction in Individuals with Obesity Compared to Normal-Weight Individuals: A Systematic Review and Meta-Analysis.* Obesity Facts, 2016. **9**(6): p. 424-441.

157. Schilder, P., *The image and appearance of the human body.* Oxford, England: Routledge., 2007.

158. Avalos, L., T. Tylka, and N. Wood-Barcalow, *The body appreciation scale: Development and psychometric evaluation.* Body Image., 2005. **2**(3): p. 285-297.

159. Slater, A. and M. Tiggemann, *Gender differences in adolescent sport participation, teasing, self-objectification and body image concerns.* Journal of Adolescence, 2011. **34**(3): p. 455-463.

160. Tylka, T.L. and N.L. Wood-Barcalow, *What is and what is not positive body image? Conceptual foundations and construct definition.* Body Image, 2015. **14**: p. 118-129.

161. Bucchianeri, M.M., et al., *Body dissatisfaction from adolescence to young adulthood: Findings from a 10-year longitudinal study.* Body Image, 2013. **10**(1): p. 1-7.

162. Shriver, L.H., et al., *Differences in body esteem by weight status, gender, and physical activity among young elementary school-aged children.* Body Image, 2013. **10**(1): p. 78-84.

163. Hilbert, A., M. de Zwaan, and E. Braehler, *How Frequent Are Eating Disturbances in the Population? Norms of the Eating Disorder Examination-Questionnaire.* Plos One, 2012. **7**(1).

164. Abbott, B.D. and B.L. Barber, *Embodied image: Gender differences in functional and aesthetic body image among Australian adolescents.* Body Image, 2010. **7**(1): p. 22-31.

165. Bucchianeri, M. and D. Neumark-Sztainer, *Body dissatisfaction: An overlooked public health concern.* Journal of Public Mental Health., 2014. **13**(2): p. 64-69.

166. Algars, M., et al., *The Adult Body: How Age, Gender, and Body Mass Index Are Related to Body Image.* Journal of Aging and Health, 2009. **21**(8): p. 1112-1132.

167. Schwartz, M. and K. Brownell, *Obesity and body image.* Body Image, 2004. **1**(1): p. 43-56.

168. Slevec, J.H. and M. Tiggemann, *Predictors of body dissatisfaction and disordered eating in middle-aged women.* Clinical Psychology Review, 2011. **31**(4): p. 515-524.

169. Penas-Lledo, E., L. Sancho, and G. Waller, *Eating attitudes and the use of alcohol, tobacco, and exercise among male and female adolescents.* Eating Behaviors., 2002. **3**: p. 101-111.

170. Tiggemann, M. and S. Williamson, *The effect of exercise on body satisfaction and self-esteem as a function of gender and age.* Sex Roles, 2000. **43**(1-2): p. 119-127.

171. Carraca, E.V., et al., *Physical Activity Predicts Changes in Body Image during Obesity Treatment in Women.* Medicine and Science in Sports and Exercise, 2012. **44**(8): p. 1604-1612.

172. Reel, J.J., et al., *Relations of body concerns and exercise behavior: A meta-analysis.* Psychological Reports, 2007. **101**(3): p. 927-942.

173. Ginis, K.A.M., R.L. Bassett-Gunter, and C. Conlin, *Body image and exercise.* In The Oxford Handbook of Exercise Psychology. Oxford Handbooks Online., 2012.

174. Sabiston, C.M., et al., *Body image, physical activity, and sport: A scoping review.* Psychology of Sport and Exercise, 2019. **42**: p. 48-57.

175. Alexandris, K., et al., *An empirical investigation of the relationships among service quality, customer satisfaction and psychological commitment in a health club context.* European Sport Management Quarterly., 2004. **4**: p. 36–52. .

176. Lee, J.H., et al., *The influence of service quality on satisfaction and intention: A gender segmentation strategy.* Sport Management Review., 2011. **14**: p. 54–63.

177. Theodorakis, N.D., et al., *A comparison of service evaluation models in the context of sport and fitness centres in Greece.* Managing Leisure., 2014. **19**: p. 18–35.

178. Li, Y., *Research on Customer Loyalty of Commercial Fitness Club based on Service Profit Chain.* Advances in Social Science, Education and Humanities Research., 2018. **236**: p. 175-179.

179. Kordi, M., *Service quality: any link to customers decision making.* Albertiana., 2015. **82**: p. 1-6.

180. Ferrand, A., L. Robinson, and P. Valette-Florence, *The Intention-to-Repurchase Paradox: A Case of the Health and Fitness Industry.* Journal of Sport Management, 2010. **24**(1): p. 83-105.

181. Gocłowska, S. and M. Piątkowska, *Service Satisfaction and Sport Consumption in The Fitness Center in Warsaw.* European Journal of Service Management., 2017. **22**(2): p. 31-37.

182. Bodet, G., *Investigating customer satisfaction in a health club context by an application of the tetraclasse model.* Eur Sport Manag Q, 2006. **6**: p. 149-65.

183. Vázquez, C., Foxall, GR., *Positive vs. negative switching barriers: the influence of service consumers.* J Consum Behav., 2006. **5**: p. 367-79.

184. Yusof, A., A. Popa, and S. Geok, *Relationship between Perceptions of Fitness Facility Service Quality and Future Intentions of Fitness Center Users in Thailand.* . International Journal of Academic Research in Business and Social Sciences., 2018. **8**: p. 863-871.

185. Gonçalves, C., P. Meireles, and M. Carvalho, *Consumer Behaviour in Fitness Club: Study of the Weekly Frequency of Use, Expectations, Satisfaction and Retention.* The Open Sports Sciences Journal, 2016. **9**(1): p. 62-70.

186. Baart de la Faille, M., Middelkamp, J., Steenbergen, J., *The state of research in the global fitness industry.* 2012, The Netherlands: Black Box Publishers.

187. Molanorouzi, K., S. Khoo, and T. Morris, *Motives for adult participation in physical activity: type of activity, age, and gender.* Bmc Public Health, 2015. **15**.

188. Nelson, N. and C. Asplund, *Exercise Testing: Who, When, and Why?* PM&R Journal, 2016. **8**(3): p. 16-23.

189. Poag, K. and E. Mcauley, *Goal-Setting, Self-Efficacy, and Exercise Behavior.* Journal of Sport & Exercise Psychology, 1992. **14**(4): p. 352-360.

190. Markland, D. and D.K. Ingledew, *The measurement of exercise motives: factorial validity and invariance across gender of a revised exercise motivations inventory.* British Journal of Health Psychology, 1997. **2**: p. 361-376.

191. Wrench, A. and R. Garrett, *Pleasure and pain: Experiences of fitness testing.* European Physical Education Review, 2008. **14**(3): p. 325-346.

192. Gosselink, R., T. Troosters, and M. Decramer, *Exercise testing: why, which and how to interpret.* Breathe, 2004. **1**(2): p. 120-129.

193. Cale, L. and J. Harris, *Fitness testing in physical education – a misdirected effort in promoting healthy lifestyles and physical activity?* Physical Education and Sport Pedagogy., 2009. **14**(1): p. 89-108.

194. Suni, J.H., et al., *Health-related fitness test battery for middle-aged adults: associations with physical activity patterns.* International Journal of Sports Medicine, 1999. **20**(3): p. 183-91.

195. Edvardsen, E., et al., *Reference values for cardiorespiratory response and fitness on the treadmill in a 20- to 85-year-old population.* Chest, 2013. **144**(1): p. 241-8.

196. Kulavic, K., C.N. Hultquist, and J.R. McLester, *A comparison of motivational factors and barriers to physical activity among traditional versus nontraditional college students.* J Am Coll Health, 2013. **61**(2): p. 60-6.

197. Ihlebaek, C., H.R. Eriksen, and H. Ursin, *Prevalence of subjective health complaints (SHC) in Norway.* Scand J Public Health, 2002. **30**(1): p. 20-9.

198. Hansen, B.H., et al., *Accelerometer-determined physical activity in adults and older people.* Med Sci Sports Exerc, 2012. **44**(2): p. 266-72.

199. Rustaden, A.M., et al., *Effects of BodyPump and resistance training with and without a personal trainer on muscle strength and body composition in overweight and obese women-A randomised controlled trial.* Obesity Research & Clinical Practice, 2017. **11**(6): p. 728-739.

200. Schroeder, E.C., et al., *Associations of Health Club Membership with Physical Activity and Cardiovascular Health.* PLoS One, 2017. **12**(1): p. 1-13.

201. Loland, N.W., *Body image and physical activity. A survey among Norwegian men and women.* International Journal of Sport Psychology, 1998. **29**(4): p. 339-365.

202. Gjestvang, C., T. Stensrud, and L.A.H. Haakstad, *Are changes in physical fitness, body composition and weight associated with exercise attendance and dropout among fitness club members? Longitudinal prospective study.* BMJ Open Sport & Exercise Medicine, 2019. **9**(4): p. 1-9.

203. Gjestvang, C., et al., *Motives and barriers to initiation and sustained exercise adherence in a fitness club setting - a one-year follow-up study.* Scandinavian Journal of Medicine & Science in Sports., 2020. **30**(9): p. 1796-1805.

204. Roberts, S., M. Reeves, and A. Ryrie, *The influence of physical activity, sport and exercise motives among UK-based university students.* Journal of Further and Higher Education, 2015. **39**(4): p. 598-607.

205. Althubaiti, A., *Information bias in health research: definition, pitfalls, and adjustment methods.* Journal of Multidisciplinary Healthcare, 2016. **9**: p. 211-217.

206. Bassett, D.R., Jr., et al., *Step Counting: A Review of Measurement Considerations and Health-Related Applications.* Sports Med, 2016.

207. Matthews, C.E., et al., *Amount of time spent in sedentary behaviors in the United States, 2003-2004.* Am J Epidemiol, 2008. **167**(7): p. 875-81.

208. Healy, G.N., et al., *Objectively measured light-intensity physical activity is independently associated with 2-h plasma glucose.* Diabetes Care, 2007. **30**(6): p. 1384-9.

209. Matthew, C.E., *Calibration of accelerometer output for adults.* Med Sci Sports Exerc, 2005. **37**(11 Suppl): p. S512-22.

210. Hagstromer, M., et al., *Levels and patterns of objectively assessed physical activity--a comparison between Sweden and the United States.* Am J Epidemiol, 2010. **171**(10): p. 1055-64.

211. Troiano, R.P., et al., *Physical activity in the United States measured by accelerometer.* Med Sci Sports Exerc, 2008. **40**(1): p. 181-8.

212. Le Masurier, G.C. and C. Tudor-Locke, *Comparison of pedometer and accelerometer accuracy under controlled conditions.* Med Sci Sports Exerc, 2003. **35**(5): p. 867-71.

213. *Global Recommendations on Physical Activity for Health*, in *Global Recommendations on Physical Activity for Health*. 2010, World Health Organization: Geneva.

214. Cash, T., *The multidimensional body-self Relations questionnaire user's manual.* www.body-images.com., 2000.

215. Giovannelli, T.S., et al., *The measurement of body-image dissatisfaction-satisfaction: Is rating importance important?* Body Image, 2008. **5**(2): p. 216-223.

216. Jarry, J.L., N.A.L. Dignard, and L.M. O'Driscoll, *Appearance investment: The construct that changed the field of body image.* Body Image, 2019. **31**: p. 221-244.

217. Laus, M., et al., *Brazilian version of the multidimensional body-self Relations questionnaire appearance scales (MBSRQ-AS): Translation and psychometric properties in adults.* Eating and Weight Disorders, 2019: p. 1253-1266.

218. Roncero, M., et al., *Confirmatory factor analysis and psychometric properties of the Spanish version of the Multidimensional Body-Self Relations Questionnaire-Appearance Scales.* Body Image, 2015. **14**: p. 47-53.

219. Vossbeck-Elsebusch, A.N., et al., *German version of the Multidimensional Body-Self Relations Questionnaire - Appearance Scales (MBSRQ-AS): Confirmatory factor analysis and validation.* Body Image, 2014. **11**(3): p. 191-200.

220. Keeton, W.P., T.F. Cash, and T.A. Brown, *Body-Image or Body Images - Comparative, Multidimensional Assessment among College-Students.* Journal of Personality Assessment, 1990. **54**(1-2): p. 213-230.

221. Sergi, G., et al., *Measurement of lean body mass using bioelectrical impedance analysis: a consideration of the pros and cons.* Aging Clinical and Experimental Research, 2017. **29**(4): p. 591-597.

222. Anderson LJ, E.D., Schroeder ET., *Utility of Multifrequency Bioelectrical Impedance Compared to DEXA for Assessment of Regional Lean Mass.* Medicine & Science in Sports & Exercise., 2011. **43**.

223. Evans, H., Ferrar, KE., Smith, AE., Parfitt, G., Eston, RG., *A systematic review of methods to predict maximal oxygen uptake from submaximal, open circuit spirometry in healthy adults.* Journal of Science and Medicine in Sport, 2015. **18**(2): p. 183-8.

224. Balke, B. and R.W. Ware, *An experimental study of physical fitness of Air Force personnel.* U S Armed Forces Med J, 1959. **10**(6): p. 675-88.

225. Edvardsen, E., E. Hem, and S.A. Anderssen, *End criteria for reaching maximal oxygen uptake must be strict and adjusted to sex and age: a cross-sectional study.* PLoS One, 2014. **9**(1): p. e85276.

226. Borg, G., *Percieved exertion as an indicator of somatic stress.* Scandinavian Journal of Rehabilitation Medicine., 1970. **2**(2): p. 92-98.

227. McMaster, D.T., et al., *A brief review of strength and ballistic assessment methodologies in sport.* Sports Medicine, 2014. **44**(5): p. 603-23.

228. Verdijk, L.B., et al., *One-repetition maximum strength test represents a valid means to assess leg strength in vivo in humans.* J Sports Sci, 2009. **27**(1): p. 59-68.

229. Pedersen, C., D. Jensen, and J. Sørensen, *SATS medlemsundersøgelse med henblik på at belyse fysisk aktivitetsniveau og træning i fitnesscenter.* Syddansk Universitet, 2011 in Danish.

230. Sallis, J.F., et al., *The development of self-efficacy scales for health-related diet and exercise behaviors.* Health Education Research., 1988. **3**: p. 283-292.

231. Sallis, J.F., et al., *The development of scales to measure social support for diet and exercise behaviors.* Prev Med, 1987. **16**(6): p. 825-36.

232. Diener, E., et al., *The Satisfaction with Life Scale.* Journal of Personality Assessment, 1985. **49**(1): p. 71-75.

233. Pavot, W. and E. Diener, *The satisfaction with life scale and the emerging construct of life satisfaction.* The Journal of Positive Psychology., 2008. **3**: p. 137-152.

234. Pavot, W., et al., *Further validation of the Satisfaction with Life Scale: evidence for the cross-method convergence of well-being measures.* J Pers Assess, 1991. **57**(1): p. 149-61.

235. Jovanović, V., M. Lazić, and V. Gavrilov-Jerković, *Measuring life satisfaction among psychiatric patients: Measurement invariance and validity of the Satisfaction with Life Scale.* Clinical Psychology & Psychotherapy., 2020.

236. Cohen, J., *Statistical Power Analysis for the Behavioral Sciences.* 1988, USA, New York: Routledge.

237. Jaeger, T.F., *Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models.* Journal of Memory and Language, 2008. **59**(4): p. 434-446.

238. Assoc, W.M., *World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects.* Jama-Journal of the American Medical Association, 2013. **310**(20): p. 2191-2194.

239. Statistics Norway. *Tobacco, alcohol and other drugs.* 2019 4. Nov; Available from: https://www.ssb.no/royk.

240. Statistics Norway. *Official statistics about Norwegian society since 1876.* 2019 16. Dec; Available from: https://www.ssb.no/.

241. Aspenes, S.T., et al., *Peak oxygen uptake and cardiovascular risk factors in 4631 healthy women and men.* Med Sci Sports Exerc, 2011. **43**(8): p. 1465-73.

242. Organization, W.H., *Waist circumference and waist–hip ratio. Report of a WHO expert consultation.*, W.H. Organization, Editor. 2011. p. 39.

243. Pivarnik, J.M., M.J. Reeves, and A.P. Rafferty, *Seasonal variation in adult leisure-time physical activity.* Medicine and Science in Sports and Exercise, 2003. **35**(6): p. 1004-1008.

244. Tucker, J.M., G.J. Welk, and N.K. Beyler, *Physical activity in U.S.: adults compliance with the Physical Activity Guidelines for Americans.* Am J Prev Med, 2011. **40**(4): p. 454-61.

245. Migueles, J.H., et al., *Accelerometer Data Collection and Processing Criteria to Assess Physical Activity and Other Outcomes: A Systematic Review and Practical Considerations.* Sports Med, 2017. **47**(9): p. 1821-1845.

246. Aaltonen, S., et al., *Motives for physical activity among active and inactive persons in their mid-30s.* Scand J Med Sci Sports, 2014. **24**(4): p. 727-35.

247. Turner, M.J., E.E. Schmitt, and T. Hubbard-Turner, *Weekly Physical Activity Levels of Older Adults Regularly Using a Fitness Facility.* J Aging Res, 2016. **2016**: p. 5010285.

248. Piercy, K.L., et al., *The Physical Activity Guidelines for Americans.* Jama-Journal of the American Medical Association, 2018. **320**(19): p. 2020-2028.

249. Warren, J.M., et al., *Assessment of physical activity - a review of methodologies with reference to epidemiological research: a report of the exercise physiology section of the European Association of Cardiovascular Prevention and Rehabilitation.* European Journal of Cardiovascular Prevention & Rehabilitation, 2010. **17**(2): p. 127-139.

250. Aadland, E., Ylvisaker, E., *Reliability of the Actigraph GT3X+ Accelerometer in Adults under Free-Living Conditions.* PLoS One, 2015. **10**(8): p. e0134606.

251. Trost, S.G., K.L. McIver, and R.R. Pate, *Conducting accelerometer-based activity assessments in field-based research.* Medicine and Science in Sports and Exercise, 2005. **37**(11): p. S531-S543.

252. Baumann, S., et al., *Pitfalls in accelerometer-based measurement of physical activity: The presence of reactivity in an adult population.* Scandinavian Journal of Medicine & Science in Sports, 2018. **28**(3): p. 1056-1063.

253. Davis, R.E. and P.D. Loprinzi, *Examination of Accelerometer Reactivity Among a Population Sample of Children, Adolescents, and Adults.* Journal of Physical Activity & Health, 2016. **13**(12): p. 1325-1332.

254. Sallis, J.F., et al., *Progress in physical activity over the Olympic quadrennium.* Lancet, 2016. **388**(10051): p. 1325-36.

255. Harris, C.D., et al., *Adult Participation in Aerobic and Muscle-Strengthening Physical Activities - United States, 2011.* Mmwr-Morbidity and Mortality Weekly Report, 2013. **62**(17): p. 326-330.

256. Loustalot, F., et al., *Muscle-strengthening activities and participation among adults in the United States.* Res Q Exerc Sport, 2013. **84**(1): p. 30-8.

257. Bennie, J.A., et al., *The descriptive epidemiology of total physical activity, muscle-strengthening exercises and sedentary behaviour among Australian adults--results from the National Nutrition and Physical Activity Survey.* BMC Public Health, 2016. **16**: p. 73.

258. Bennie, J.A., et al., *The epidemiology of muscle-strengthening exercise in Europe: A 28-country comparison including 280,605 adults.* Plos One, 2020. **15**(11).

259. Hata, O. and N. Umezawa, *Use of Fitness Facilities, Equipment, and Programs: A Case Study of a Japanese Fitness Club.* Journal of Sport Management, 1995. **9**(1): p. 78-84.

260. Gjestvang, C., et al., *Stay true to your workout: Does repeated physical testing boost exercise attendance? A one-year follow-up study.* Accepted for publication in Journal of Sports Science and Medicine., 2020.

261. Van Domelen, D.R., et al., *Employment and physical activity in the U.S.* Am J Prev Med, 2011. **41**(2): p. 136-45.

262. Murakami, K., et al., *Distinct impact of education and income on habitual exercise: a cross-sectional analysis in a rural city in Japan.* Soc Sci Med, 2011. **73**(12): p. 1683-8.

263. Micklesfield, L.K., et al., *Understanding the Relationship between Socio-Economic Status, Physical Activity and Sedentary Behaviour, and Adiposity in Young Adult South African Women Using Structural Equation Modelling.* Int J Environ Res Public Health, 2017. **14**(10).

264. Brudzynski, L.R. and W. Ebben, *Body image as a motivator and barrier to exercise participation.* International Journal of Exercise Science, 2010. **3**: p. 14-24.

265. Panão, I. and E.V. Carraca, *Effects of exercise motivations on body image and eating habits/behaviours: A systematic review.* Nutrition & Dietetics, 2020. **77**(1): p. 41-59.

266. Fernandez-Bustos, J.G., et al., *Effect of Physical Activity on Self-Concept: Theoretical Model on the Mediation of Body Image and Physical Self-Concept in Adolescents.* Frontiers in Psychology, 2019. **10**.

267. Feng, X.Q. and A. Wilson, *Does dissatisfaction with, or accurate perception of overweight status help people reduce weight? Longitudinal study of Australian adults.* Bmc Public Health, 2019. **19**.

268. Paans, N.P.G., et al., *Contributions of depression and body mass index to body image.* Journal of Psychiatric Research, 2018. **103**: p. 18-25.

269. Albawardi, N.M., et al., *Associations of Body Dissatisfaction With Lifestyle Behaviors and Socio-Demographic Factors Among Saudi Females Attending Fitness Centers.* Front. Psychol. 12:611472., 2021.

270. Hoj, K., et al., *The effect of cardiorespiratory fitness assessment in preventive health checks: a randomised controlled trial.* European Journal of Public Health, 2018. **28**(1): p. 173-179.

271. Ekkekakis, P., G. Parfitt, and S. Petruzzello, *The Pleasure and Displeasure People Feel When they Exercise at Different Intensities Decennial Update and Progress towards a Tripartite Rationale for Exercise Intensity Prescription.* Sports Medicine, 2011. **41**(8): p. 641-671.

272. Lollgen, H. and D. Leyk, *Exercise Testing in Sports Medicine.* Deutsches Arzteblatt International, 2018. **115**(24): p. 409-+.

273. Epton, T., S. Currie, and C.J. Armitage, *Unique effects of setting goals on behavior change: Systematic review and meta-analysis.* J Consult Clin Psychol, 2017. **85**(12): p. 1182-1198.

274. Hooker, S.A., et al., *Identifying groups at risk for 1-year membership termination from a fitness center at enrollment.* Preventive Medicine Reports, 2016. **4**: p. 563-568.

275. Box, A.G., et al., *Individual differences influence exercise behavior: how personality, motivation, and behavioral regulation vary among exercise mode preferences.* Heliyon, 2019. **5**(4): p. 1-22.

276. McClaran, S.R., *The effectiveness of personal training on changing attitudes towards physical activity.* Journal of Sports Science and Medicine, 2003. **2**(1): p. 10-4.

277. Jeffery, R.W., et al., *Use of personal trainers and financial incentives to increase exercise in a behavioral weight-loss program.* Journal of Consulting and Clinical Psychology, 1998. **66**(5): p. 777-783.

278. Brown, T., Fry, MD., *Helping Members Commit to Exercise: Specific Strategies to Impact the Climate at Fitness Centers.* Journal of Sport Psychology in Action., 2011. **2**: p. 70-80.

279. Tsitskari, E., G. Tzetzis, and D. Konsoulas, *Perceived Service Quality and Loyalty of Fitness Centers' Customers: Segmenting Members Through Their Exercise Motives.* Services Marketing Quarterly., 2017. **38**: p. 253-268.

280. Deelen, I., D. Ettema, and C.B.M. Kamphuis, *Sports participation in sport clubs, gyms or public spaces: How users of different sports settings differ in their motivations, goals, and sports frequency.* PLoS One, 2018. **13**(10): p. e0205198.

281. Mullan, E., D. Markland, and D.K. Ingledew, *A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analytic procedures.* Personality and Individual Differences, 1997. **23**(5): p. 745-752.

282. Sebire, S.J., M. Standage, and M. Vansteenkiste, *Examining Intrinsic Versus Extrinsic Exercise Goals: Cognitive, Affective, and Behavioral Outcomes.* Journal of Sport & Exercise Psychology, 2009. **31**(2): p. 189-210.

283. Brawley, L., Martin, KA., Gyurcsik, NC., *Problems in assessing perceived barriers to exercise: confusing obstacles with attributions and excuses.* Duda Journal ed.Advances in sport & exercise measurement. USA, Morgantown: Fitness Information Technology., 1998: p. 337–350.

284. Martikainen, P., M. Bartley, and E. Lahelma, *Psychosocial determinants of health in social epidemiology.* International Journal of Epidemiology, 2002. **31**(6): p. 1091-3.

285. Keating, X.D., et al., *A meta-analysis of college students' physical activity behaviors.* J Am Coll Health, 2005. **54**(2): p. 116-25.

286. Rhodes, R.E., et al., *Factors associated with participation in resistance training: a systematic review.* British Journal of Sports Medicine, 2017. **51**(20): p. 1466-1472.

287. Shephard, R.J., *Limits to the measurement of habitual physical activity by questionnaires.* British Journal of Sports Medicine, 2003. **37**(3): p. 197-206.

288. Gabriel, K.P., et al., *Issues in accelerometer methodology: the role of epoch length on estimates of physical activity and relationships with health outcomes in overweight, post-menopausal women.* Int J Behav Nutr Phys Act, 2010. **7**: p. 53.

289. Notthoff, N., P. Reisch, and D. Gerstorf, *Individual Characteristics and Physical Activity in Older Adults: A Systematic Review.* Gerontology, 2017. **63**(5): p. 443-459.

290. Sedgwick, P., *Bias in observational study designs: prospective cohort studies.* Bmj-British Medical Journal, 2014. **349**.

291. SATS, *SATS Sustainability Report 2019.* 2019.

292. Sattler, M.C., et al., *Physical activity self-reports: past or future?* Br J Sports Med, 2021.

293. Grimes, D.A. and K.F. Schulz, *Cohort studies: marching towards outcomes.* Lancet, 2002. **359**(9303): p. 341-345.

294. Levin, K.A., *Study design IV. Cohort studies.* Evid Based Dent, 2006. **7**(2): p. 51-2.

295. Andrade, C., *Internal, External, and Ecological Validity in Research Design, Conduct, and Evaluation.* Indian Journal of Psychological Medicine, 2018. **40**(5): p. 498-499.

296. Song, J.W. and K.C. Chung, *Observational studies: cohort and case-control studies.* Plast Reconstr Surg, 2010. **126**(6): p. 2234-42.

297. Merril, R.M. and T.C. Timmreck, *Introduction to Epidemiology. 4th Ed. Jones and Bartlett Publishers; Mississauga, Ontario: 2006. p. 1-342.* 2006.

298. Kristman, V., M. Manno, and P. Cote, *Loss to follow-up in cohort studies: how much is too much?* European Journal of Epidemiology, 2004. **19**(8): p. 751-760.

299. Fincham, J.E., *Response rates and responsiveness for surveys, standards, and the Journal.* American Journal of Pharmaceutical Education, 2008. **72**(2).

300. Saleh, A. and K. Bista, *Examining factors impacting online survey reponse rates in educational research: perceptions of graduate students.* Journal of multidisciplinary Evaluation., 2017. **13**(29): p. 63-74.

301. Cacciattolo, M., *Ethical Considerations in Research. Pages: 55–73 In: The Praxis of English Language Teaching and Learning (PELT).* Brill Sense., 2015.

302. McNamee, M., Olivier, S. & Wainwright, P., *Introduction. Research ethics in exercise, health and sport sciences.* 2007, London.: Routledge. 7-28.

303. TheNorwegianNationalResearchEthicsCommittees., *General guidelines for research ethics.*

304. Payne, G., Payne, J., *Key Concepts in Social Research.* Key Concepts in Social Research. 2004, USA.: SAGE Publishing. 248.

305. Lo, B., Field, M.J., *Conflict of Interest in Medical Research, Education, and Practice.* 2009, Washington (DC): National Academies Press.

306. Ghooi, R.B., *Conflict of interest in clinical research.* Perspect Clin Res, 2015. **6**(1): p. 10-4.

Paper I

Received: 9 August 2019 | Revised: 26 September 2019 | Accepted: 7 November 2019

DOI: 10.1002/tsm2.120

ORIGINAL ARTICLE

WILEY

Are fitness club members likely to meet the current physical activity recommendations?

Christina Gjestvang | **Trine Stensrud** | **Bjørge H. Hansen** | **Elin Kolle** | **Lene A.H. Haakstad**

Department of Sports Medicine, Norwegian School of Sports Sciences, Oslo, Norway

Correspondence
Christina Gjestvang, Department of Sports Medicine, Norwegian School of Sports Sciences, Oslo, Norway.
Email: christina.gjestvang@nih.no

Abstract

The aims of the present study were (a) to assess PA level and prevalence meeting PA recommendations at onset and after 12 months of fitness club membership, and (b) to identify socioeconomic status (SES), and compare this in participants with high (≥two weekly sessions) exercise frequency and low (≤one exercise session/week) exercise frequency. PA level was measured by ActiGraph GT1M in 125 new fitness club members at onset and 12 months. A total of 250 participants answered a questionnaire covering SES and exercise frequency. To examine changes in PA level and the prevalence meeting PA recommendations, paired t tests or McNemar's test was used. No changes were found in total PA level (counts per minute (cpm)) (359.3 ± 109.5 vs 375.8 ± 123.1 cpm, $P = .226$) or MVPA (19.4 ± 14.8 vs 21.3 ± 17.9 minutes/d, $P = .358$) at 12 months. PA recommendation (≥150 minutes/wk of moderate to vigorous PA) was met by 37.7% and 45.9% at onset and after 12 months. Exercise frequency was not associated with SES. We found no increase in PA level the first year of fitness club membership. SES was not associated with regular use of the fitness club.

KEYWORDS

exercise, health, physical activity

1 | INTRODUCTION

The scientific evidence linking regular physical activity (PA) to health benefits is well-established, and promoting PA is a public health priority.[1] Currently, the PA recommendations state that in order to achieve health benefits, individuals should engage in physical activity for at least 150 minutes of moderate or 75 minutes of vigorous intensity per week.[2] Further, it recommended weekly participation in muscle-strengthening activities on two or more days.[2] Data from device-measured PA demonstrate that only about 19%-33% of the European adult population comply with the PA recommendations.[3,4]

Much research has focused on understanding demographic and socioeconomic determinants of PA and inactivity; however, few have considered the context of PA.[5-7] Hence, it is important to understand the differences, not only between physically active and inactive individuals, but also if exercise involvement differs between activity settings (such as fitness clubs, organized sports clubs, or public spaces). Throughout the 1990s, the fitness club industry gradually

grew in popularity as a new venue for exercise and PA. A fitness club consists of a wide range of exercise concepts and activities, such as equipment for cardiovascular and resistance exercise, group exercise classes, and personal trainers who are accessible to members for exercise consultation. To date, the global fitness club industry has about 174 million members and counts more than 201 000 clubs.[8] Those joining a fitness club may be more motivated to be physically active than other individuals, and it is suggested that the social environment, as well as financial commitment (monthly fee), may influence exercise behavior, hence, contribute to achieving the PA recommendations.[9] Further, demographic and socioeconomic factors are shown to act as facilitators or barriers with regard to exercise involvement.[5,6] It is reported that individuals with higher socioeconomic status are more likely than those with lower socioeconomic status to participate in physical activity and exercise, and more specifically in a sport setting.[5,6] However, the scientific knowledge of those that choose to be a member is scant, and few studies have examined if demographic and socioeconomic variables are associated with exercise involvement among new members in a fitness club setting.

Search on PubMed revealed three cross-sectional studies investigating PA level among fitness club members, but only by a questionnaire.[10-12] These studies found that 87%-94% of fitness club members met the PA recommendations.[10-12] However, cross-sectional studies do not allow for assessing the direction of the relationship between fitness club membership and overall PA levels, and assessment of PA by self-report may be imprecise.[13] In addition, only one of these studies asked the members to report muscle-strengthening activity (such as lifting free weights and body weight exercises).[11] Hence, there is a need for follow-up data and research that investigate whether having a fitness club membership is associated with changes in device-measured PA, including self-reported muscle-strengthening PA.

The main aim of the present study was to assess total PA level and prevalence meeting PA recommendations at onset and after 12 months of fitness club membership. In addition, we wanted to identify demographic and socioeconomic status, and compare this in participants with high (≥two exercise sessions/week the last month) and low (one exercise session/week, or no exercise the last month) exercise frequency after 12 months of fitness club membership.

2 | MATERIALS AND METHODS

2.1 | Design

The study was part of a longitudinal prospective cohort study (Fitness clubs—a venue for public health?), following a group of new members at 25 fitness clubs in Oslo, Norway. The aim was to gather repeated measures of PA level and an increased understanding of different factors influencing exercise involvement, attendance, and dropout in a fitness club setting. The project was financed by the Norwegian School of Sports Sciences (NSSS), and data collection was conducted during the period October 2015-October 2018.

The project was reviewed by the Regional Committee for Medical and Health Research Ethics (REK 2015/1443 A), who concluded that, according to the Act on medical and health research (the Health Research Act 2008), the study did not require full review. The project was approved by the Norwegian Social Science Data Service (NSD 44135). In accordance with the Declaration of Helsinki, all participants received written information about the project´s purpose and procedures and gave consent to participate.

2.2 | Participants

Participants were recruited during October 2015 to October 2017. All new fitness club members were approached to take part in the study, by an email invitation from the fitness club company. Eligibility criteria were <4 weeks fitness club membership, physically inactive (exercising < 60 minutes/wk at moderate or vigorous intensity or brisk walking <150 minutes/wk, the last 6 months), ≥18 years, healthy (no chronic disease or pathology, ie, heart disease, severe hypertension, or lung disease such as asthma), and not pregnant (at onset). In Europe, September and January are two important months for recruiting new fitness club members. Hence, the participants for the present study were mainly enrolled during those two key periods.

Sample size considerations for the present study were conservatively based on results from a large cross-sectional study assessing PA level among Norwegian adults,[14] as well as what the research group hypothesized as relevant increase in the prevalence of meeting PA recommendations for new members at a fitness club.[11] Those joining a fitness club may be more motivated to increase their physical activity level compared with other individuals; however, we also wanted to detect small changes. Hence, with a power of 80% at the 0.05 level, we would be able to detect a 15% change in the prevalence of meeting PA recommendations with 80 participants. To allow adjustment of other factors and losses to follow-up, an additional 20% participants (n = 16) were needed.[15] In addition to accelerometer measurements of PA level, we intended to investigate demographic and socioeconomic variables and compare this in participants with high exercise frequency and low exercise frequency at 12 months. As such, we aimed to recruit all new fitness club members who fulfilled the eligibility criteria.

In total, 676 fitness club members replied to our email invitation and wanted to participate in the study. We excluded individuals classified as physically active (n = 270), or had cardiovascular disease, hypertension, or asthma (n = 8). In addition, 148 individuals did not respond after the first email, leaving 250 enrolling in the study. Of these, a sub-group (49.2% men) monitored PA using ActiGraph GT1M (ActiGraph, LLC, Pensacola, FL) at onset of fitness club membership (n = 125) and at 12 months of follow-up (n = 61=). All participants (n = 250) answered a questionnaire covering demographic and socioeconomic variables at onset of fitness club membership, and 187 of these reported exercise frequency after 12 months. Flow of the participants and reasons for loss to follow-up are shown in Figure 1.

2.3 | Measurements

2.3.1 | PA measure

Measurement of PA followed the same protocol as another Norwegian study.[14] Previous studies have demonstrated ActiGraph GT1M to be a valid and reliable measure of PA

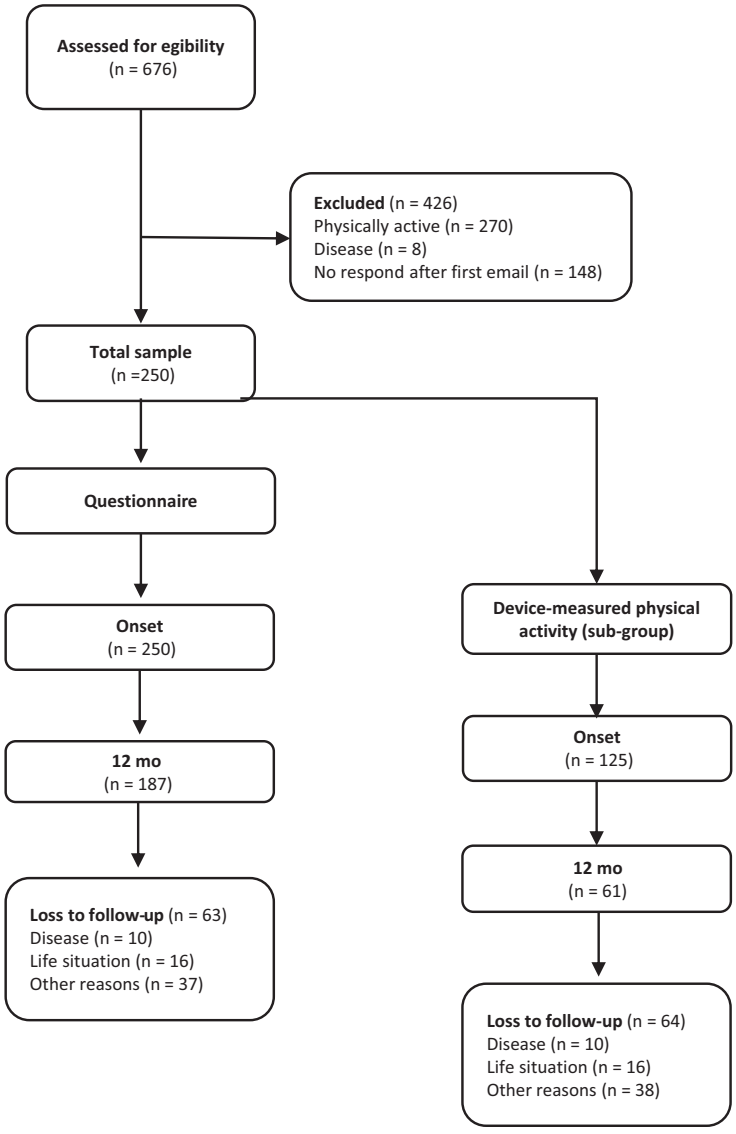

FIGURE 1 Flow diagram of the participants throughout the study

in adults.[16] The participants received the preprogrammed accelerometer and standardized instructions, including how to wear the accelerometer and to remove it during sleeping and water activities such as swimming. The accelerometer was worn for seven consecutive days and returned by prepaid mail. All participants accumulating a minimum of 10 hours of activity recording per day for at least 4 days were included in the data analysis.

Different intensities of PA with count thresholds corresponding to the energy cost of the given intensity were applied in the analysis. Sedentary time was defined as all activity <100 counts per minute (cpm) (eg, sitting or lying down),[14] and low-intensity PA was defined as counts between 100 and 2019 (eg, slow walking, grocery shopping, and child care),[14] whereas moderate to vigorous PA (MVPA) was defined as all activity ≥2020 cpm (eg, walking at speeds of ≥4.7 km/h, as well as more vigorous activities).[14] Numbers of minutes per day at different intensities were determined by summing all minutes where the count met the criterion for that intensity, divided by the number of valid days. The accelerometer measures vertical accelerations in units called counts and samples data in sampling intervals (epochs). Hence, steps per day were registered as number of intervals, suggested to be representative of number of steps taken.[17]

PA data are presented as (a) total PA level (cpm), (b) number of minutes spent in intensity-specific categories, (c) numbers of steps per day, (d) percentage of participants accumulating ≥10 000 steps per day, and (e) percentage of participants meeting the PA recommendations. Adherence to current PA recommendations were determined as accumulating a minimum of 150 minutes of weekly MVPA (in mean >21.4 minutes/d).[2,18] All MVPA that occurred in bouts of ≥10 minutes (with allowance for interruptions of 1-2 minutes) during the registration period was included in the analysis.

ActiGraph GT1M is not waterproof and primarily measures vertical accelerations of the body when hip-worn; hence, all forms of PA may not be measured accurately (eg, upper body movement, resistance training, isometric muscle contractions, and cycling).[19] Thus, in fitness club members who participate in such activities, PA level may be underestimated. Hence, we asked the participants to report swimming, all muscle-strengthening activities, and cycling in a standardized form. The question and response option were " Have you been doing swimming, cycling or resistance exercise during the measurement period?": "yes" or "no." If the participants had performed some of the activities, frequency and duration were obtained. Hence, to determine weekly combined PA (accelerometer measure added with minutes of self-reported activities), and further numbers meeting PA recommendations, we added accelerometer measure with the self-reported activities: Combined weekly PA = (accelerometer measured weekly PA + (days of self-reported activity * duration)).

2.3.2 | Questionnaire

Information related to demographic variables and socioeconomic status was obtained from an electronic questionnaire at onset of fitness club membership. The participants answered questions covering age, gender, body weight and height, smoking, level of education, total household income, cohabitation, and occupation. At 12 months of follow-up, the participants also reported on exercise frequency at the fitness club the last 4 weeks. The three questions and response options were (a) "Are you still a member?": "yes" or "no," (b) "Have you been exercising regularly at the fitness club?": "yes" or "no," (c) "How often have you exercised per week on average at the fitness club?": "once a week", "twice a week", "three times a week", "four times a week", "five times a week", "six times a week," or "seven times a week or more." The specific questionnaire section for the present study was primarily based on a previous study in a Danish fitness club setting [20] and piloted for comprehensibility among four research group members and four volunteers. At all time points, the questionnaire took approximately 30 minutes to complete. Further details about the questionnaire have been described previously.[21]

With respect to self-reported exercise frequency at 12 months, the participants were classified with high or low exercise frequency. As recommended by Garber et al,[22] high exercise frequency with the intention to improve, for example, physical fitness, was defined as visiting the fitness club ≥ two times a week the last month (n = 70), and low exercise frequency as visiting the fitness club < one time a week or no exercise the last month (n = 93).

2.4 | Statistical analysis

Data were analyzed using SPSS Statistical Software (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp). Results are presented as means with standard deviations (SD), or frequencies (n) and percentages, as well as group differences with 95% confidence intervals (CI). To examine changes in PA level (from onset to 12 months of fitness club membership) and numbers meeting current PA recommendations; independent and paired t tests, McNemar's test, or chi-square was used as appropriate. With respect to PA level, completers only (participants who underwent measurement at both time points, n = 61) were included in the analyses.

To examine differences in demographic and socioeconomic variables between high exercise frequency and low exercise frequency, independent t tests were used. Crude analysis revealed no significant differences between the groups; hence, no logistic regression was performed.

To evaluate whether the present participants at 12 months were representative of our initial study population, a comparison analysis was performed with the participants lost to follow-up.

3 | RESULTS

Fitness club members (n = 250) in the present study were predominantly white (95.6%), and 51.2% aged 18-34 years, 40.8% aged 35-54 years, 8.0% aged 55-65 years, and 1.2% aged 65+. As shown in Table 1, 40.8% had university education ≥4 years, 74.0% were employed outside the home, 45.6% reported a high total household income (>$87 500 per year), 61.2% were living with a partner, and 32.0% had children. In terms of BMI, 34.0% were classified as overweight (BMI > 25.0), and 14.4% were classified as obese (BMI > 30.0). With respect to smoking habits, 19 participants reported daily smoking. Nine out of ten (89.6%) had previously been a member of another fitness club. More details of the sample and main reasons for membership dropout, primary motives for the new membership, and physical fitness are described elsewhere.[21,23]

TABLE 1 Demographic and socioeconomic variables in the total sample and sub-group at onset of fitness club membership

Variables	Total sample (n = 250)	Sub-group (n = 125)
Age (y), mean (SD)	36.4 (±11.3)	36.7 (±11.0)
Body weight (kg), mean (SD)	78.7 (±15.8)	77.4 (±14.5)
Current smoker, n (%)	19 (7.6)	7 (5.6)
BMI ≥ 25 (overweight or obese)	121 (48.4)	52 (41.6)
Educational level, n (%)		
Low (<13 y or <4 y of higher education)	141 (56.4)	68 (54.4)
High (≥4 y of higher education)	102 (40.8)	57 (45.6)
Household income (US dollar), n (%)		
Low (<50 000-87 499 per y)	121 (48.4)	73 (58.4)
High (>87 500 per y)	114 (45.6)	52 (41.6)
Cohabitation, n (%)		
Spouse/partner	153 (61.2)	82 (65.6)
Live alone	74 (29.6)	31 (24.8)
Have children	80 (32.0)	41 (32.8)
Occupation, n (%)		
Employed outside the home	185 (74.0)	91 (72.8)
Student	21 (8.4)	8 (6.4)
Sick-listed	30 (12.0)	18 (14.4)

Note: Data are presented as mean (SD) for continuous variables and n (%) for categorical variables.

3.1 | PA level

The sub-group (61 out of 125) had a mean of 6.4 (±1.6) and 6.0 (±1.5) days of valid activity recordings at onset and after 12 months of fitness club membership, respectively. At both time points, mean daily accelerometer wear time was 13.8 (±1.2) hours/d.

As shown in Table 2, no changes in total PA level (cpm), sedentary time, low-intensity PA, MVPA, or numbers meeting current PA recommendation (≥150 minutes/wk of MVPA) were found after 12 months of fitness club membership. Regarding number of participants meeting >10 000 steps per day, the prevalence increased from 14.8% to 19.5% (95% CI: 2.8, 26.0 $P = .022$) between the two measurements. At 12 months of follow-up, 45.9% met current PA recommendations. Adding self-reported muscle-strengthening activities, swimming and cycling to device-measured PA increased the prevalence to 57.4% ($P = <.001$). Two days or more per week of muscle-strengthening activity according to current recommendation was followed by about 13% of the participants at 12 months of follow-up.

3.2 | Demographic and socioeconomic variables

Of 187 participants answering the questionnaire at 12 months, 37.4%, 49.8%, and 12.8% reported high exercise frequency, low exercise frequency, and membership dropout, respectively. Among members reporting high exercise frequency and low exercise frequency, weekly exercise sessions at the fitness club were 3.0 (±1.5) and 0.5 (±0.5) days per week, respectively.

As shown in Table 3, crude analysis revealed no differences in demographic and socioeconomic variables between high exercise frequency and low exercise frequency at 12 months. Excluding those who reported exercise dropout in the analysis did not change the present findings.

No baseline differences were found between participants lost to follow-up and current participants at 12 months with respect to PA level, steps per day, number of minutes spent in intensity-specific categories, time spent in bouts of MVPA, prevalence of meeting PA recommendations or 10 000 steps per day, or demographic and socioeconomic variables (data not shown).

TABLE 2 Comparison of total PA level (cpm), steps per day, number of minutes spent in intensity-specific categories, time spent in bouts of MVPA, prevalence of meeting current PA recommendations, and >10 000 steps per day in the sub-group at onset and after 12 mo of fitness club membership (total sub-group: n = 125, completers: n = 61)

Variables	At onset All (n = 125) Mean ± SD	At onset Completers (n = 61) Mean ± SD	After 12 months Completers (n = 61) Mean ± SD	Mean change*	95% CI	*P*-value
Total PA level (cpm)	357.0 (±113.6)	359.3 (±109.5)	375.8 (±123.1)	16.5	−10.5 to 43.5	.226
Steps per day	7705.0 (±2254.3)	7934.0 (±2309.8)	8256.5 (±2571.5)	322.5	−247.0 to 892.0	.262
Sedentary time (min/d)	549.0 (±65.8)	566.8 (±58.8)	549.9 (±73.2)	-16.9	−34.7 to 0.8	.062
Low-intensity PA (min/d)	236.7 (±66.0)	237.0 (±63.2)	234.7 (±66.8)	-2.3	−16.0 to 11.5	.743
Accumulated MVPA (min/d)	37.3 (±16.0)	37.3 (±16.0)	42.2 (±19.5)	4.0	−0.4 to 8.4	.071
Bouts of MVPA (min/d)	18.1 (±15.0)	19.4 (±14.8)	21.3 (±17.9)	1.9	−2.2 to 5.9	.358
	%	%	%	**Mean change***	**95% CI**	
>150 min of weekly MVPA**	37.6	37.7	45.9	8.2	−13.0 to 16.0	.383
>150 min of weekly combined PA***	59.2	68.9	57.4	−11.5	−23.0 to 12.0	.281
>10 000 steps per day	13.6	14.8	29.5	14.8	2.8 to 26.0	.022

Note: Data are presented as mean (SD) or %, mean change (inclusion-12 mo), and 95% CI.

*Mean change from inclusion to 12 mo.

**Objectively accelerometer measure.

***Objectively accelerometer measure added with minutes of self-reported muscle-strengthening activities, swimming, cycling, and/or cross-country skiing.

4 | DISCUSSION

In the present study, main findings were that a fitness club membership was not associated with increased PA level or prevalence meeting ≥150 minutes/wk of MVPA. At 12 months of follow-up, about 46% of the participants met current PA recommendations, which is higher compared to Norwegian data (33.3%), as well as other studies in the general adult population investigating device-measured PA (19%-33%).[3,4] By adding self-reported muscle-strengthening activities, swimming, and cycling to the objective measurements, the prevalence increased to 57.4%. Demographic and socioeconomic variables did not differ between members with high or low exercise frequency, nor members who did not visit the fitness club despite ongoing membership fee.

4.1 | PA level

To our knowledge, no other study has used accelerometer to measure PA level among fitness club members. Compared with data in the general adult population (5.0%-33.0%),[4,18,24] the present study found a somewhat higher prevalence of meeting PA recommendations (45.9%). The technology and application of accelerometers in PA research are rapidly changing, and differences between studies may be due to device placement, data protocols, and processing techniques, how data were analyzed (eg, cut-points), interpretation of PA recommendations and how prevalence estimates was determined.[25] The higher prevalence found in our study may also be explained by a somewhat higher motivation toward regular PA among fitness club members, compared with physically inactive individuals.[10,26] The monthly cost of a commercial fitness club membership is from $70 to $114. Hence, our participants voluntarily paid a monthly fee to use the gym. Our initial hypothesis was that financial commitment, as well as access to exercise equipment, group exercise classes, and staff who can help and support, may aid compliance to PA and exercise. Yet, we did not find that a fitness club membership contributed to a more active lifestyle, which is in contrast to three studies that have investigated PA in a fitness club setting.[10-12] These studies were, however, based on self-report; therefore, social desirability may have potentially affected the risk of over-reporting PA level.[27] It is also likely that members reported time spent at the fitness club, rather than time spent in MVPA. In our study, we aimed to investigate resistance exercise and other activities performed in a fitness club setting (such as cycling and rowing), and an accelerometer is likely to underestimate upper body movement and horizontal accelerations of the body.[19] As such, when adding accelerometer measures with self-reported activities, more

TABLE 3 Demographic and socioeconomic variables in fitness club members reporting high (visiting the fitness club ≥ two times per week the last month) exercise frequency and low (visiting the fitness club ≤ one time per week, or no exercise the last month) exercise frequency after 12 months of fitness club membership

Variables	High exercise frequency (n = 70, 37.4%)	Low exercise frequency (n = 93, 49.8%)	*P*-value
Age (y), mean (SD)	37.3 (±12.6)	36.7 (±10.8)	.757
Body weight (kg), mean (SD)	79.8 (±13.5)	79.2 (±15.4)	.792
Current smoker, n (%)	6 (8.6)	7 (7.5)	.807
BMI ≥ 25 (overweight or obese)	38 (54.3)	46 (49.5)	.652
Educational level, n (%)			.327
Low (<13 y or <4 y of higher education)	40 (57.1)	46 (49.5)	
High (≥4 y of higher education)	27 (38.6)	45 (48.4)	
Household income (US dollar), n (%)			.283
Low (<50 000-87 499 per y)	33 (47.2)	36 (38.7)	
High (>87 500 per y)	29 (41.4)	48 (51.6)	
Cohabitation, n (%)			1.000
Spouse/partner	43 (61.4)	60 (64.5)	
Live alone	19 (27.1)	27 (29.0)	
Have children	18 (25.7)	30 (32.3)	.463
Occupation, n (%)			.689
Employed outside the home	51 (72.9)	69 (74.2)	
Student	7 (8.0)	6 (6.5)	
Sick-listed	13 (14.9)	10 (10.8)	

Note: Data are presented as mean (SD) for continuous variables and n (%) for categorical variables.

participants met PA recommendations. This corresponds to other literature of self-reported PA, where self-report generally shows higher numbers meeting PA recommendations.

Muscle-strengthening activity according to current recommendation (≥2 days/per week) was followed by about 13% of the participants at 12 months of follow-up, which is consistent with studies in the general adult population (3.4%-29.3%).[28-30] This differs, however, from two cross-sectional studies, reporting that 68.0% to 84.0% of fitness club members met muscle-strengthening activity recommendations.[11,31] Cross-sectional study design prohibits causal inferences [13]; thus, it is also likely that more active individuals are those exercising in a fitness club. In addition, in contrast to the present study, exercise behavior was not analyzed over a period of time, nor did they include a group of new beginner exercisers.

4.2 | Demographic and socioeconomic variables

We found no differences in demographic or socioeconomic variables among participants with high or low exercise frequency. Hence, our results contradict the hypotheses that factors like socioeconomic status, age, smoking habits, and BMI are related to higher levels of PA.[5-7,32]

Part of the explanation for findings in our study may be related to two aspects. First, the fitness club chain used for recruitment of participants has a relatively high price level with respect to membership fee, which may explain why nearly 80% of participants were classified with middle to high household income. Hence, the study sample was homogenous. Secondly, more than 78% of our participants had college or university education. Studies investigating the general population have shown that higher education levels reflect more favorable lifestyle habits, including participation in regular exercise.[6,33] Still, a high proportion of our fitness club members (nearly 60%) reported low exercise frequency (<one time a week, or no exercise the last month). Hence, including a larger and more diverse population might have given different results.

Few studies have compared demographic and socioeconomic variables (educational level, household income, and BMI) between fitness club members and non-members,[10,11,34] and only one showed that fitness club members were younger, included more women and the majority had

a BMI < 25, than individuals exercising at sports clubs or public spaces.[34]

In the present study, nearly 60% of the participants self-reported low exercise frequency (<two times a week) or no exercise the last month. Another study has also found that even among highly educated individuals, the percentage of those performing regular exercise is not sufficient with respect to health benefits.[35] This may demonstrate how challenging it is to change health habits and that PA is a complex behavior influenced by several different factors (such as social support, individual psychological factors, motives, and barriers).[36,37]

4.3 | Strengths and limitations

In this study, the use of an accelerometer and the prospective longitudinal design may be considered major strengths. Device-measured PA offers a potential solution to information bias due to self-reported data.[38] However, since the included accelerometer is uniaxial and likely to underestimate upper body and horizontal movements (such as cycling), another strength in our study was that participants reported on muscle-strengthening activities, swimming, and cycling. Hence, we were able to combine self-reported activities with device-measured PA for the prevalence of meeting PA recommendations.

Limitations are that data were obtained from only one fitness club chain in Oslo, Norway, and that 64 out of 125 participants in the sub-group did not participate in follow-up accelerometer measure of PA. Still, we had a sufficient number of participants according to prior power considerations for follow-up measurements. Despite the strength of self-reported PA not measured accurately by the accelerometer (such as resistance training), combined weekly PA may be overestimated, due to the risk that individuals may subjectively over-report PA level.

Regarding demographic and socioeconomic variables, we also considered to compare this between those who maintained 12 months of fitness club membership with those reporting membership dropout. Although, only 12.8% (n = 24) reported membership dropout throughout the follow-up period. Hence, the sample size was not large enough to statistically compare these two groups. Further, a potential bias in our study may also be the relatively high socioeconomic status of participants and that they were predominantly white and of Norwegian descent. These factors may lower the internal and external validity of our findings. Even though, they might be considered representative for an urban Norwegian population of Scandinavian origin.

In conclusion, we did not find that fitness club as a health-promoting setting, influenced total PA level or prevalence meeting PA recommendations. Still, a higher proportion of fitness club members met current PA recommendations, compared to the general adult population in Europe. No differences were found in demographic and socioeconomic variables between high exercise frequency and low exercise frequency.

5 | PERSPECTIVES

In the present study, more than half of the fitness club members were insufficiently physically active, despite a financial commitment and a wide range of exercise concepts at the fitness club. An essential prerequisite to promote physical activity in a fitness club setting is more research, aiming to gain an increased knowledge about how different factors are associated with PA at fitness clubs, and to design relevant interventions.

At fitness clubs, physical activity and exercise are most often performed individually (such as running, cycling, or resistance exercise), which allows for personal time management and flexibility in terms of place and type of activity. On the other hand, the individuals are then left to be active on their own. Thus, initiating supervised group activities and social support in a safe setting with qualified instructors may aid compliance to physical activity and exercise.

ACKNOWLEDGEMENT

We would thank Ingar Holme and Morten Fagerland, professors in biostatistics, Norwegian School of Sports Sciences for important guidance with power considerations and data analysis, and the research assistants Hege Heiestad, Fredrik Kristiansen, and Lasse Bækken.

ORCID

Christina Gjestvang https://orcid.org/0000-0003-2253-1921
Trine Stensrud https://orcid.org/0000-0002-5250-525X

REFERENCES

1. Rhodes RE, Janssen I, Bredin SSD, Warburton DER, Bauman A. Physical activity: health impact, prevalence, correlates and interventions. *Psychol Health*. 2017;32(8):942-975.
2. World Health Organization *Global Recommendations on Physical Activity for Health*. Geneva: WHO; 2010. 978 92 4 159 997 9.
3. Hansen BH, Kolle E, Steene-Johannessen J, Dalene KE, Ekelund U, Anderssen SA. Monitoring population levels of physical activity and sedentary time in Norway across the lifespan. *Scand J Med Sci Sports*. 2019;29(1):105-112.
4. Loyen A, Clarke-Cornwell AM, Anderssen SA, et al. Sedentary time and physical activity surveillance through accelerometer pooling in four European countries. *Sports Med*. 2017;47(7):1421-1435.
5. Eime RM, Charity MJ, Harvey JT, Payne WR. Participation in sport and physical activity: associations with socio-economic status and geographical remoteness. *BMC Public Health*. 2015;15:434.

6. Schuz B, Li ASW, Hardinge A, McEachan RRC, Conner M. Socioeconomic status as a moderator between social cognitions and physical activity: systematic review and meta-analysis based on the Theory of Planned Behavior. *Psychol Sport Exerc*. 2017;30:186-195.
7. Van Domelen DR, Koster A, Caserotti P, et al. Employment and physical activity in the U.S. *Am J Prev Med*. 2011;41(2):136-145.
8. The IHRSA Global Report 2019.
9. Giles-Corti B, Donovan RJ. The relative influence of individual, social and physical environment determinants of physical activity. *Soc Sci Med*. 2002;54(12):1793-1812.
10. Ready AE, Naimark BJ, Tate R, Boreskie SL. Fitness centre membership is related to healthy behaviours. *J Sports Med Phys Fitness*. 2005;45(2):199-207.
11. Schroeder EC, Welk GJ, Franke WD, Lee DC. Associations of health club membership with physical activity and cardiovascular health. *PLoS ONE*. 2017;12(1):e0170471.
12. Kaphingst KA, Bennett GG, Sorensen G, Kaphingst KM, O'Neil AE, McInnis K. Body mass index, physical activity, and dietary behaviors among members of an urban community fitness center: a questionnaire survey. *BMC Public Health*. 2007;7:181.
13. Levin KA. Study design III: Cross-sectional studies. *Evid Based Dent*. 2006;7(1):24-25.
14. Hansen BH, Kolle E, Dyrstad SM, Holme I, Anderssen SA. Accelerometer-determined physical activity in adults and older people. *Med Sci Sports Exerc*. 2012;44(2):266-272.
15. Suresh K, Chandrashekara S. Sample size estimation and power analysis for clinical research studies. *J Hum Reprod Sci*. 2012;5(1):7-13.
16. Herman Hansen B, Bortnes I, Hildebrand M, Holme I, Kolle E, Anderssen SA. Validity of the ActiGraph GT1M during walking and cycling. *J Sports Sci*. 2014;32(6):510-516.
17. Le Masurier GC, Tudor-Locke C. Comparison of pedometer and accelerometer accuracy under controlled conditions. *Med Sci Sports Exerc*. 2003;35(5):867-871.
18. Hansen BH, Kolle E, Steene-Johannessen J, Dalene KE, Ekelund U, Anderssen SA. Monitoring population levels of physical activity and sedentary time in Norway across the lifespan. *Scand J Med Sci Sports*. 2019;29(1):105-112.
19. Bassett DR Jr, Toth LP, LaMunion SR, Crouter SE. Step counting: a review of measurement considerations and health-related applications. *Sports Med*. 2017;47(7):1303-1315.
20. Pedersen CJD, Sørensen J.SATS medlemsundersøgelse med henblik på at belyse fysisk aktivitetsniveau og træning i fitnesscenter. Syddansk Universitet. 2011 Danish.
21. Gjestvang C, Stensrud T, Haakstad LAH. How is rating of perceived capacity related to VO2max and what is VO2max at onset of training? *BMJ Open Sport Exerc Med*. 2017;3(1):e000232.
22. Garber CE, Blissmer B, Deschenes MR, et al. College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc*. 2011;43(7):1334-1359.
23. Gjestvang C, Stensrud T, Haakstad LAH. Are changes in physical fitness, body composition and weight associated with exercise attendance and dropout among fitness club members? Longitudinal prospective study. *BMJ Open Sport Exerc Med*. 2019;9:e027987.
24. Tucker JM, Welk GJ, Beyler NK. Physical activity in U.S.: adults compliance with the Physical Activity Guidelines for Americans. *Am J Prev Med*. 2011;40(4):454-461.
25. Migueles JH, Cadenas-Sanchez C, Ekelund U, et al. Accelerometer data collection and processing criteria to assess physical activity and other outcomes: a systematic review and practical considerations. *Sports Med*. 2017;47(9):1821-1845.
26. Aaltonen S, Rottensteiner M, Kaprio J, Kujala UM. Motives for physical activity among active and inactive persons in their mid-30s. *Scand J Med Sci Sports*. 2014;24(4):727-735.
27. Steene-johannessen J, Anderssen SA, Van der ploeg HP, et al. Are self-report measures able to define individuals as physically active or inactive? *Med Sci Sports Exerc*. 2016;48(2):235-244.
28. Harris CD, Watson KB, Carlson SA, Fulton JE, Dorn JM, Elam-Evans L. Adult participation in aerobic and muscle-strengthening physical activities – United States, 2011. *Mmwr-Morbidity and Mortality Weekly Report*. 2013;62(17):326-330.
29. Loustalot F, Carlson SA, Kruger J, Buchner DM, Fulton JE. Muscle-strengthening activities and participation among adults in the United States. *Res Q Exerc Sport*. 2013;84(1):30-38.
30. Bennie JA, Pedisic Z, van Uffelen JGZ, et al. The descriptive epidemiology of total physical activity, muscle-strengthening exercises and sedentary behaviour among Australian adults–results from the National Nutrition and Physical Activity Survey. *BMC Public Health*. 2016;16:73.
31. Kathrins BP, Turbow DJ. Motivation of fitness center participants toward resistance training. *J Strength Cond Res*. 2010;24(9):2483-2490.
32. Murakami K, Hashimoto H, Lee JS, Kawakubo K, Mori K, Akabayashi A. Distinct impact of education and income on habitual exercise: a cross-sectional analysis in a rural city in Japan. *Soc Sci Med*. 2011;73(12):1683-1688.
33. Micklesfield L, Munthali R, Prioreschi A, et al. Understanding the relationship between socio-economic status, physical activity and sedentary behaviour, and adiposity in young adult South African women using structural equation modelling. *Int J Environ Res Public Health*. 2017;14:1271.
34. Deelen I, Ettema D, Kamphuis CBM. Sports participation in sport clubs, gyms or public spaces: how users of different sports settings differ in their motivations, goals, and sports frequency. *PLoS ONE*. 2018;13(10):e0205198.
35. Biernat E, Piątkowska M. Comparative leisure physical activity: a comparison between polish and European population. *Phys Culture Sport Stud Res*. 2013;59(1):33-41.
36. Burgess E, Hassmen P, Pumpa KL. Determinants of adherence to lifestyle intervention in adults with obesity: a systematic review. *Clin Obes*. 2017;7(3):123-135.
37. Choi J, Lee M, Lee JK, Kang D, Choi JY. Correlates associated with participation in physical activity among adults: a systematic review of reviews and update. *BMC Public Health*. 2017;17(1):356.
38. Troiano RP. Translating accelerometer counts into energy expenditure: advancing the quest. *J Appl Physiol*. 2006;100(4):1107-1108.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Gjestvang C, Stensrud T, Hansen BH, Kolle E, Haakstad LAH. Are fitness club members likely to meet the current physical activity recommendations?. *Transl Sports Med*. 2019;00:1–9. https://doi.org/10.1002/tsm2.120

Paper II

Psychology of Sport & Exercise 53 (2021) 101880

Contents lists available at ScienceDirect

Psychology of Sport & Exercise

journal homepage: www.elsevier.com/locate/psychsport

Mirror, mirror - Does the fitness club industry have a body image problem?

Lene A.H. Haakstad *, Charlotte Jakobsen, Runar Barstad Solberg, Christine Sundgot-Borgen, Christina Gjestvang

Department of Sports Medicine, Norwegian School of Sports Sciences, Norway

ARTICLE INFO

Keywords:
Body image
Body mass index
Fitness club
Exercise
Men
Women

ABSTRACT

The primary aim of the present study was to report longitudinal data on body image across the first year of gym engagement. Second, we aimed to compare body image among those who reported regular use of the fitness club (≥2 sessions/week) with those who did not (≤1exercise session/week or no exercise/dropout), as well as between genders and Body Mass Index groups (BMI<25 and BMI≥25) at membership start-up. Novice exercisers (n = 250) from 25 fitness clubs in Oslo (Norway) responded to an online questionnaire at start-up, three, six and 12-months follow-up, with a high response rate (100%, 89.6%, 85.2% and 74.8%). The questionnaire covered background/health information and exercise involvement. A modified Multidimensional Body Self Relations Questionnaire Appearance Scales (MBSRQ-AS), comprising five subscales (appearance satisfaction, appearance investment, weight-related attitude, self-classified weight and Body Areas Satisfaction Scale (BASS), was used to gather repeated measures of body image. Data were analysed separately for each subscale and as a body image total score, using a linear mixed model adjusted for baseline, gender and BMI. We found differences in body image total score reported at six months when compared with onset (0.04, 95% CI 0.005–0.078, p = 0.024), whereas the subscale appearance satisfaction was different at three (0.08, 95% CI 0.015–0.164, p = 0.018), six (0.11, 95% CI 0.039–0.197, p = 0.003) and twelve (0.10, 95% CI 0.021–0.179, p = 0.013) months when compared with onset. Also the subscale BASS was different at three (0.17, 95% CI 0.009–0.255, p < 0.001), six (0.21, 95% CI 0.127–0.301, p < 0.001) and twelve (0.26, 95% CI 0.143–0.388, p < 0.001). Participants adhering to regular exercise (≥2 times weekly) had better outcomes on total body image than those who exercised less frequently or irregularly (three: 2.94 vs. 2.83, p = 0.027 and 12-months: 2.97 vs. 2.85, p = 0.028).

At membership start-up, being male (p < 0.001) and having a BMI<25 (p = 0.003), were the strongest factors associated with reporting a higher score on total body image. In conclusion, we found improved body area and appearance satisfaction in novice exercisers across the first year of fitness club membership.

1. Introduction

At present, a negative body image and body weight dissatisfaction are global phenomena, with a large proportion wanting to alter at least some characteristics of their physical appearance (Ginsberg et al., 2016; Runfola et al., 2013; Swami et al., 2016; Vandervoort et al., 2015; Weinberger et al., 2016). Body mass index (BMI) is inversely associated with body image and body dissatisfaction tends to be more common in persons with overweight and obesity compared with normal-weight individuals (Algars et al., 2009; Schwartz & Brownell, 2004; Slevec & Tiggemann, 2011). Also, body dissatisfaction is more prevalent in women than men (Hilbert et al., 2012), and studies report a difference between the genders even among young ages, where girls are more insecure about their appearance compared with boys (Bucchianeri et al., 2013; Shriver et al., 2013). As such, women of all ages seem to value aesthetic ideals rather than the functional importance of their bodies (Abbott & Barber, 2010). This represents a major public health concern, as a negative body image is defined as a major risk factor for depression, anxiety, low self-worth, eating disorders, conditions which cost the society billions of dollars each year (Bucchianeri & Neumark-Sztainer, 2014).

Some research has revealed that a negative body image is associated with participation in regular exercise, when reasons for exercise are appearance based (Campbell & Hausenblas, 2009). In line with this, exercise may be seen as a strategy for weight loss, shaping and toning the body, and these reasons of exercise are associated with increased body dissatisfaction (Prichard & Tiggemann, 2005). On the other hand, intervention studies have shown that compared with controls,

* Corresponding author. Department of Sports Medicine, P.O Box 4014, Ullevål Stadion, 0806, Oslo, Norway.
E-mail address: lahaakstad@nih.no (L.A.H. Haakstad).

https://doi.org/10.1016/j.psychsport.2020.101880
Received 4 June 2020; Received in revised form 22 December 2020; Accepted 22 December 2020
Available online 25 December 2020

participants randomized to exercise have greater improvements in body image (Campbell & Hausenblas, 2009; Carraça et al., 2012; Reel et al., 2007). Hence, body image may be seen as a positive consequence of exercise, since participating in regular activity may pose changes to body-esteem, self-esteem and self-efficacy, all leading to a more positive body image (Martin Ginis et al., 2012). This theory is in accordance with a recent scoping review of 210 studies, concluding that overall, participating in structured or leisure physical activity was linked to less negative and more positive body image (Sabiston et al., 2019). However, it is important to investigate body image attitudes not only between individuals that are active or inactive (randomized to exercise or controls), but also if this differs between activity contexts (organized sports clubs, public spaces and fitness clubs) and exercise involvement (frequency). The existing literature has also largely included cross-sectional data, and prospective studies are therefore needed to further improve our understanding of causality of the established associations (Sabiston et al., 2019).

Body image attitudes has been defined somewhat differently in the literature, but can shortly be described as "the subjective picture of our own body which we form in our mind; that is to say, the way in which the body appears to ourselves" (Schilder, 2007). It has further been conceptualized as a multidimensional construct, comprising a cognitive, affective, perceptual, and a behavioral component (Pruzinsky & Cash, 1990), and where the subjective experience of one's appearance is more powerful than what could be defined as objectively true or observed by others in a social setting (Cash, 2004). Body image attitudes influences how individuals feel, think, perceive, evaluate, invest and act regarding their physical attributes or certain body parts, and is therefore an important component of a person's identity, health and quality of life (Avalos et al., 2005; Slater & Tiggemann, 2011; Tylka & Wood-Barcalow, 2015).

As previously described, gender and body size influence body image attitudes, and in sport psychology, exercise has received considerable attention as an important factor related to body image and body dissatisfaction. Additional factors of relevance to body image attitudes are age, personality traits, interactions with significant others (family, friends), as well as culture, media and experiences (Cash, 2004; Holland & Tiggemann, 2016). An individual's body image attitudes often adapts to reflect new information and people, and it may be sensitive to situations and environment (Holland & Tiggemann, 2016). Research has not yet investigated how exercise relates to body image attitudes among novice exercisers at fitness clubs, a setting often considered to be an appearance orientated milieu (Prichard & Tiggemann, 2005, 2008). Also, studies regarding physical activity and body image has largely focused on women (Bassett-Gunter et al., 2017; Campbell & Hausenblas, 2009), and body image in men is an area that has received little attention (Sklar, 2017). Lastly, there is an important knowledge gap in the causal, directional associations between body image attitudes and exercise. Hence, the primary aim of the present study was to report longitudinal data on body image across the first year of gym engagement. Secondary, we aimed to compare body image among those who reported regular use of the fitness club ($\geq$2 sessions/week) with those who did not ($\leq$1exercise session/week or no exercise/dropout), as well as between genders and BMI groups (BMI$<$25 and BMI$\geq$25) at membership start-up.

Our hypothesis was that both genders would report a more positive body image across the follow-up period, especially in those attaining regular exercise. Furthermore, we hypothesized that body image dissatisfaction would be higher in women than in men, and among persons with a BMI higher than 25 compared to normal-weight participants.

2. Materials and methods

2.1. Design and participants

The present study was a secondary analysis of data that were collected as part of a prospective study of contributing factors that influence exercise involvement, attendance and exercise drop-out in a fitness club setting (*Fitness clubs - a venue for public health*? (Gjestvang et al., 2020). The original study was conducted in Oslo (Norway) from October 2015 to October 2018. The eligibility criteria were: healthy, untrained, $<$four weeks' membership, $\geq$18 years, not pregnant and literate in the Scandinavian language. Being healthy was defined as no severe disease or pathology (such as heart disease or severe hypertension). Untrained was defined as exercising $<$60 min once a week at moderate or vigorous intensity (Loland, 1998). There were 676 novice exercisers from 25 multipurpose fitness clubs (resistance and cardio exercise rooms, and group exercise classes) who expressed interest to participate in the study, however 148 did not respond after the first email, and 278 did not meet the eligibility criteria. Hence, 250 fitness club members (equal number of men and women) were included and followed for one year. More details of the research project are published elsewhere (Gjestvang et al., 2019, 2020).

Ethical approval

The Regional Committee for Medical and Health Research Ethics, Southern Norway, Oslo, revised the project and complete data collection (REK, 2015/1443 A) and concluded that the study did not require full review according to the Act on medical and health research (the Health Research Act, 2008). All participants signed an informed consent form, following the Helsinki declaration. The study was approved by the Norwegian Social Science Data Service (NSD 44135) and was financed by a PhD position (CG) at the Norwegian School of Sports Sciences (NSSS). No economic compensation was given to the participants.

2.2. Outcome measures

A standardized, multidimensional electronic questionnaire (SurveyXact, www.survey-xact.no) was answered at start-up (52 questions) and after three, six and 12 months (65 questions) of fitness club membership. The questionnaire took about 25 min to complete, and was fully answered at the four time points by 250, 224, 213, and 187 participants, respectively. A total of 184 (men, n = 94 and women, n = 90) answered at all time points (73.6%). Up to three emails and one telephone reminder were directed to participants who did not respond. For most participants we do not know the reasons for why they were lost to follow-up (n = 43). Other withdrawals included life situation (n = 14), injury/disease (n = 5) and relocation (n = 1).

Information related to demographic variables and socioeconomic status were obtained from the questionnaire answered at start-up of fitness club membership, including questions about age, body weight and height, smoking, level of education, total household income, occupation, cohabitation and children. At three, six and 12 months follow-up, the participants also reported on exercise involvement. Due to potential recall bias associated with the use of self-report, we asked the participants to report exercise involvement over the last four weeks only (Sallis & Saelens, 2000). The questions and response options were: 1) *"Are you still a fitness club member?"*: *"yes"* or *"no"*, 2) *"Have you been exercising regularly at the fitness club?"*: *"yes"* or *"no"* and 3) *"How often have you exercised per week on average at the fitness club?"*: *"once a week", "twice a week", "three times a week", "four times a week", "five times a week", "six times a week*" or *"seven times a week or more"*. Based on the latter (question 3), average sessions/week was obtained across all three time-points. In the analysis, the participants were classified with either regular or non-regular exercise frequency. In line with Garber et al. (2011), regular exercise was defined as visiting the fitness club $\geq$2 times

a week in the last month (Garber et al., 2011), and non-regular exercise as visiting the fitness club ≤1 time a week in the last month, counting exercise relapse, exercise dropouts and membership cancellations.

The Multidimensional Body Self Relations Questionnaire (MBSRQ) consists of separate subscales that can be used jointly or independently, and are together with a manual available for a nominal fee (Cash, 2000; Keeton et al., 1990). In the present study, body image attitudes was collected using a modified version of the MBSRQ-Appearance Scales (MBSRQ-AS), including 21 statements, comprising four sets of subscales (appearance satisfaction, appearance investment, weight-related attitude, self-classified weight), plus the Body Areas Satisfaction Scale (BASS) (Cash, 2000; Keeton et al., 1990). These are described below:

1. Appearance satisfaction: feelings of physical attractiveness or unattractiveness; satisfaction or dissatisfaction with one's looks.
2. Appearance investment: extent of investment in one's appearance. High scorers place more importance on how they look, pay attention to their appearance, and engage in extensive grooming behaviours, whereas low scorers are apathetic about their appearance and looks.
3. Weight-related attitude: reflecting fat anxiety, weight vigilance, dieting, and eating restraint.
4. Self-classified weight: reflecting how one perceives and labels one's weight, from very underweight to very overweight.

The MBSRQ-AS and BASS are developed for adults and adolescents (≥15 years), and addresses within each of the subscales, how the participants feel, think, invest or behave regarding each dimension. All separate statements were rated on a five point Likert scale (1 = *definitely disagree*, 5 = *definitely agree*), where higher values represented a more positive body image evaluation (Cash, 2000; Keeton et al., 1990). With respect to one of the statements assessing weight-related attitude (*"I have tried to lose weight by fasting or going on crash diets"*), the response options were slightly different: *"never", "rarely", "sometimes", "often"* and *"very often"*. In addition, for self-classified weight (*"I think I am …"*), the response options were grouped according to World Health Organization (WHO) BMI classification: *"underweight (* $<$ *18.5* kg/m^2*)", "normal weight (18.5 to 24.9* kg/m^2*)", "overweight (25 to 29.9* kg/m^2*)"* and *"obese (* $\geq$ 30 kg/m^2*)"*.

The supplementary BASS subscale measures participants satisfaction with specific body areas (lower torso, mid torso, upper torso, muscle tone, weight, overall appearance), also using a five point Likert scale (1 = *very dissatisfied*, 5 = *very satisfied*) (Cash, 2000; Giovannelli et al., 2008). For all statements (MBSRQ-AS and BASS), the participants could tick *"I do not want to answer"*, which was treated as missing data in the analysis.

All subscales of the MBSRQ-AS, have been found to have good validity and reliability among both genders and different cultural groups (Cash, 2000; Giovannelli et al., 2008; Jarry et al., 2019; Laus et al., 2019; Roncero et al., 2015; Vossbeck-Elsebusch et al., 2014). In our participants, Cronbach's α for the subscales used ranged from 0.85 to 0.89 (appearance satisfaction), 0.79 to 0.86 (BASS), 0.50 to 0.79 (appearance investment) and 0.60 to 0.72 (weight related attitude). Tests on internal consistency of the modified version of MBSRQ-AS as a whole, gave the following Cronbach's α 0.78, 0.83, 0.81 and 0.78 at start-up, three, six and 12 months of fitness club membership, respectively.

To achieve high cross-language validation when translating the English version of MBSRQ-AS into Norwegian language, we used a forward-backward translation technique, involving three members of the research group. A bilingual Australian Associate Professor with English as mother tongue finally assured the quality by comparing the "new" English version" with the original version. Based on this, some adjustments were made. A pilot test of the whole electronic questionnaire, where four volunteers were asked to provide feedback, led to minor changes in format, layout and wording. A full questionnaire list in Norwegian may be provided upon request.

2.3. Data processing

The MBSRQ-AS manual provides gender specific adult norms for all subscales (Cash, 2000). In the present study, the results were analysed separately for each subscale and as a body image total score. Mean scores for the subscales were calculated by adding scores from each statement, divided by the number of statements.

For some subscales items, the statements had a negatively worded query, where lower score (Likert scale agreement) was considered positive for body image attitudes. In the final dataset, negatively framed statements were therefore reversed so that the sum score reflected a more positive body image.

2.4. A priory power calculations

Sample size considerations were based on a previous study assessing body image among Norwegian adults (Loland, 1998), as well as what the research group hypothesized to be relevant changes in body image attitudes in novice exercisers in a fitness club setting. When an individual joins a gym, it may be that small changes occur in body image evaluation throughout the first year of membership. Hence, all equations were based on detecting 10% changes in all MBSRQ subscales and body image total score using univariate and bivariate analyses. We used the following equation ($N = \frac{\sigma^2(z_{1-\beta} + z_{1-\alpha/2})^2}{(\mu_0 - \mu_1)^2}$), where μ_0 = population mean and σ = variance of population in the study of Loland (1998), and μ_1 = anticipated mean for our participants. With a power of 80% at the 0.05 level, we would be able to detect a 10% change in, for example, body image total score and "appearance satisfaction" with 87 and 182 participants, respectively. To allow adjustment for other factors and losses to follow-up, an additional 30%–40% were needed (Suresh & Chandrashekara, 2012). Hence, 250 participants were considered as an appropriate sample size and we aimed to recruit all new fitness club members who fulfilled the eligibility criteria."

2.5. Statistical analysis

All statistics were conducted with SPSS Software V. 24 for Windows or STATA SE version 16.0 (StataCorpStataCorp LP). Not all participants answered every question, as such individual questions may have varying response rate.

Descriptive data were screened for normality and outliers, including a comparison of the overall curve of the bars of the histograms, and the usage of parametric statistics (Kolmogorow-Smirnov Test for Normality).

Changes in body image (body image total score and subscales) across four time-points: start-up of membership, three months, six months and 12 months, were calculated using a linear mixed model adjusted for baseline, gender and BMI. The model included a random intercept, thereby ascribing all differences at baseline to the individual level. The results from the mixed model were expressed as estimated mean difference in change with 95% confidence interval (CI) for comparison, representing mean differences in change from onset to the respective follow-ups (Table 4). However, as few reported regular exercise at all follow-ups (n = 31 out of 250), we also decided to do additional subgroup analyses, using a two-sided independent sample *t*-test to compare body image attitudes between those who reported regular exercise (≥2 exercise session/week) at three measurements points (three, six and 12 months of gym membership), with those who did not (≤1 exercise session/week, or no exercise).

To address if body image dissatisfaction was higher in women than in men, and among persons with a BMI higher than 25 compared with normal-weight participants, we used independent sample t-tests for means. As these analyses revealed differences between BMI groups (≥25 and < 25) and age, as well as differences between men and women and BMI in some of the MBSRQ subscales and body image total score, we

decided to use a standard multiple regression to explore the impact of age, gender and BMI on body image total score.

Results are presented as numbers with percentages or means with standard deviation (SD), as well as group differences with 95% Confidence Intervals (CIs) and p-values.

3. Results

The majority of the participants (78.4%) were of Norwegian descent, with a mean age of 36.4 (±11.3) years. Mean BMI (kg/m^2) was 25.6 (±4.4), 48.4% had a BMI ≥25, and 14.4% had a BMI ≥30. Only one participants had a BMI<18 (underweight). General background characteristics of all participants at start-up of fitness club membership, with grouping into BMI≥25 and BMI<25, are shown in Table 1. Mean BMI values were 29.0 (±3.9) and 22.5 (±1.7) in the two groups, respectively. Otherwise, we observed two differences: participants with a high BMI were older (5.4 years, 95% CI 2.7 to 8.1, p < 0.01) and a higher proportion were men (20.0%, 95% CI 7.6 to 31.6, p < 0.01).

3.1. Body image across the first year of gym membership

Table 2 shows the adjusted mean with 95% confidence interval of MBSRQ subscales across the four timepoints. We found significant differences in body image total score reported at six months when compared with onset (mean difference 0.04, 95% CI 0.005–0.078, p = 0.024). When examining the subscale appearance satisfaction, we found significant differences at three (mean difference 0.08, 95% CI 0.015–0.164, p = 0.018), six (mean difference 0.11, 95% CI 0.039–0.197, p = 0.003) and twelve (mean difference 0.10, 95% CI 0.021–0.179, p = 0.013) months when compared with onset. Also for the subscale BASS, there were significant differences at three (mean difference 0.17, 95% CI 0.009–0.255, p < 0.001), six (mean difference 0.21, 95% CI 0.127–0.301, p < 0.001) and twelve (mean difference 0.26, 95% CI 0.143–0.388, p < 0.001), whereas appearance investment was lower at three months (mean difference −0.06, 95% CI -0.124 – 0.002, p = 0.041) compared with start-up of fitness club membership.

There was a large drop in participants reporting regular exercise at the fitness club (≥2 exercise sessions) from three (51.8%) to six (37.6%) and 12 (37.4%) months (p = 0.003).

A comparison of body image attitudes between those who reported this level of regular exercise (≥2 exercise sessions) with those who did not (≤1 exercise session/week, or no exercise) are shown in Table 3. At three and 12 months, regular exercise was associated with a more positive score on three out of five MBSRQ subscales, as well as higher body

Table 1
General characteristics at onset of fitness club membership, given for all participants and divided into two BMI (kg/m2) groups (BMI≥25 and BMI<25).

Variable	All (**n = 250**)	BMI≥25 (**n = 121**)	BMI<25 (**n = 129**)	p-value
Mean (SD[a])				
BMI[b]	25.6 (4.4)	29.0 (3.9)	22.5 (1.7)	<0.001
Age in years	36.4 (11.3)	39.2 (11.2)	33.8 (10.7)	<0.001
n (%)				
Gender				0.002
- Men	125 (50.0)	73 (60.3)	52 (40.3)	
- Women	125 (50.0)	48 (39.7)	77 (59.7)	
Daily smoker[c]	19 (7.6)	7 (5.8)	12 (9.3)	0.294
Cohabitation/married[c]	153 (61.2)	78 (64.5)	75 (58.1)	0.305
Children[c]	80 (32.0)	43 (35.5)	37 (28.7)	0.246
University/college education ≥4 years	102 (40.8)	44 (36.4)	58 (45.0)	0.167
Occupation				
- 100%	159 (63.6)	79 (65.3)	80 (62.0)	0.591
- Sick leave	30 (12.0)	11 (9.1)	19 (14.7)	0.170
High household income (>87,500 USD)	92 (36.8)	48 (39.7)	44 (34.1)	0.362

[a] SD, Standard Deviation.
[b] BMI; Body Mass Index.
[c] Answers to yes–no questions.

Table 2
MBSRQ subscales and participants body image evaluation across four timepoints: At onset (n = 250), three (n = 224), six (n = 213) and 12 (n = 187) months of fitness club membership, adjusted for gender and BMI.

Outcomes [mean (95% CI)[a]]	Onset (men, n = 125 women, n = 125)	Three months (men, n = 108 women, n = 116)	Six months (men, n = 106 women, n = 107)	12 months (men, n = 96 women, n = 91)
Body image total score	2.87 (2.83–2.91)	2.89 (2.84–2.94)	2.91 (2.87–2.96)[b]	2.88 (2.83–2.93)
- Appearance satisfaction	2.93 (2.83–3.03)	3.02 (2.91–3.13)[b]	3.05 (2.94–3.15)[b]	3.03 (2.93–3.13)[b]
- Appearance investment	2.69 (2.63–2.74)	2.62 (2.57–2.67)[b]	2.67 (2.61–2.72)	2.64 (2.59–2.70)
- Weight-related attitude	3.48 (3.37–3.60)	3.48 (3.37–3.60)	3.43 (3.31–3.55)	3.42 (3.29–3.55)
- Self-classified weight	2.53 (2.46–2.59)	2.43 (2.37–2.49)	2.46 (2.39–2.53)	2.41 (2.36–2.47)
- Body Areas Satisfaction Scale (BASS)	2.74 (2.66–2.83)	2.92 (2.82–3.02)[b]	2.96 (2.86–3.06)[b]	3.01 (2.89–3.13)[b]

[a] 95% Confidence interval (CI).
[b] Indicates significant differences when compared with data at onset.

Table 3
Comparison of Adherence to Regular Exercise (≥2 sessions/week) and Body Image Evaluation at Three, Six and 12 Months of Fitness Club Membership.

Outcomes	Regular exercise		
Three months (Mean (SD))	Yes (n = 116)	No (n = 108)	p-value
Body image total score (three months)	2.94 (0.4)	2.83 (0.4)	0.027
- Appearance satisfaction	3.16 (0.9)	2.87 (0.9)	0.020
- Appearance investment	2.58 (0.4)	2.67 (0.4)	0.070
- Weight-related attitude	3.58 (0.9)	3.37 (1.0)	0.101
- Self-classified weight	2.36 (0.6)	2.52 (0.7)	0.049
- Body Areas Satisfaction Scale (BASS)	3.06 (0.8)	2.75 (0.9)	0.008
Six months (Mean (SD))	Yes (n = 80)	No (n = 133)	p-value
Body image total score (six months)	2.91 (0.4)	2.93 (0.4)	0.812
- Appearance satisfaction	3.14 (0.9)	3.03 (0.8)	0.357
- Appearance investment	2.61 (0.4)	2.70 (0.4)	0.100
- Weight-related attitude	3.39 (1.0)	3.49 (1.0)	0.507
- Self-classified weight	2.44 (0.6)	2.48 (0.7)	0.590
- Body Areas Satisfaction Scale (BASS)	2.97 (0.9)	2.95 (0.8)	0.879
12 months (Mean (SD))	Yes (n = 70)	No (n = 117)	p-value
Body image total score (12 months)	2.97 (0.4)	2.85 (0.4)	0.028
- Appearance satisfaction	3.26 (0.8)	2.92 (0.8)	0.004
- Appearance investment	2.54 (0.4)	2.71 (0.4)	0.005
- Weight-related attitude	3.60 (1.0)	3.27 (1.1)	0.042
- Self-classified weight	2.39 (0.6)	2.46 (0.6)	0.401
- Body Areas Satisfaction Scale (BASS)	3.15 (0.7)	2.94 (0.9)	0.089
Exercise at all follow-ups (Mean (SD))	Yes (n = 31)	No (n = 153)	p-value
Body image total score (12 months)	3.02 (0.3)	2.86 (0.4)	0.018
- Appearance satisfaction	3.38 (0.7)	2.98 (0.8)	0.009
- Appearance investment	2.51 (0.4)	2.67 (0.4)	0.061
- Weight-related attitude	3.70 (1.1)	3.32 (1.1)	0.085
- Self-classified weight	2.42 (0.6)	2.44 (0.6)	0.832
- Body Areas Satisfaction Scale (BASS)	3.24 (0.9)	2.96 (0.9)	0.103

Table 4
MBSRQ subscales and participants body image evaluation at start-up of fitness club membership, divided into gender and two BMI (kg/m2) groups (BMI≥25 and BMI<25).

Outcomes	All (n = 232)	Men (n = 118)	Women (n = 114)	p-value	BMI≥25 (= 113)	BMI<25 (n = 119)	p-value
Mean (SD*)							
Body image total score	2.88 (0.4)	2.99 (0.4)	2.76 (0.3)	<0.001	2.83 (0.3)	2.91 (0.4)	0.065
- Appearance satisfaction	2.93 (0.9)	3.00 (0.9)	2.86 (0.9)	0.227	2.67 (0.9)	3.19 (0.8)	<0.001
- Appearance investment	2.68 (0.4)	2.73 (0.5)	2.64 (0.4)	0.123	2.73 (0.5)	2.65 (0.4)	0.179
- Weight-related attitude	3.49 (1.0)	3.85 (0.9)	3.13 (1.1)	<0.001	3.38 (0.9)	3.59 (1.1)	0.102
- Self-classified weight	2.53 (0.7)	2.50 (0.6)	2.55 (0.7)	0.566	2.89 (0.6)	2.19 (0.5)	<0.001
- Body Areas Satisfaction Scale (BASS)	2.75 (0.8)	2.88 (0.7)	2.62 (0.8)	0.007	2.51 (0.8)	2.98 (0.7)	<0.001
Missing*	18 (7.2)						

*SD, Standard Deviation.
**Participants that did not answer to the all the statements, comprising four sets of subscales and 21 queries (appearance satisfaction, appearance investment, weight related attitude, self-classified weight), plus the Body Areas Satisfaction Scale (BASS), were counted as missing data in the calculation of body image total score.

image total score. The latter remained the same when analyzing those who (n = 31,16.8%) reported regular exercise at all follow-ups.

3.2. Body image between genders and BMI groups (BMI < 25 and BMI≥25)

At start-up of fitness club membership, women reported lower values on overall body image, weight related attitude and BASS than men (Table 4). Persons with overweight or obesity (BMI≥25) had lower appearance satisfaction, self-classified weight and BASS compared with normal weight participants (BMI<25) (Table 4). In the linear regression models, being male ($p < 0.001$) and having a BMI<25 ($p = 0.003$), were the strongest factors associated with reporting a higher score on total body image.

To evaluate if the participants were representative of our initial study population, a comparison analysis was performed with the 66 participants lost to follow-up across the year. No differences were found concerning total body image evaluation at start-up (all: 2.88 ± 0.4 and lost to follow-up: 2.86 ± 0.4), nor demographic and socioeconomic variables (data not shown).

4. Discussion

To our knowledge, we are the first to investigate longitudinal changes in body image attitudes among novice exercisers in a fitness club setting. The findings in this study were in line with our hypothesizes, that both genders would report a more positive body image across the follow-up period, especially in those attaining regular exercise. This indicates that among new members, exercise has the potential to influence body image in a positive way, in that body image attitudes increases with exercise participation. Furthermore, we also confirmed our secondary hypothesizes, that body image dissatisfaction would be higher in women than in men, and among persons with overweight/obesity compared with normal-weight participants.

The association between body image attitudes and exercise is not well understood, and findings have shown that a negative body image may serve as both a motivator and barrier to exercise participation (Brudzynski & Ebben, 2010). Studies with an experimental design have, however, concluded that sustained exercise may have a positive effect on body image (Campbell & Hausenblas, 2009; Carraça et al., 2012; Reel et al., 2007). In the present longitudinal study, for the whole group, we found a positive change in the subscales BASS and appearance satisfaction from membership start-up to three, six and 12-months. This suggests that regardless of gender and BMI, participants generally felt more satisfied with specific body areas and improved their feelings of physical attractiveness throughout the follow-up period. Also, body image total score was rated higher at six months compared with start-up. A potential key moderator is, of course, the individual's motivation for regular exercise. According to a systematic review by Panão and Carraça (2020), the reasons underlying one's engagement in exercise might influence the association between exercise and body image evaluation. For example, exercising to improve appearance or control weight has been found to be related to lower body image, whereas exercising for intrinsic motives (joy and interest for the activity) have been associated with several positive body image markers (Panão & Carraça, 2020).

In line with other results among fitness club members (Annesi, 2003; Middelkamp et al., 2017), we confirmed low exercise adherence at all measurement points, and highlight that more than 60% did not manage to visit the fitness club regularly within the first 6–12 months of fitness club membership. Nevertheless, among those using the gym regularly, our additional subgroup analyses showed that those exercising (pre-defined cut-off value ≥ 2 sessions/week), had higher scores on overall body image, as well as on three out of five MBSRQ subscales (three months: appearance satisfaction, self-classified weight and BASS and 12 months: appearance satisfaction, appearance investment and weight-related attitude) compared with those who did not.

In a recent systematic review (Jarry et al., 2019), higher appearance investment was found to be associated with poorer psychological outcomes, such as body image disturbance, depression and eating pathology. Our results show that appearance investment may be amenable to change, given that those exercising ≥2 sessions/week had lower scores on the subscale appearance investment than those exercising ≤1 exercise session/week. The difference between was statistically significant at 12 months, and borderline significant at three months. Hence, this lends further credibility to the hypothesis that exercise has the potential to influence body image in a positive way.

Ginis et al. (2012) have summarized mechanisms that might explain the effects of exercise on body image evaluation, reporting that while objective changes in body composition played a relatively small role, self-perceived changes in body composition, and specifically changes in self-efficacy were likely to have a profound effect (Ginis et al., 2012). Due to few participants exercising regularly throughout all measurements, we had limited statistical power to estimate possible underlaying mechanisms with respect to body image attitudes and exercise.

Up to recent years, body image attitudes in men is an area that has received little attention and are less spoken about (Bassett-Gunter et al., 2017; Campbell & Hausenblas, 2009; Sklar, 2017). The inclusion of both genders in the present study (with a low drop-out rate and non-response bias), add to the literature, and allows for a better understanding of body image evaluation in men starting a gym membership (Bassett-Gunter et al., 2017; Campbell & Hausenblas, 2009). Among our participants, nearly 50% had a BMI ≥25. There is evidence that persons with obesity report lower body image (Schwartz & Brownell, 2004; Weinberger et al., 2016). Within this study, our results showed that participants with a high BMI were less satisfied with their body image at membership start-up compared with healthy weight participants.

4.1. Strength and limitations

This is the first longitudinal study exploring body image attitudes in

a group of new fitness club members, all considered untrained by inclusion. Hence, our prospective observational design allowed us to study causality of exercise and body image evaluation. We had a high response-rate, and nearly 74% answered the questionnaire at all time-points. It is well known that the higher the response rate, the lower the risk of non-response bias (Sedgwick, 2014). In the present study, we also included a non-response analysis, and found no differences in demographic and socioeconomic variables, nor total body image evaluation at start-up between responders and non-responders, which further strengthen the external validity and confidence in the study results (Sedgwick, 2014). Further, subgroup analyses among those who reported regular use of the fitness club with those who did not, allowed us to investigate the influence of exercise adherence on body image attitudes.

Another strength of the present study is the multidimensional measure of body image, including the dimension appearance investment. The MBSRQ-AS used in the present study is a well-validated instrument, with good validity and reliability among both genders and different cultural groups (Cash, 2000; Giovannelli et al., 2008; Jarry et al., 2019; Laus et al., 2019; Roncero et al., 2015; Vossbeck-Elsebusch et al., 2014). Also, the use of an electronic questionnaire gathered responses quickly and eliminated the costs associated with printing and distributing paper-based questionnaires. Finally, body image evaluation in men are an area that has received little attention, and a another aspect of the present study was that our participants included an age diverse group of both genders. Still, there is need for some methodological considerations. Since, body image attitudes depends on the individuals own perception of their physical appearance, self-report may be an appropriate measurement method. Different key terms in the questionnaire, such as body image, appearance, and exercise can have different meaning for the participants, including how they interpret the wording of questions. As such, we recommend future studies in this area to add information about gym statistics (such as membership card swipes). Also, as body image covers multidimensional aspects, including how individuals feel, think, perceive, evaluate, invest and act regarding our physical attributes or certain body parts (Hosseini & Padhy, 2020), our quantitative design may not be robust enough to capture body image attitudes. There is therefore a need for future qualitative studies and high quality randomized controlled trials, investigating this in more depth, allowing for a further understanding on how exercise may alter body image attitudes.

Based on a former study among Norwegian adults (Loland, 1998) and that the research group wanted to detect small changes (such as going from 3.00 to 3.50 on the Body image total score), we assumed that a 10% change in body image evaluation was a relevant change for our participants. However, measures of MBSRQ-AS across four time points revealed smaller changes in the subscales. We observed a positive change in BASS (6.6%–9.9%) and appearance satisfaction (3.1%–4.1%) from start-up to three, six and 12 months. In the three other subscales (appearance investment, weight-related attitude, self-classified weight), decreases from 0.7% to 4.7% were revealed. Also, only minor differences were found for body image total score (0.4%–1.4%). Therefore, our study had insufficient sample size to detect smaller changes in body image attitudes. In addition, we pre-defined regular exercise as a minimum of two sessions/week, which do not reflect if the participants met the current activity recommendations for adults regarding intensity, duration and mode of activity (endurance and resistance exercise). Yet, very few (n = 31, 16.8%) reported exercise twice weekly at all follow-ups, and this limit our statistical power regarding the sub-group analyses. It should be noted that data were obtained from one fitness club chain, with middle to high monthly costs. Enrollment of other clubs (such as low-cost gyms and CrossFit centers) might have given other results.

5. Conclusions

We provide an update to the current literature, focusing on body image attitudes and exercise in an age diverse group of untrained, new fitness club members, with an equitable ratio of men and women. Throughout the initial year, we found improved body area evaluation and a more positive rating of appearance satisfaction. Adhering to regular exercise was associated with a higher body image total score, appearance and body area satisfaction. As exercise and body image evaluation may be influenced by other variables such as psychological and social aspects, we need additional research examining these moderators in a fitness club setting with a larger sample size.

Author contributions

LAHH conceived the idea for the research project and wrote the protocol together with CG. CG and CJ was responsible for participant follow-up and data collection. LAHH supervised the project and outlined the manuscript. CG, CSB and CJ contributed to interpretation of data, and revised it critically for important intellectual content, including English editing. RBS provided statistical expertise in STATA software program and assisted with mixed linear modelling analyses. All authors read and corrected draft versions of the manuscript and approved the final version.

Funding

This work was supported by the Norwegian School of Sport Sciences, Department of Sport Medicine, Norway, and did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Abbott, B. D., & Barber, B. L. (2010). Embodied image: Gender differences in functional and aesthetic body image among Australian adolescents. *Body Image, 7*(1), 22–31. https://doi.org/10.1016/j.bodyim.2009.10.004

Algars, M., Santtila, P., Varjonen, M., Witting, K., Johansson, A., Jern, P., et al. (2009). The adult body: How age, gender, and body mass index are related to body image. *Journal of Aging and Health, 21*(8), 1112–1132. https://doi.org/10.1177/0898264309348023

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.

Avalos, L., Tylka, T. L., & Wood-Barcalow, N. (2005). The body appreciation scale: Development and psychometric evaluation. *Body Image, 2*(3), 285–297. https://doi.org/10.1016/j.bodyim.2005.06.002

Bassett-Gunter, R., McEwan, D., & Kamarhie, A. (2017). Physical activity and body image among men and boys: A meta-analysis. *Body Image, 22*, 114–128. https://doi.org/10.1016/j.bodyim.2017.06.007

Brudzynski, L. R., & Ebben, W. (2010). Body image as a motivator and barrier to exercise participation. *International Journal of Exercise Science, 3*, 14–24.

Bucchianeri, M., Arikian, A. J., Hannan, P. J., Eisenberg, M. E., & Neumark-Sztainer, D. (2013). Body dissatisfaction from adolescence to young adulthood: Findings from a 10-year longitudinal study. *Body Image, 10*(1), 1–7. https://doi.org/10.1016/j.bodyim.2012.09.001

Bucchianeri, M. M., & Neumark-Sztainer, D. (2014). Body dissatisfaction: An overlooked public health concern. *Journal of Public Mental Health, 13*(2), 64–69.

Campbell, A., & Hausenblas, H. A. (2009). Effects of exercise interventions on body image: A meta-analysis. *Journal of Health Psychology, 14*(6), 780–793. https://doi.org/10.1177/1359105309338977

Carraça, E. V., Markland, D., Silva, M. N., Coutinho, S. R., Vieira, P. N., Minderico, C. S., et al. (2012). Physical activity predicts changes in body image during obesity treatment in women. *Medicine & Science in Sports & Exercise, 44*(8), 1604–1612. https://doi.org/10.1249/MSS.0b013e31824d922a

Cash, T. F. (2000). The multidimensional body-self Relations questionnaire user's manual. www.body-images.com.

Cash, T. F. (2004). Body image: Past, present, and future. *Body Image, 1*(1), 1–5. https://doi.org/10.1016/S1740-1445(03)00011-1

Garber, C., Blissmer, B., Deschenes, M., Franklin, B., Lamonte, M., Lee, I., et al. (2011). American college of sports medicine position stand. 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*(7), 1334–1359.

Ginis, K. A. M., McEwan, D., Josse, A. R., & Phillips, S. M. (2012). Body image change in obese and overweight women enrolled in a weight-loss intervention: The importance of perceived versus actual physical changes. *Body Image, 9*(3), 311–317. https://doi.org/10.1016/j.bodyim.2012.04.002

Ginsberg, R. L., Tinker, L., Liu, J., Gray, J., Sangi-Haghpeykar, H., Manson, J. E., et al. (2016). Prevalence and correlates of body image dissatisfaction in postmenopausal women. *Women & Health, 56*(1), 23–47. https://doi.org/10.1080/03630242.2015.1074636

Giovannelli, T. S., Cash, T. F., Henson, J. M., & Engle, E. K. (2008). The measurement of body-image dissatisfaction-satisfaction: Is rating importance important? *Body Image, 5*(2), 216–223. https://doi.org/10.1016/j.bodyim.2008.01.001

Gjestvang, C., Abrahamsen, F., Stensrud, T., & Haakstad, L. A. H. (2020). Motives and barriers to initiation and sustained exercise adherence in a fitness club setting - a one-year follow-up study. *Scandinavian Journal of Medicine & Science in Sports, 30*(9), 1796–1805. https://doi.org/10.1111/sms.13736

Gjestvang, C., Stensrud, T., & Haakstad, L. A. H. (2019). Are changes in physical fitness, body composition and weight associated with exercise attendance and dropout among fitness club members? Longitudinal prospective study. *BMJ Open, 9*(4), 1–10. https://doi.org/10.1136/bmjopen-2018-027987

Hilbert, A., de Zwaan, M., & Braehler, E. (2012). How frequent are eating disturbances in the population? Norms of the eating disorder examination-questionnaire. *PloS One, 7*(1). https://doi.org/10.1371/journal.pone.0029125. ARTN e29125.

Holland, G., & Tiggemann, M. (2016). A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image, 17*, 100–110. https://doi.org/10.1016/j.bodyim.2016.02.008

Hosseini, S. A., & Padhy, R. K. (2020). Body image distortion. In *StatPearls*. Treasure Island (FL).

Jarry, J. L., Dignard, N. A. L., & O'Driscoll, L. M. (2019). Appearance investment: The construct that changed the field of body image. *Body Image, 31*, 221–244. https://doi.org/10.1016/j.bodyim.2019.09.001

Keeton, W. P., Cash, T. F., & Brown, T. A. (1990). Body-image or body images - comparative, multidimensional assessment among college-students. *Journal of Personality Assessment, 54*(1–2), 213–230. https://doi.org/10.1207/s15327752jpa5401&2_21

Laus, M. F., Vales, L., Oliveira, N. G., Braga Costa, T. M., & Almeida, S. S. (2019). Brazilian version of the multidimensional body-self Relations questionnaire-appearance scales (MBSRQ-AS): Translation and psychometric properties in adults. *Eating and Weight Disorders*, 1253–1266. https://doi.org/10.1007/s40519-019-00758-w

Loland, N. W. (1998). Body image and physical activity. A survey among Norwegian men and women. *International Journal of Sport Psychology, 29*(4), 339–365.

Martin Ginis, K. A., Bassett-Gunter, R. L., & Conlin, C. (2012). Body image and exercise. In *The oxford handbook of exercise psychology*. Oxford Handbooks Online.

Middelkamp, J., van Rooijen, M., Wolfhagen, P., & Steenbergen, B. (2017). 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. *Journal of Sports Science and Medicine, 16*(2), 163–171.

Panão, I., & Carraça, E. V. (2020). Effects of exercise motivations on body image and eating habits/behaviours: A systematic review. *Nutrition and Dietetics, 77*(1), 41–59. https://doi.org/10.1111/1747-0080.12575

Prichard, I., & Tiggemann, M. (2005). Objectification in fitness centers: Self-objectification, body dissatisfaction, and disordered eating in aerobic instructors and aerobic participants. *Sex Roles, 53*(1–2), 19–28. https://doi.org/10.1007/s11199-005-4270-0

Prichard, I., & Tiggemann, M. (2008). Relations among exercise type, self-objectification, and body image in the fitness centre environment: The role of reasons for exercise. *Psychology of Sport and Exercise, 9*(6), 855–866. https://doi.org/10.1016/j.psychsport.2007.10.005

Pruzinsky, T., & Cash, T. F. (1990). Integrative themes in body-image development, deviance, and change. In T. F. Cash, & T. Pruzinsky (Eds.), *Body images: Development, deviance, and change* (pp. 337–349). Guilford Press.

Reel, J. J., Greenleaf, C., Baker, W. K., Aragon, S., Bishop, D., Cachaper, C., et al. (2007). Relations of body concerns and exercise behavior: A meta-analysis. *Psychological Reports, 101*(3), 927–942. https://doi.org/10.2466/Pro.101.3.927-942

Roncero, M., Perpina, C., Marco, J. H., & Sanchez-Reales, S. (2015). Confirmatory factor analysis and psychometric properties of the Spanish version of the multidimensional body-self Relations questionnaire-appearance scales. *Body Image, 14*, 47–53. https://doi.org/10.1016/j.bodyim.2015.03.005

Runfola, C. D., Von Holle, A., Trace, S. E., Brownley, K. A., Hofmeier, S. M., Gagne, D. A., et al. (2013). Body dissatisfaction in women across the lifespan: Results of the UNC-self and gender and body image (GABI) studies. *European Eating Disorders Review, 21*(1), 52–59. https://doi.org/10.1002/erv.2201

Sabiston, C. M., Pilab, E., Vani, M., & Thogersen-Ntoumanie, C. (2019). Body image, physical activity, and sport: A scoping review. *Psychology of Sport and Exercise, 42*, 48–57.

Sallis, J. F., & Saelens, B. E. (2000). Assessment of physical activity by self-report: Status, limitations, and future directions. *Research Quarterly for Exercise & Sport, 71*(2), S1–S14.

Schilder, P. (2007). *The image and appearance of the human body*. Oxford, England: Routledge.

Schwartz, M. B., & Brownell, K. D. (2004). Obesity and body image. *Body Image, 1*(1), 43–56. https://doi.org/10.1016/S1740-1445(03)00007-X

Sedgwick, P. (2014). Bias in observational study designs: Prospective cohort studies. *BMJ, 349*. https://doi.org/10.1136/bmj.g7731

Shriver, L. H., Harrist, A. W., Page, M., Hubbs-Tait, L., Moulton, M., & Topham, G. (2013). Differences in body esteem by weight status, gender, and physical activity among young elementary school-aged children. *Body Image, 10*(1), 78–84. https://doi.org/10.1016/j.bodyim.2012.10.005

Sklar, E. M. (2017). Body image, weight, and self-concept in men. *American Journal of Lifestyle Medicine, 11*(3), 252–258. https://doi.org/10.1177/1559827615594351

Slater, A., & Tiggemann, M. (2011). Gender differences in adolescent sport participation, teasing, self-objectification and body image concerns. *Journal of Adolescence, 34*(3), 455–463. https://doi.org/10.1016/j.adolescence.2010.06.007

Slevec, J. H., & Tiggemann, M. (2011). Predictors of body dissatisfaction and disordered eating in middle-aged women. *Clinical Psychology Review, 31*(4), 515–524. https://doi.org/10.1016/j.cpr.2010.12.002

Suresh, K., & Chandrashekara, S. (2012). Sample size estimation and power analysis for clinical research studies. *Journal of Human Reproductive Sciences, 5*(1), 7–13. https://doi.org/10.4103/0974-1208.97779

Swami, V., von Nordheim, L., & Barron, D. (2016). Self-esteem mediates the relationship between connectedness to nature and body appreciation in women, but not men. *Body Image, 16*, 41–44. https://doi.org/10.1016/j.bodyim.2015.11.001

Tylka, T. L., & Wood-Barcalow, N. L. (2015). What is and what is not positive body image? Conceptual foundations and construct definition. *Body Image, 14*, 118–129. https://doi.org/10.1016/j.bodyim.2015.04.001

Vandervoort, J., Aime, A., & Green-Demers, I. (2015). The monster in the mirror: Reasons for wanting to change appearance. *Eating and Weight Disorders, 20*(1), 99–107. https://doi.org/10.1007/s40519-014-0160-1

Vossbeck-Elsebusch, A. N., Waldorf, M., Legenbauer, T., Bauer, A., Cordes, M., & Vocks, S. (2014). German version of the multidimensional body-self Relations questionnaire - appearance scales (MBSRQ-AS): Confirmatory factor analysis and validation. *Body Image, 11*(3), 191–200. https://doi.org/10.1016/j.bodyim.2014.02.002

Weinberger, N. A., Kersting, A., Riedel-Heller, S. G., & Luck-Sikorski, C. (2016). Body dissatisfaction in individuals with obesity compared to normal-weight individuals: A systematic review and meta-analysis. *Obesity Facts, 9*(6), 424–441. https://doi.org/10.1159/000454837

Paper III

©Journal of Sports Science and Medicine (2021) **20,** 35-44
http://www.jssm.org

Research article

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

Christina Gjestvang [1]✉, Trine Stensrud [1], Gøran Paulsen [2] and Lene A. H. Haakstad [1]
[1] Norwegian School of Sports Sciences, Department of Sports Medicine, Oslo, Norway
[2] Norwegian School of Sports Sciences, Department of Physical Performance, Oslo, Norway

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).

Received: 04 June 2020 / Accepted: 06 December 2020 / Published (online): 01 March 2021

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.

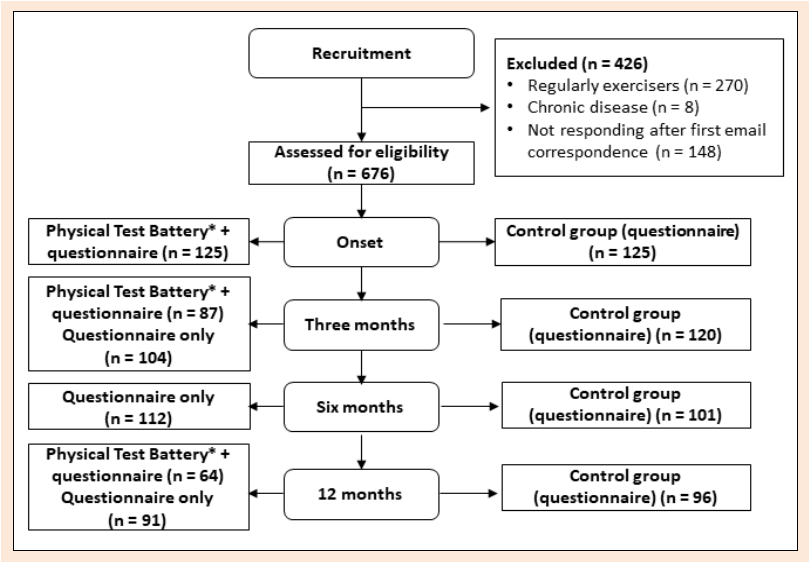

Figure 1. Flow-chart of the study and participants. *Assessment of maximal oxygen uptake, maximal muscle strength and body composition.

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: "Y*es*" or "N*o*".
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: "Y*es*" 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: "Y*es*" 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.

Acknowledgements

We thank Ingar Holme (Norwegian School of Sports Sciences) and Morten Fagerland (Oslo University Hospital Norway and Norwegian School of Sports Sciences), professors in biostatistics, for important guidance with power considerations. Thanks also to the research assistants Hege Heiestad, Fredrik Kristiansen and Lasse Bækken. The present study complies with the current laws of Norway, the country in which the study was performed. There are no conflicts of interest, including financial, consultant, institutional, and other relationships that might lead to bias or a conflict of interest. The results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

References

Andreasson, J. and Johansson, T. (2018) Glocalised fitness: the franchising of a physical movement, fitness professionalism and gender. *Leisure/Loisir* **42,** 301-321.

Armitage, C. J. (2005) Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychology Journal* **24,** 235-245.

Box, A. G., Feito, Y., Brown, C. and Petruzzello, S. J. (2019) Individual differences influence exercise behavior: how personality, motivation, and behavioral regulation vary among exercise mode preferences. *Heliyon* **5,** 1-22.

Brown, T. and Fry, M. D. (2011) Helping Members Commit to Exercise: Specific Strategies to Impact the Climate at Fitness Centers. *Journal of Sport Psychology in Action* **2,** 70-80.

Cale, L. and Harris, J. (2009) Fitness testing in physical education - a misdirected effort in promoting healthy lifestyles and physical activity? *Physical Education and Sport Pedagogy* **14,** 89-108.

Caspersen, C. J., Powell, K. E. and Christenson, G. M. (1985) Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Reports* **100,** 126-131.

Ekkekakis, P., Parfitt, G. and Petruzzello, S. (2011) The Pleasure and Displeasure People Feel When they Exercise at Different Intensities Decennial Update and Progress towards a Tripartite Rationale for Exercise Intensity Prescription. *Sports Medicine* **41,** 641-671.

Epton, T., Currie, S. and Armitage, C. J. (2017) Unique effects of setting goals on behavior change: Systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology* **85,** 1182-1198.

Evans, H., Ferrar, K., Smith, A., Parfitt, G. and Eston, R. (2015) A systematic review of methods to predict maximal oxygen uptake from submaximal, open circuit spirometry in healthy adults. *Journal of Science and Medicine in Sport* **18,** 183-188.

Freitas, A. and Lacerda, T. (2019) Fitness Centers: What Are the Most Important Attributes in This Sector? *International Journal for Quality Research* **13,** 177-192.

Garber, C., Blissmer, B., Deschenes, M., Franklin, B., Lamonte, M., Lee, I., Nieman, D., Swain, D. and Medicine., A. C. O. S. (2011) American College of Sports Medicine position stand. 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.

Gjestvang, C., Abrahamsen, F., Stensrud, T. and Haakstad, L. a. H. (2020) Motives and barriers to initiation and sustained exercise adherence in a fitness club setting - a one-year follow-up study. *Scandinavian Journal of Medicine & Science in Sports* **30,** 1796-1805.

Gjestvang, C., Stensrud, T. and Haakstad, L. (2017) How is rating of perceived capacity related to VO2max and what is VO2max at onset of training? *BMJ Open Sport & Exercise Medicine* **3,** 1-7.

Gjestvang, C., Stensrud, T. and Haakstad, L. (2019a) Are changes in physical fitness, body composition and weight associated with exercise attendance and dropout among fitness club members? Longitudinal prospective study. *BMJ Open Sport & Exercise Medicine* **9,** 1-9.

Gjestvang, C., Stensrud, T., Hansen, B., Kolle, E. and Haakstad, L. (2019b) Are fitness club members likely to meet the current physical activity recommendations? *Translational Sports Medicine* **3,** 75-83.

Gonçalves, C., Meireles, P. and Carvalho, M. (2016) Consumer Behaviour in Fitness Club: Study of the Weekly Frequency of Use, Expectations, Satisfaction and Retention. *The Open Sports Sciences Journal* **9,** 62-70.

Gosselink, R., Troosters, T. and Decramer, M. (2004) Exercise testing: why, which and how to interpret. *Breathe* **1,** 120-129.

Hata, O. and Umezawa, N. (1995) Use of Fitness Facilities, Equipment, and Programs: A Case Study of a Japanese Fitness Club. *Journal of Sport Management* **9,** 78-84.

Hawley-Hague, H., Skelton, D. A., and Todd, C. (2016) Review of how we should define (and measure) adherence in studies examining older adults' participation in exercise classes. *BMJ Open Sport & Exercise Medicine* **6,** 1-6.

Heiestad, H., Gjestvang, C. and Haakstad, L. A. H. (2020) Investigating self-perceived health and quality of life: a longitudinal prospective study among beginner recreational exercisers in a fitness club setting. *BMJ Open Sport & Exercise Medicine* **10,** 1-8.

Hoj, K., Skriver, M., Maindal, H., Christensen, B. and Sandbaek, A. (2018) The effect of cardiorespiratory fitness assessment in preventive health checks: a randomised controlled trial. *European Journal of Public Health* **28,** 173-179.

Hooker, S. A., Ross, K. M., Ranby, K. W., Masters, K. S., Peters, J. C. and Hill, J. O. (2016) Identifying groups at risk for 1-year membership termination from a fitness center at enrollment. *Preventive Medicine Reports* **4,** 563-568.

Ihrsa (2020) The International Health Racquet & Sportsclub Association. The IHRSA Global Report 2020. Available from URL: https://www.ihrsa.org/publications/the-2020-ihrsa-global-report/# 04.12.2020.

Ingledew, D. K., Markland, D. and Ferguson, E. (2009) Three Levels of Exercise Motivation. *Applied Psychology-Health and Well Being* **1,** 336-355.

Jeffery, R. W., Wing, R. R., Thorson, C. and Burton, L. R. (1998) Use of personal trainers and financial incentives to increase exercise in a behavioral weight-loss program. *Journal of Consulting and Clinical Psychology* **66,** 777-783.

Jekauc, D., Volkle, M., Wagner, M. O., Mess, F., Reiner, M. and Renner, B. (2015) Prediction of attendance at fitness center: a comparison between the theory of planned behavior, the social cognitive theory, and the physical activity maintenance theory. *Frontiers in Psychology* **6,** 1-10.

Kathrins, B. and Turbow, D. (2010) Motivation of fitness center participants toward resistance training. *The Journal of Strength & Conditioning Research* **24,** 2483-2490.

Lollgen, H. and Leyk, D. (2018) Exercise Testing in Sports Medicine. *Deutsches Arzteblatt International* **115,** 409-416.

Mcclaran, S. R. (2003) The effectiveness of personal training on changing attitudes towards physical activity. *Journal of Sports Science and Medicine* **2,** 10-14.

Mcmaster, D. T., Gill, N., Cronin, J. and Mcguigan, M. (2014) A brief review of strength and ballistic assessment methodologies in sport. *Sports Medicine* **44,** 603-623.

Middelkamp, J., Rooijen M. and B., S. (2016) Attendance Behavior of Ex-members in Fitness Clubs: A Retrospective Study Applying the Stages of Change. *Perceptual and Motor Skills* **122,** 350-359.

Mullen, S. and Whaley, D. (2010) Age, gender, and fitness club membership: Factors related to initial involvement and sustained participation. *International Journal of Sport and Exercise Psychology* **8,** 24-35.

Nelson, N. and Asplund, C. (2016) Exercise Testing: Who, When, and Why? *Physical Medicine & Rehabilitation Journal* **8,** 16-23.

Pedersen, C., Jensen, D. and Sørensen, J. (2011) in Danish. SATS medlemsundersøgelse med henblik på at belyse fysisk aktivitetsniveau og træning i fitnesscenter. *Syddansk Universitet*.

Ready, A. E., Naimark, B., Tate, R. and Boreskie, S. (2005) Fitness centre membership is related to healthy behaviours. *The Journal of Sports Medicine and Physical Fitness* **45,** 199-207.

Riseth, L., Nost, T. H., Nilsen, T. I. L. and Steinsbekk, A. (2019) Long-term members' use of fitness centers: a qualitative study. *BMC Sports Science Medicine and Rehabilitation* **11**, 1-9.

Rustaden, A. M., Haakstad, L.A. H., Paulsen, G. and Bo, K. (2017) Effects of BodyPump and resistance training with and without a personal trainer on muscle strength and body composition in overweight and obese women-A randomised controlled trial. *Obesity Research & Clinical Practice* **11,** 728-739.

Sallis, J. F. and Saelens, B. E. (2000) Assessment of physical activity by self-report: Status, limitations, and future directions. *Research quarterly for exercise and sport* **71,** 1-14.

Sas-Nowosielski, K. and Szopa, S. (2015) Self-regulation strategies used by men and women attending to fitness clubs. *Baltic Journal of Health and Physical Activity* **7,** 23-28.

Schroeder, E. C., Welk, G. J., Franke, W. D. and Lee, D. C. (2017) Associations of Health Club Membership with Physical Activity and Cardiovascular Health. *Plos One* **12,** 1-13.

Seelig, H. and Fuchs, R. (2011) Physical exercise participation: A continuous or categorical phenomenon? *Psychology of Sport and Exercise* **12,** 115-123.

Sperandei, S., Vieira, M. C. and Reis, A. C. (2016) Adherence to physical activity in an unsupervised setting: Explanatory variables for high attrition rates among fitness center members. *Journal of Science and Medicine in Sport* **19,** 916-920.

Standage, M. and Ryan, Ed. (2012) Self-Determination Theory and Exercise Motivation: Facilitating Self-Regulatory Processes to Support and Maintain Health and Well-Being. *Advances in motivation in sport and exercise. G. C. Roberts and D. C. Treasure.* Champaign, IL., Human Kinetics, Inc.

Statistics Norway. (2019a) *Official statistics about Norwegian society since 1876.* Available from URL: https://www.ssb.no/ [Accessed].

Statistics Norway. (2019b) *Tobacco, alcohol and other drugs.* Statistics Norway. Available from URL: https://www.ssb.no/royk [Accessed].

Steene-Johannessen, J., Anderssen, S. A., Van Der Ploeg, H. P., Hendriksen, I. J. M., Donnelly, A. E., Brage, S. and Ekelund, U. (2016) Are Self-report Measures Able to Define Individuals as Physically Active or Inactive? *Medicine and Science in Sports and Exercise* **48,** 235-244.

Suni, J. H., Oja, P., Miilunpalo, S. I., Pasanen, M. E., Vuori, I. M. and Bos, K. (1999) Health-related fitness test battery for middle-aged adults: associations with physical activity patterns. *International Journal of Sports Medicine* **20,** 183-191.

Tappe, K., Tarves, E., Oltarzewski, J. and Frum, D. (2013) Habit Formation Among Regular Exercisers at Fitness Centers: An Exploratory Study. *Journal of Physical Activity and Health* **10,** 607-613.

Teixeira, P., Carraca, E., Markland, D., Silva, M. and Ryan, R. (2012) Exercise, physical activity, and self-determination theory: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity* **9,** 2-30.

Thogersen-Ntoumani, C. and Ntoumanis, N. (2006) The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *Journal of Sports Science* **24,** 393-404.

Vlachopoulos, S. and Neikou, E. (2007) A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout. *The Journal of Sports Medicine and Physical Fitness* **47,** 475-482.

Waterman, M. R., Wiecha, J. M., Manne, J., Tringale, S. M., Costa, E. and Wiecha, J. L. (2014) Utilization of a free fitness center-based exercise referral program among women with chronic disease risk factors. *Journal of Community Health* **39,** 1179-1185.

Wrench, A. and Garrett, R. (2008) Pleasure and pain: Experiences of fitness testing. *European Physical Education Review* **14,** 325-346.

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.

AUTHOR BIOGRAPHY

Christina GJESTVANG
Employment
Norwegian School of Sports Sciences, Department of Sports Medicine, Oslo, Norway.
Degree
PhD Student.
Research interests
Physical activity, the fitness club industry, new recreational exercisers, fitness trends, personal trainer.
E-mail: christina.gjestvang@nih.no

Trine STENSRUD
Employment
Norwegian School of Sports Sciences, Department of Sports Medicine, Oslo, Norway.
Degree
Professor
Research interests
Respiratory and exercise physiology, pulmonary diseases and exercise, elite athletes and development of asthma.
E-mail: trine.stensrud@nih.no

Gøran PAULSEN
Employment
Norwegian School of Sports Sciences, Department of Physical Performance, Oslo, Norway.
Degree
Associate Professor
Research interests
Exercise physiology, muscle physiology, sport science, strength training.
E-mail: goran.paulsen@nih.no

Lene Anette Hagen HAAKSTAD
Employment
Norwegian School of Sports Sciences, Department of Sports Medicine, Oslo, Norway.
Degree
Associate Professor
Research interests
Women's health issues, pregnancy and exercise, urinary incontinence and exercise, the fitness club industry, new recreational exercisers.
E-mail: l.a.h.haakstad@nih.no

✉ **Christina Gjestvang**
Norwegian School of Sport Sciences, Department of Sports Medicine P.O Box 4014, Ullevål Stadion, 0806 Oslo, Norway

Paper IV

Received: 24 November 2019 | Revised: 18 May 2020 | Accepted: 25 May 2020

DOI: 10.1111/sms.13736

ORIGINAL ARTICLE

WILEY

Motives and barriers to initiation and sustained exercise adherence in a fitness club setting—A one-year follow-up study

Christina Gjestvang[1] | **Frank Abrahamsen**[2] | **Trine Stensrud**[1] | **Lene A. H. Haakstad**[1]

[1]Department of Sports Medicine, Norwegian School of Sports Sciences, Oslo, Norway

[2]Department of Coaching and Psychology, Norwegian School of Sports Sciences, Oslo, Norway

Correspondence
Christina Gjestvang, Department of Sports Medicine, Norwegian School of Sport Sciences, P.O Box 4014, Ullevål Stadion, 0806 Oslo, Norway.
Email: christina.gjestvang@nih.no

[Correction added on 27 June 2020, after online publication: Trine Stensrud and Frank Abrahamsen's affiliations and order have been corrected in this version.]

No prospective studies have investigated motives and barriers to exercise in new untrained fitness club members. The aims of the present prospective longitudinal study were to (a) examine proportions reporting regular exercise, non-regular exercise, and exercise dropout; (b) identify motives and barriers to exercise; and (c) compare motives between regular and non-regular exercisers the first year of fitness club membership. New members (n = 250) were followed for 1 year. A questionnaire including demographics, exercise frequency, motives (EMI-2), and barriers (18 common reported barriers) was used, and 184 answered at four time points (onset, and after 3, 6, and 12 months). Participants were categorized into *regular exercise:* ≥2 sessions/wk or *non-regular exercise:* ≤1 session/wk, exercise relapse, or dropout. At 3, 6, and 12 months, 63.4%, 59.6%, and 57.2% exercised regularly, whereas 20.1%, 21.1%, and 28.3%, dropped out, respectively. Throughout the follow-up, 37% reported regular exercise. At all time points, motives regarding positive health and strength/endurance were rated highest on a six-point scale. Exercise dropouts rated priority as the greatest barrier. Regular exercisers rated the motives enjoyment (such as "I enjoy the feeling of exerting myself") and challenge (such as "To give me goals to work towards") higher than non-regular exercisers ($P = \leq.05$). In conclusion, less than half exercised regularly, and most members were motivated by factors such as positive health and physical fitness the first year of fitness club membership. Higher levels of the motives enjoyment and challenge were associated with regular exercise.

KEYWORDS
adherence, barriers, exercise, fitness club members, fitness clubs, motives

1 | INTRODUCTION

Regular exercise is associated with a wide range of well-known health benefits such as prevention of cardiovascular diseases and type 2 diabetes.[1] However, it appears to be challenging to adhere to regular exercise, and it is demonstrated that around 50% relapse to physical inactivity or a less active status the first months after initiation of exercise.[2,3] Hence, it is important to motivate physically inactive individuals to begin with exercise, and to encourage exercise adherents to maintain exercise.[4] Many psychological factors influence exercise adherence, for instance, perceived motives and barriers.[5]

Perceived motives and barriers are key factors that influence initiation and regular exercise adherence.[6]

Self-determination theory (SDT)[5] is a contemporary theory that has been applied in the exercise domain and delineates how motives influence behavior. SDT suggests that motivation lies along a continuum of different degrees of autonomy. Behavior is considered to be freely initiated when the individual chooses to achieve a particular motive for autonomous rather than controlled reasons.[5] Motives are autonomous when they are undertaken because of the value in itself, or because the motives are an important part of an individual's identity and controlled when they are initiated due to a sense of external or internal pressure.[5,6] Autonomously motivated individuals may exercise for the inherent enjoyment, because their motives are to achieve valued outcomes or are an important part of their identity. Individuals have controlled motivation when they are achieving motives to satisfy the wishes of some external pressure (eg, family/physician) or internal pressure (eg, sense of guilt).[5,6] Consistent with SDT, it is shown that more autonomous motives rather than more controlled motives are associated with regular exercise behavior.[7]

Further, the perception of barriers may inhibit an individual's exercise behavior, because barriers are significant predictors of physical activity.[8] Perceived barriers encompass internal (eg, "I do not have time and energy") and external components (eg, practical or environmental causes).[8] Internal barriers are related to personal aspects, unlike external barriers, that refers to, for example, infrastructure in communities and practical barriers. The interaction of perceived barriers may particularly hinder leisure-time exercise.[8] There is consensus in the literature that access to exercise facilities (environmental factors), enjoyment (intrinsic motives), and fulfillment of goals positively influence exercise adherence, whereas lack of time, social support, and energy (internal barriers) inhibit exercise adherence.[9-11] It is important to investigate motives and barriers in the context and setting where such activities take place, and it is unclear how motives and barriers to exercise in a fitness club setting are different from motives and barriers to exercising elsewhere.

The number of fitness clubs has increased significantly in recent decades.[12] Worldwide, the fitness club industry has about 183 million members and more than 210 000 clubs; hence, it is one of the most popular settings for exercise.[12] Fitness clubs are located where people live, work, and travel; have flexible opening hours; and offer childcare, in addition to a wide range of exercise opportunities.[12] Fitness clubs may suit our "modern" lifestyle, which seldom offers occupational or commuting physical activity.[13] Despite the increasing popularity of fitness clubs, several studies have found exercise dropout rates between 40% and 65% the first 5-8 months after individuals join a fitness club.[14,15] Studies have also shown a trend (49%-71%) of exercise relapse [14,16,17]—an individual maintaining exercise for a period, then dropout for a short-term, and then return to previous exercise behavior.[18] Based on these numbers, it is important to investigate why some individuals adhere to regular exercise, while others relapse or dropout.

To our knowledge, only seven studies have reported on motives or barriers in a fitness club setting.[17,19-24] However, six of these studies did not recruit untrained new fitness club members,[17,19-22,24] six were cross-sectional,[17,19,20,22-24] and four are more than 10 years old.[17,19,20,23] In the fitness club industry, exercise has often been promoted in relation to external outcomes, such as appearance.[25] However, the fitness club industry has evolved substantially over the last decade.[25] To make gym culture more accessible to everyone, fitness clubs have shifted toward a more body-positive, health-related focus.[25] To date, the "typical fitness club" offers exercise options that should make you feel good, instead of "looking good." However, we do not know whether this shift also has influenced the motives of those who choose to join a gym, especially new recreational exercisers. Individuals' motives to initiate exercise may also differ from the motives that lead to sustained exercise adherence. Hence, the present study bridges this gap by identifying motives and barriers that are contributing to regular use of the gym, not only the first weeks but also months after joining a fitness club.

This study aimed to examine the proportions reporting regular exercise, non-regular exercise, and exercise dropout, as well as to identify perceived motives and barriers to exercise throughout the first year of fitness club membership. Thirdly, we wanted to compare motives between those who reported regular exercise with those who did not (irregular exercise or exercise dropout) at 3, 6, and 12 months.

2 | MATERIALS AND METHODS

For the present study, we used data from the research project *Fitness clubs—a venue for public health?*, a 1-year follow-up study conducted in Oslo (Norway) from October 2015 to October 2018.[26,27] The main aim of the project was to investigate factors associated with exercise adherence and dropout in a group of new beginner exercisers in a fitness club setting.[26,27] Hence, motives and barriers were one of the project's primary outcomes. All new members from 25 multipurpose gyms (resistance and cardio-exercise rooms, and group exercise classes) in one fitness club chain (mid- to high membership fees) were invited to take part in the study by e-mail invitation. In total, 676 individuals wanted to participate in the study, of whom 148 did not respond after the first e-mail. Enrollment was limited to adults (≥18 years), <4 weeks membership, classified as non-exercising (exercising <60 min/wk at moderate or vigorous intensity or brisk walking <150 min/wk, in the last 6 months),[28] and healthy (no disease or illness considered to hinder physical activity, eg, severe heart disease, hypertension, or lung diseases such as asthma). We excluded 278 who did not meet the eligibility

criteria (physically active n = 270, disease/illness n = 8). Hence, 250 fitness club members were included. More details of the research project are published elsewhere.[26,27]

2.1 | Ethical approval

The Norwegian Social Science Data Service provided approval for this study (NSD 44135). The project was reviewed by the Regional Committee for Medical and Health Research Ethics (REK 2015/1443 A) that concluded that according to the Act on Medical and Health Research (the Health Research Act 2008), the study did not require extensive review. All participants signed informed consent for participation in the study, following the Helsinki Declaration.

2.2 | Outcome measures

A standardized electronic questionnaire was used to obtain demographic information, exercise involvement, perceived motives, and barriers. At all time points (at onset, 3, 6, and 12 months of fitness club membership), the questionnaire took approximately 25 minutes to complete and was answered by 250, 224, 213, and 187 participants, respectively. A total of 184 participants answered at all four time points. Losses to follow-up included life situation (n = 16), injury/disease (n = 6), relocation (n = 1), and unknown reasons (n = 43).

The specific questionnaire section concerning motives for exercise was based on the validated questionnaire *Exercise Motivations Inventory-2 (EMI-2)*[29] and translated into Norwegian by three members of the research group. Due to a comprehensive questionnaire in the current research project and 16 statements not considered relevant in a fitness club setting (such as "Because I like trying to win in physical activities" and "Because I enjoy physical competition"), we chose 35 out of 51 statements from the original EMI-2. The EMI-2 consists of 14 different subscales that can be considered as extrinsic or intrinsic motives, and each subscale includes one to four statements.[29] The participants were requested to rate the significance of each statement as a personal motive for exercise on a six-point scale, ranging from 0 (not true for me) to 5 (very true for me). Further, a sum score for each subscale was calculated. The participants could also tick "I do not want to answer."

Assessment of barriers to exercise was based on a former investigation in Norway in which an adult population (n = 12 504) reported on perceived barriers to physical activity,[30] and a pilot testing completed among four volunteers and four research group members. We included all barriers and subscales used in that study, and added four barriers suggested to be an issue for members in a fitness club: "I do not know how to exercise," "I am embarrassed for others to see me exercise," "I am afraid to do the exercises wrong," and "I am afraid of injuries." Based on the initial investigation, we also categorized the perceived barriers into four subscales: priority, practical, health-related, and affective-cognitive.[30] Each subscale included two to nine statements, and the participants were asked to rate the significance of each statement on a three-point scale, ranging from 1 (not important to me) to 3 (very important to me).[30] Then, a sum score for each subscale was calculated. Perceived barriers to exercise were answered by all participants at onset of fitness club membership (n = 184). In the electronic questionnaire, only those who reported exercise dropout at 3 (=43), 6 (n = 53), and 12 months (n = 65) were forwarded to statements regarding barriers. Overview of subscales and sample statements on motives and barriers to exercise is presented in Table 1.

At the 3-, 6-, and 12-month follow-ups, the participants also reported on exercise involvement. The questions and response options were as follows: (a) "Are you still a fitness club member?": "yes" or "no"; (b) "Have you been exercising regularly?": "yes" or "no"; (c) "How often have you exercised per week on average at the fitness club?": "number of sessions"; and (d) "How often have you exercised per week on average outside the fitness club?": "number of sessions." In the analysis, questions 3 and 4 were amassed to the total number of sessions/wk. We asked the participants to report exercise involvement over only the last 4 weeks, due to potential recall bias associated with the use of self-report.[31]

In line with definitions suggested by Hawley-Hague,[4] participants self-reported exercise involvement across all three time points were divided into *regular exercise* (n = 68), reporting ≥2 exercise sessions/wk and *non-regular exercise* (n = 116), reporting ≤1 exercise session/wk, exercise relapse (eg, reported exercise at 3 and 12 months, and no exercise at 6 months), or exercise dropout (reported no exercise during the follow-up period). Regular exercise was based on that ≥2 exercise sessions/wk is suggested to improve factors such as physical fitness and health.[28]

2.3 | Statistical analysis

Sample size considerations for the present study were based on studies assessing motives to exercise (EMI-2) among adults,[32,33] as well as what the research group hypothesized to be relevant changes in scores on motives for new members joining a fitness club. All equations were based on detecting a 10% change in every single motive statement using univariate and bivariate analyses $N = \frac{\sigma^2(z_{1-\beta}+z_{1-\alpha/2})}{(\mu_0-\mu_1)^2}^2$. With a power of 80% at the 0.05 level, we would be able to detect a 10% change in, for example, the subscales "Enjoyment" and

TABLE 1 Subscales and sample statements of perceived motives and barriers to exercise

Subscales	Number of items	Sample statements
Motives[a]		
Stress Management	3	To help manage stress
Revitalization	2	To recharge my batteries
Enjoyment	4	Because I enjoy the feeling of exerting myself
Challenge	3	To give me goals to work towards
Social Recognition	2	To gain recognition for my accomplishments
Affiliation	4	To spend time with friends
Competition	1	Because I enjoy competing
Health Pressures	3	Because my doctor advised me to exercise
Ill-Health Avoidance	3	To prevent health problems
Positive Health	3	To have a healthy body
Weight Management	4	To lose weight
Appearance	4	To look more attractive
Strength and Endurance	3	To increase my endurance
Mobility	2	To stay/become flexible
Barriers[b]		
Priority	2	I do not have time and energy
Practical	4	I lack transport
Health-related	3	Health problems hinder me
Affective-cognitive	9	I do not like to be physically active

[a]Answered by all participants at onset, and after 3, 6, and 12 mo (n = 184).
[b]Answered by all participants at onset (n = 184) and participants reporting exercise dropout at 3 (n = 43), 6 (n = 53), and 12 mo (n = 65).

"Challenge" with 137 and 154 participants, respectively. To allow adjustment of other factors and losses to follow-up, 30% more participants were needed.[34] We aimed to recruit all new fitness club members who fulfilled the eligibility criteria between October 2015 and October 2017.

The data were analyzed using SPSS Statistical Software (version 24.0 for Windows). Results are presented as frequencies (n) and percentages or means with standard deviations (SD), as well as 95% confidence intervals (CIs) and effect sizes (d). To investigate differences between regular and non-regular exercisers in background variables (age, body weight, gender, body mass index, educational level, total household income, cohabitation, and occupation) at onset, an independent *t* test or chi-square test was used as appropriate. To examine changes in motives and barriers between onset, 3, 6, and 12 months and differences between regular and non-regular exercisers, a one-way repeated-measures ANOVA with Bonferroni correction and an independent *t* test were used, respectively. A *P*-value $\leq .05$ was considered to indicate statistical significance, with a cut-off value of $P = \leq .012$ for the Bonferroni correction. Effect sizes were interpreted as small (0.20), medium (0.50), and large (0.80).[35] To compare motives between those who reported regular exercise with those who did not, only participants who completed the questionnaire at all time points were included in the analysis (n = 184).

3 | RESULTS

A total of 79.9% were still fitness club members at 12-month follow-up. Among all participants, at 3, 6, and 12 months, 63.4%, 59.6%, and 57.2% reported regular exercise, whereas 20.1%, 21.1%, and 28.3% had dropped out, respectively. Of 184 participants that completed the full study (who answered the questionnaire at all time points), 37.0% were classified as regular exercisers throughout the first year of fitness club membership, with an average of 3.88 (SD 1.66) exercise sessions/wk. Of those classified as non-regular exercisers (63.0%), exercise dropout was reported by 38.8%, 48.3%, and 56.0% at 3, 6, and 12 months, respectively. Sixteen participants (13.8%) did not start exercising at all.

Nearly half of early exercise dropouts reported exercise at 6 (51.2%) and 12 months (39.1%), and 45.6% of exercise dropouts at 6 months exercised again at 12 months. Of those relapsing, 61.4% reported exercise dropout only once. Further, of those exercising $\leq$1 session/wk at 3 months, 46.7% and 53.3% reported exercise $\geq$2 sessions/wk at 6 and 12 months, respectively. At 12 months, 60.0% of those reporting $\leq$1 exercise session/wk at 6 months exercised $\geq$2 sessions/wk.

Concerning background variables at onset, a larger proportion of those classified as regular exercisers throughout all three follow-ups were men, overweight/obese (BMI $\geq$ 25), older, and employed outside the home, compared with non-regular exercisers (63.0%) (Table 2). The two groups were well-balanced in household income, education, and cohabitation. The principal reasons for membership dropout, health variables, physical fitness, and physical activity level are described elsewhere.[26,27]

3.1 | Perceived motives and barriers throughout the first year of fitness club membership

At all follow-ups, the motives positive health (4.37-4.51), increase in strength/endurance (3.76-4.00), and mobility (3.63-3.92) were rated highest on a six-point scale (Table 3). Throughout the follow-up, we found an increase in six subscales of motives: appearance (d = 0.13),

TABLE 2 Background characteristics of participants divided into regular exercisers (n = 68) and non-regular exercise (n = 116) throughout all three follow-ups

Variable	Regular exercisers Mean ± SD	Non-regular exercise Mean ± SD	*P*
Age (y)	39.5 ± 12.5	35.5 ± 10.7	.028
Body weight (kg)	82.8 ± 14.7	77.3 ± 15.0	.017
	n (%)	n (%)	
Gender (men)	43 (63.2)	51 (44.0)	.018
BMI (kg/m^2) ≥25 (overweight or obese)	43 (63.2)	53 (45.7)	.032
High educational level (≥4 y of higher education)	30 (44.1)	47 (40.5)	.747
High household income (>100 000 US dollar per year)	29 (42.7)	39 (33.6)	.286
Spouse/partner	42 (61.8)	73 (63.0)	.875
Have children	19 (27.9)	38 (32.8)	.605
Employed outside the home	57 (83.8)	78 (67.2)	.022

Abbreviation: Body mass index.

enjoyment (d = 0.13), challenge (d = 0.06), stress management (d = 0.10), health pressures (d = 0.19), and social recognition (d = 0.11), with 0.26-0.52 higher scores at 3, 6, and 12 months, compared with onset. However, despite an increase, three subscales (enjoyment, challenge, and stress management) had scores below the midpoint of the scale (from 0 to 5) (Table 3). We also found a decrease in the subscales strength and endurance from midway (in mean 0.22-0.24 lower scores) to 12-month follow-ups. The score at 12 months was also lower compared with onset (Table 3).

At 3, 6, and 12 months, the internal barrier priority, on a three-point scale (2.03-2.32, d = 0.32), was rated as the most important among exercise dropouts. Otherwise, all other barrier subscales had scores around the midpoint of the scale (1-3) and remained relatively unchanged throughout the 1-year follow-up (Table 3). The barrier statements suggested to be an issue for members in a fitness club ("I do not know how to exercise," "I am embarrassed for others to see me exercise," "I am afraid to do the exercises wrong," and "I am afraid of injuries") had mean scores below the midpoint of the scale (3 months: 1.37 ± 0.65, 6 months: 1.27 ± 0.57, 12 months: 1.38 ± 0.67).

We found no persistent gender differences in perceived motives or barriers throughout the first year of fitness club membership. For brevity, these are not included.

Regular exercisers rated the subscales enjoyment (mean diff. from 0.67 to 0.80, d = 0.06 to 0.09) and challenge (mean diff. from 0.50 to 0.69, d = 0.004 to 0.03) higher than non-regular exercisers at all four measurements points (Table 4).

4 | DISCUSSION

The main findings were that few (37%) maintained regular exercise throughout the first year of fitness club membership. At 3, 6, and 12 months, regular exercisers rated motives such as enjoyment and challenge higher than non-regular exercisers. However, the differences in means and magnitude of the effect sizes for the motives enjoyment and challenge were small. Our results suggest that those exercising regularly are more likely to report that they exercise for the inherent enjoyment.

Consistent with other studies among fitness club members, our study also demonstrates low exercise adherence and an increase in exercise dropout throughout the initial year of fitness club membership.[14,15] However, only 13.8% of non-regular exercisers reported sustained exercise dropout at all time points. Hence, the majority relapsed, a common phenomenon at fitness clubs.[17] In agreement with the literature,[20,22,24] we also found that the most common barrier was priority (such as finding time to exercise). Therefore, it may be essential that fitness club staff promotes practical methods toward members on how to exercise regularly, such as planning (creating time for exercise in one's schedule), and how to incorporate exercise into everyday life.

In our study, motives with external outcomes such as positive health and an increase in physical fitness were reported as the main motives for exercise, consistent with two studies among fitness club members.[23,24] Other authors investigating motives for exercise among individuals in different activity settings have revealed that fitness club members are more likely to report motives such as appearance than motives such as social factors and enjoyment, compared with individuals exercising at sports clubs or in public spaces.[36,37] SDT proposes that individuals may engage in exercise to obtain outcomes separate from the behavior itself, such as physical fitness and appearance-related goals, and individuals may value their exercise goals differently.[5,6,38] For instance, to achieve positive changes in physical fitness, an untrained

TABLE 3 Subscales of perceived motives to and barriers for exercise at onset, and after 3, 6, and 12 mo

	Onset	3 mo	6 mo	12 mo		
	(n = 184)	(n = 184)	(n = 184)	(n = 184)		
Subscales (0-5)	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Mean ± SD (95% CI)**	**Cohen`s d**	***P***
Positive Health	4.47 ± 0.82 (4.34, 4.58)	4.51 ± 0.82 (4.38, 4.62)	4.41 ± 0.80 (4.30, 4.53)	4.37 ± 0.82 (4.25, 4.49)	0.02	.217
Strength and Endurance	3.84 ± 1.01 (3.69, 3.99)	4.00 ± 1.20 (3.85, 4.13)**	3.98 ± 1.12 (3.81, 4.15)**	3.76 ± 1.10 (3.58, 3.93)	0.06	.012
Mobility	3.63 ± 1.39 (3.42, 3.83)	3.92 ± 1.24 (3.75, 4.11) *	3.83 ± 1.39 (3.61, 4.04)	3.74 ± 1.36 (3.55, 3.92)	0.04	.028
Ill-Health Avoidance	3.56 ± 1.18 (3.38, 3.73)	3.82 ± 0.91 (3.68, 3.95)*	3.76 ± 1.05 (3.60, 3.90)	3.69 ± 1.12 (3.52, 3.86)	0.04	.028
Weight Management	3.18 ± 1.61 (2.95, 3.41)	3.39 ± 1.44 (3.18, 3.60)	3.54 ± 1.46 (3.33, 3.75)*	3.46 ± 1.48 (3.24, 3.67)*	0.08	.001
Appearance	2.98 ± 1.41 (2.76, 3.18)	3.30 ± 1.40 (3.09, 3.50)*	3.37 ± 1.38 (3.17, 3.57)*	3.25 ± 1.37 (3.05, 3.45)*	0.13	<.001
Revitalization	2.97 ± 1.28 (2.78, 3.16)	3.10 ± 1.30 (2.91, 3.28)	3.14 ± 1.27 (2.96, 3.33)	3.06 ± 1.32 (2.86, 3.25)	0.02	.187
Enjoyment	2.47 ± 1.40 (2.25, 2.66)	2.83 ± 1.42 (2.60, 3.03)*	2.87 ± 1.39 (2.66, 3.06)*	2.74 ± 1.47 (2.53, 2.95)*	0.13	<.001
Competition	1.11 ± 1.56 (0.90, 1.34)	1.11 ± 1.51 (0.90, 1.33)	1.18 ± 1.57 (0.97, 1.42)	1.29 ± 1.76 (1.05, 1.56)	0.01	.320
Challenge	1.91 ± 1.43 (1.72, 2.13)	2.20 ± 1.49 (1.99, 2.42)*	2.19 ± 1.59 (1.98, 2.43)*	2.25 ± 1.58 (2.02, 2.48)*	0.06	.006
Stress Management	1.94 ± 1.45 (1.73, 2.15)	2.20 ± 1.46 (2.00, 2.43)*	2.28 ± 1.58 (2.04, 2.52)*	2.36 ± 1.52 (2.13, 2.60)*	0.10	<.001
Health Pressures	1.11 ± 1.23 (0.94, 1.30)	1.63 ± 1.33 (1.44, 1.82)*	1.49 ± 1.45 (1.29, 1.70)*	1.55 ± 1.51 (1.33, 1.79)*	0.19	<.001
Social Recognition	0.64 ± 1.01 (0.51, 0.79)	0.90 ± 1.12 (0.73, 1.07)*	1.00 ± 1.27 (0.82, 1.18)*	0.99 ± 1.33 (0.81, 1.19)*	0.11	<.001
Affiliation	0.87 ± 1.05 (0.72, 1.04)	0.96 ± 1.16 (0.79, 1.14)	1.03 ± 1.29 (0.84, 1.23)	1.10 ± 1.34 (0.91, 1.30)	0.03	.107
Barrier subscales (1-3)	(n = 184)	(n = 43)	(n = 53)	(n = 65)		
	Mean ± SD (95% CI)	Mean ± SD (95% CI)	Mean ± SD (95% CI)	Mean ± SD (95% CI)		$P^{\dagger}$
Priority	2.03 ± 0.63 (1.71, 2.35)	2.17 ± 0.69 (1.78, 2.53)	2.32 ± 0.46 (2.07, 2.57)	2.17 ± 0.54 (1.89, 2.42)	0.32	.206
Practical	1.50 ± 0.51 (1.28, 1.82)	1.39 ± 0.41 (1.21, 1.62)	1.41 ± 0.36 (1.23, 1.60)	1.37 ± 0.37 (1.19, 1.58)	0.11	.714
Health-related	1.52 ± 0.33 (1.35, 1.69)	1.64 ± 0.49 (1.38, 1.90)	1.57 ± 0.35 (1.38, 1.76)	1.45 ± 0.33 (1.30, 1.64)	0.24	.365
Affective-cognitive	1.35 ± 0.30 (1.12, 1.57)	1.38 ± 0.32 (1.16, 1.62)	1.44 ± 0.25 (1.24, 1.61)	1.29 ± 0.31 (1.11, 1.55)	0.56	.424

[†]Only participants who reported exercise dropout at all time points (n = 16) were included in the analysis,

*significantly different from onset, and

**significantly different from 12 mo.

TABLE 4 Subscales of perceived motives to exercise at onset (all participants n = 184), and after 3, 6, and 12 mo between regular exercise (n = 68) and non-regular exercise (n = 116)

	Onset	3 mo			6 mo			12 mo		
	All	Regular exercise	Non-regular exercise		Regular exercise	Non-regular exercise		Regular exercise	Non-regular exercise	
Subscales (0-5)	Mean ± SD (95% CI)	Mean ± SD (95% CI)	Mean ± SD (95% CI)	*P*	Mean ± SD (95% CI)	Mean ± SD (95% CI)	*P*	Mean ± SD (95% CI)	Mean ± SD (95% CI)	*P*
Positive Health	4.46 ± 0.82 (4.36, 4.56)	4.51 ± 0.95 (4.27, 4.73)	4.50 ± 0.74 (4.36, 4.63)	.964	4.36 ± 0.88 (4.15, 4.56)	4.43 ± 0.76 (4.29, 4.57)	.599	4.33 ± 0.88 (4.10, 4.54)	4.39 ± 0.80 (4.23, 4.54)	.645
Strength and Endurance	3.86 ± 1.08 (3.72, 3.99)	4.17 ± 0.80 (3.98, 4.37)	3.89 ± 1.13 (3.68, 4.10)	.050	4.13 ± 0.86 (3.93, 4.32)	3.91 ± 1.25 (3.68, 4.13)	.213	3.92 ± 1.05 (3.65, 4.16)	3.78 ± 1.19 (3.54, 3.97)	.397
Mobility	3.63 ± 1.45 (3.44, 3.82)	4.05 ± 1.22 (3.74, 4.34)	3.85 ± 1.25 (3.62, 4.06)	.278	4.08 ± 1.23 (3.78, 4.35)	3.68 ± 1.46 (3.41, 3.93)	.055	3.89 ± 1.12 (3.63, 4.16)	3.66 ± 1.47 (3.37, 3.92)	.275
Ill-Health Avoidance	3.64 ± 1.18 (3.50, 3.79)	3.95 ± 0.86 (3.71, 4.15)	3.75 ± 0.94 (3.56, 3.91)	.143	3.95 ± 1.06 (3.69, 4.20)	3.64 ± 1.04 (3.47, 3.83)	.057	3.76 ± 1.07 (3.47, 4.00)	3.66 ± 1.15 (3.45, 3.85)	.540
Weight Management	3.15 ± 1.58 (2.95, 3.35)	3.45 ± 1.41 (3.13, 3.76)	3.37 ± 1.47 (3.08, 3.61)	.698	3.67 ± 1.43 (3.31, 3.99)	3.48 ± 1.48 (3.23, 3.75)	.384	3.68 ± 1.33 (3.34, 4.00)	3.35 ± 1.56 (3.07, 3.62)	.125
Revitalization	3.02 ± 1.33 (2.85, 3.18)	3.27 ± 1.18 (3.01, 3.53)	3.00 ± 1.36 (2.76, 3.23)	.164	3.52 ± 1.16 (3.24, 3.80)	2.93 ± 1.29 (2.70, 3.16)	.002	3.36 ± 1.19 (3.06, 3.64)	2.89 ± 1.37 (2.64, 3.13)	.015
Appearance	3.07 ± 1.34 (2.90, 3.25)	3.29 ± 1.39 (2.97, 3.58)	3.31 ± 1.42 (3.03, 3.56)	.940	3.48 ± 1.39 (3.14, 3.80)	3.23 ± 1.38 (2.95, 3.53)	.561	3.19 ± 1.35 (2.87, 3.51)	3.29 ± 1.39 (3.04, 3.56)	.609
Enjoyment	2.57 ± 1.44 (2.39, 2.75)	3.28 ± 1.19 (3.00, 3.56)	2.56 ± 1.47 (2.30, 2.83)	.001	3.42 ± 1.22 (3.12, 3.71)	2.55 ± 1.39 (2.31, 2.80)	<.001	3.21 ± 1.26 (2.88, 3.51)	2.47 ± 1.52 (2.20, 2.74)	.001
Challenge	2.05 ± 1.52 (1.87, 2.23)	2.65 ± 1.45 (2.31, 2.98)	1.93 ± 1.45 (1.67, 2.19)	.001	2.78 ± 1.53 (2.41, 3.13)	1.85 ± 1.54 (1.59, 2.12)	<.001	2.67 ± 1.39 (2.34, 3.01)	1.99 ± 1.64 (1.68, 2.31)	.004
Stress Management	2.02 ± 1.51 (1.84, 2.21)	2.34 ± 1.47 (2.00, 2.69)	2.12 ± 1.45 (1.87, 2.38)	.325	2.63 ± 1.57 (2.27, 3.02)	2.07 ± 1.55 (1.79, 2.35)	.020	2.60 ± 1.44 (2.27, 2.94)	2.22 ± 1.55 (1.95, 2.50)	.100
Competition	1.19 ± 1.55 (0.99, 1.38)	1.19 ± 1.45 (0.84, 1.53)	1.06 ± 1.55 (0.79, 1.34)	.593	1.41 ± 1.44 (1.07, 1.90)	1.01 ± 1.46 (0.73, 1.28)	.059	1.17 ± 1.64 (0.80, 1.61)	1.34 ± 1.83 (1.01, 1.66)	.515
Health Pressures	1.12 ± 1.22 (0.98, 1.27)	1.82 ± 1.45 (1.50, 2.17)	1.52 ± 1.24 (1.29, 1.74)	.153	1.61 ± 1.48 (1.24, 1.96)	1.41 ± 1.44 (1.16, 1.66)	.359	1.59 ± 1.45 (1.24, 1.95)	1.53 ± 1.55 (1.24, 1.82)	.787
Social Recognition	0.72 ± 1.05 (0.59, 0.85)	0.91 ± 1.18 (0.63, 1.19)	0.90 ± 1.09 (0.70, 1.10)	.951	1.16 ± 1.39 (0.85, 1.51)	0.90 ± 1.19 (0.70, 1.13)	.196	0.83 ± 1.09 (0.59, 1.11)	1.09 ± 1.45 (0.85, 1.36)	.208
Affiliation	0.94 ± 1.05 (0.80, 1.07)	1.00 ± 1.15 (0.72, 1.28)	0.93 ± 1.16 (0.72, 1.15)	.681	1.31 ± 1.35 (0.98, 1.64)	0.87 ± 1.24 (0.66, 1.11)	.031	1.07 ± 1.11 (0.82, 1.35)	1.11 ± 1.47 (0.85, 1.39)	.878

Note: P-value shows differences between regular exercise and non-regular exercise.

individual must exercise >1 session/wk over a specific period (eg, 12 weeks).[28] If progress is lacking and the individual's motive is undertaken for controlled reasons (by, eg, external pressure), this may contribute to exercise relapse or dropout. In contrast, more autonomous motives (eg, the individual value higher levels of physical fitness) may predict sustained exercise adherence.[7] Hence, it may be the reason why an individual has a particular exercise motive or goal that results in exercise behavior.[5] An individual may exercise to improve physical fitness (an external outcome) to satisfy an external demand such as a doctor (controlled), to avoid feelings of, for example, guilt (controlled), because the individual values physical fitness (autonomous), or consistent with his or her ambitions in life (autonomous).[5] Therefore, all motives have an autonomous or controlled foundation, and it is shown that the strongest predictor of exercise maintenance is whether the individual personally values the outcome (eg, higher physical fitness).[11] Fitness club staff may benefit by paying attention to the members' exercise goals and the motivation attributed to the goals, due to the relationship between goals and motivation.[38] If the members' motives are commenced for controlled reasons, it is essential to guide the member to create more autonomous motives. In our study, both non-regular exercisers and regular exercisers had high scores on motives related to external outcomes (such as strength/endurance), and we may speculate whether regular exercisers were more autonomously motivated than the non-regular exercisers. However, in the present study, we did measure exercise motives only. Another explanation that the participants in our study had high scores on the motives positive health, increase in physical fitness, and mobility may be that individuals motivated by external outcomes join a fitness club because it appears to be an activity setting that fits their goals.[25]

Several studies among fitness club members[20,22,24] and the general population[30,39] demonstrate that lack of time and motivation are the most common barriers that inhibit exercise adherence. This is in line with our findings, where priority (lack of time/energy or valuing other leisure-time activities) was perceived as the most important barrier. Despite paying monthly fees and despite access to exercise equipments and group exercise classes, 23.0%-35.0% of our participants dropped out once or more during the follow-up period. As most fitness clubs are conveniently located and offer practical solutions for exercise attendance (such as intense group exercise classes of 30 minutes and childcare), "lack of time" is both a barrier and perhaps an excuse. Further, most barriers were rated below or around midpoint on the scale by exercise dropouts, which can be seen as non-limiting barriers. However, individuals cope differently with barriers, so to what extent a barrier is a limitation to exercise is suggested to be not automatic.[40] It has also been proposed that the total number of perceived barriers is likely to be more important, because it may be easier to overcome one or a few barriers rather than many.[30] It may be essential that fitness clubs may implement a tutorial talk for all new members, aiming to get an overview of possible barriers and how to overcome these barriers (such as low priority).[40]

4.1 | Strengths and limitations

Collecting data as it happens in a real-life natural context, a low dropout rate, and the use of a prospective longitudinal design with 12 months of follow-up are considered strong aspects of the present study. Previous studies reporting on motives or barriers in a fitness club setting are cross-sectional, and several were published more than 10 years ago. The present study had several follow-ups throughout the first year of fitness club membership, allowing us to investigate changes in motives and barriers. Another strength was the use of an electronic questionnaire based on validated questions[29] and a previous investigation in Norway.[30] Electronic questionnaires are cost-efficient and gather responses quickly. Further, we recruited from 25 fitness clubs, and the sample (untrained new fitness club members) is a study population of which there is limited knowledge. Sample size considerations estimated that fewer participants were needed than the number who participated. Also, subgroup analysis comparing regular exercisers with non-regular exercisers allowed us to investigate the influence of intrinsic and extrinsic motives on exercise adherence.

Limitations were that data were obtained from only one fitness club chain. Recruitment of other gyms such as fitness-only (low-cost membership) and CrossFit gyms might have yielded different results. Confounding factors such as gender and age may also be present because we did not adjust for background variables. Losses to follow-ups may also introduce selection bias; hence, the results should be viewed with caution. However, a comparative analysis of demographic data from study dropouts (n = 66, 26.4%) and current participants at 12 months indicated no differences in age, gender, educational level, total household income, or BMI. In the current study, another limitation was that exercise attendance was measured by self-report, with no objective data of attendance at the fitness club. It is well known that individuals tend to overestimate the number of exercise sessions because of social desirability, and therefore, the measure may be imprecise.[31] In addition, we defined two sessions/wk as regular exercise attendance, and this definition does not reflect if the participants met the current physical activity recommendations. Yet, with respect to exercise intensity, it is still possible to meet the physical activity recommendations by two exercise sessions/wk. However, we did not measure exercise intensity in the present study. Further, another limitation with using an electronic questionnaire is the absence of an interviewer or someone present to help interpret questions;

also, an electronic questionnaire may not be suitable for asking open-ended questions. We also considered comparing motives between regular exercisers, those with exercise relapse and exercise dropouts. Regrettably, our sample size was not large enough to statistically compare more than two groups. Another limitation is that only those reporting exercise dropout answered statements regarding barriers at 3, 6, and 12 months. Hence, we could not conduct a longitudinal analysis of barriers in all participants. Finally, our quantitative design may not be robust enough to explain complex aspects such as motives and barriers to exercise. Hence, there is a need for future qualitative studies investigating this in more depth.

5 | PERSPECTIVES

After 1-year follow-up, more than half in our study were classified as non-regular exercisers, despite being a gym member. Fitness club staff and specifically the instructors are in a unique position to influence members' attitudes and exercise behavior. Aiming to increase the proportion that is adhering to regular exercise, it should be highlighted to fitness club staff that knowledge of SDT and how to translate theoretical principles into "real-life" practice may be important for members' exercise participation. An instructor with knowledge of the relationship between motives and behavior may know how to get the members aware of why they have a particular exercise motive and guide them to create more autonomous motives. Fitness club employees should also implement practical methods that seek to prevent barriers, through the understanding of behavior and the underlying mechanisms.[5]

6 | CONCLUSION

Less than half (37.0%) of the participants reported regular exercise adherence throughout the first year of fitness club membership. Most members were motivated for exercise by factors such as positive health, increase in physical fitness, and mobility, and the most common barrier to exercise adherence was priority (such as lack of time). Regular exercisers rated the motives enjoyment and challenge as more important than non-regular exercisers, however, the differences in means and magnitude of the effect sizes were very small.

ACKNOWLEDGMENTS

We would like to thank Ingar Holme and Morten Fagerland, professors in biostatistics, Norwegian School of Sports Sciences, for important guidance with power considerations and data analysis. Thanks also to the research assistants Hege Heiestad, Fredrik Kristiansen, and Lasse Bækken. We would also like to thank the reviewers who have helped us furthering the manuscript.

CONFLICTS OF INTEREST

There are no conflicts of interest, including financial, consultant, institutional, and other relationships that might lead to bias or a conflict of interest. The results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

ORCID

Christina Gjestvang https://orcid.org/0000-0003-2253-1921
Trine Stensrud https://orcid.org/0000-0002-5250-525X

REFERENCES

1. DE Waburton CS, Ivey A, et al. A systematic review of the evidence for Canada`s physical activity guidelines for adults. *Int J Behav Nutr Phys Act*. 2010;7(1):39.
2. Dishman RK, Buckworth J. Adherence to physical activity. In: Morgan WP, ed. Series in health psychology and behavioral medicine. Physical activity and mental health (Reprinted in modified form from W. P. Morgan et al. (Eds.), "*Exercise and Mental Health*," Washington, DC: Hemisphere, 1987). Philadelphia, PA: Taylor & Francis; 1997;63–80.
3. Marcus BH, Dubbert PM, Forsyth LH, et al. Physical activity behavior change: issues in adoption and maintenance. *Health Psychol*. 2000;19(1 Suppl):32-41.
4. Hawley-Hague H, Horne M, Skelton DA, Todd C. Review of how we should define (and measure) adherence in studies examining older adults' participation in exercise classes. *BMJ Open Sport Exerc Med*. 2016;6:6.
5. Standage M, Ryan ED. Self-determination theory and exercise motivation: facilitating self-regulatory processes to support and maintain health and well-being. In: Roberts GC, Treasure DC, eds. *Advances in Motivation in Sport and Exercise*. Champaign, IL: Human Kinetics, Inc.; 2012: 233-270.
6. Ryan RM, Deci EL. Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp Educ Psychol*. 2000;25(1):54-67.
7. Ingledew DK, Markland D, Ferguson E. Three levels of exercise motivation. *Appl Psychol-Health Well Being*. 2009;1(3):336-355.
8. Bandura A. Health promotion by social cognitive means. *Health Educ Behav*. 2004;31(2):143-164.
9. Baert V, Gorus E, Mets T, Geerts C, Bautmans I. Motivators and barriers for physical activity in the oldest old: a systematic review. *Ageing Res Rev*. 2011;10(4):464-474.
10. Burgess E, Hassmen P, Pumpa KL. Determinants of adherence to lifestyle intervention in adults with obesity: a systematic review. *Clin Obes*. 2017;7(3):123-135.
11. Teixeira PJ, Carraca EV, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: a systematic review. *Int J Behav Nutr Phys Act*. 2012;9:78.
12. The IHRSA Global Report. The International Health Racquet & Sportsclub Association. 2019.
13. Ng SW, Popkin BM. Time use and physical activity: a shift away from movement across the globe. *Obes Rev*. 2012;13(8):659-680.

14. Middelkamp J, van Rooijen M, Wolfhagen P, Steenbergen B. 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. *J Sports Sci Med*. 2017;16(2):163-171.
15. Annesi JJ. Effects of a cognitive behavioral treatment package on exercise attendance and drop out in fitness centers. *Eur J Sport Sci*. 2003;3(2):1-16.
16. Vlachopoulos SP, Neikou E. A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout. *J Sports Med Phys Fitness*. 2007;47(4):475-482.
17. Thogersen-Ntoumani C, Ntoumanis N. The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *J Sport Sci*. 2006;24(4):393-404.
18. Reed GR. Adherence to exercise and the transtheoretical model of behavior change In: Bull S, *Adherence Issues in Sport and Exercise*. ed. England: John Wiley & Sons Ltd.; 2001:19-45.
19. Kathrins BP, Turbow DJ. Motivation of fitness center participants toward resistance training. *J Strength Cond Res*. 2010;24(9):2483-2490.
20. Schwetschenau HM, O'Brien WH, Cunningham CJL, Jex SM. Barriers to physical activity in an on-site corporate fitness center. *J Occup Health Psychol*. 2008;13(4):371-380.
21. Jekauc D, Volkle M, Wagner MO, Mess F, Reiner M, Renner B. Prediction of attendance at fitness center: a comparison between the theory of planned behavior, the social cognitive theory, and the physical activity maintenance theory. *Front Psychol*. 2015;6:121.
22. Stankowski CL, Trauntvein NE, Hall SL. I use the student recreation center, but i would use it more if..: understanding male and female constraints to student recreation center use. *RSJ*. 2017;41(1):55-66.
23. Mullen SP, Whaley DE. Age, gender, and fitness club membership: Factors related to initial involvement and sustained participation. *Int J Sport Exercise Psychol*. 2010;8(1):24-35.
24. Riseth L, Nost TH, Nilsen TIL, Steinsbekk A. Long-term members' use of fitness centers: a qualitative study. *BMC Sports Sci Med Rehabil*. 2019;11(1).1–9.
25. Andreasson JJ, Johansson T. Glocalised fitness: the franchising of a physical movement, fitness professionalism and gender. *Leisure/Loisir*. 2018;42(3):301-321.
26. Gjestvang C, Stensrud T, Hansen BH, Kolle E, Haakstad LAH. Are fitness club members likely to meet the current physical activity recommendations? *TSM*. 2019;3:75-83.
27. Gjestvang C, Stensrud T, Haakstad LAH. Are changes in physical fitness, body composition and weight associated with exercise attendance and dropout among fitness club members? Longitudinal prospective study. *BMJ Open Sport Exerc Med*. 2019;9(4):e027987.
28. Garber CE, Blissmer B, Deschenes MR, et al. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc*. 2011;43(7):1334-1359.
29. Markland D, Ingledew DK. The measurement of exercise motives: factorial validity and invariance across gender of a revised exercise motivations inventory. *Br J Health Psychol*. 1997;2:361-376.
30. Sorensen M, Gill DL. Perceived barriers to physical activity across Norwegian adult age groups, gender and stages of change. *Scand J Med Sci Sports*. 2008;18(5):651-663.
31. Sallis JF, Saelens BE. Assessment of physical activity by self-report: Status, limitations, and future directions. *Res Q Exerc Sport*. 2000;71(2):S1-S14.
32. Kulavic K, Hultquist CN, McLester JR. A comparison of motivational factors and barriers to physical activity among traditional versus nontraditional college students. *J Am Coll Health*. 2013;61(2):60-66.
33. Roberts S, Reeves M, Ryrie A. The influence of physical activity, sport and exercise motives among UK-based university students. *J Further Higher Educ*. 2015;39(4):598-607.
34. Suresh K, Chandrashekara S. Sample size estimation and power analysis for clinical research studies. *J Hum Reprod Sci*. 2012;5(1):7-13.
35. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. New York, NY: Routledge; 1988.
36. Deelen I, Ettema D, Kamphuis CBM. Sports participation in sport clubs, gyms or public spaces: How users of different sports settings differ in their motivations, goals, and sports frequency. *PLoS One*. 2018;13(10):e0205198.
37. Ulseth A. New opportunities - Complex motivations: gender differences in motivation for physical activity in the context of sports clubs and fitness centers. *IJAASS*. 2008;20(1):44-66.
38. Sebire SJ, Standage M, Vansteenkiste M. Examining intrinsic versus extrinsic exercise goals: cognitive, affective, and behavioral outcomes. *J Sport Exercise Psy*. 2009;31(2):189-210.
39. Herazo-Beltran Y, Pinillos Y, Vidarte J, Crissien E, Suarez D, Garcia R. Predictors of perceived barriers to physical activity in the general adult population: a cross-sectional study. *Braz J Phys Ther*. 2017;21(1):44-50.
40. Brawley L, Martin KA, Gyurcsik NC. Problems in assessing perceived barriers to exercise: confusing obstacles with attributions and excuses. In: Duda Journal, ed. *Advances in Sport & Exercise Measurement*. Morgantown, WV: Fitness Information Technology; 1998: 337-350.

How to cite this article: Gjestvang C, Stensrud T, Abrahamsen F, Haakstad LAH. Motives and barriers to initiation and sustained exercise adherence in a fitness club setting—A one-year follow-up study. *Scand J Med Sci Sports*. 2020;30:1796–1805. https://doi.org/10.1111/sms.13736

Paper V

What makes individuals stick to their exercise regime? A one-year follow-up study among novice exercisers in a fitness club setting.

Christina Gjestvang[1*], Frank Abrahamsen[2], Trine Stensrud[1], Lene A. H. Haakstad[1].

[1]Department of Sports Medicine, Norwegian School of Sports Sciences, Oslo, Norway

[2]Department of Sport and Social Sciences, Norwegian School of Sports Sciences, Oslo, Norway

*** Correspondence:**
Christina Gjestvang
christina.gjestvang@nih.no

Keywords: Fitness club members[1], motives[2], novice exercisers[3], physical activity[4], self-efficacy[5], social support[6].

Abstract

Objectives: A fitness club may be an important arena to promote regular exercise. However, authors have reported low attendance rates (10% to 37%) the first months after individuals sign up for membership. It is therefore important to understand the reasons for poor exercise adherence. In this project, we aimed to investigate different psychosocial factors that might increase the likelihood of reporting regular exercise the first year of a fitness club membership, including self-efficacy, motives, social support, life satisfaction, and customer satisfaction.

Methods: New members (≤four weeks membership, n = 250) classified as novice exercisers (exercise <60 min/week the last six months) from 25 multipurpose gyms were followed for one year. Data were collected by an electronic survey including background and health factors, self-efficacy, social support, life satisfaction, motives, customer satisfaction, and exercise attendance, and was answered at start-up and after three (n = 224), six (n = 213), and 12 (n = 187) months. It is well established in the literature that ≥2 exercise sessions/week improve physical fitness in novice exercisers (if adhered to). Hence, we divided the participants into regular exercise attendance (≥2 sessions/week) and non-regular exercise attendance (≤1 session/week, exercise dropout, or membership dropout) in the analysis.

Results: A mixed-effects logistic regression model revealed that the strongest predictor for reporting regular exercise attendance was higher levels of the motive "enjoyment" (OR = 1.84, p = <0.001, 95% CI for OR = 1.35, 2.50), followed by self-efficacy "sticking to it" (OR = 1.73, p = 0.002, 95% CI for OR = 1.22, 2.46) and social support from friends and family (OR = 1.16, p = <0.001, 95% CI for OR = 1.09, 1.23).

Conclusion: In novice exercisers, regular exercise at three, six, and 12 months was associated with higher scores of the motive "enjoyment", self-efficacy ("sticking to it"), and social support compared with non-regular exercise. Our results show that the majority of new fitness club members do not achieve regular exercise behavior.

Word count: 3787. **Number of Tables:** 4.

1 Introduction

Even though the health benefits of physical activity (PA) are well documented (Warburton and Bredin 2017), research shows that 38% of the European adult population`s physical activity level is inadequate (Mayo et al. 2019). Thus, two public health challenges are to motivate inactive individuals to become physically active and to encourage already active individuals to increase or maintain their PA level. It is therefore important to examine factors that increase the probability of starting with and stay physically active and to identify factors that may reduce the risk of dropping out.

A fitness club holds equipment for group and individual exercise and represents one large context to be physically active (IHRSA 2020). To date, this industry has about 185 million members and 210 000 gyms worldwide. Thus, fitness clubs are important arenas for the promotion of PA and exercise (IHRSA 2020). We have previously reported that among new fitness club members, only 37% exercised regularly irrespective of activity setting, and only 17% used the gym twice weekly the first year as a member (Gjestvang et al. 2020a; Gjestvang et al. 2020b). Other authors have also reported low attendance rates (10% to 37%) the first three to six months after individuals sign up for gym membership (Middelkamp et al. 2016; Sperandei et al. 2016). Hence, it is important to understand the reasons for poor exercise adherence.

It is shown that individuals experience a wide range of psychosocial facilitators and barriers to regular exercise (Ayotte et al. 2010; Bauman et al. 2012; Choi et al. 2017; Scarapicchia et al. 2017). Most often reported correlates of exercise behavior are self-efficacy, social support, and different motives (such as “exercising for the inherent enjoyment” or “exercising for personal challenge”) (Scarapicchia et al. 2017; Ayotte et al. 2010; Bauman et al. 2012; Choi et al. 2017). Also, it is well established that satisfaction with life is positively associated with PA (Bize et al. 2007; Gillison et al. 2009). However, to our knowledge, no studies have investigated the association between these recognized psychosocial factors and exercise attendance among novice exercisers in a fitness club setting.

We have previously shown that regular exercisers had higher scores on motives such as “enjoyment” (e.g. “I enjoy the feeling of exerting myself”) and “challenge” (e.g. “To give me goals to work towards”), and life satisfaction compared with non-regular exercising members (Gjestvang et al. 2020a; Heiestad et al. 2020). Other authors have also suggested that higher levels of motives considered as intrinsic (Kathrins and Turbow 2010; Kopp et al. 2020; Thogersen-Ntoumani and Ntoumanis 2006), self-efficacy (Jekauc et al. 2015), and social support (Jekauc et al. 2015; Sas-Nowosielski and Szopa 2015) contribute to regular use of the gym. A limitation of previous research is, however, the use of a piecewise approach, often including data of only one or two psychosocial factors in the analysis. Exercise is a complex behavior, as for this, several psychosocial factors need to be considered when investigating the reasons for adherence (Bauman et al. 2012). Also, one challenge in the interpretation of previous findings is that most studies were cross-sectional. To our knowledge, only two former studies in this field were prospective and there is a need for research with a longer time-frame than 20 and 30 weeks as in the previous studies (Jekauc et al. 2015; Kopp et al. 2020).

Members seek fitness clubs that will satisfy their specific needs, such as opening hours, equipment, and exercise concepts. Further, authors have shown that a satisfied member is more likely to attend the fitness club regularly (Ferrand et al. 2010; Gocłowska and Piątkowska 2017). Hence, customer satisfaction is also a key factor to consider when understanding exercise attendance among fitness club members, especially in novice exercisers with limited gym experience and preferences.

Using data from the research project "Fitness clubs - a venue for public health?" (Gjestvang et al. 2020a; Gjestvang et al. 2017, 2019; Haakstad et al. 2020; Heiestad et al. 2020), we aimed to investigate different psychosocial factors that might increase the likelihood of reporting regular exercise the first year of a fitness club membership, including self-efficacy, social support, motives, life satisfaction, and customer satisfaction. Our hypothesis was that self-efficacy, perceived motives considered as intrinsic, and social support would be higher in regular exercisers compared with those reporting non-regular exercise attendance.

2 Materials and methods

The research project Fitness clubs - a venue for public health?, was a one-year prospective study conducted from October 2015 to October 2018 (Gjestvang et al. 2020a; Gjestvang et al. 2017, 2019; Haakstad et al. 2020; Heiestad et al. 2020). The main aim was to increase evidence about the characteristics of those individuals who are able to stay active and continue with regular exercise in a fitness club setting. Measures of self-efficacy, social support, life satisfaction, and perceived motives for exercise were primary outcomes, whereas customer satisfaction was a secondary outcome. Except for data on perceived motives and life satisfaction, the data set used in this study are original for publication and have not yet been used yet.

The Nordic fitness club chain used to obtain data in this study consists of multipurpose gyms, including a wide range of exercise concepts, resistance and cardio-exercise rooms, group exercise classes, and personal training. The membership fees are from mid (55 USD) to high (120 USD), dependent on each membership profile, and members purchase a 12-month contract that cannot be canceled or a "pay as you go" contract. The fitness clubs have long reception opening hours (6 am to 10 pm), childcare, and focus on customer satisfaction. All new members from 25 gyms were invited to take part in the study by an email-invitation from the fitness club chain. Eligibility criteria were: ≥18 years, <four weeks membership, untrained (exercising <60 min/week at moderate or vigorous-intensity in the last six months) (Garber et al., 2011), and healthy (no disease/illness considered to hinder exercise, e.g., severe heart disease or hypertension). A total of 676 new members wanted to participate in the study, of whom 148 did not respond after the first e-mail correspondence, and 278 did not meet the eligibility criteria (regularly exercising n = 270, disease/illness n = 8). Hence, 250 participants with equal gender distribution were included and followed for one year. More details of the research project are published elsewhere (Gjestvang et al. 2020a; Gjestvang et al. 2017, 2019; Haakstad et al. 2020; Heiestad et al. 2020).

2.1 Sample size calculations

Details of sample size calculations have been reported previously and found to be eligible (Gjestvang et al. 2020a; Heiestad et al. 2020). For the present study, with respect to a mixed effects logistic regression, including eight independent variables, a minimum of ten participants per predictor variable was assumed appropriate. Hence, we needed a minimum of 80 participants to conduct the analysis and aimed to recruit all new fitness club members (n = 250) who fulfilled the eligibility criteria between October 2015 to October 2017.

2.2 Ethical approval

The Norwegian Social Science Data Service provided approval for this study (NSD 44135). The project was reviewed by the Regional Committee for Medical and Health Research Ethics (REK 2015/1443 A) concluding that according to the Act on medical and health research (the Health Research Act 2008), the study did not require extensive review. All participants signed informed consent for participation following the Helsinki Declaration.

2.3 Outcome measures

A standardized electronic survey was answered by 250 at start-up, and 224, 213, and 187 after three, six, and 12 months follow-up, respectively. A total of 184 participants answered at all time-points. Losses to follow-up included life situation (n = 16), injury/disease (n = 6), relocation (n = 1) and unknown reasons (n = 43).

The questionnaire contained 52 questions at start-up and 65 questions at three, six, and 12 months. Additional questions at three, six, and 12 months covered exercise habits, use of the fitness club, and customer satisfaction. All questions were close-ended, and the survey took approximately 25 minutes to complete at each time-point. On all questions, the participants could tick “Does not apply” or “I do not want to answer”, which was treated as missing data in the analysis. For the present study, the participants answered questions concerning background and health factors (such as age, gender, total household income, occupation, and education), and psychosocial factors (self-efficacy, social support, life satisfaction, and perceived motives) at start-up. At three, six, and 12 months follow-up, the participants reported on the same psychosocial factors, as well as customer satisfaction and exercise attendance. We asked the participants to answer the questions over the last four weeks, due to potential recall bias associated self-report (Vetter and Mascha 2017). The questionnaire sections used to answer the present study aims are shown in Table 1.

Table 1 summarize questions and response options used to answer the present study aim. Assessment of self-efficacy was based on a validated version of the Self-Efficacy Survey (Sallis et al. 1988). The questionnaire assesses how confident an individual is to increase or continue with regular exercise in a wide range of conditions. The original scale consists of two subscales, with a total of 12 statements (Sallis et al. 1988). Each subscale covers four to eight statements where the participants rated each statement on a five-point scale. For each subscale, a sum score (from 1 to 5) was calculated by adding scores from each statement, divided by the number of statements.

Social support for exercise was based on a modified validated version of a social support questionnaire developed by Sallis et al. (Sallis et al. 1987), consisting of 13 statements concerning social support. The individuals rate each statement on how often, on a five-point scale, their family or friends have been supportive of them exercising. Due to seven statements considered with similar wording (such as “Asked me for ideas on how they can get more exercise” and “Discussed exercise with me”), six out of the total 13 statements were used in the present study. Since the questionnaire as a whole was comprehensive, the two sections family and friends were also merged. The scoring on the six statements was assembled, and a total social support score was calculated (from 6 to 30), where higher scores demonstrated greater social support for exercise.

The questionnaire section regarding life satisfaction was based on the validated Satisfaction of Life Scale (SWLS) (Diener et al. 1985), a short survey assessing satisfaction with the individuals` life as a whole. SWLS contains five statements that the individual rates on a seven-point scale and a total

score is calculated by adding scores from each statement (from 5 to 35), where higher scores demonstrated higher life satisfaction.

Perceived motives for exercise were based on the validated Exercise Motivations Inventory-2 (EMI-2) (Markland and Ingledew 1997), assessing a broad range of exercise motives. The original EMI-2 comprises 14 subscales, with a total of 51 statements (Markland and Ingledew 1997). Each subscale contains one to four statements where the individuals rate the significance of each statement as a personal motive for exercise on a six-point scale. A sum score (from 0 to 5) for each subscale is calculated by adding scores from each statement, divided by the number of statements. We have previously reported that total score of life satisfaction and five motivational subscales were significantly higher in regular exercisers compared with non-regular exercisers. Hence, in this study, total score of life satisfaction and the five motivational subscales were included (Table 1).

Data on customer satisfaction was based on a former questionnaire used in a Danish fitness club setting (Pedersen et al. 2011 in Danish), containing 15 statements. We categorized the statements into four subscales, including two to five statements in each subscale. The participants rated how satisfied they were with the fitness club`s functioning, on a five-point scale. By adding the score from each statement divided by the number of statements, a sum-score (from 1 to 5) for each subscale was calculated.

The questionnaire sections concerning Exercise Self-efficacy Scale, social support for exercise, SWLS, and EMI-2 were translated into Norwegian by three members of the research group, using a forward-backward translation technique. A bilingual Australian Associate Professor with English as mother tongue assured the final questionnaire sections by comparing the “new” English version” with the original version. Based on this, some adjustments were made.

To obtain data on exercise attendance the participants reported on exercise frequency at the fitness club (Table 1). In line with definitions from Hawley-Hague (Hawley-Hague et al. 2016) and due to that ≥2 exercise sessions/week may improve physical fitness in novice exercisers (Garber et al. 2011), in the analysis, we divided the participants at each time-point into regular exercise attendance: reporting ≥2 exercise sessions/week and non-regular exercise attendance: reporting ≤1 exercise session/week, exercise dropout, or membership dropout.

2.4 Statistical analysis

Data were analyzed using SPSS (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp) and STATA Statistical Software (StataCorp. Released 2019. Stata Statistical Software, Version 16.0. TX: StataCorp LP.). An independent t-test for continuous variables, chi-squared test for proportions, or a repeated measures ANOVA were used as appropriate.

We also calculated Cohen's D effect size to determine what potential group differences practically mean (Cohen 1988).

Pearson's correlation coefficient was calculated for the association between the psychosocial factors, customer satisfaction, and exercise attendance. At each follow-up, Pearson's correlation coefficients revealed correlations between regular exercise attendance and six psychosocial factors. Hence, we decided to use a mixed effects logistic regression with exercise attendance as a binary response variable (1 = regular exercise attendance, 0 = non-regular exercise attendance), to estimate the odds of regular exercise attendance associated with the six psychosocial factors as independent variables (Jaeger, 2008). Independent variables tested in the full model were; self-efficacy ("sticking to it" and "making time for exercise"), social support, and three motivational subscales ("revitalisation", "enjoyment", and "challenge"). Based on significant differences between regular and non-regular exercisers, the model was adjusted for two background factors (gender and BMI classification). The model included a random intercept to account for unmeasured individual differences in the probability of exercise attendance. Few (n = 31) were categorized as regular exercisers throughout all the follow-ups, hence, this sample size was not large enough for the regression analysis. The mixed effects logistic regression therefore contained data from three, six, and 12 months, including 228 participants with 2.6 observations (time-points) on average.

Results are presented as means ± SD, or frequencies (n) and percentages, correlations coefficient (r), odds ratio (OR), 95% CI for OR, and effect sizes (d). Effect sizes were interpreted as small (0.20), medium (0.50), and large (0.80) (Cohen, 1988). A two-tailed alpha level of 0.05 was used for statistical significance and was adjusted as appropriate for the mixed effects logistic regression ($p = \leq 0.01$).

3 Results

Most of the participants (78.4%) was of Norwegian descent, with a mean age of 36.4 ± 11.3 years. The distribution of regular exercise attendance (≥ 2 sessions/week at the gym) at three, six, and 12 months were as follows: 51.8%, 37.6%, and 37.4%. About 17% reported regular exercise attendance at all time-points. At 12 months follow-up, 86.6% were still fitness club members. More data on background and health factors, physical fitness, PA level, and exercise attendance are described elsewhere (Gjestvang et al. 2020a; Gjestvang et al. 2017, 2019; Haakstad et al. 2020; Heiestad et al. 2020).

At each follow-up, an independent t-test showed that the self-efficacy subscales "sticking to it" (mean diff: 0.60 to 0.74, d = 0.28 to 0.71) and "making time for it" (mean diff: 0.41 to 0.54, d = 0.32 to 0.55), social support (mean diff: 2.15 to 2.54, d = 0.17 to 0.54), and three motivational subscales (("revitalisation" (mean diff: 0.45 to 0.69, d = 0.38 to 0.59), "enjoyment" (mean diff: 0.85 to 0.91, d = 0.48 to 0.70), and "challenge" (mean diff: 0.74 to 0.79, d = 0.45 to 0.56)) were rated higher among those classified with regular exercise attendance compared with those attending non-regularly ($p = \leq 0.01$). Pearson's correlation coefficients also revealed that these six psychosocial factors were positively associated with regular exercise attendance, with correlations (r) ranging from 0.17 to 0.38 (Table 2).

When putting all significant psychosocial factors into one model, adjusting for gender and BMI classification, a mixed-effects logistic regression showed that participants with a higher score in the motive "enjoyment", self-efficacy ("sticking to it"), and social support were more likely to report regular exercise attendance (Table 3). The strongest predictor of reporting regular exercise attendance was higher levels of the motive "enjoyment" (OR = 1.84), followed by self-efficacy "sticking to it" (OR = 1.73) and social support (OR = 1.16).

All participants were generally pleased with the member service, and no differences were found between regular and non-regular exercise attendance at the different time-points (Table 4). "Group exercise classes/instructors" (3.7 to 4.0) and "personal trainers" (3.5 to 3.9) were rated highest at each time-point. There was a drop in satisfaction score for "service" (3.6 and 3.4, mean diff: 0.21, $p = <0.001$) and "group exercise classes/instructors" (4.0 and 3.7, mean diff: 0.26, $p = 0.045$) from three to 12 months follow-up.

4 Discussion

The main finding in our study was that higher levels of the motive "enjoyment", self-efficacy ("sticking to it"), and social support were the strongest predictors associated with reporting regular exercise attendance throughout the first year of a fitness club membership. We found no association between customer satisfaction and regular exercise attendance. The findings in this study were in line with our hypothesis, that self-efficacy, perceived motives considered as intrinsic, and social support would be higher in those reporting regular exercise attendance than those exercising irregularly. This indicates that among novice exercisers in a fitness club setting, higher levels of self-efficacy, intrinsic motives, and social support have the potential to positively influence exercise attendance.

Our results mirror studies of general PA among both children and adults in that motivation, self-efficacy, and social support are three of the strongest factors associated with PA behavior (Ayotte et al. 2010; Bauman et al. 2012; Choi et al. 2017; Greaves et al. 2011; Rhodes et al. 2017b; Scarapicchia et al. 2017). Comparable results are also found in the scarce literature concerning the fitness club industry, with one cross-sectional study (Kathrins and Turbow 2010) and two prospective studies (Jekauc et al. 2015; Kopp et al. 2020) reporting that gym members with higher levels of self-efficacy, motives considered as intrinsic, as well as social support, were more likely to exercise regularly. Despite different study design and questionnaires than in our study, this suggests that members with intrinsic motivation may have a more autonomous foundation contributing to sustained exercise compared with members with more controlled motivation (such as extrinsic reasons for exercise) (Teixeira et al. 2012; Rodrigues et al. 2018). Kopp et al. (2020) found that controlled motivation was unrelated to use of the fitness club, whereas intrinsic motivation predicted self-reported attendance at the gym (Kopp et al. 2020). That said, there is no conclusive evidence that implicates the direction of causality in our findings. For instance, we cannot determine whether participants reporting regular exercise attendance were exercising because they had higher levels of self-efficacy, or whether they scored higher on self-efficacy since they exercised and perceived a feeling of mastery (Jekauc et al. 2015; Mikkelsen et al. 2017).

The way members perceive encouragement by significant others may create a strong normative support, and past experience with exercise might influence self-efficacy for exercise (Rhodes et al. 2017a). It is also proposed that social support positively influence exercise attendance by improving self-efficacy for exercise (Ayotte et al. 2010). Hence, initiating supervised group activities and social support in a safe setting with qualified instructors, may aid compliance to exercise among fitness club members (Hancox et al. 2018; Rodrigues et al. 2018). One study found higher exercise adherence in participants conducting a 12 weeks resistance exercise program with supervision from a personal trainer, compared with those exercising individually (Rustaden et al. 2017). A personal trainer may support the member in setting up easily achievable goals that may help improve self-efficacy and to focus on making exercise "enjoyable" instead of focusing on burning calories or weight loss (Rhodes et al. 2017a; Rodrigues et al. 2018). Yet, to date, the evidence is scarce regarding a personal trainer`s influence on an individual's exercise behavior. We also believe that most novice exercisers may have a low level of knowledge on how to perform endurance and resistance exercise and implementation of exercise habits in their everyday life. Thus, it may be important to guide members in exercise planning and how to self-monitor progress towards personal goals, preferably with a cognitive-behavioral approach (Rhodes et al. 2017a). For instance, Annesi (2003) investigated new fitness club

members receiving a 36-week cognitive-behavioral change treatment (guidance in goal setting, relapse prevention, and self-reinforcement) or a typical exercise counseling (guidance around types and dose of exercise) (Annesi 2003). Their findings showed that the treatment group had higher exercise attendance (55% versus 36%) and less dropout (20% versus 55%) compared to the control group (Annesi 2003).

Even though regular exercisers scored higher on the motive "enjoyment", self-efficacy ("sticking to it"), and social support compared with non-regular exercisers, the distribution of regular exercise attendance decreased throughout the follow-up from 52% to 37%. Further, only 17% reported exercise at all time-points, an interesting finding considering that 86.6% were still gym members after one year. Hence, they paid a monthly membership fee to the club without using its facilities. One explanation for the high number of membership retention may be that most participants in the current study reported purchasing a 12-month contract that could not be canceled. It can be questioned whether a financial commitment and access to exercise equipment contribute to regular exercise. Based on the many positive health benefits of exercise (Rhodes et al. 2017a), the low prevalence of regular exercise attendance among fitness club members is worrying (Gjestvang et al. 2020a; Gjestvang et al. 2020b; Middelkamp et al. 2016; Sperandei et al. 2016). One explanation for the decrease in regular exercise attendance in our study may be seasonal variation, especially in participants recruited during fall/winter. Other authors have shown among the general US adult population that weekly PA level was greater during spring and summer than winter and fall (Pivarnik et al. 2003). However, the contrary may happen in Scandinavia. Due to low outdoor temperature, a member may have a medium to high exercise attendance at the gym during winter and fall, with a decreasing attendance during spring and summer because of more participation in outdoor activities. We have previously shown that when we combined exercise attendance both at the fitness club and at other arenas, the attendance rate was still decreasing throughout the follow-up (Gjestvang et al. 2020a). Hence, another explanation may be that some authors have reported that in individuals who experience a decrease in social support by family/friends or self-efficacy, this may lead to decreased exercise attendance (Bauman et al. 2012; Martikainen et al. 2002). Numerous research among young adults has also shown that a decrease in social support from significant others and self-efficacy to cope with barriers may be one explanation for a decline in PA level (Keating et al. 2005). As shown in our study, we believe that even minor changes in perceived motivation, self-efficacy, and social support may affect exercise attendance. We suggest that this should be emphasized in the fitness club industry, to counteract the poor exercise adherence among the 184 million individuals exercising in fitness clubs worldwide (IHRSA 2020).

We did not find any association between customer satisfaction and regular exercise attendance at the fitness club, and this contrasts studies showing that regular use of the gym reflects the members` satisfaction with the services offered (Ferrand et al. 2010; Gocłowska and Piątkowska 2017). The fitness club chain we used to recruit participants focuses largely on customer satisfaction to provide strong customer relationships. The gyms offer several exercise concepts, a wide range of exercise equipment, group exercise classes, personal training, and in addition, long reception opening hours and childcare. Thus, these factors are possibly satisfying the member`s specific needs. Hence, we were not surprised that most participants reported medium to high customer satisfaction, which could explain the low membership dropout at 12 months follow-up (13.4%).

4.1 Strengths and limitations

A sample size of 250 participants, equally men and women, an electronic questionnaire primarily based on former validated surveys (Diener et al. 1985; Markland and Ingledew 1997; Sallis et al. 1988; Sallis et al. 1987), several follow-ups during the first year of fitness club membership, as well as a high response rate at all follow-ups (n = 184, 73.6%) may be considered strong aspects of our study. Even though long-term regular exercise attendance might have to be verified in more than one year, our one-year design made it possible to collect data in a longer time frame than previous research. Study limitations are that we gathered exercise attendance by self-report, with no objective data (such as membership card swipes) and that we should have included members from different fitness club segments. Hence, the generalizability of our findings to other gyms such as low-cost and Crossfit gyms are therefore uncertain. For instance, it may be differences in background factors (such as age, household income, and occupation), motivation, and self-efficacy between those joining a multipurpose fitness club and those joining a low-cost gym. Also, a multipurpose gym focus to a large extent on customer satisfaction compared with a low-cost gym. Even though we used a forward-backward translation technique for the questionnaire sections concerning self-efficacy, social support, life satisfaction, and motives, another limitation is that these instruments were not psychometrically tested and evaluated for the Norwegian language or a fitness club setting. Further, very few (n = 31, 17%) reported regular exercise attendance at all follow-ups, hence, our statistical power to conduct prospective data analyses was limited. Lastly, our quantitative design with numeric results may be too narrow to explain the complex aspect of exercise behavior.

5 Conclusion

Among novice fitness club members, those exercising regularly at three, six, and 12 months had higher scores on the motive “enjoyment” and self-efficacy (“sticking to it”). Also, social support from family and friends was greater in those reporting regular exercise. Our results show that most new fitness club members use the gym intermittently and do not achieve a regular exercise behavior. Hence, there is a need for research investigating possible effective interventions in a fitness club setting, contributing to that members find interest and time to incorporate exercise in their everyday lives, as such prevent abandonment of exercise.

6 Acknowledgement

We would like to thank Morten Fagerland, professors in biostatistics, Norwegian School of Sports Sciences for important guidance and help with the data analysis.

7 Funding

This work was supported by the Norwegian School of Sport Sciences, Department of Sport Medicine, Norway, and did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

8 Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

9 Author contribution

LAHH conceived the idea for the research project, supervised the project and wrote the protocol together with CG, FA, and TS. CG was responsible for participant follow-up, data collection and analysis, and outlined the manuscript. LAHH, FA and TS contributed to interpretation of data, and revised the manuscript critically for important intellectual content, including English editing. All authors read and corrected draft versions of the manuscript and approved the final version.

10 References

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.

Ayotte, B. J., Margrett, J. A., and Hicks-Patrick, J. 2010. "Physical Activity in Middle-aged and Young-old Adults The Roles of Self-efficacy, Barriers, Outcome Expectancies, Self-regulatory Behaviors and Social Support." *Journal of Health Psychology* 15 (2): 173-185. https://doi.org/10.1177/1359105309342283. <Go to ISI>://WOS:000275233400002.

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., and Martin, B. W. 2012. "Correlates of physical activity: why are some people physically active and others not?" *Lancet* 380 (9838): 258-71. https://doi.org/10.1016/S0140-6736(12)60735-1. https://www.ncbi.nlm.nih.gov/pubmed/22818938.

Bize, R., Johnson, J. A., and Plotnikoff, R. C. 2007. "Physical activity level and health-related quality of life in the general adult population: a systematic review." *Prev Med* 45 (6): 401-15. https://doi.org/10.1016/j.ypmed.2007.07.017. https://www.ncbi.nlm.nih.gov/pubmed/17707498.

Choi, J., Lee, M., Lee, J. K., Kang, D., and Choi, J. Y. 2017. "Correlates associated with participation in physical activity among adults: a systematic review of reviews and update." *BMC Public Health* 17 (1): 356. https://doi.org/10.1186/s12889-017-4255-2. https://www.ncbi.nlm.nih.gov/pubmed/28438146.

Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. USA, New York: Routledge.

Diener, E., Emmons, R. A., Larsen, R. J., and Griffin, S. 1985. "The Satisfaction with Life Scale." *Journal of Personality Assessment* 49 (1): 71-75. https://doi.org/DOI 10.1207/s15327752jpa4901_13. <Go to ISI>://WOS:A1985AEV0700014.

Ferrand, A., Robinson, L., and Valette-Florence, P. 2010. "The Intention-to-Repurchase Paradox: A Case of the Health and Fitness Industry." *Journal of Sport Management* 24 (1): 83-105. https://doi.org/DOI 10.1123/jsm.24.1.83. <Go to ISI>://WOS:000275025700005.

Garber, CE., Blissmer, B., Deschenes, MR., Franklin, BA., Lamonte, MJ., Lee, IM., et al. 2011. "American College of Sports Medicine position stand. 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 (7): 1334-59.

Gillison, F. B., Skevington, S. M., Sato, A., Standage, M., and Evangelidou, S. 2009. "The effects of exercise interventions on quality of life in clinical and healthy populations; a meta-analysis." *Social Science & Medicine* 68 (9): 1700-10. https://doi.org/10.1016/j.socscimed.2009.02.028. https://www.ncbi.nlm.nih.gov/pubmed/19297065.

Gjestvang, C., Abrahamsen, F., Stensrud, T., and Haakstad, L. A. H. 2020a. "Motives and barriers to initiation and sustained exercise adherence in a fitness club setting - a one-year follow-up study." *Scandinavian Journal of Medicine & Science in Sports.* 30 (9): 1796-1805. https://doi.org/10.1111/sms.13736. https://www.ncbi.nlm.nih.gov/pubmed/32488898.

Gjestvang, C., Stensrud, T., and Haakstad, L.A.H. 2017. "How is rating of perceived capacity related to VO2max and what is VO2max at onset of training?" *BMJ Open Sport & Exercise Medicine* 3 (1): 1-7.

511 Gjestvang, C., Stensrud, T., and Haakstad, L.A.H. 2019. "Are changes in physical fitness, body
512 composition and weight associated with exercise attendance and dropout among fitness club
513 members? Longitudinal prospective study." *BMJ Open Sport & Exercise Medicine* 9 (4): 1-9.

514 Gjestvang, C., Stensrud, T., Paulsen, G., and Haakstad, L.A.H. 2020b. "Stay true to your workout:
515 Does repeated physical testing boost exercise attendance? A one-year follow-up study."
516 *Accepted for publication in Journal of Sports Science and Medicine.*

517 Gocłowska, S., and Piątkowska, M. 2017. "Service Satisfaction and Sport Consumption in The
518 Fitness Center in Warsaw." *European Journal of Service Management.* 22 (2): 31-37.

519 Greaves, C. J., Sheppard, K. E., Abraham, C., Hardeman, W., Roden, M., Evans, P. H., et al. 2011.
520 "Systematic review of reviews of intervention components associated with increased
521 effectiveness in dietary and physical activity interventions." *BMC Public Health* 11.

522 Haakstad, L.A.H., Gjestvang, C., Lamerton, T., and Bø, K. 2020. "Urinary incontinence in a fitness
523 club setting—is it a workout problem?" *International Urogynecology Journal.*
524 https://doi.org/https://doi.org/10.1007/s00192-020-04253-0.

525 Hancox, JE., Quested, E., Ntoumanis, N., and Thøgersen-Ntoumani, C. 2018. "Putting self-
526 determination theory into practice: application of adaptive motivational principles in the
527 exercise domain." *Qualitative Research in Sport, Exercise and Health* 10 (1): 75-91.
528 https://doi.org/10.1080/2159676X.2017.1354059.

529 Hawley-Hague, H., Horne, M., Skelton, D.A., and Todd, C. 2016. "Review of how we should define
530 (and measure) adherence in studies examining older adults' participation in exercise classes."
531 *BMJ Open Sport & Exercise Medicine* 6: 6. https://doi.org/10.1136.

532 Heiestad, H., Gjestvang, C., and Haakstad, L. A. H. 2020. "Investigating self-perceived health and
533 quality of life: a longitudinal prospective study among beginner recreational exercisers in a
534 fitness club setting." *BMJ Open* 10: 1-8.

535 IHRSA. 2020. The International Health Racquet & Sportsclub Association. The IHRSA Global
536 Report 2020. Available from: https://www.ihrsa.org/publications/the-2020-ihrsa-global-
537 report/#.

538 Jekauc, D., Volkle, M., Wagner, M. O., Mess, F., Reiner, M., and Renner, B. 2015. "Prediction of
539 attendance at fitness center: a comparison between the theory of planned behavior, the social
540 cognitive theory, and the physical activity maintenance theory." *Frontiers in Psychology* 6: 1-
541 10.

542 Kathrins, BP., and Turbow, DJ. 2010. "Motivation of fitness center participants toward resistance
543 training." *The Journal of Strength & Conditioning Research* 24 (9): 2483-90.

544 Keating, X. D., Guan, J., Pinero, J. C., and Bridges, D. M. 2005. "A meta-analysis of college
545 students' physical activity behaviors." *J Am Coll Health* 54 (2): 116-25.
546 https://doi.org/10.3200/JACH.54.2.116-126.
547 https://www.ncbi.nlm.nih.gov/pubmed/16255324.

548 Kopp, P. M., Senner, V., Kehr, H. M., and Gropel, P. 2020. "Achievement motive, autonomous
549 motivation, and attendance at fitness center: A longitudinal prospective study." *Psychology of*
550 *Sport and Exercise* 51.

551 Markland, D., and Ingledew, D.K. 1997. "The measurement of exercise motives: factorial validity
552 and invariance across gender of a revised exercise motivations inventory." *British Journal of*
553 *Health Psychology* 2: 361-376.

554 Martikainen, P., Bartley, M., and Lahelma, E. 2002. "Psychosocial determinants of health in social
555 epidemiology." *International Journal of Epidemiology* 31 (6): 1091-3.
556 https://doi.org/10.1093/ije/31.6.1091. https://www.ncbi.nlm.nih.gov/pubmed/12540696.

557 Mayo, X., Liguori, G., Iglesias-Soler, E., Copeland, R. J., San Emeterio, I. C., Lowe, A., et al. 2019.
558 "The active living gender's gap challenge: 2013-2017 Eurobarometers physical inactivity data
559 show constant higher prevalence in women with no progress towards global reduction goals."
560 *BMC Public Health* 19 (1).

561 Middelkamp, J., Rooijen M., and B., Steenbergen. 2016. "Attendance Behavior of Ex-members in
562 Fitness Clubs: A Retrospective Study Applying the Stages of Change." *Perceptual and Motor*
563 *Skills* 122 (1): 350-359.

564 Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., and Apostolopoulos, V. 2017.
565 "Exercise and mental health." *Maturitas* 106: 48-56.
566 https://doi.org/10.1016/j.maturitas.2017.09.003.
567 https://www.ncbi.nlm.nih.gov/pubmed/29150166.

568 Pedersen, C., Jensen, DC., and Sørensen, J. 2011 in Danish. "SATS medlemsundersøgelse med
569 henblik på at belyse fysisk aktivitetsniveau og træning i fitnesscenter." *Syddansk Universitet*.

570 Pivarnik, J. M., Reeves, M. J., and Rafferty, A. P. 2003. "Seasonal variation in adult leisure-time
571 physical activity." *Medicine and Science in Sports and Exercise* 35 (6): 1004-1008.
572 https://doi.org/10.1249/01.Mss.0000069747.55950.B1. <Go to
573 ISI>://WOS:000183385500016.

574 Rhodes, R. E., Janssen, I., Bredin, S. S. D., Warburton, D. E. R., and Bauman, A. 2017a. "Physical
575 activity: Health impact, prevalence, correlates and interventions." *Psychology & Health* 32
576 (8): 942-975. https://doi.org/10.1080/08870446.2017.1325486.
577 https://www.ncbi.nlm.nih.gov/pubmed/28554222.

578 Rhodes, R. E., Lubans, D. R., Karunamuni, N., Kennedy, S., and Plotnikoff, R. 2017b. "Factors
579 associated with participation in resistance training: a systematic review." *British Journal of*
580 *Sports Medicine* 51 (20): 1466-1472. https://doi.org/10.1136/bjsports-2016-096950.
581 https://www.ncbi.nlm.nih.gov/pubmed/28404558.

582 Rodrigues, F., Bento, T., Cid, L., Neiva, H. P., Teixeira, D., Moutao, J., et al. 2018. "Can
583 Interpersonal Behavior Influence the Persistence and Adherence to Physical Exercise Practice
584 in Adults? A Systematic Review." *Frontiers in Psychology* 9.

585 Rustaden, A. M., Haakstad, L. A. H., Paulsen, G., and Bø, K. 2017. "Effects of BodyPump and
586 resistance training with and without a personal trainer on muscle strength and body
587 composition in overweight and obese women-A randomised controlled trial." *Obesity*
588 *Research & Clinical Practice* 11 (6): 728-739.

589 Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., and Nader, P. R. 1987. "The
590 development of scales to measure social support for diet and exercise behaviors." *Prev Med*
591 16 (6): 825-36.

592 Sallis, J. F., Pinski, R. B., Grossman, R. M., Patterson, T. L., and and Nader, P. R. 1988. "The
593 development of self-efficacy scales for health-related diet and exercise behaviors." *Health*
594 *Education Research.* 3: 283-292.

595 Sas-Nowosielski, K., and Szopa, S. 2015. "Self-regulation strategies used by men and women
596 attending to fitness clubs." *Baltic Journal of Health and Physical Activity* 7 (3): 23-28.

Scarapicchia, T. M. F., Amireault, S., Faulkner, G., and Sabiston, C. M. 2017. "Social support and physical activity participation among healthy adults: a systematic review of prospective studies." *International Review of Sport and Exercise Psychology* 10 (1): 50-83. https://doi.org/10.1080/1750984x.2016.1183222. <Go to ISI>://WOS:000408020100002.

Sperandei, S., Vieira, M. C., and Reis, A. C. 2016. "Adherence to physical activity in an unsupervised setting: Explanatory variables for high attrition rates among fitness center members." *Journal of Science and Medicine in Sport* 19 (11): 916-920. https://doi.org/10.1016/j.jsams.2015.12.522. <Go to ISI>://WOS:000388544200011.

Teixeira, PJ., Carraca, EV., Markland, D., Silva, MN., and Ryan, RM. 2012. "Exercise, physical activity, and self-determination theory: a systematic review." *International Journal of Behavioral Nutrition and Physical Activity* 9: 78.

Thogersen-Ntoumani, C., and Ntoumanis, N. 2006. "The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations." *Journal of Sports Science and Medicine* 24 (4): 393-404.

Vetter, T. R., and Mascha, E. J. 2017. "Bias, Confounding, and Interaction: Lions and Tigers, and Bears, Oh My!" *Anesthesia & Analgesia* 125 (3): 1042-1048. https://doi.org/10.1213/ANE.0000000000002332. https://www.ncbi.nlm.nih.gov/pubmed/28817531.

Warburton, D. E. R., and Bredin, S. S. D. 2017. "Health benefits of physical activity: a systematic review of current systematic reviews." *Current Opinion in Cardiology* 32 (5): 541-556. https://doi.org/10.1097/HCO.0000000000000437. https://www.ncbi.nlm.nih.gov/pubmed/28708630.

Table 1. *Psychosocial factors and customer satisfaction.*

	Specifics	Questions/statements	Response options†	Scores
Background*		Age, gender, body weight, level of education, total household income, cohabitation and occupation.	-	-
Self-efficacy**	Twelve statements on how confident an individual was in a range of conditions. Statements were divided into two subscales, and a sum score for each subscale was calculated.	**Sticking to it:** *"Stick to your exercise program after a long, tiring day at work", "Exercise even though you are feeling depressed", "Continue to exercise with others even though they seem too fast or too slow for you", "Stick to your exercise program when undergoing a stressful life change (e.g., divorce, death in the family, moving)", "Stick to your exercise program when your family is demanding more time from you", "Stick to your exercise program when you have household chores to attend to", "Stick to your exercise program even when you have excessive demands at work", "Stick to your exercise program when social obligations are very time consuming".* **Making time for exercise:** *"Get up early, even on weekends, to exercise", "Set aside time for a physical activity program; that is walking, jogging. swimming, biking, or other continuous activities for at least 30 minutes, 3 times per week", "Attend a party only after exercising", "Read or study less in order to exercise more".*	*"1 I know I cannot", "2", "3 Maybe I can", "4", "5 I know I can".*	1 to 5. Higher scores indicate greater self-efficacy for exercise.
Social support**	Six statements regarding how often, over the previous four weeks, an individual's family/friends had been supportive of them exercising. All statements were amassed, and total score was calculated.	*"Exercised with me", "Gave me encouragement. to stick with my exercise program", "Complained about the time I spend exercising", "Planned for exercise on recreational outings", "Helped plan activities around my exercise", "Asked me for ideas on how they can get more exercise".*	*"1 None", "2 Rarely", "3 A few times", "4 Often", "5 Very often".*	6 to 30. Higher scores demonstrate greater social support for exercise.
Motives§**	Thirty five statements on how a motive was a personal motive for exercise. Statements were allocated into 14	**Enjoyment:** *"Because I feel at my best when exercising", "For enjoyment of the experience of exercising", "Because I find exercising satisfying in and of itself", "Because I enjoy the feeling of exerting myself".* **Challenge:** *"To give me goals to work towards", "To give me personal challenges to face", "To develop personal skills".* **Revitalisation:**	*"0 Not at all true for me", "1", "2", "3", "4", "5 Very true for me".*	0 to 5. Greater score indicates the importance of a motive.

	subscales, and a sum score for each subscale was calculated.	*"Because it makes me feel good", "To recharge my batteries".* **Stress management:** *"To give me space to think", "Because it helps to reduce tension", "To help manage stress".* **Affiliation:** *"To make new friends", "To spend time with friends and to enjoy the social aspects of exercising", "To have fun being active with other people".*		
Life satisfaction§**	Five statements related to satisfaction with the individuals` life as a whole. All statements were amassed, and a total score was calculated.	*"In most ways my life is close to my ideal", "The conditions of my life are excellent", "I am satisfied with life", "So far I have gotten the important things I want in life", "If I could live my life over, I would change almost nothing".*	*"1 Strongly Disagree", "2 Disagree", "3 Slightly Disagree", "4 Neither Agree nor Disagree", "5 Slightly Agree", "6 Agree", "7 Strongly Agree".*	5 to 35. Higher score demonstrates higher life satisfaction.
Customer satisfaction***	Fifteen statements on how satisfied the individual was with the fitness club. Statements were assembled into four areas of the club`s functioning, and a sum score for each was calculated.	*"How satisfied are you with the following conditions at your fitness center?":* **Service:** *"Introduction and guidance", "Opening hours", "price of membership fee", "Service quality", "The atmosphere".* **Facilities:** *"Square meters", "Wardrobes", "Parking conditions", "Maintenance and cleaning", "Quality of equipment".* **Group exercise classes/instructors:** *"Group exercise instructors", "Quality of group exercise classes", "Group exercise class schedule".* **Personal trainers:** *"Personal trainers", "Quality of personal trainers".*	*"1 Very dissatisfied", "2 Dissatisfied", "3 Neutral", "4 Satisfied", "5 Very satisfied".*	1 to 5. Higher scores demonstrate greater service satisfaction.
Exercise attendance***		*"Have you been exercising regularly?", "How often have you exercised per week on average at the fitness club?".*	*"Yes"* or *"No"*, and *"number of sessions".*	-

***Answered at start-up of fitness club membership, **Answered at all time-points, ***Answered after three, six and 12 months follow-up, §Total score of life satisfaction and five motivational subscales significantly higher in regular exercisers (≥2 exercise sessions/week) compared with non-regular exerciser in our previous research were included in the present study.**

Table 2. *Pearson's correlations between regular exercise attendance and psychosocial factors and service satisfaction.*

	Regular Exercise Attendance		
	Three months (n = 224)	**Six months (n = 213)**	**12 months (n = 187)**
Self-efficacy			
Sticking to it	0.38**	0.29**	0.30**
Making time for exercise	0.24**	0.25**	0.18*
Social Support	0.24**	0.27**	0.25**
Motives			
Enjoyment	0.31**	0.32**	0.30**
Challenge	0.24**	0.23**	0.26**
Revitalisation	0.18**	0.17*	0.27**
Stress Management	0.18**	0.21**	0.10
Affiliation	0.12	0.25**	0.13
Life Satisfaction	0.04	-0.001	0.21**
Service Satisfaction			
Service	-0.04	0.11	0.01
Facilities	0.02	-0.04	-0.02
Group exercise classes/instructors	0.09	0.12	-0.02
Personal trainers	0.01	-0.10	0.08

***Correlations significant at the 0.05 level, **Correlations significant at the 0.01 level.**

Regular exercise attendance = ≥2 exercise sessions/week.

Table 3. *Mixed Effects Logistic Regression and Odds Ratio (OR) for reporting regular exercise attendance (n = 228).*

Factor	OR	p	95% CI* for OR	
			Lower	Upper
Gender (female)	0.92	0.772	0.52	1.63
BMI classification	0.97	0.450	0.90	1.05
Self-efficacy				
Sticking to it	1.73	0.002	1.22	2.46
Making time for exercise	1.09	0.563	0.81	1.47
Social support	1.16	<0.001	1.09	1.23
Motives				
Enjoyment	1.84	<0.001	1.35	2.50
Challenge	1.04	0.716	0.83	1.30
Revitalisation	0.76	0.079	0.56	1.03
Constant	0.01	<0.001	0.00	0.13

***Confidence interval.**

Regular exercise attendance = ≥2 exercise sessions/week

Table 4. *Customer satisfaction at the fitness club.*

Variable (1 to 5)				
Three months	**Regular exercise (n = 116)**	**Non-regular exercise (n = 108)**		
	mean ± SD	**mean ± SD**	**p**	**Cohen`s d**
Service	3.59 ± 0.76	3.65 ± 0.64	0.574	0.09
Facilities	3.42 ± 0.67	3.39 ± 0.75	0.793	0.04
Group exercise classes/instructors	4.02 ± 0.78	3.88 ± 0.75	0.276	0.18
Personal trainers	3.91 ± 1.14	3.89 ± 1.03	0.905	0.02
Six months	**Regular exercise (n = 80)**	**Non-regular exercise (n = 133)**		
Service	3.58 ± 0.80	3.40 ± 0.78	0.104	0.23
Facilities	3.31 ± 0.80	3.38 ± 0.75	0.547	0.09
Group exercise classes/instructors	4.04 ± 0.85	3.84 ± 0.75	0.175	0.25
Personal trainers	3.50 ± 1.28	3.76 ± 1.11	0.286	0.22
12 months	**Regular exercise (n = 70)**	**Non-regular exercise (n = 117)**		
Service	3.41 ± 0.83	3.39 ± 0.73	0.891	0.03
Facilities	3.24 ± 0.69	3.28 ± 0.79	0.721	0.05
Group exercise classes/instructors	3.24 ± 0.69	3.28 ± 0.79	0.721	0.05
Personal trainers	3.65 ± 1.32	3.43 ± 1.16	0.461	0.18

646 **Regular exercise attendance = ≥2 exercise sessions/week.**

Appendix 1

Overview of revealed studies according to STROBE Statement, the Quality Assessment Tool, and the PEDro rating scale.

Overview of the revealed observational studies according to STROBE Statement and The Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies, and the non-randomized interventions according to PEDro rating scale.

	STROBE Statement																
	Item No																
	1a	**1b**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12a**	**12b**	**12c**	**12d**	**12e**
Unger (1995) [51]	NR	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	Yes	Yes	NA	Yes	NR	NR
Ready (2005) [52]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	NR	Yes	Yes	Yes	NR	NR	NR
Thøgersen-Ntoumani (2006) [50]	NR	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Kaphingst (2007) [53]	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	NR	Yes	Yes	Yes	Yes	NA	NR
Prichard (2008) [54]	NR	Yes	Yes	Yes	Yes	Yes	CD	Yes	Yes	NR	NR	NR	NR	NR	NR	NA	NR
Schwetschenau (2008) [55]	NR	Yes	Yes	Yes	Yes	NR	CD	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	NA	NR
Ulseth (2008) [31]	NR	Yes	Yes	Yes	No	Yes	CD	CD	Yes	CD	NR	Yes	Yes	Yes	NR	NA	NR
Kathrins (2010) [56]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	CD	NR	Yes	Yes	Yes	NR	NA	NA
Mullen (2010) [57]	NR	Yes	Yes	Yes	Yes	NR	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	CD	NA	NA
Tappe (2013) [58]	NR	Yes	Yes	Yes	Yes	NR	CD	Yes	Yes	NR	NR	Yes	Yes	NR	Yes	NA	NA
Amireault (2014) [59]	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	NA	NA
Armitage (2005) [60]	Yes	Yes	Yes	Yes	Yes	Yes	CD	Yes	Yes	Yes	NR	Yes	Yes	Yes	CD	NR	NA
Vlachopoulos (2007) [49]	Yes	Yes	Yes	Yes	Yes	Yes	CD	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	NR	NA
Seelig (2011) [61]	NR	Yes	Yes	Yes	Yes	Yes	CD	Yes	Yes	NR	NR	Yes	Yes	Yes	CD	NR	NA
Jekauc (2015) [62]	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	NR	NR	NA
Kaushal (2015) [63]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	CD	NA

	STROBE Statement															
	Item No															
	13a	**13b**	**13c**	**14a**	**14b**	**14c**	**15**	**16a**	**16b**	**16c**	**17**	**18**	**19**	**20**	**21**	**22**

Unger (1995) [51]	Yes	NR	NR	Yes	NR	NA	Yes	NR	NR	NA	Yes	Yes	Yes	Yes	Yes	NR
Ready (2005) [52]	Yes	NR	NR	Yes	Yes	NA	Yes	Yes	NR	NA	Yes	Yes	NR	Yes	Yes	NR
Thøgersen-Ntoumani (2006) [50]	NR	NR	NR	NR	NR	NA	Yes	Yes	NR	NA	Yes	Yes	Yes	Yes	Yes	NR
Kaphingst (2007) [53]	Yes	Yes	NR	Yes	NR	NA	Yes	NR	Yes	NA	Yes	Yes	Yes	Yes	Yes	Yes
Prichard (2008) [54]	Yes	Yes	NR	NR	NR	NA	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	NR
Schwetschenau (2008) [55]	Yes	NR	NR	NR	No	NA	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	NR
Ulseth (2008) [31]	NR	NR	NR	NR	NR	NA	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	NR
Kathrins (2010) [56]	Yes	NR	NR	Yes	NR	NA	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	Yes
Mullen (2010) [57]	NR	NR	NR	Yes	NR	NA	Yes	Yes	Yes	NA	Yes	Yes	NR	Yes	Yes	NR
Tappe (2013) [58]	NR	NR	NR	Yes	NR	NA	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	CD	NR
Amireault (2014) [59]	Yes	NA	NR	Yes	NA	NA	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	NR
Armitage (2005) [60]	NR	NR	NR	NR	NR	Yes	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	NR
Vlachopoulos (2007) [49]	NR	NR	NR	NR	NR	Yes	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	NR
Seelig (2011) [61]	Yes	Yes	NR	Yes	NR	Yes	Yes	Yes	Yes	NA	Yes	Yes	CD	Yes	CD	NR
Jekauc (2015) [62]	NR	NR	NR	NR	CD	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	NR
Kaushal (2015) [63]	Yes	Yes	NR	Yes	CD	Yes	Yes	Yes	NR	NA	Yes	Yes	Yes	Yes	CD	NR

The Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies

	Item No													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Unger (1995) [51]	Yes	Yes	NR	CD	NR	NA	CD	NA	Yes	NA	Yes	No	NA	Yes
Ready (2005) [52]	Yes	Yes	NR	CD	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	NR
Thøgersen-Ntoumani (2006) [50]	Yes	Yes	NR	CD	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	CD
Kaphingst (2007) [53]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	NR
Prichard (2008) [54]	Yes	Yes	NR	CD	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	CD

Schwetschenau (2008) [55]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	Yes
Ulseth (2008) [31]	Yes	Yes	NR	CD	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	CD
Kathrins (2010) [56]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	CD
Mullen (2010) [57]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	Yes
Tappe (2013) [58]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	NR
Amireault (2014) [59]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	NA	Yes	No	NA	Yes
Armitage (2005) [60]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	No	Yes	No	CD	Yes
Vlachopoulos (2007) [49]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	No	Yes	No	CD	Yes
Seelig (2011) [61]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	No	Yes	No	CD	NR
Jekauc (2015) [62]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	No	Yes	No	NR	Yes
Kaushal (2015) [63]	Yes	Yes	NR	Yes	NR	NA	Yes	NA	Yes	No	Yes	No	NR	Yes

PEDro rating scale

	Item No										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Annesi (1998) [64]	Yes	No	NR	Yes	No	No	NA	NR	NR	Yes	Yes
Annesi (2003) [37]	Yes	CD	NR	Yes	No	No	NA	NR	NR	Yes	Yes

***Note. CD = cannot determine, NA = not applicable, NR = not reported**

Appendix 2

Questionnaire (start-up)

Deltakernummer

_____

Baseline

Kjære deltager,

Treningssentre er i dag en voksende bransje og en viktig arena for fysisk aktivitet. Vi vet svært lite om hvordan medlemmer bruker sentrene for å trene, samt hvilken rolle dette spiller i forhold til andre aktiviteter. Det er også liten kunnskap om hva som bidrar til mer aktivt bruk av senteret og hvordan det det kan legges til rette for at flest mulig opprettholder regelmessig og anbefalt fysisk aktivitet.
Ved å besvare dette spørreskjemaet bidrar du til å få frem nyttig kunnskap uansett om du er svært aktiv på et treningssenter eller ikke.

En liten oppfordring før du starter, vær ærlig - her er det ingen riktige eller gale svar!

Totalt vil spørsmålene ta ca. 30 minutter å besvare. Velg den svarkategorien som passer best for deg og sett kryss (marker) eller fyll ut på linje/boks.

På forhånd takk for hjelpen!

1. Kjønn

- ❑ Mann
- ❑ Kvinne

2. Alder (år)

_____

3. Fødeland

_____

4. Hva er din nåværende samlivsstatus?

- ❑ Bor alene uten barn
- ❑ Bor alene med barn
- ❑ Bor med ektefelle/samboer uten barn
- ❑ Bor med ektefelle/samboer med barn
- ❑ Annet

5. Hvor mange barn har du?

_____

6. Hva er din høyeste fullførte utdanning?

- ❑ Grunnskole
- ❑ Videregående skole, yrkesfag
- ❑ Videregående skole, allmennfag
- ❑ Høyskole/universitet mindre enn 4 år
- ❑ Høyskole/universitet mer enn 4 år
- ❑ Annen utdanning
- ❑ Ønsker ikke svare

7. Hva er din arbeidsstuasjon?

- ❑ Ansatt i offentlig virksomhet
- ❑ Ansatt i privat virksomhet
- ❑ Selvstendig næringsdrivende
- ❑ Student
- ❑ Lærling/yrkespraksis
- ❑ Attføring/ufør
- ❑ Arbeidssøkende/permittert
- ❑ Hjemmeværende
- ❑ Pensjonert
- ❑ Annet
- ❑ Ønsker ikke svare

8. Dersom du er i arbeid utenfor hjemmet, hvor stor prosentandel arbeider du (inkludert ev. lunsjpause, fastlagte timer, betalt overtid og annet ekstraarbeid)? Skriv prosenttallet.

_____

9a. Er du for tiden fraværende fra ditt vanlige arbeid?

- ❑ Ja
- ❑ Nei

9b. Dersom ja, hva er årsaken til fraværet (sett eventuelt flere kryss)?

- ❑ Sykemelding
- ❑ Permisjon
- ❑ Sykt barn
- ❑ Annet
- ❑ Ønsker ikke svare

9c. Dersom du er sykemeldt, hvor stor prosentandel er du sykemeldt? Skriv prosenttall.

_____

10. Hvor høy var husholdningens samlede bruttoinntekt siste år (ta med alle inntekter fra arbeid, trygder, sosialhjelp og lignende)?Sett et kryss.

- ❑ Under 125.000 kr
- ❑ 125.000-200.00 kr
- ❑ 201.000-300.00 kr
- ❑ 301.000-400.000 kr
- ❑ 401.000-550.000 kr
- ❑ 551.000-700.00 kr
- ❑ 701.000-850.000 kr
- ❑ Over 850.000 kr
- ❑ Ønsker ikke svare

Livsstil og helse

11. Hva er din kroppsvekt i dag (kg)?

_____

12. Hva er din kroppshøyde (centimeter)?

_____

13. Har du hatt større vektendringer (+/- 5kg) det siste året?

- ❑ Ja
- ❑ Nei

13a. Hvor stor har vektendringen vært?

Vektnedgang (i kilo) _____

Vektoppgang (i kilo) _____

13b. Har du prøvd å gå ned i vekt ved å faste eller ved lavkalori-diett?

- ❑ Aldri
- ❑ Sjelden
- ❑ Noen ganger
- ❑ Ofte
- ❑ Veldig ofte
- ❑ Ønsker ikke svare

13c. Jeg syns jeg er...

- ❑ Undervektig
- ❑ Normalvektig
- ❑ Overvektig
- ❑ Fet
- ❑ Ønsker ikke svare

14. Røyker du daglig?

- ❑ Ja
- ❑ Nei

14a. Omtrent hvor mange sigaretter røyker du per dag?

_____

15a. Hvor mange timer sover du vanligvis i løpet av et døgn?

	3 til 4 timer	4 til 5 timer	5 til 6 timer	6 til 7 timer	7 til 8 timer	8 til 9 timer	9 til 10 timer	Mer enn 10 timer
På en hverdag?	❑	❑	❑	❑	❑	❑	❑	❑
På en helgedag?	❑	❑	❑	❑	❑	❑	❑	❑

15b. På en skala fra 0-10, hvor 0 er svært dårlig og 10 er svært bra, hvordan vil du vurdere din søvnkvalitet?

0	1	2	3	4	5	6	7	8	9	10
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

16. Hvordan vil du vurdere din nåværende helse (sykdom, plager og/eller skader) i alminnelighet?

- ❑ Meget god
- ❑ God
- ❑ Noenlunde
- ❑ Dårlig
- ❑ Meget dårlig
- ❑ Vet ikke

17. Hadde du ved innmeldelse på treningssenteret generelle helseproblemer som smerte og/eller ubehag i kroppen (generelle helseproblemer i bevegelsesapparatet er forstått som smerter og/eller ubehag i ankel, kne, hofte/bekken, håndledd, albue, skulder, bryst/rygg, nakke, korsrygg)?

- ❑ Ja
- ❑ Nei
- ❑ Vet ikke

18. Har du blitt anbefalt å begynne med trening av din lege og/eller annet helsepersonell?

- ❑ Ja
- ❑ Nei
- ❑ Vet ikke
- ❑ Ønsker ikke svare

19. Helseproblemer de siste 4 uker Nå nevnes noen vanlige helseplager. Vi vil be deg om å vurdere hvert enkelt problem/symptom, og oppgi i hvilken grad du har vært plaget av dette i løpet av de siste 4 ukene.

	0 Ikke plaget	1 Litt plaget	2 Endel plaget	3 Alvorlig plaget	Ønsker ikke svare
Forkjølelse, influensa	❑	❑	❑	❑	❑
Hodepine	❑	❑	❑	❑	❑
Migrene	❑	❑	❑	❑	❑
Nakkesmerter	❑	❑	❑	❑	❑
Smerter i ryggen (øvre del av rygg og/eller korsrygg)	❑	❑	❑	❑	❑
Smerter i skuldre/armer	❑	❑	❑	❑	❑
Bekkenløsning	❑	❑	❑	❑	❑
Artrose (slitasjegikt)	❑	❑	❑	❑	❑
Brystsmerter og/eller hjertebank, ekstraslag	❑	❑	❑	❑	❑
Magesmerter	❑	❑	❑	❑	❑
Tarmproblematikk (løs avføring, diarè eller forstoppelse)	❑	❑	❑	❑	❑
Urinlekkasje	❑	❑	❑	❑	❑
Søvnproblemer	❑	❑	❑	❑	❑
Tretthet	❑	❑	❑	❑	❑
Angst	❑	❑	❑	❑	❑
Nedtrykt, depresjon	❑	❑	❑	❑	❑

19b.Dersom du på forrige spørsmål oppga å være fra litt til alvorlig plaget av urinlekkasje, når skjer dette (du kan sette flere kryss)?

- ❑ Når jeg er fysisk aktiv
- ❑ Når jeg må veldig på do
- ❑ Når jeg hoster og/eller nyser
- ❑ Når jeg ler
- ❑ Jeg har ikke urinlekkasje
- ❑ Ønsker ikke svare

20a. Vet du hva bekkenbunnstrening er?

- ❑ Ja
- ❑ Nei
- ❑ Vet ikke

20b. Har du gjort bekkenbunnstrening de siste 4 ukene?

- ❑ Ja
- ❑ Nei
- ❑ Vet ikke

20c. Hvor mange ganger i uken har du gjort bekkenbunnstrening? Skriv et tall for antall ganger.

_____

Kosthold og matvaner

Helsedirektoratet anbefaler et variert kosthold som inneholder mye grønnsaker, frukt og bær, grove kornprodukter og fisk, samt et begrenset inntak av bearbeidet kjøtt, salt og sukker.

21. På en skala fra 0-10, hvor 0 er svært dårlig og 10 er svært bra, hvordan vil du si at du har fulgt disse anbefalingene **de siste 4 uker**?

0	1	2	3	4	5	6	7	8	9	10
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

22. Velger du produkter som er nøkkelhullsmerket?

- ❑ Ja, alltid
- ❑ Ofte
- ❑ Av og til
- ❑ Nei, aldri
- ❑ Nøkkelhull betyr ikke noe for valget mitt
- ❑ Jeg vet ikke hva nøkkelhullsmerking er

23. Helsedirektoratet anbefaler 5 enheter med frukt og grønnsaker daglig.

23a. Hvor mange enheter med frukt får du i deg daglig?

_____

23b. Hvor mange enheter med grønnsaker får du i deg daglig?

_____

24. Helsedirektoratet anbefaler inntak av 3 enheter kalsiumprodukter daglig. En enhet kan f. eks. være gulost på brødskiven, yoghurt, melk etc. Inneholder din daglige kost til sammen 3 eller flere enheter av kalsiumprodukter?

- ❑ Nei, aldri
- ❑ Av og til
- ❑ Ofte
- ❑ Ja, alltid

25. Hvor ofte i en vanlig uke spiser du fisk og/eller kjøtt (som f. eks. kylling, rødt kjøtt, kjøttpålegg etc.)?

	1 gang i uken	2 ganger i uken	3 ganger i uken	4 ganger i uken	5 ganger i uken	6 ganger i uken	7 ganger i uken	Aldri	Ønsker ikke svare
Fisk (inkluder alle måltider)	❑	❑	❑	❑	❑	❑	❑	❑	❑
Kjøtt (inkluder alle måltider)	❑	❑	❑	❑	❑	❑	❑	❑	❑

25b. Jeg er vegetarianer

- ❑ Ja
- ❑ Nei
- ❑ Ønsker ikke svare

26. Hvor ofte i en vanlig uke spiser/drikker du:

	1 gang i uken	2 ganger i uken	3 ganger i uken	4 ganger i uken	5 ganger i uken	6 ganger i uken	7 ganger i uken	Aldri	Ønsker ikke svare
Mat som pizza, kebab, pølse, hamburger etc.?	❑	❑	❑	❑	❑	❑	❑	❑	❑
Søte matvarer som f.eks. syltetøy, nugatti, søt frokostblanding etc.?	❑	❑	❑	❑	❑	❑	❑	❑	❑
Mat som potetgull, sjokolade, smågodt, kaker, is etc.?	❑	❑	❑	❑	❑	❑	❑	❑	❑
Søte drikkevarer som saft, fruktjuice, brus, energidrikk etc.?	❑	❑	❑	❑	❑	❑	❑	❑	❑

27. Drikker du kaffe?

- ❑ Ja
- ❑ Nei

27b. Hvor mange kopper kaffe drikker du daglig? Skriv antall kopper.

_____

28. Drikker du alkohol?

- ❑ Ja
- ❑ Nei

28a. Hvor mange enheter per uke drikker du (en alkoholenhet = en flaske 33cl pils eller ett glass vin)?

_____

29. Har du brukt vitaminer, mineraler eller annet kosttilskudd de siste 4 ukene?

- ❑ Ja
- ❑ Nei

29a. Hvilken type har du brukt (sett gjerne flere kryss)?

- ❑ Multivitamin-/mineraltilskudd
- ❑ Tran/fiskeolje
- ❑ Proteintilskudd
- ❑ Jerntabletter
- ❑ Kalsiumtilskudd
- ❑ Folat (folsyre)
- ❑ Annet

Totalt fysisk aktivitetsnivå

Helsemyndighetene anbefaler fysisk aktivitet i minimum 30 minutter av moderat intensitet (lett svett og andpusten) 5 ganger i uken. Dette tilsvarer 150 minutter i uken, og inkluderer aktiviteter som å gå til jobb/butikken og andre fysisk anstrengende aktiviteter som f. eks. snømåking og vasking (hver aktivitet må gjøres i minimum 10 minutter sammenhengende).

30. I henhold til dette, vil du karakterisere deg selv som regelmessig fysisk aktiv?

- ❑ Ja
- ❑ Nei
- ❑ Vet ikke

Transportaktiviteter

31. Kan du angi hvor mye du i gjennomsnitt går i løpet av en vanlig ukedag (her inkluderes all aktivitet, f. eks. til og fra arbeid og butikken, hente/bringe barn, på jobb, turer, trening osv.)?

Skriv antall timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

32. Hvor mange av disse minuttene ble du lett svett og andpusten (moderat intensitet)? Skriv antall timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

Jobbaktiviteter

33. Vil du karakterisere jobben din som fysisk krevende?

- ❑ Ja
- ❑ Av og til
- ❑ Nei

34. Hvor mye tid bruker du daglig på stillesittende aktiviteter på jobb? Skriv totalt timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

35. Hvor mye tid bruker du på aktivitet på jobb daglig (gå/stå)? Skriv timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

Aktivitet i hjem og nærmiljø

36. Hvor lang tid bruker du på lett til middels anstrengende arbeid i hjemmet daglig (f. eks. støvsuge, vaske gulv, lek med barn, innkjøp av mat, pleie og omsorgsoppgaver)?Skriv timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

37. På en skala fra 0-10, hvor 0 er svært lett og 10 er svært anstrengende, hvor fysisk anstrengende er dine daglige omsorgsoppgaver og gjøremål i og rundt hjemmet?

0	1	2	3	4	5	6	7	8	9	10
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

38. Hvor mange timer i snitt bruker du totalt (både arbeid og fritid) på stillesittende aktiviteter (f. eks. se TV, slappe av, internett, PC, høre på musikk, kontorarbeid m.m.)?Skriv antall timer (skriv 0 i rubrikken om du ikke gjør aktiviteten).

På en hverdag _____

På en helgedag _____

Sport og trening

39. Har du tidligere vært medlem på et annet treningssenter?

- ❑ Ja
- ❑ Nei

39a. Hvorfor avsluttet du medlemskapet (sett gjerne flere kryss)?

- ❑ Bedre fasiliteter andre steder
- ❑ Flyttet
- ❑ Sykdom
- ❑ Graviditet
- ❑ Mistet motivasjonen for trening
- ❑ Manglende tid
- ❑ Bedre pris på medlemskap på andre treningssentre
- ❑ Flere gruppetimer på andre treningssentre
- ❑ Lengre åpningstider på andre treningssentre
- ❑ Venner på andre treningssentre
- ❑ Kortere avstand til andre treningssentre
- ❑ Endret daglige rutiner
- ❑ Annet

40. Hvordan ble du oppmerksom på treningssenteret du er medlem av i dag?

- ❑ Jeg tok selv kontakt med treningssenteret
- ❑ Jeg kjente til treningssenteret fra før
- ❑ Jeg deltok på "Åpent hus"-arrangement
- ❑ Jeg så en reklame/annonse for treningssenteret og meldte meg deretter inn
- ❑ Jeg fant informasjon via internett
- ❑ Jeg ble introdusert gjennom familie, venner, bekjente eller kollegaer
- ❑ Jeg hørte om treningssenteret gjennom en idrettsforening
- ❑ Jeg ble oppmerksom på treningssenteret via min arbeidsplass
- ❑ Jeg ble kontaktet av en selger fra treningssenteret og meldte meg deretter inn
- ❑ Annet

41. Hva har vært den viktigste årsaken til innmeldelse på treningssenteret (sett gjerne flere kryss)?

- ❑ Forebygge smerte og/eller ubehag i kroppens bevegelsesapparat
- ❑ Kroppslig velvære
- ❑ Bedre fysisk form
- ❑ Vekttap
- ❑ Større muskelmasse
- ❑ En flottere, mer veltrent kropp
- ❑ Opptrening etter en skade
- ❑ Annet

Vurdering av egen fysisk kapasitet

42. Marker den mest anstrengende aktiviteten du tror du klarer å utføre i 30 minutter. Kan du i en halvtime eller mer...

- ❑ 1 Sitte
- ❑ 2
- ❑ 3 Gå langsomt
- ❑ 4
- ❑ 5 Gå i normal takt/sykle langsomt
- ❑ 6
- ❑ 7
- ❑ 8 Jogge/sykle
- ❑ 9
- ❑ 10 Løpe
- ❑ 11
- ❑ 12 Løpe fort/sykle fort
- ❑ 13
- ❑ 14
- ❑ 15 Løpe veldig fort (mer enn 15 km/t)
- ❑ 16
- ❑ 17
- ❑ 18 Utføre utholdenhetstrening på elitenivå (kvinner)
- ❑ 19
- ❑ 20 Utføre utholdenhetstrening på elitenivå (menn)

43. Motiver for fysisk aktivitet

Nå vil du se en rekke utsagn som folk ofte oppgir når de blir spurt om hvorfor de trener. Uansett om du trener regelmessig eller ikke, les hvert utsagn nøye og merk på skalaen det tallet som passer best for deg. På en skala fra 0-5, hvor 0 er ikke sant og 5 er helt sant, hvordan vil du si at hvert utsagn passer deg personlig?

Personlig, så trener jeg (eller kan trene).....

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
For å holde meg slank/kontrollere kroppsvekt	❑	❑	❑	❑	❑	❑	❑
For å gå ned i vekt	❑	❑	❑	❑	❑	❑	❑
For å kunne se mer ungdommelig ut	❑	❑	❑	❑	❑	❑	❑
For å ha en fin kropp	❑	❑	❑	❑	❑	❑	❑
For å ha en sunn kropp	❑	❑	❑	❑	❑	❑	❑
For å forbedre utseende mitt/føle meg mer attraktiv	❑	❑	❑	❑	❑	❑	❑
For å føle meg mer sunn	❑	❑	❑	❑	❑	❑	❑
Fordi trening hjelper meg med å forbrenne kalorier	❑	❑	❑	❑	❑	❑	❑
For å unngå dårlig helse	❑	❑	❑	❑	❑	❑	❑
Fordi legen min råder meg til det	❑	❑	❑	❑	❑	❑	❑
For å forebygge helseproblemer/opprettholde god helse	❑	❑	❑	❑	❑	❑	❑

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
For å forebygge mot arvelige sykdommer i familien	❑	❑	❑	❑	❑	❑	❑
For å unngå hjerte-karsykdommer	❑	❑	❑	❑	❑	❑	❑
For å rehabilitere etter en sykdom/skade	❑	❑	❑	❑	❑	❑	❑
Fordi det får meg til å føle meg bra	❑	❑	❑	❑	❑	❑	❑
For å få rom til å tenke	❑	❑	❑	❑	❑	❑	❑
For å ha mål å jobbe mot	❑	❑	❑	❑	❑	❑	❑
Fordi jeg syns trening er tilfredstillende/stimulerende	❑	❑	❑	❑	❑	❑	❑
Fordi det hjelper å redusere anspenthet	❑	❑	❑	❑	❑	❑	❑
For å gi meg personlige utfordringer	❑	❑	❑	❑	❑	❑	❑
For å lade batteriene mine	❑	❑	❑	❑	❑	❑	❑
For stresshåndtering	❑	❑	❑	❑	❑	❑	❑
For å utvikle personlige ferdigheter	❑	❑	❑	❑	❑	❑	❑
Fordi jeg føler meg på mitt beste når jeg trener	❑	❑	❑	❑	❑	❑	❑
For å bli verdsatt	❑	❑	❑	❑	❑	❑	❑

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
Fordi jeg liker følelsen av å bruke kroppen min	❑	❑	❑	❑	❑	❑	❑
For å tilbringe tid med venner og jeg liker de sosiale sidene ved trening	❑	❑	❑	❑	❑	❑	❑
Fordi jeg liker å konkurrere	❑	❑	❑	❑	❑	❑	❑
For å få anerkjennelse for mine prestasjoner/gjøre ting andre ikke klarer	❑	❑	❑	❑	❑	❑	❑
For gleden ved å trene/være i aktivitet	❑	❑	❑	❑	❑	❑	❑
For å ha det gøy med andre på trening	❑	❑	❑	❑	❑	❑	❑
For å få nye venner	❑	❑	❑	❑	❑	❑	❑
For å bli sterkere/bygge muskulatur	❑	❑	❑	❑	❑	❑	❑
For å vedlikeholde/bli mer bevegelig	❑	❑	❑	❑	❑	❑	❑
For å bedre min utholdenhet	❑	❑	❑	❑	❑	❑	❑

44. Barrierer for fysisk aktivitet

Nå følger en rekke utsagn som folk ofte oppgir når de blir spurt om hvorfor de ikke trener. På en skala fra 0-3, hvor 0 er ikke relevant og 3 er veldig viktig, hvordan vil du si at hvert utsagn passer deg personlig?

	1 Ikke viktig	2 Ganske viktig	3 Veldig viktig	Ønsker ikke svare
Det er for dyrt for meg	❑	❑	❑	❑
Jeg mangler et organisert tilbud og har ingen å være fysisk aktiv med	❑	❑	❑	❑
Jeg mangler transport til og fra trening	❑	❑	❑	❑
Jeg syns ikke det er av betydning for helsen min	❑	❑	❑	❑
Helseutfordringer hindrer meg	❑	❑	❑	❑
Jeg er plaget av svimmelhet	❑	❑	❑	❑
Jeg er redd for skader	❑	❑	❑	❑
Jeg liker ikke å være fysisk aktiv	❑	❑	❑	❑
Jeg har verken tid eller energi	❑	❑	❑	❑
Jeg tror ikke jeg vil få noe ut av det	❑	❑	❑	❑
Jeg ser ikke på meg selv som en fysisk aktiv person	❑	❑	❑	❑
Jeg vil heller slappe av og ta	❑	❑	❑	❑

	1 Ikke viktig	2 Ganske viktig	3 Veldig viktig	Ønsker ikke svare
det med ro				
Jeg ønsker heller å gjøre andre ting	❑	❑	❑	❑
Jeg tør ikke	❑	❑	❑	❑
Jeg mangler kunnskap om hvordan jeg skal trene	❑	❑	❑	❑
Jeg er redd for at andre ser på når jeg trener	❑	❑	❑	❑
Jeg er redd for at jeg gjør øvelser feil	❑	❑	❑	❑
Jeg anser meg selv som nok aktiv i hverdagen	❑	❑	❑	❑

45. Sosial støtte

Uansett om du trener eller ikke, les, og gi et svar til hvert spørsmål/påstand nedenfor. Tenk i gjennom de siste 4 uker, hvor ofte har venner og/eller familie gjort det som er beskrevet? Velg et nummer som passer.

	Aldri	Sjelden	Noen få ganger	Ofte	Veldig ofte	Ikke relevant	Ønsker ikke svare
Trent sammen med meg	❑	❑	❑	❑	❑	❑	❑
Oppfordret/motivert meg til å gjennomføre treningsprogrammet mitt	❑	❑	❑	❑	❑	❑	❑
Klaget eller kritisert over den tiden jeg bruker på trening	❑	❑	❑	❑	❑	❑	❑
Planlagt feller sport og trening på fritiden	❑	❑	❑	❑	❑	❑	❑
Lagt til rette for at jeg skal kunne få trent	❑	❑	❑	❑	❑	❑	❑
Spurt meg om tips om hvordan de kan trene	❑	❑	❑	❑	❑	❑	❑

46. Var det noen i din nære familie (mor, far eller søsken) som drev regelmessig fysisk aktivitet under din oppvekst (før du fylte 18 år)?

- ❑ Ja
- ❑ Nei

47. Hvor vanlig er det å drive fysisk aktivitet i din nærmeste omgangskrets?

- ❑ Ikke vanlig
- ❑ Forekommer
- ❑ Svært vanlig

Livskvalitet

48. Nå følger fem utsagn som du kan være både enig eller uenig i. På en skala fra 1-7, hvor 1 er sterkt uenig og 7 er sterkt enig, hvordan vil du si at hvert utsagn passer deg personlig?

	1 Sterkt uenig	2	3	4	5	6	7 Sterkt enig	Ønsker ikke svare
På de fleste måter er livet mitt nær mitt ideelle liv	❑	❑	❑	❑	❑	❑	❑	❑
Jeg lever livet mitt på en god måte	❑	❑	❑	❑	❑	❑	❑	❑
Jeg er fornøyd med livet	❑	❑	❑	❑	❑	❑	❑	❑
Så langt har jeg oppnådd de viktige tingene jeg ønsker i livet	❑	❑	❑	❑	❑	❑	❑	❑
Om jeg kunne levd livet mitt om igjen, ville jeg nesten ikke ha endret på noe	❑	❑	❑	❑	❑	❑	❑	❑

Selvtillit og trening

49. Om du trener eller ikke, på en skala fra 1-5, hvor 1 er "jeg vet jeg ikke kan" og 5 er "jeg vet jeg kan", hvor sikker er du på at du kunne motivert deg selv til å klare målsettingene nedenfor i minst seks måneder?

	1 Jeg vet jeg ikke kan	2	3	4	5 Jeg vet jeg kan	Ikke relevant	Ønsker ikke svare
Stå opp tidlig, til og med i helgene for å trene	❑	❑	❑	❑	❑	❑	❑
Gjennomføre et treningsprogram, også etter en lang og slitsom dag på jobb	❑	❑	❑	❑	❑	❑	❑
Trene selv om du føler deg deprimert	❑	❑	❑	❑	❑	❑	❑
Sette av tid til regelmessig trening; som f. eks turgåing, jogging, svømming, sykling eller andre aktiviteter i minst 30 minutter, 3 ganger i uken	❑	❑	❑	❑	❑	❑	❑
Fortsette å trene med andre, selv om de enten er i bedre eller dårligere form enn deg	❑	❑	❑	❑	❑	❑	❑
Gjennomføre et treningsprogram, også under omfattende endringer i livet (f. eks. skilsmisse dødsfall i familien, flytting m.m.)	❑	❑	❑	❑	❑	❑	❑

	1 Jeg vet jeg ikke kan	2	3	4	5 Jeg vet jeg kan	Ikke relevant	Ønsker ikke svare
Bare delta på fest etter at du har trent	❑	❑	❑	❑	❑	❑	❑
Gjennomføre et treningsprogram når familien krever mer tid fra deg	❑	❑	❑	❑	❑	❑	❑
Gjennomføre et treningsprogram selv om du har plikter i hjem og nærmiljø	❑	❑	❑	❑	❑	❑	❑
Gjennomføre et treningsprogram, selv når du har stor arbeidsbelastning på jobb	❑	❑	❑	❑	❑	❑	❑
Holde deg til treningsprogrammet når sosiale forpliktelser er svært tidkrevende	❑	❑	❑	❑	❑	❑	❑
Lese eller studere mindre for å trene mer	❑	❑	❑	❑	❑	❑	❑

Kroppsbilde og trening

50. Nedenfor er det en rekke utsagn som handler om kroppsbilde og utseende. På en skala fra 1-5, hvor 1 er veldig uenig og 5 er veldig enig, hvor godt passer utsagnene deg personlig?

	1 Veldig uenig	2	3	4	5 Veldig enig	Ønsker ikke svare
Kroppen min er seksuelt tiltrekkende	❑	❑	❑	❑	❑	❑
Jeg bekymrer meg alltid om å være eller bli tykk	❑	❑	❑	❑	❑	❑
Jeg liker utseende mitt akkurat slik det er	❑	❑	❑	❑	❑	❑
Jeg ser meg selv i speilet så ofte jeg kan	❑	❑	❑	❑	❑	❑
Jeg er veldig bevisst på selv små vektendringer	❑	❑	❑	❑	❑	❑
De fleste vil si at jeg er pen	❑	❑	❑	❑	❑	❑
Det er viktig at jeg alltid ser bra ut	❑	❑	❑	❑	❑	❑
Jeg liker hvordan jeg ser ut naken	❑	❑	❑	❑	❑	❑
Jeg liker måten klærne mine sitter på kroppen min	❑	❑	❑	❑	❑	❑
Jeg bryr meg ikke om hva folk tenker om utseende mitt	❑	❑	❑	❑	❑	❑
Jeg misliker kroppen min	❑	❑	❑	❑	❑	❑

	1 Veldig uenig	2	3	4	5 Veldig enig	Ønsker ikke svare
Jeg tenker aldri over utseendet mitt	❑	❑	❑	❑	❑	❑
Jeg prøver alltid å forbedre mitt fysiske ytre	❑	❑	❑	❑	❑	❑

På en skala fra 1-5, hvor 1 er veldig misfornøyd og 5 er veldig fornøyd, hvor misfornøyd eller fornøyd er du med følgende kroppsdeler?

	1 Veldig misfornøyd	2	3	4	5 Veldig fornøyd	Ønsker ikke svare
Rumpe, hofter, lår og legger	❑	❑	❑	❑	❑	❑
Midje, mage	❑	❑	❑	❑	❑	❑
Brystet eller brystene, skuldre, armer	❑	❑	❑	❑	❑	❑
Muskulatur	❑	❑	❑	❑	❑	❑
Kroppsvekt	❑	❑	❑	❑	❑	❑
Helhetsinntrykket	❑	❑	❑	❑	❑	❑

Informasjonskilder

51. Har du fått og/eller innhentet informasjon/råd om fysisk aktivitet fra noen av følgende informasjonskilder de siste 4 ukene (sett gjerne flere kryss)?

- ❑ Blogger/internettforum
- ❑ Magasiner/ukeblader
- ❑ Faglitteratur/brosjyrer
- ❑ Venner/familie
- ❑ Lege og annet helsepersonell
- ❑ Personlig trener
- ❑ Annet
- ❑ Jeg har ikke fått eller innhentet informasjon om fysisk aktivitet

52. Hvilke av alternativene har hatt størst betydning for din motivasjon for å drive fysisk aktivitet?

- ❑ Blogger/internettforum
- ❑ Magasiner/ukeblader
- ❑ Faglitteratur/brosjyrer
- ❑ Venner/familie
- ❑ Lege og annet helsepersonell
- ❑ Personlig trener
- ❑ Annet
- ❑ Jeg har ikke fått eller innhentet informasjon om fysisk aktivitet

Hvor lang tid brukte du på spørreskjemaet?

_____

Har du kommentarer til spørreskjemaet er du velkommen til å skrive de her:

_____

_____

_____

_____

_____

_____

Takk for din deltakelse!

Appendix 3

Questionnaire (three, six, and 12 months)

Deltakernummer

_____

Kjære deltager,

Uavhengig av om du per i dag er regelmessig aktiv eller ikke, ønsker vi å vite litt mer om årsaker til at du trener, eventuelt ikke trener.
Ved å besvare dette spørreskjemaet vil vi få mer kunnskap om hva som kan bidra til mer aktivt bruk av treningssenteret og hvordan det kan legges til rette for at flere opprettholder regelmessig og anbefalt fysisk aktivitet.
Vi ønsker også å kartlegge ditt generelle forhold til trening og fysisk aktivitet, kosthold, kropp og utseende.

En liten oppfordring før du starter, vær ærlig - her er det ingen riktige eller gale svar!
Totalt vil spørreskjemaet ta ca. 30 minutter å besvare. Velg den svarkategorien som passer best for deg og marker eller fyll ut på linje.

På forhånd takk for hjelpen!

1. Dersom du er i arbeid utenfor hjemmet, hvor stor prosentandel arbeider du (inkludert ev. lunsjpause, fastlagte timer, betalt overtid og annet ekstraarbeid)? Skriv prosenttallet.

_____

1a. Er du for tiden fraværende fra ditt vanlige arbeid?

- ❑ Ja
- ❑ Nei

1b. Dersom ja, hva er årsaken til fraværet (sett eventuelt flere kryss)?

- ❑ Sykemelding
- ❑ Permisjon
- ❑ Sykt barn
- ❑ Annet
- ❑ Ønsker ikke svare

1c. Dersom du er sykemeldt, hvor stor prosentandel er du sykemeldt? Skriv prosenttall.

_____

2. Hva er din kroppsvekt i dag (kg)?

_____

3. Hva er din kroppshøyde (centimeter)?

_____

4a. Hvor mange timer sover du vanligvis i løpet av et døgn?

	3 til 4 timer	4 til 5 timer	5 til 6 timer	6 til 7 timer	7 til 8 timer	8 til 9 timer	9 til 10 timer	Mer enn 10 timer
På en hverdag?	❑	❑	❑	❑	❑	❑	❑	❑
På en helgedag?	❑	❑	❑	❑	❑	❑	❑	❑

4b. På en skala fra 0-10, hvor 0 er svært dårlig og 10 er svært bra, hvordan vil du vurdere din søvnkvalitet?

0	1	2	3	4	5	6	7	8	9	10
(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑	(10) ❑	(11) ❑

5. Hvordan vil du vurdere din nåværende helse (sykdom, plager og/eller skader) i alminnelighet?

(5) ❑ Meget god

(4) ❑ God

(3) ❑ Noenlunde

(2) ❑ Dårlig

(1) ❑ Meget dårlig

(6) ❑ Vet ikke

6. Hadde du ved innmeldelse på treningssenteret generelle helseproblemer som smerte og/eller ubehag i kroppen (generelle helseproblemer i bevegelsesapparatet er forstått som smerter og/eller ubehag i ankel, kne, hofte/bekken, håndledd, albue, skulder, bryst/rygg, nakke, korsrygg)?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Vet ikke

7. Har treningen hjulpet deg med de generelle helseproblemene som du opplever/har opplevd?

(5) ❑ Nei, tvert imot. Smertene og/eller ubehaget er blitt forverret av treningen

(4) ❑ Nei, smertene og/eller ubehaget er der stadig

(3) ❑ Vet ikke/det er for tidlig å si noe om

(2) ❑ Ja smertene og/eller ubehaget er blitt vesentlig mindre ved hjelp av treningen

(1) ❑ Ja smertene og/eller ubehaget er helt vekk ved hjelp av treningen

(6) ❑ Ønsker ikke svare

8. Helseproblemer de siste 4 uker

Nå nevnes noen vanlige helseplager. Vi vil be deg om å vurdere hvert enkelt problem/symptom, og oppgi i hvilken grad du har vært plaget av dette i løpet av de siste 4 ukene.

	0 Ikke plaget	1 Litt plaget	2 Endel plaget	3 Alvorlig plaget	Ønsker ikke svare
Forkjølelse, influensa	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Hodepine	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Migrene	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Nakkesmerter	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Smerter i ryggen (øvre del av rygg og/eller korsrygg)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Smerter i skuldre/armer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Bekkenløsning	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Artrose (slitasjegikt)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Brystsmerter og/eller hjertebank, ekstraslag	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Magesmerter	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Tarmproblematikk (løs avføring, diarè eller forstoppelse)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Urinlekkasje	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Søvnproblemer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Tretthet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Angst	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	0 Ikke plaget	1 Litt plaget	2 Endel plaget	3 Alvorlig plaget	Ønsker ikke svare
Nedtrykt, depresjon	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

8b. Dersom du på forrige spørsmål oppga å være fra litt til alvorlig plaget av urinlekkasje, når skjer dette (du kan sette flere kryss)?

(1) ❑ Når jeg er fysisk aktiv

(2) ❑ Når jeg må veldig på do

(3) ❑ Når jeg hoster og/eller nyser

(4) ❑ Når jeg ler

(6) ❑ Jeg har ikke urinlekkasje

(5) ❑ Ønsker ikke svare

Kosthold og matvaner

Helsedirektoratet anbefaler et variert kosthold som inneholder mye grønnsaker, frukt og bær, grove kornprodukter og fisk, samt et begrenset inntak av bearbeidet kjøtt, salt og sukker.

9. På en skala fra 0-10, hvor 0 er svært dårlig og 10 er svært bra, hvordan vil du si at du har fulgt disse anbefalingene **de siste 4 uker**?

0	1	2	3	4	5	6	7	8	9	10
(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑	(10) ❑	(11) ❑

10. Velger du produkter som er nøkkelhullsmerket?

(1) ❑ Ja, alltid

(2) ❑ Ofte

(3) ❑ Av og til

(4) ❑ Nei, aldri

(5) ❑ Nøkkelhull betyr ikke noe for valget mitt

(6) ❑ Jeg vet ikke hva nøkkelhullsmerking er

11. Helsedirektoratet anbefaler 5 enheter med frukt og grønnsaker daglig.

11a. Hvor mange enheter med frukt spiser du daglig?

_____

11b. Hvor mange enheter med grønnsaker spiser du daglig?

_____

12. Helsedirektoratet anbefaler inntak av 3 enheter kalsiumprodukter daglig. En enhet kan f. eks. være gulost på brødskiven, yoghurt, melk etc. Inneholder din daglige kost til sammen 3 eller flere enheter av kalsiumprodukter?

(4) ❑ Nei, aldri

(3) ❑ Av og til

(2) ❑ Ofte

(1) ❑ Ja, alltid

13. Hvor ofte i en vanlig uke spiser du fisk og/eller kjøtt (som f. eks. kylling, rødt kjøtt, kjøttpålegg etc.)?

	1 gang i uken	2 ganger i uken	3 ganger i uken	4 ganger i uken	5 ganger i uken	6 ganger i uken	7 ganger i uken	Aldri	Ønsker ikke svare
Fisk (inkluder alle måltider)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑
Kjøtt (inkluder alle måltider)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑

13b. Jeg er vegetarianer

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Ønsker ikke svare

14. Hvor ofte i en vanlig uke spiser/drikker du:

	1 gang i uken	2 ganger i uken	3 ganger i uken	4 ganger i uken	5 ganger i uken	6 ganger i uken	7 ganger i uken	Aldri	Ønsker ikke svare
Mat som pizza, kebab, pølse, hamburger etc.?	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑
Søte matvarer som f.eks. syltetøy, nugatti, søt frokostblanding etc.?	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑
Mat som potetgull, sjokolade, smågodt, kaker, is etc.?	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑
Søte drikkevarer som saft, fruktjuice, brus, energidrikk etc.?	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑

15. Drikker du kaffe?

(1) ❑ Ja

(2) ❑ Nei

15b. Hvor mange kopper kaffe drikker du daglig? Skriv antall kopper.

_____

16. Drikker du alkohol?

(1) ❑ Ja

(2) ❑ Nei

16a. Hvor mange enheter per uke drikker du (en alkoholenhet = en flaske 33cl pils eller ett glass vin)?

_____

17. Har du brukt vitaminer, mineraler eller annet kosttilskudd de siste 4 ukene?

(1) ❑ Ja

(2) ❑ Nei

17a. Hvilken type har du brukt (sett gjerne flere kryss)?

(1) ❑ Multivitamin-/mineraltilskudd

(2) ❑ Tran/fiskeolje

(3) ❑ Proteintilskudd

(4) ❑ Jerntabletter

(5) ❑ Kalsiumtilskudd

(6) ❑ Folat (folsyre)

(7) ❑ Annet

Totalt fysisk aktivitetsnivå 18/65

Helsemyndighetene anbefaler fysisk aktivitet i minimum 30 minutter av moderat intensitet (lett svett og andpusten) 5 ganger i uken. Dette tilsvarer 150 minutter i uken, og inkluderer aktiviteter som å gå til jobb/butikken og andre fysisk anstrengende aktiviteter som f. eks. snømåking og vasking (hver aktivitet må gjøres i minimum 10 minutter sammenhengende).

18. I henhold til dette, vil du karakterisere deg selv som regelmessig fysisk aktiv?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Vet ikke

Transportaktiviteter 1

19. Kan du angi hvor mye du i gjennomsnitt går i løpet av en vanlig **ukedag** (her inkluderes all aktivitet, f. eks. til og fra arbeid og butikken, hente/bringe barn, på jobb, turer, trening osv.)?

Skriv antall timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

20. Hvor mange av disse minuttene ble du lett svett og andpusten (moderat intensitet)? Skriv antall timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

Jobbaktiviteter

21. Vil du karakterisere jobben din som fysisk krevende?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Av og til

22. Hvor mye tid bruker du daglig på stillesittende aktiviteter på jobb? Skriv totalt timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

23. Hvor mye tid bruker du på aktivitet på jobb daglig (gå/stå)? Skriv timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

Aktivitet i hjem og nærmiljø

24. Hvor lang tid bruker du på lett til middels anstrengende arbeid i hjemmet daglig (f. eks. støvsuge, vaske gulv, lek med barn, innkjøp av mat, pleie og omsorgsoppgaver)? Skriv timer og/eller minutter (skriv 0 i rubrikken om du ikke gjør aktiviteten).

Timer _____

Minutter _____

25. På en skala fra 0-10, hvor 0 er svært lett og 10 er svært anstrengende, hvor fysisk anstrengende er dine daglige omsorgsoppgaver og gjøremål i og rundt hjemmet?

0	1	2	3	4	5	6	7	8	9	10
(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑	(9) ❑	(10) ❑	(11) ❑

26. Hvor mange timer i snitt bruker du totalt (både arbeid og fritid) på stillesittende aktiviteter (f. eks. se TV, slappe av, internett, PC, høre på musikk, kontorarbeid m.m.)?Skriv antall timer (skriv 0 i rubrikken om du ikke gjør aktiviteten).

På en hverdag _____

På en helgedag _____

Sport og trening

27. Har du vært medlem på treningssenteret de siste 4 ukene?

(1) ❑ Ja

(2) ❑ Nei

27a. Hvorfor avsluttet du medlemskapet (sett gjerne flere kryss)?

(1) ❑ Bedre fasiliteter andre steder

(2) ❑ Flyttet

(3) ❑ Sykdom

(4) ❑ Graviditet

(5) ❑ Mistet motivasjonen for trening

(6) ❑ Manglende tid

(7) ❑ Bedre pris på medlemskap på andre treningssentre

(8) ❑ Flere gruppetimer på andre treningssentre

(9) ❑ Lengre åpningstider på andre treningssentre

(10) ❑ Venner på andre treningssentre

(11) ❑ Kortere avstand til andre treningssentre

(12) ❑ Endret daglige rutiner

(13) ❑ Annet

27b. Vil du fornye ditt medlemskap på treningssenteret når ditt nåværende abonnement utløper?

(1) ❑ Ja, helt sikkert

(2) ❑ Ja, sannsynligvis

(3) ❑ Kanskje, har ikke bestemt meg ennå

(4) ❑ Nei, sannsynligvis ikke

(5) ❑ Nei, helt sikkert ik

28. Bedriver du fortrinnsvis sport og trening i sommer- eller vinterhalvåret?

(1) ❑ Fortrinnsvis fra 1.april - 30.september (sommer)

(2) ❑ Fortrinnsvis fra 1.oktober - 31.mars (vinter)

(3) ❑ Ca. like mye gjennom hele året

(4) ❑ Jeg dyrker sport og trening i forskjellige perioder ujevnt fordelt gjennom året

(5) ❑ Jeg er nytt medlem og kan derfor ikke svare presist på mine treningsvaner

(6) ❑ Vet ikke

29. Trening er det samme som fysisk aktivitet, men aktiviteten er planlagt og regelmessig, og inkluderer målsetting om å øke/vedlikeholde fysisk form, helse eller prestasjon. I henhold til dette, har du trent de siste 4 ukene?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Vet ikke

30. Hvor mange økter trente du i snitt på treningssenteret per uke de siste 4 uker?

(2) ❑ 1 økt per uke

(3) ❑ 2 økter per uke

(4) ❑ 3 økter per uke

(5) ❑ 4 økter per uke

(6) ❑ 5 økter per uke

(7) ❑ 6 økter per uke

(8) ❑ 7 økter per uke

(9) ❑ Mer enn 7 økter per uke

31. I henhold til hvor mange økter du trente per uke **de siste 4 ukene**, har du generelt lyst til å trene oftere og/eller mer?

(1) ❑ Ja, jeg vil gjerne trene oftere/mer enn jeg gjør

(2) ❑ Nei, jeg er godt fornøyd med denne treningsmengden

(3) ❑ Vet ikke

(4) ❑ Nei

32. Hva er årsakene til at du ikke trener oftere på ditt treningssenter (sett gjerne flere kryss)?

(1) ❑ Generelt mangel på lyst og motivasjon

(2) ❑ Trening på treningssenter er ikke min foretrukne treningsform

(3) ❑ Jeg har ingen å trene med

(4) ❑ Treningssenteret har ikke de treningstilbudene jeg ønsker

(5) ❑ Jeg har hatt dårlige opplevelser og erfaring med min trening på treningssenter

(6) ❑ Jeg har ikke tid til å trene

(7) ❑ Jeg fikk medlemskapet i gave og har ikke brukt det siden

(8) ❑ Jeg kan ikke trene for tiden pga. en skade

(9) ❑ Jeg har flyttet

(10) ❑ Jeg har sluttet å trene

(11) ❑ Jeg syns jeg trener ofte nok

(12) ❑ Annet

33. Hvor lang tid bruker du på transport til og fra ditt treningssenter?Skriv antall minutter og/eller timer per besøk.

Timer _____

Minutter _____

34. Hvordan kommer du deg oftest til og fra ditt treningssenter?

(1) ❑ Går

(2) ❑ Sykler

(3) ❑ Kjører moped/motorsykkel

(4) ❑ Kollektivt

(5) ❑ Kjører bil

(6) ❑ Annet

35. Hvor lang tid bruker du vanligvis når du trener på ditt treningssenter (ikke medregnet tid til skift, dusj og reisevei)?Skriv minutter og/eller timer.

Timer _____

Minutter _____

Hvert enkelt treningssenter tilbyr en rekke ulike aktiviteter du kan benytte deg av.
De neste spørsmålene handler om du har benyttet deg av disse **de siste 4 ukene** og hvor fornøyd du er som medlem når det gjelder service, renhold, pris, veiledning, åpningstider etc.

36. Trener du oftest individuelt (f. eks. tredemølle eller styrketrening) eller gruppetimer (f.eks. aerobic eller spinning)?

(1) ❑ Utelukkende individuelt (f.eks. tredemølle eller styrketrening)

(2) ❑ Oftest individuelt

(3) ❑ Både individuelt og gruppetimer

(4) ❑ Oftest gruppetimer

(5) ❑ Utelukkende gruppetimer (f.eks. aerobic eller spinning)

(6) ❑ Det er veldig varierende og tilfeldig hva jeg trener

37. I hvilket omfang består din trening av styrketrening eller utholdenhetstrening?

(1) ❑ Utelukkende styrketrening (f.eks. bruk av apparater eller frivekter)

(2) ❑ Primært styrketrening, men supplert med litt utholdenhetstrening

(3) ❑ Likt fordelt mellom styrketrening og utholdenhetstrening

(4) ❑ Primært utholdenhetstrening, men supplert med litt styrketrening

(5) ❑ Utelukkende utholdenhetstrening

(6) ❑ Det er veldig varierende og tilfeldig hva jeg trener

38. Trener du oftest alene eller sammen med andre?

(1) ❑ Oftest alene

(2) ❑ Oftest sammen med andre jeg ikke kjenner (f.eks. gruppetimer)

(3) ❑ Oftest sammen med en eller flere jeg har blitt kjent med på treningssenteret

(4) ❑ Oftest sammen med en eller flere treningsvenner jeg kjente før jeg begynte på treningssenteret

(5) ❑ Oftest sammen med et eller flere familiemedlemmer

(6) ❑ Det er veldig varierende og tilfeldig om jeg trener alene eller sammen med andre

39. Har du deltatt på gruppetimer på treningssenter **de siste 4 ukene**?

(1) ❑ Ja

(2) ❑ Nei

40. Hvor ofte de siste 4 ukene har du deltatt på følgende gruppetimer?

	1 gang de siste 4 ukene	2 til 3 ganger de siste 4 ukene	1 gang i uka	2 til 3 ganger i uka	4 til 5 ganger i uka	6 til 7 ganger i uka
Bevegelighet og balanse (f. eks. yoga og pilates)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Utholdenhet og koordinasjon (f. eks. aerobic og zumba)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Styrke (f. eks. bodypump)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Utholdenhet (f. eks. spinning)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Sirkeltrening (f. eks. crossfit, bootcamp)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

41. Har du trent på egenhånd på treningssenter de siste 4 ukene?

(1) ❑ Ja

(2) ❑ Nei

42. Hvor ofte de siste 4 ukene har du trent på treningssenteret på egenhånd?

	1 gang de siste 4 ukene	2 til 3 ganger de siste 4 ukene	1 gang i uka	2 til 3 ganger i uka	4 til 5 ganger i uka	6 til 7 ganger i uka
Styrketrening med vekter eller maskiner	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Kondisjonsapparater (f eks. tredemølle, sykkel og ellipsemaskin)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Annet (f. eks. squash, svømming)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

43. Har du benyttet deg av personlig trener (PT) for å nå dine treningsmål de siste 4 ukene?

(1) ❑ Ja

(2) ❑ Nei

43a. Hvor mange PT-timer kjøpte du ved siste kjøp?

_____

44. Hvor tilfreds er du med følgende forhold på ditt treningssenter?

	1 Meget misfornøyd	2 Misfornøyd	3 Nøytral	4 Fornøyd	5 Meget fornøyd	Vet ikke	Ønsker ikke svare
Introduksjon og veiledning	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Åpningstider	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Vedlikehold og renhold	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Pris på medlemskap	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Plass i forhold til antall medlemmer på treningssenteret	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Garderober	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Parkeringsforhold	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Kvaliteten på utstyr (kondisjonsapparater, styrkeapparater, frivekter etc.)	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Gruppeinstruktører	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Kvaliteten på gruppetimer	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Senterets gruppetimeplan	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Personlig trenere	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Kvaliteten på Personlig trenere	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Servicenivå på senteret	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑
Stemning og atmosfære på senteret	(5) ❑	(4) ❑	(3) ❑	(2) ❑	(1) ❑	(6) ❑	(7) ❑

45. Dersom du har barn, benytter du deg av treningssenterets barnepass/aktivitetstilbud?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Har ikke barn

46a. Vet du hva bekkenbunnstrening er?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Vet ikke

46b. Har du fått veiledning med hensyn til bekkenbunnstrening på treningssenteret?

(1) ❑ Ja

(2) ❑ Nei

47. Har du gjort bekkenbunnsøvelser på treningssenteret eller hjemme de siste 4 uker?

(1) ❑ Ja

(2) ❑ Nei

(3) ❑ Vet ikke

47a. Hvor mange ganger i uken? Skriv et tall for antall ganger.

_____

Vi er også interessert i å vite om du trener **utenom** det du gjør på treningssenteret.

De neste spørsmålene omhandler derfor sport/trening på andre arenaer.

48. Har du trent **utenfor** treningssenteret **de siste 4 uker** (trening er det samme som fysisk aktivitet, men aktiviteten er planlagt og regelmessig, og inkluderer målsetting om å øke/vedlikeholde fysisk form, helse eller prestasjon)?

(1) ❑ Ja

(2) ❑ Nei

49. Hvor mange økter trente du i snitt utenfor treningssenteret de siste 4 uker?

(2) ❑ 1 økt per uke

(3) ❑ 2 økter per uke

(4) ❑ 3 økter per uke

(5) ❑ 4 økter per uke

(6) ❑ 5 økter per uke

(7) ❑ 6 økter per uke

(8) ❑ 7 økter per uke

(9) ❑ Mer enn 7 økter per uke

50. Ved hvilken arena utenom treningssenter utøver du vanligvis trening/fysisk aktivitet (sett gjerne flere kryss)?

(1) ❑ Idrettshall

(2) ❑ Idrettslag

(3) ❑ Marka/landevei/parken

(4) ❑ Treningsrom på jobb

(5) ❑ Hjemme

(6) ❑ Annet

51. Har du drevet med utholdenhetstrening utenom treningssenteret de siste 4 uker?

(1) ❑ Ja

(2) ❑ Nei

51a. Hvor mange timer og/eller minutter i uken?

Timer _____

Minutter _____

51b. Hvilken type aktivitet gjør du vanligvis?

(1) ❑ Gå tur

(2) ❑ Løp/jogg

(3) ❑ Dans

(4) ❑ Roing

(5) ❑ Sykling

(6) ❑ Aerobic

(7) ❑ Svømming

(8) ❑ Langrenn

(9) ❑ Annet

52. Har du drevet med styrketrening utenom treningssenteret **de siste 4 uker**?

(1) ❑ Ja

(2) ❑ Nei

52a. Hvor mange timer og/eller minutter i uken?

Timer _____

Minutter _____

52b. Dersom ja, hvilken type aktivitet gjør du vanligvis?

(1) ❑ Løfte vekter/apparater

(2) ❑ Crossfit

(3) ❑ Styrke med egen kroppsvekt

(4) ❑ Annet

53. Har du drevet med annen trening utenom treningssenteret de siste 4 uker?

(1) ❑ Ja

(2) ❑ Nei

53a. Hvor mange timer og/eller minutter i uken?

Timer _____

Minutter _____

53b. Hvilken type aktivitet gjør du vanligvis?

(1) ❑ Lagidrett (ballsport)

(2) ❑ Yoga

(3) ❑ Turn

(4) ❑ Pilates

(5) ❑ Kampsport

(6) ❑ Annet

Vurdering av egen fysisk kapasitet

54. Marker den mest anstrengende aktiviteten du tror du klarer å utføre i 30 minutter. Kan du i en halvtime eller mer...

(1) ❑ 1 Sitte

(2) ❑ 2

(3) ❑ 3 Gå langsomt

(4) ❑ 4

(5) ❑ 5 Gå i normal takt/sykle langsomt

(6) ❑ 6

(7) ❑ 7

(8) ❑ 8 Jogge/sykle

(9) ❑ 9

(10) ❑ 10 Løpe

(11) ❑ 11

(12) ❑ 12 Løpe fort/sykle fort

(13) ❑ 13

(14) ❑ 14

(15) ❑ 15 Løpe veldig fort (mer enn 15 km/t)

(16) ❑ 16

(17) ❑ 17

(18) ❑ 18 Utføre utholdenhetstrening på elitenivå (kvinner)

(19) ❑ 19

(20) ❑ 20 Utføre utholdenhetstrening på elitenivå (menn)

55. Motiver for fysisk aktivitet

Nå vil du se en rekke utsagn som folk ofte oppgir når de blir spurt om hvorfor de trener.Uansett om du trener regelmessig eller ikke, les hvert utsagn nøye og merk på skalaen det tallet som passer best for deg. På en skala fra 0-5, hvor 0 er ikke sant og 5 er helt sant, hvordan vil du si at hvert utsagn passer deg personlig?

Personlig, så trener jeg (eller kan trene).....

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
For å holde meg slank/kontrollere kroppsvekt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å gå ned i vekt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å kunne se mer ungdommelig ut	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å ha en fin kropp	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å ha en sunn kropp	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å forbedre utseende mitt/føle meg mer attraktiv	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å føle meg mer sunn	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi trening hjelper meg med å forbrenne kalorier	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å unngå dårlig helse	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi legen min råder meg til det	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å forebygge helseproblemer/opprettholde god helse	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å forebygge mot arvelige sykdommer i familien	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
For å unngå hjerte-karsykdommer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å rehabilitere etter en sykdom/skade	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi det får meg til å føle meg bra	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å få rom til å tenke	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å ha mål å jobbe mot	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi jeg syns trening er tilfredstillende/stimulerende	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi det hjelper å redusere anspenthet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å gi meg personlige utfordringer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å lade batteriene mine	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For stresshåndtering	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å utvikle personlige ferdigheter	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi jeg føler meg på mitt beste når jeg trener	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å bli verdsatt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fordi jeg liker følelsen av å bruke kroppen min	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å tilbringe tid med venner og	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

	0 Ikke sant	1	2	3	4	5 Helt sant	Ønsker ikke svare
jeg liker de sosiale sidene ved trening							
Fordi jeg liker å konkurrere	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å få anerkjennelse for mine prestasjoner/gjøre ting andre ikke klarer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For gleden ved å trene/være i aktivitet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å ha det gøy med andre på trening	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å få nye venner	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å bli sterkere/bygge muskulatur	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å vedlikeholde/bli mer bevegelig	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
For å bedre min utholdenhet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

56. Barrierer for fysisk aktivitet

Nå følger en rekke utsagn som folk ofte oppgir når de blir spurt om hvorfor de ikke trener.På en skala fra 0-3, hvor 0 er ikke relevant og 3 er veldig viktig, hvordan vil du si at hvert utsagn passer deg personlig?

	1 Ikke viktig	2 Ganske viktig	3 Veldig viktig	Ønsker ikke svare
Det er for dyrt for meg	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg mangler et organisert tilbud og har ingen å være fysisk aktiv med	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg mangler transport til og fra trening	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg syns ikke det er av betydning for helsen min	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Helseutfordringer hindrer meg	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg er plaget av svimmelhet	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg er redd for skader	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg liker ikke å være fysisk aktiv	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg har verken tid eller energi	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg tror ikke jeg vil få noe ut av det	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg ser ikke på meg selv som en fysisk aktiv person	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg vil heller slappe av og ta det med ro	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg ønsker heller å gjøre andre ting	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	1 Ikke viktig	2 Ganske viktig	3 Veldig viktig	Ønsker ikke svare
Jeg tør ikke	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg mangler kunnskap om hvordan jeg skal trene	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg er redd for at andre ser på når jeg trener	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg er redd for at jeg gjør øvelser feil	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg anser meg selv som nok aktiv i hverdagen	(2) ❑	(3) ❑	(4) ❑	(5) ❑

57. Sosial støtte

Uansett om du trener eller ikke, les, og gi et svar til hvert spørsmål/påstand nedenfor. Tenk i gjennom de siste 4 uker, hvor ofte har venner og/eller familie gjort det som er beskrevet? Velg et nummer som passer.

	Aldri	Sjelden	Noen få ganger	Ofte	Veldig ofte	Ikke relevant	Ønsker ikke svare
Trent sammen med meg	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Oppfordret/motivert meg til å gjennomføre treningsprogrammet mitt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Klaget eller kritisert over den tiden jeg bruker på trening	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Planlagt feller sport og trening på fritiden	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Lagt til rette for at jeg skal kunne få trent	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Spurt meg om tips om hvordan de kan trene	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

58. Var det noen i din nære familie (mor, far eller søsken)) som drev med regelmessig fysisk aktivitet under din oppvekst (før du fylte 18 år)?

(1) ❑ Ja

(2) ❑ Nei

59. Hvor vanlig er det å drive fysisk aktivitet i din nærmeste omgangskrets?

(1) ❑ Ikke vanlig

(2) ❑ Forekommer

(3) ❑ Svært vanlig

60. Livskvalitet

Nå følger fem utsagn som du kan være både enig eller uenig i. På en skala fra 1-7, hvor 1 er sterkt uenig og 7 er sterkt enig, hvordan vil du si at hvert utsagn passer deg personlig?

	1 Sterkt uenig	2	3	4	5	6	7 Sterkt enig	Ønsker ikke svare
På de fleste måter er livet mitt nær mitt ideelle liv	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑
Jeg lever livet mitt på en god måte	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑
Jeg er fornøyd med livet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑
Så langt har jeg oppnådd de viktige tingene jeg ønsker i livet	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑
Om jeg kunne levd livet mitt om igjen, ville jeg nesten ikke ha endret på noe	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑	(8) ❑

61. Selvtillit og trening

Om du trener eller ikke, på en skala fra 1-5, hvor 1 er ”jeg vet jeg ikke kan” og 5 er ”jeg vet jeg kan”, hvor sikker er du på at du kunne motivert deg selv til å klare målsettingene nedenfor i minst seks måneder?

	1 Jeg vet jeg ikke kan	2	3	4	5 Jeg vet jeg kan	Ikke relevant	Ønsker ikke svare
Stå opp tidlig, til og med i helgene for å trene	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Gjennomføre et treningsprogram, også etter en lang og slitsom dag på jobb	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Trene selv om du føler deg deprimert	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Sette av tid til regelmessig trening; som f. eks turgåing, jogging, svømming, sykling eller andre aktiviteter i minst 30 minutter, 3 ganger i uken	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Fortsette å trene med andre, selv om de enten er i bedre eller dårligere form enn deg	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Gjennomføre et treningsprogram, også under omfattende endringer i livet (f. eks. skilsmisse dødsfall i familien, flytting m.m.)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Bare delta på fest etter at du har trent	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

	1 Jeg vet jeg ikke kan	2	3	4	5 Jeg vet jeg kan	Ikke relevant	Ønsker ikke svare
Gjennomføre et treningsprogram når familien krever mer tid fra deg	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Gjennomføre et treningsprogram selv om du har plikter i hjem og nærmiljø	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Gjennomføre et treningsprogram, selv når du har stor arbeidsbelastning på jobb	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Holde deg til treningsprogrammet når sosiale forpliktelser er svært tidkrevende	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Lese eller studere mindre for å trene mer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

62. Treningsvaner

Nå følger en rekke utsagn om holdning og atferd i forbindelse med trening. Tenk igjennom de siste 4 uker. På en skala fra 1-6, hvor 1 er aldri og 6 er alltid, hvor godt passer utsagnene deg personlig?

	1 Aldri	2	3	4	5	6 Alltid	Ønsker ikke svare
Jeg trener for å ikke bli irritabel	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg trener for å ikke føle meg anspent	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg trener for å ikke bli engstelig	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg trener når jeg er skadet /har gjentatte fysiske problemer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg øker kontinuerlig treningsvolumet (varighet, hyppighet, intensitet) for å oppnå en ønsket effekt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg trener ofte lenger enn jeg hadde planlagt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg tenker på trening når jeg egentlig bør konsentrere meg om arbeid/skole	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg bruker store deler av fritiden min på trening	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑
Jeg vil heller trene enn å være sammen med familie/venner	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑	(7) ❑

63. Kroppsbilde og trening

Nedenfor er det en rekke utsagn som handler om kroppsbilde og utseende. På en skala fra 1-5, hvor 1 er veldig uenig og 5 er veldig enig, hvor godt passer utsagnene deg personlig?

	1 Veldig uenig	2	3	4	5 Veldig enig	Ønsker ikke svare
Kroppen min er seksuelt tiltrekkende	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg bekymrer meg alltid om å være eller bli tykk	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg liker utseende mitt akkurat slik det er	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg ser meg selv i speilet så ofte jeg kan	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg er veldig bevisst på selv små vektendringer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
De fleste vil si at jeg er pen	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Det er viktig at jeg alltid ser bra ut	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg liker hvordan jeg ser ut naken	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg liker måten klærne mine sitter på kroppen min	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg bryr meg ikke om hva folk tenker om utseende mitt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg misliker kroppen min	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Jeg tenker aldri over utseendet mitt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

	1 Veldig uenig	2	3	4	5 Veldig enig	Ønsker ikke svare
Jeg prøver alltid å forbedre mitt fysiske ytre	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

Jeg har prøvd å gå ned i vekt ved å faste eller ved lavkalori-diett

(1) ❑ Aldri

(2) ❑ Sjelden

(3) ❑ Noen ganger

(4) ❑ Ofte

(5) ❑ Veldig ofte

(6) ❑ Ønsker ikke svare

Jeg syns jeg er...

(1) ❑ Undervektig

(3) ❑ Normalvektig

(4) ❑ Overvektig

(5) ❑ Fet

(6) ❑ Ønsker ikke svare

På en skala fra 1-5, hvor 1 er veldig misfornøyd og 5 er veldig fornøyd, hvor misfornøyd eller fornøyd er du med følgende kroppsdeler?

	1 Veldig misfornøyd	2	3	4	5 Veldig fornøyd	Ønsker ikke svare
Rumpe, hofter, lår og legger	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Midje, mage	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Brystet eller brystene, skuldre, armer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Muskulatur	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Kroppsvekt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
Helhetsinntrykket	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

Informasjonskilder

64. Har du fått og/eller innhentet informasjon/råd om fysisk aktivitet fra noen av følgende informasjonskilder de siste 4 ukene (sett gjerne flere kryss)?

(1) ❑ Blogger/internettforum

(2) ❑ Magasiner/ukeblader

(3) ❑ Faglitteratur/brosjyrer

(4) ❑ Venner/familie

(5) ❑ Lege og annet helsepersonell

(6) ❑ Personlig trener

(7) ❑ Annet

(8) ❑ Jeg har ikke fått eller innhentet informasjon om fysisk aktivitet

65. Hvilke av alternativene har hatt størst betydning for din motivasjon for å drive fysisk aktivitet?

(1) ❑ Blogger/internettforum

(2) ❑ Magasiner/ukeblader

(3) ❑ Faglitteratur/brosjyrer

(4) ❑ Venner/familie

(5) ❑ Lege og annet helsepersonell

(6) ❑ Personlig trener

(7) ❑ Annet

Hvor lang tid brukte du på spørreskjemaet?

_____

Har du kommentarer til spørreskjemaet er du velkommen til å skrive de her:

_____

_____

_____

_____

_____

_____

Takk for din deltakelse!

Appendix 4

Instructions for use of the accelerometer (paper I)

Bruk av aktivitetsmåleren

Ta på deg aktivitetsmåleren med en gang du mottar den. Den skal sitte på i syv hele dager, fra du står opp til du legger deg. Du behøver ikke slå den av eller på, alt går automatisk.

Ta på deg måleren på følgende måte:

- Fest beltet rundt livet slik at måleren sitter på **høyre hoftekam** (se bilder). Det er viktig at du er nøyaktig med plassering av måleren
- Måleren skal være godt festet og ikke henge og slenge

Det er kun i følgende situasjoner at måleren **ikke** skal sitte på:

- Når du sover (om natten)
- Når du dusjer, svømmer eller bader (den er ikke vanntett)

Måleren tåler daglig bruk, og du behøver ikke være redd for at den skal gå i stykker. Måleren må imidlertid ikke åpnes, vaskes eller lånes bort. Gå med måleren så vel til hverdag som til fest, dersom den sjenerer kan du gjemme den under klærne.
Måleren koster 2500 kr. Du er ikke økonomisk ansvarlig for måleren, men pass godt på den. Returner måleren ved avtalt tidspunkt på Norges idrettshøgskole etter at du har gått med den i syv dager (da får du også dine testresultater).

Appendix 5

Form used to assess swimming, muscle-strengthening activities, cross-country skiing, and cycling (paper I)

Heng med opp et sted hvor jeg er synlig! (på kjøleskapet, dodøra eller lignende)

Har du husket aktivitetsmåleren i dag?

Gå med måleren hver dag fra du står opp om morgenen til du legger deg om kvelden!

Når tok du på og av måleren i dag? (klokkeslett f. eks. 07:30)							
	Dag 1	**Dag 2**	**Dag 3**	**Dag 4**	**Dag 5**	**Dag 6**	**Dag 7**
På:							
Av:							

Tok du av deg måleren for å drive med svømming i måleperioden?			
	Ja ☐	**Nei** ☐	**Vet ikke/husker ikke** ☐
Antall dager:		**Minutter i gj.snitt pr. dag:**	
Syklet du eller trente på ergometersykkel (spinningsykkel) i måleperioden?			
	Ja ☐	**Nei** ☐	**Vet ikke/husker ikke** ☐
Antall dager:		**Minutter i gj.snitt pr. dag:**	
Trente du styrketrening (med vekter/i apparater) i måleperioden?			
	Ja ☐	**Nei** ☐	**Vet ikke/husker ikke** ☐
Antall dager:		**Minutter i gj.snitt pr. dag:**	
Gikk du på langrenn/rulleski i måleperioden?			
	Ja ☐	**Nei** ☐	**Vet ikke/husker ikke** ☐
Antall dager:		**Minutter i gj.snitt pr. dag:**	

Når måleperioden er over, lever måler og denne plakaten til Christina Gjestvang på NIH (oppsatt tidspunkt) eller send tilbake i vedlagt konvolutt.
Tusen takk for hjelpen!

Appendix 6

Letter from the Regional Committee for Medical and Health Research Ethics

Emne: Svar på framleggingsvurdering
Fra: post@helseforskning.etikkom.no
Dato: 13.08.2015 14:12
Til: christina.gjestvang@nih.no
Kopi:

Vår ref.nr.: 2015/1443 A

Det vises til forespørsel om framleggingsplikt for prosjektet "Fitnessbransjen - En arena for folkehelse. Hvem, hva og hvorfor?" mottatt den 04.08.2015 (vår ref. 2015/1443).

Henvendelsen er vurdert av leder i REK sør-øst A.

Prosjektbeskrivelse

Til tross for at fitnessbransjen har utviklet seg til å bli en viktig arena for fysisk aktivitet eksisterer det svært lite forskningsbasert kunnskap om de som velger å være fysisk aktive på et treningssenter, produktene som tilbys, både innenfor gruppetrening og individuell veiledning, samt kompetansen til de som jobber der. Videre viser studier at rundt 50 % av de som starter å trene regelmessig faller fra sitt treningsprogram innen 6-12 måneder etter oppstart. Grunner til hvorfor det er stort frafall i begynnelsen av trening er lite beskrevet i litteraturen, og dette forskningsprosjektet vil belyse medvirkende årsaker til hvem som klarer, og ikke klarer, å opprettholde trening over tid, slik at man kan bli i bedre stand til å utvikle tiltak som får flere til å opprettholde et aktivt liv. Denne studien vil også gi kunnskap som kan bidra til å forklare fysisk aktivitets betydning for livskvalitet, inkludert følelse av velvære og helseplager hos de som går fra å være inaktive til å bli regelmessig aktive, noe som er litebeskrevet i litteraturen.

Nye medlemmer på SATS ELIXIA-sentre i Oslo vil rekrutteres til en prospektiv, observasjonell kohortstudie over 12 måneder med oppfølging 5 år etter studiestart. Data vil innsamles ved hjelp av spørreskjema og fysiologiske målinger (måling av kroppsanalyse, maksimalt oksygenopptak, maksimal styrke og muskulær utholdenhet) kartlagt ved baseline og etter 3, 6 og 12 mnd.

Vurdering

Etter REKs vurdering faller prosjektet slik det er beskrevet utenfor virkeområdet til helseforskningsloven. Helseforskningsloven gjelder for *medisinsk og helsefaglig forskning* på norsk territorium eller når forskningen skjer i regi av en forskningsansvarlig som er etablert i Norge.

Medisinsk og helsefaglig forskning er forskning på mennesker, humant biologisk materiale og helseopplysninger, som har som formål *å frambringe ny kunnskap om helse og sykdom*, jf. helseforskningsloven §§ 2 og 4a. Formålet er avgjørende, ikke om forskningen utføres av helsepersonell eller på pasienter eller benytter helseopplysninger.

Prosjektet er etter REKs vurdering et prosjekt som ikke har som formål å skaffe til veie ny kunnskap om helse og sykdom.

Prosjekter som faller utenfor helseforskningslovens virkeområde kan gjennomføres uten godkjenning av REK. Det er institusjonens ansvar på å sørge for at prosjektet gjennomføres på en forsvarlig måte med hensyn til for eksempel regler for taushetsplikt og personvern.

Vi gjør oppmerksom på at vurderingen og konklusjonen er å anse som veiledende jf. forvaltningsloven § 11.

Dersom dere likevel ønsker å søke REK vil søknaden bli behandlet i komitémøte, og det vil bli fattet et enkeltvedtak etter forvaltningsloven.

Med vennlig hilsen
Vivi Opdal
seniorrådgiver
post@helseforskning.etikkom.no
T: 22845526

Regional komité for medisinsk og helsefaglig forskningsetikk REK sør-øst-Norge (REK sør-øst)
http://helseforskning.etikkom.no

SPREK banner 20100316.jpg

Appendix 7

Approval letter from the Norwegian Social Science Data Service

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Lene A.H. Haakstad
Seksjon for idrettsmedisinske fag Norges idrettshøgskole
Postboks 4014 Ullevål Stadion
0806 OSLO

Vår dato: 02.09.2015 Vår ref: 44135 / 3 / LT Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 04.08.2015. Meldingen gjelder prosjektet:

44135	*Fitnessbransjen -En arena for folkehelse. Hvem, hva og hvorfor?*
Behandlingsansvarlig	*Norges idrettshøgskole, ved institusjonens øverste leder*
Daglig ansvarlig	*Lene A.H. Haakstad*

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 28.02.2023, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Lis Tenold

Kontaktperson: Lis Tenold tlf: 55 58 33 77
Vedlegg: Prosjektvurdering

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 44135

Formålet med prosjektet er å generere ny kunnskap om medvirkende faktorer assosiert med oppslutning og frafall til trening, slik at en kan bli bedre i stand til å utvikle
tiltak som får flere til å opprettholde et aktivt liv.

Utvalget omfatter 280 nye inaktive medlemmer fra SATS ELIXIA-sentre i Oslo. Rekruttering og førstegangskontakt skjer gjennom SATS ELIXIA-kundeservice som formidler henvendelsen fra prosjektleder.

Utvalget informeres skriftlig om prosjektet og samtykker til deltakelse. Personvernombudet finner informasjonsskrivet mottatt 25.08.2015 tilfredsstillende.

Det behandles sensitive personopplysninger om etnisk bakgrunn eller politisk/filosofisk/religiøs oppfatning og helseforhold, jf. personopplysningsloven § 2 punkt a og c.

Personvernombudet legger til grunn at forsker etterfølger Norges idrettshøgskole sine interne rutiner for datasikkerhet. Dersom personopplysninger skal sendes elektronisk eller lagres på privat pc/mobile enheter, bør opplysningene krypteres tilstrekkelig.

Forventet prosjektslutt er 28.02.2023. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:
- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)

Appendix 8

Informed written consent statement Group A

NORGES IDRETTSHØGSKOLE

Forespørsel om deltakelse i forskningsprosjektet

«Fitnessbransjen – en arena for folkehelse»

Til tross for at fitnessbransjen har utviklet seg til å bli en viktig arena for fysisk aktivitet, eksisterer det i dag svært lite forskningsbasert kunnskap om de som velger å være fysisk aktive på treningssentre, produktene som tilbys, både innenfor gruppetrening og individuell veiledning, samt kompetansen til de som jobber der.

I prosjektet «Fitnessbransjen – en arena for folkehelse» fokuseres det på grunnleggende aspekter ved trening og fysisk aktivitet, inkludert treningsvaner, motiver og barrierer for trening.

Målet med studien er å generere ny kunnskap om medvirkende faktorer assosiert med oppslutning til og frafall fra trening, slik at vi kan bli i bedre stand til å sette i gang tiltak som får flere til å opprettholde et aktivt liv.

Hva vil det innebære å delta i prosjektet?
Totalt ønsker vi å rekruttere ca. 250 nye medlemmer på SATS ELIXIA-sentre i Oslo til denne studien som vil gå over 12 måneder, inkludert oppfølging 5 år etter studiestart. Data vil innsamles ved hjelp av spørreskjema og fysiologiske målinger kartlagt ved tre til fire tidspunkt.

Testingen vil foregå på Norges idrettshøgskole (NIH), vil ta ca. **1 time og 30 minutter** hver gang og inkluderer følgende prosedyre:

Baseline, 3 og 12 måneder:

- Spørreskjema om fysisk aktivitet/trening, kosthold, helse, livskvalitet og sosial støtte (dette fylles ut hjemmefra, tar ca. 30 minutter å fylle ut)
- Måling av kroppssammensetning (fettmasse og muskelmasse) med Inbody
- Måling av maksimalt oksygenopptak med indirekte kalorimetri («Breath by breath»)
- Måling av styrke og muskulær utholdenhet inkludert 1RM test (Repetisjon Maksimum) i benpress (underkropp) og benkpress (overkropp). Det vil også gjennomføres styrketester med 70 % belastning av 1RM i de samme øvelsene.

Baseline og 12 måneder:

- Objektiv kartlegging av totalt fysisk aktivitetsnivå med ActiGraph GT1M. Du vil bære akselerometeret i en uke (7 dager) ved hver måleperiode.

NORGES IDRETTSHØGSKOLE

Seks måneder:

Spørreskjema om fysisk aktivitet/trening, kosthold, helse, livskvalitet og sosial støtte vil sendes elektronisk til alle deltagere.

Alle testene benyttes hyppig innen forskning og idrettsmedisin, og innebærer liten risiko for skader og negativ påvirkning for deg. Kroppssammensetning måles med Inbody som gir en beskjeden stråledose. Testing av maksimal styrke, muskulær utholdenhet og oksygenopptak (VO^2max) følger standard prosedyrer ved NIH, og vil gjennomføres av erfarne testledere.

Gjennomføring av tester og deltakelse i prosjektet er selvsagt uten kostnader for deg. Kostnader i forbindelse med transport til og fra testing dekkes ikke.

Jeg er frisk og er klar over at deltagelse er helt frivillig, og at jeg har anledning til å trekke meg fra prosjektet når jeg måtte ønske det, uten å måtte oppgi grunn. Alle resultater vil bli behandlet konfidensielt, og kun kodenummer, ikke navn, vil bli lagt inn på datamaskin for videre analyser. Prosjektet er vurdert av Personvernombudet for forskning, Norsk samfunnsvitenskapelige datatjeneste. Innsamlede opplysninger vil bli anonymisert ved prosjektslutt 28.02.2023.

Lene Haakstad
Associate professor, dr. scient

Kontaktperson:
Christina Gjestvang
Forskningsmedarbeider
Seksjon for idrettsmedisinske fag
Norges idrettshøgskole
P.b 4014, Ullevål Stadion
0806 OSLO
E-post: christina.gjestvang@nih.no
Tlf: 90 02 03 91

Jeg har mottatt muntlig og skriftlig informasjon om studien, og samtykker i å delta.

Dato: _____ Underskrift: _____

Vennligst skriv ned følgende opplysninger (benytt blokkbokstaver):

Navn: …….....

Adresse:…….....

Tlf.nr:……og epost:……

Appendix 9

Informed written consent statement Group B

NORGES IDRETTSHØGSKOLE

Forespørsel om deltakelse i forskningsprosjektet

«Fitnessbransjen – en arena for folkehelse»

Til tross for at fitnessbransjen har utviklet seg til å bli en viktig arena for fysisk aktivitet, eksisterer det i dag svært lite forskningsbasert kunnskap om de som velger å være fysisk aktive på treningssentre, produktene som tilbys, både innenfor gruppetrening og individuell veiledning, samt kompetansen til de som jobber der.

I prosjektet «Fitnessbransjen – en arena for folkehelse» fokuseres det på grunnleggende aspekter ved trening og fysisk aktivitet, inkludert treningsvaner, motiver og barrierer for trening.

Målet med studien er å generere ny kunnskap om medvirkende faktorer assosiert med oppslutning til og frafall fra trening, slik at vi kan bli i bedre stand til å sette i gang tiltak som får flere til å opprettholde et aktivt liv.

Hva vil det innebære å delta i prosjektet?
Totalt ønsker vi å rekruttere ca. 250 nye medlemmer på SATS ELIXIA-sentre i Oslo og Akershus til denne studien som vil gå over 12 måneder, inkludert oppfølging 5 år etter studiestart. Data vil innsamles ved hjelp av spørreskjema kartlagt ved fire tidspunkt.

Spørreskjemaet skal gjennomføres hjemmefra (elektronisk) og vil ta ca. **30 minutter** hver gang. Spørreskjemaet skal besvares ved baseline (oppstart) og etter 3, 6 og 12 måneder. Spørreskjema omhandler fysisk aktivitet/trening, kosthold, helse, livskvalitet, motiv og barriere for fysisk aktivitet og sosial støtte.

Besvarelse av første spørreskjema er din samtykke til deltakelse. Da erklærer du at du er klar over at deltagelse er helt frivillig, og at du har anledning til å trekke deg fra prosjektet når du måtte ønske det, uten å måtte oppgi grunn.

Alle resultater vil bli behandlet konfidensielt, og kun kodenummer, ikke navn, vil bli lagt inn på datamaskin for videre analyser. Prosjektet er vurdert av Personvernombudet for forskning, Norsk samfunnsvitenskapelige datatjeneste. Innsamlede opplysninger vil bli anonymisert ved prosjektslutt 28.02.2023.

Lene Haakstad
Associate professor, dr. scient

NORGES IDRETTSHØGSKOLE

Kontaktperson:
Christina Gjestvang
Forskningsmedarbeider
Seksjon for idrettsmedisinske fag
Norges idrettshøgskole
P.b 4014, Ullevål Stadion
0806 OSLO
E-post: christina.gjestvang@nih.no
Tlf: 90 02 03 91