Introduction

Inadequate daily physical activity has become a major threat to health with low cardiorespiratory fitness levels matching smoking, diabetes, and cardiovascular disease when referring to all-cause mortality (Mandsager et al, 2018). Identification and implementation of effective exercise interventions are, therefore, of major importance from a general societal and individual health perspective. While traditional exercise such as continuous running, bicycling, and strength training have been extensively studied and proved to be effective in the prevention and treatment of certain diseases, it is also clear that traditional exercise-training programmes have some shortcomings. In particular, the low adherence to long-term interventions and hence loss of sustainable effectiveness is a major concern (Middleton et al, 2013; Pedersen and Saltin, 2015; Kiens et al, 2007).

Team sports have in this context proved to be motivating and associated with positive psycho-social interactions that increase social capital and quality of life. These are factors that have been shown to play an important role in relation to promoting adherence (Wikman et al, 2017; Nielsen et al, 2014; Ottesen et al, 2010). In addition, while isolated endurance or strength training may have potent effects on selected cardiovascular, metabolic and musculoskeletal parameters, intermittent team sports appear to have more widespread beneficial health effects (Nybo et al, 2010; Krstrup et al, 2018; Milanović et al, 2018; Vorup et al, 2017; Randers et al, 2018). At present, the physiological research field related to health in untrained people has been most extensive in recreational football conducted as small-sided games, and the results have been convincing, showing favorable physiological adaptations in not only inactive healthy people, but also in patient groups, including hypertensive and diabetic patients (Krstrup et al, 2009; Andersen et al, 2014a; Andersen et al, 2010; Schmidt et al, 2013; Andersen et al, 2014b; Krstrup et al,
Recreational football provides training effects that resemble a combination of strength training, high-intensity interval training, and endurance training, which is due to the intermittent characteristic of football, with periods of near-maximal intensity combined with accelerations, decelerations, rapid turns, jumps, short sprints, tackles, passes and shots (Randers et al, 2010). The extensive research in recreational football has contributed to clubs around Denmark now offering ‘football fitness’ for people with no interest in playing at competition level and people with limited skills. The concept has been a success and has resulted in additional members in the clubs, especially among women (Bennike et al, 2014). Still, it is of great importance to investigate other team sports as different types of physical activity may attract and motivate different people.

A recently observational study in 7v7 team handball for middle-aged men with prior handball experience showed that the intensity and the amount of intermittent work were high and that the activity patterns were similar to what is observed in recreational football (Póvoas et al, 2017). Team handball, however, is a tactically- and technically-demanding activity that may have a less pronounced effect on the physiological response and the enjoyment of the activity if participants have limited skills (Stelter, 1999:194). This is, among other things, why the Danish Handball Federation has developed small-sided team handball with inspiration from ‘football fitness’ where no hard tackles are allowed, and where the competition is less important.

There are no randomized controlled studies that have investigated the intensity and activity patterns in small-sided team handball, nor the motivational aspects, nor the physiological response of a range of parameters, including cardiovascular, metabolic and musculoskeletal fitness. It is unknown whether or not the participant with limited technical skills and lack of experience will achieve beneficial health effects, and whether or not the physiological stimuli will be the same for beginners as for more experienced players.
Thus, by investigating and answering the research objectives below, this thesis will add knowledge on the use of small-sided team handball as a health-promoting activity for young adult men and women and middle-aged overweight premenopausal women. Therefore the present thesis aimed to:

1. Investigate the activity profile and exercise intensity during training, and measure the effect of small-sided team handball on cardiovascular, metabolic and musculoskeletal parameters during three to four-months interventions for three different populations: (1) untrained healthy women aged 20-30 years, (2) untrained healthy men aged 20-30 years, and (3) overweight premenopausal women aged 35-50 years with and without prior handball experience.

2. Examine if participants with limited technical skills (lack of prior experience with team handball) may complete training with adequate intensity to achieve physiological adaptations of relevance for health.

3. Evaluate if it is feasible for untrained participants, including participants with no prior experience with team handball, to complete the training interventions with regards to adherence, exercise intensity, motivational aspects as well as adverse events.