
Title registration for a systematic review: Examining the best time of day for exercise

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Title of the review

Examining the best time of day for exercise: a systematic review

Background

The positive effects of regular exercise have been extensively reported by many studies including improved wellbeing, reduced cardiovascular events and weight reduction (Der & Ssd, 2017; Füzéki, Engeroff, & Banzer, 2018; Hills, Street, & Byrne, 2015; Nehrllich, 2006). However, lots of factors could influence the benefits of doing regular exercise, such as the exercise type, duration, hormone adaptation, and timing of exercise (Seo et al., 2013).

The existence of a time-of-day effect on human performance is now well established, because circadian rhythms are periodic time-dependent changes in physiological variables. It is already known that hormone concentrations exhibit circadian rhythmicity and vary throughout the day (Kraemer et al. 2001) along with body temperature (Bailey and Heitkemper 2001) and strength performance (Sedliak et al. 2009). With the different hormone concentrations, motor function (such as strength, whole-body flexibility, simple reaction time and short-term power output) display a time-of-day effect characterized by a late afternoon acrophase (~18:00 hours) and an early morning bathyphase (~06:00 hours; see reviews by Atkinson and Reilly 1996, Reilly et al. 2000).

The Physical Activity Guidelines for Americans, 2nd edition (Piercy et al. 2018), provided information and guidance on the types and amounts of physical activity that provide substantial health benefits, but no recommendations on the best time of a day to exercise. There are several RCTs (Brito et al., 2018; Cavalcanti et al., 2016; Drust, Waterhouse, Atkinson, Edwards, & Reilly, 2005; Pettee Gabriel et al., 2017; Souissi, Gauthier, Sesboüé, Larue, & Davenne, 2002) focusing on the timing of exercise. One RCT based on 10086 participants indicated that body weight, body mass index, abdominal skin fold thickness and abdominal circumference of the morning exercise decreased significantly more than that of the evening exercise during six weeks (Pettee, Gabriel et al., 2017). Souissi et al (2002) suggested that several weeks of repeated strength training performed in the morning hours may reduce the typical diurnal pattern by increasing maximum strength more in the morning than at other times of day. However, the results about different timing for exercise are not always consistent, for example, Drust et al (2005) reported that maximum voluntary strength of untrained men typically exhibits a diurnal pattern, with low morning values and peak values in the afternoon.

Knowing the right time to do exercise could be valuable for people to improve the quality and efficiency of their life, but the controversial results from current evidence make it difficult to draw a conclusion to this question. Therefore, the main target of the this review is to investigate the effect of different exercise timing on wellbeing, heart rate, appetite sensation,

sleep quality, calorie intake, macronutrient consumption, weight loss in overweight and other anthropometric indices.

Policy relevance

Policy interventions are recommended to improve and sustain population behavioral outcomes and have been recently applied to physical activity, and some guidelines had reported that physical activity can promote the prevention, treatment and rehabilitation of diseases. But there are no policies or guidelines that recommend the best time of a day to exercise, this study aims to conduct a systematic review and meta-analysis focusing on the effect of training time in a day on the effectiveness of exercise, so as to provide reference for policy making.

Objectives

The main target of this review is to include all human population without restrictions on gender, age, race, health status and source of cases, to investigate the effect of different exercise timing on wellbeing, heart rate, appetite sensation, sleep quality, calorie intake, macronutrient consumption, weight loss in overweight people, and other anthropometric indices.

Existing reviews

At present, no systematic reviews have examined the best time for doing exercise in a day, but there are some RCTs that have researched the topic. So we think it is necessary to conduct a systematic review.

Intervention

Experimental group: any type of exercise in different time in a day: morning, afternoon, evening.

Control group: non-training

Population

All human populations including any age, sex, and health status.

Outcomes

Well-being (which were examined using validated questionnaires, eg: Profile of Mood States 2nd edition [POMS-2], Distress Thermometer for Parents [DT-P]) and so on, sleep quality

(any objective or subjective validated tool to assess sleep), heart rate, appetite sensation, calorie intake, macronutrient consumption, weight loss in overweight and other anthropometric indices.

Study designs

Randomized controlled trials (Experimental group: any type of exercise in different time in a day: morning, afternoon, evening; Control group: non-training).

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Potential conflicts of interest

The authors declare that they have no conflict of interest.

Preliminary timeframe

- Date you plan to submit a draft protocol: May 2019
- Date you plan to submit a draft review: December 2019