

Linking psycho-physical profiles to different training condition during COVID-19 confinement

VALERIO BONAVALONTÀ, STEFANIA CATALDI , ANTONELLO CONENNA, FRANCESCO FISCHETTI


School of Medicine, Department of Basic Medical Sciences, Neuroscience and Sense Organs, University of Study of Bari "Aldo Moro", Bari, Italy

ABSTRACT

At the end of the period of home confinement due to Covid-19 lockdown, the 12-item Health Survey (SF-12) questionnaire was used to assess the quality of life. Participants also completed the Profile of Mood State (POMS) for the assessment of mood. Data were collected through an online form on a sample of 143 adults (71% aged 18-30, 12% 31-40, 11% 41-50 and 6% aged >50, 58% males and 42% females). Subjects were divided into 5 groups according to the corresponding training condition followed during the first lockdown. Training classes were carried out via online guided distance learning. 19 subjects (Group FT) received functional training classes as they did before the confinement. Group FTL (29 subjects) followed another functional training only during the lockdown. Group DT (46 subjects) continued a non-functional type training also during lockdown; group TL performed one training only during lockdown. Finally, group NT (25 subjects) received no training. Results from SF-12 showed no significant differences between groups. POMS result indicated that only the FT group had positive effects on anxiety and depression, whereas a functional training performed with a different program (FTL) resulted in no significant effects on anxiety compared to NA group. **Keywords:** Functional training; Anxiety; Depression; Quality of life; Home training; Distance learning.

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 **Corresponding author.** School of Medicine: Department of Basic Medical Sciences, Neuroscience and Sense Organs. University of Study of Bari "Aldo Moro", Lungomare Starita 1/b, 70132, Bari, Italy. <https://orcid.org/0000-0002-5929-4766>
E-mail: stefania.cataldi@uniba.it

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INTRODUCTION

Many studies that support the positive effects of physical activity on mental health and in particular with regard to anxiety, depression and quality of life, and it is clear that physical activity can lead to many physiological changes that result in improved mood, self-esteem, stress and anxiety levels (Abd El-Kader and Al-Jiffri, 2016; Anderson and Shivakumar, 2013; Bartholomew et al., 2005; Broman-Fulks et al., 2004; Chang et al., 2017; DeBoer et al., 2012).

However, currently in the literature it is not clear which physical activity is better in order to produce an improvement of these parameters, as improvements can be achieved either with a purely aerobic and with a purely anaerobic exercise (DiLorenzo et al., 1999; Martinsen et al., 1989).

In addition, there are numerous studies in the scientific literature reporting that exercise improves mood disorders, primarily depression (Kvam et al., 2016) and anxiety (Wipfli et al., 2008) in clinical and nonclinical populations; in fact, exercise as a nonpharmacological treatment has been shown to be superior to control interventions and sometimes comparable to medication for mild and moderate depression (Wipfli et al., 2008; Cooney et al., 2013).

Major depressive disorder (MDD) is one of the major diseases worldwide that affects health status more than diseases such as diabetes and diseases to the musculoskeletal system, thus it should be considered a public health priority (Moussavi et al., 2007).

In fact, depression causes a marked change in mood such as sadness and irritability and is accompanied by numerous psychophysiological alterations including appetite and sleep disturbance, loss of ability to feel pleasure, slowed speech and action, and suicidal thoughts (Belmaker and Agam; 2008).

Therefore, physical activity and in particular physical exercise, are to be considered an important antidepressant therapy option based on various evidence (Schuch et al., 2016, Vancampfort et al., 2017), and has been included in World Health Organization (WHO) guidelines as a standard treatment of depression (WHO, 2012).

Functional training (FT) is often performed using an interval training methodology, where interval training is defined as "*a training in which we alternate periods of relatively intense exercise with periods of lower intensity effort or complete rest for recovery*" (Gibala et al., 2014). The two most commonly used forms of interval training are sprint interval training (SIT) and high intensity interval training (HIIT) (Gibala et al., 2014).

SIT refers to protocols that are performed at supramaximal exercise at intensities corresponding to loads/intensities greater than those associated with maximum oxygen consumption (VO_{2max}) obtained with an incremental test (Viana et al., 2018); whereas HIIT is a training stimulus with a target intensity between 80% and 100% of maximum heart rate (FC max) as reported by Viana et al. (2018).

From a study conducted by Lee et al. (2014) it is showed that exercise can increase neurotrophin levels and, in particular, HIIT has been shown to improve depression and neuronal plasticity in the hippocampus in rats with post-stroke depression (Luo et al., 2019); these studies hypothesized that both HIIT and SIT would improve depressive and anxiety symptoms in healthy women. Another study conducted by Wu et al. (2015) showed the success of HIIT training with psychiatric patients and in addition a study conducted by Heggelund et al. (2014) demonstrated the positive effect of this type of training on subjects who suffered from depression.

In addition, another study (Kvam et al., 2016) have demonstrated the positive effects of SIT training on subjects suffering from depression. Moreover, the WHO places specific recommendations for home physical training, recommending 60' per day of moderate to vigorous physical activity for children and youth aged 6-17 years and 75' per week of vigorous physical activity or 150' per week of moderate physical activity for adults and the elderly; all of which can help counteract the harmful physical and mental side effects of lifestyle regulations due to Covid-19 (Hammami et al., 2020).

Therefore, the aim of the study is to verify if physical activity and, specifically, a functional training program can have positive effects on anxiety, depression, and quality of life in healthy subjects during the lockdown period due to COVID-19, compared to subjects who did not engage in any type of physical activity during the same period.

METHODS

Participants

The sample consisted of 143 participants (71% aged 18-30, 12% 31-40, 11% 41-50 and 6% aged >50; 83 females and 60 males) who decided to voluntarily complete a questionnaire created through Google Forms. This questionnaire was submitted in the week immediately after the end of the severe lockdown had in Italy due to the COVID-19 pandemic that began on March 9, 2020 and ended on May 18, 2020. The inclusion criteria for the present study were to be healthy and at least 18 years of age.

The sample was divided into 5 groups: the functional training group (FT) composed of 19 people who performed in the lockdown period the training protocol of 10 weeks through video lessons. This group performed functional training during the lockdown period but was also performing the same type of training before the lockdown. A second group of 29 people performed functional training only during this lockdown period (FTL) in a self-taught manner or following a different training protocol; before the lockdown they performed another type of training. Another group of 46 people performed a different type of training (DT) than functional training both during the lockdown and before. A fourth group of 24 people trained during the lockdown period (TL) but were not performing any type of physical activity before the lockdown. Finally, a group of 25 people did not perform any type of training during the lockdown period (NT) nor did before the lockdown.

Instruments

The questionnaire used for data collection consisted of three sections: the first in which biographical information were provided, which type of physical activity was performed or not performed before and during the lockdown, the frequency of activity in terms of days and hours of training per week, and finally whether or not any training was planned by a specialist in sport science or performed autonomously.

In the second section there was a validated questionnaire as the SF12 (Ware, 1996) which aims to assess the health status of the subject in particular what the subject thinks of his health. This questionnaire consists of 12 questions rated from 1 to 6 for some items, from 1 to 5 for others and from 1 to 2 for the resting, with a total score that can vary from a minimum total score of 12 and a maximum of 47. SF12 questionnaire allows to calculate two indices, one of which concerns the physical status of the group, referred to as Physical Component Summary (PCS): this index takes into account six items in turn referred to various areas; in particular for physical activity, physical health, physical pain and to health in general. The other index analysed is the Mental Component Summary (MCS) which is an index that measures the mental state of the

group: even for this index six items are referred to various areas, in particular to vitality, social activity, emotional state and to mental health.

In the third section the participant had to answer a standardized and validated questionnaire such as the abbreviated Profile of Mood State (POMS-40; Grove and Prapavessis, 1992), composed of 40 questions rated from 0 to 4; by answering the items of this questionnaire indications on the scales of tension, anger, fatigue, depression, affection related to esteem, vigour and confusion were provided. Total mood disorder (TMD) is calculated which is a value that includes seven subscales (tension, anger, fatigue, depression, vigour, confusion and effect).

Procedures

The training protocol used to carry out functional training performed with interval training methodology included 8 different exercises for each training session, performed alternating a phase of work and a phase of passive recovery with a work/recovery ratio of 1:1; each week included two training sessions with an average duration of 1h for each lesson. Each training session or workout was divided into three parts: a part of activation or warm up in which exercises of joint mobility and dynamic stretching were performed with an average duration of 10'. A central phase lasting about 32' with a workout consisting of eight exercises performed with an interval training methodology that alternated a work phase of 30" and a passive recovery phase of 30". Finally, a final cool down phase lasting about 10' in which static stretching exercises were performed. For all the training conditions the average training frequency was twice a week for about one hour.

Statistical analysis

This study has a cross-sectional design. Considering a 95% confidence level or $\alpha = .05$, using the Shapiro-Wilk test it was seen that the distribution for the variables PCS, MCS and total score for the SF-12 (TOT SF-12) was not normal. Given the non-normal distribution the non-parametric Kruskal-Wallis test was used to check for statistical differences between the five groups for each dependent variable. When a statistical significance between groups for any dependent variable was detected, a two-tailed Mann-Whitney test was applied to verify which groups showed the differences. Statistical significance was set at $p < .05$.

RESULTS

Data analysis showed that there were no statistically significant differences between the five groups regarding the health status collected with the questionnaire SF-12, as the TOT SF-12 value of the five groups was $p = .334$; also, analysing in detail the two indices of the questionnaire, PCS and MCS, no statistically significant difference was found because the p -value was $.359$ for PCS and $p = .36978$ for MCS index.

Conversely, with regard to the POMS 40, statistically significant differences were found between the five groups. In particular, for the variable indicating the POMS 40 total mood disorder score (TMD) these differences were highlighted comparing the FT and NT groups ($p = .01878$), the DT and NT groups ($p < .001$), between the DT and FTL ($p = .01208$) groups and finally between the DT and TL groups ($p = .0151$).

DISCUSSION AND CONCLUSIONS

Aim of the study was to compare different training conditions performed before and during the lockdown home-confinement linked to psycho-physical parameters in healthy adults. Reduced level of physical activity can alter bio-psycho-social functioning and wellbeing (D'Elia et al. 2020). Previous research by the authors

showed that a functional training, such as CrossFit could positively affect the general physical well-being and mental attitude and improve the emotional perceived self-efficacy (Bonavolontà et al., 2020 b). In addition, several studies reported that physical and sport activities were deeply influenced by the current pandemic scenario as online distance learning allowed to attend different classes as well as to maintain a certain physical fitness for sport and individual teams (Bonavolontà et al. 2020; Raiola et al. 2020). Raiola et al. (2020) reported that functional training was practiced by 27% of a 268 people sample during the first Italian lockdown. In addition, it is crucial to understand which modality better fit into the current limited socio-economic scenario, to find the better strategy in order to design efficient teaching-learning experiences (Sgrò et al. 2018). Indeed, as reported by Haga et al. (2018) different cultural contexts, lifestyles and physical activity contexts can impact on a successful process of developing motor competences.

Our results showed no significant differences in relation to SF-12 questionnaire for all the training conditions, i.e., between subjects who engaged in physical activity or a functional training program during the lockdown period, and those who did not engage in any type of physical activity.

Conversely, statistically significant differences were found for POMS-40. Indeed, with regard to the variable TMD, comparing the means of the groups, FT was significantly lower than NT group: thus, the group that has performed functional training (FT) following a 10-week training protocol for the entire period of lockdown through video lessons created by a specialist in sport and exercise science, showed a positive effect on the total mood disorder (TMD) compared to the NT group that did not perform any type of training during the lockdown nor was doing before the lockdown. From the comparison of the DT and NT groups, it can be seen that DT, that was the group that has performed a different type of training than the functional during the lockdown and before, showed a significantly lower TMD than NT, suggesting a positive effect on total mood disorder. From the comparison of the DT and FTL groups comparing the means of the two groups, DT value is significantly lower than that of FTL which represents the group that has done a functional training in a self-taught manner or following a different training protocol and that before the lockdown had a different type of training than the functional: this implies that the DT had a positive effect on TMD respect to the FTL group. Finally, comparing the DT and TL groups, DT has significantly lower mean than TL that was the group that has trained exclusively during the lockdown, suggesting that the DT had a greater positive impact on TMD than the TL group. On the other hand, with regard to the comparisons between the FT and FTL groups, between the FT and DT groups, between the FT and TL groups, between the NT and FTL groups, between the NT and TL groups, and finally between the FTL and TL groups, no statistically significant differences were found. It should be noted that the same type of functional training performed in a self-taught manner or by performing a different type of training protocol (FTL), did not determine any statistically significant beneficial effect compared to the group that did not perform any type of training (NT). Our findings are partly in line with Viana and colleagues (2019) who found that both HIIT and SIT groups similarly improved depressive symptoms but not anxiety levels in healthy and physically active young adult women.

Although some research highlighted that digital devices could cause and increase mental fatigue (Greco et al., 2017), currently, online distance training allowed to keep a relationship between the teacher/trainer and his athletes (Bonavolontà et al., 2020), like it has occurred for several participants to the present study.

Limitations of the study include the fact that gender has not been considered, while previous research reported that physical education plays a gender-related role on body dissatisfaction (Fischetti et al., 2020) and functional training does as well on anxiety and depression (de Sousa et al., 2020).

Future extension of the present work should include a longitudinal design, consistent with contingent epidemiologic needs and limitations.

In conclusion, subjects who remained active, in particular those who have continued to perform the same type of training done before the lockdown, had a better profile from the point of view of anxiety and depression compared to those who have not done any type of training, to those who changed their usual training during the lockdown by choice or by necessity performing workouts in a self-taught manner, and also compared to those who began to train only in this period of total lockdown.

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