Journal of Physical Education and Sport ® (JPES), 19(1), Art 110 pp. 772 - 780, 2019
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Indoor-cycling classes: Is there a difference between what instructors predict and what practitioners practice?

DARIO TEODORO CAMPOS DA SILVA[1], KAUE DOS SANTOS SILVA[1], SHIRKO AHMADI[2]; LUIS FELIPE MILANO TEIXEIRA[1,2]

[1] Department of Physical Education, University of Sorocaba, Sorocaba, São Paulo, BRAZIL
[2] Department of Adapted Physical Activity, School of Physical Education, University of Campinas, BRAZIL

Published online:March 31, 2019
(Accepted for publication March 12, 2019)
DOI:10.7752/jpes.2019.01110

Abstract:
Indoor-cycling, is one of the most popular modern exercises modality of physical activity. However, since most of the collective gymnastics offered in fitness clubs, their classes do not usually have to monitor the loads imposed on practitioners. Thus, main purpose of this study is to investigate if the internal training load (ITL) predicted by instructors is the same received and perceived by practitioners in indoor-cycling classes. Subjects were 5 practitioners and 3 instructors of indoor-cycling. The practitioners were 3 males and 2 females (n= 5; age= 45.6±5.5 years; weight= 84.3±6.1 kg; training experience= 1.9±0.5 years). The instructors were 3 males (n= 3; age= 36±3.4 years; weight= 79.9±3.3 kg; teaching experience= 3.6±3.4 years). The practitioners performed 9 indoor-cycling classes during the experiment, 3 classes with each instructor and 3 classes in different intensities (i.e. 3 classes easy; 3 classes moderate and; 3 classes hard) with 45 minutes' volume. The data were collected in 3 times: A) before the class: i) blood lactate concentration and ii) Section rating of perceived exertion (sRPE) (for instructors only); B) during the class: i) Heart Rate (HR) and; C) after the class: i) blood lactate concentration and ii) sRPE after 10 minutes (for practitioners only). One-way ANOVA with Tukey's post hoc used as statistical analyses. Significant differences were observed between the instructors and practitioners in sRPE and ITL in low and high intensity classes ($p < 0.01$). We conclude that there is a difference between ITL predicted by coaches and performed by practitioners in classes designed for low intensity and high intensity. Our results show that indoor-cycling practitioners tend to maintain moderate loads of intensity regardless of the coaches' planning and instruction.
Key words: indoor-cycling; internal training load; rating of perceived exertion.

Introduction

Indoor-cycling, also known as Spinning, is one of the most popular modern modality of physical activity (Reeves, 2012; Sport England, 2012), which normally performed in fitness clubs under direction of an instructor and accompanied by music. Nevertheless, both of the instructor and the music could influence the practitioners' performance that may be independent of exercise (Szabo et al., 2015). In Indoor-cycling, expectations related to the instructor and exercise could influence the post-exercise affect. In this field, it should be realized that evaluation and perception of various exercise efforts are affected by past experiences in practitioners (Mason & Holt, 2012). Nowadays, athletes' ability to adapt to training and improve physical performance is one of the keystones of modern sports sciences (Foster et al., 2001). Foster et al. (1996), found a quantitative relationship between the magnitude of the training load (TL) and subsequent performance.

TL is a significant parameter for monitoring athletes by coaches and scientists (Van Erp et al., 2018), which demands to be high enough to make a stimulus for adaptation (Foster et al., 1996). However, very large values for chronic TL or maintaining the same TL for long periods of training are related with overtraining syndrome (Meeusen et al., 2013) and injuries (Hulin et al., 2014). Training programs are usually based on evaluations of external load (e.g. power output, time or distance completed or amount of throws) (Van Erp et al., 2018). Though, internal training load (ITL) as a relative physiological stress that imposed on athletes, is a more important determinant principle of the stimulus for training adaptation than external TL (Viru & Viru, 2000). The most common methods based on evaluations of the ITL are heart rate (HR), rating of perceived exertion (RPE) (Impellizzeri et al., 2005; Coutts et al., 2007; Van Erp et al., 2018) and blood lactate (Halson, 2014). HR is mostly used to determine TL because the method is widely accessible, noninvasive and no cost. Using HR to evaluate exercise intensity is based on the obvious linear relationship between HR and Oxygen Consumption (VO_2) throughout of steady-state submaximal exercise (Åstrand and Rodahl, 1986; Hopkins, 1991).

Corresponding Author: SHIRKO AHMADI, Email: shirkooahmadi@yahoo.com

Another alternative method to determine ITL is Borg's Category Ratio–10 (CR-10) RPE scale (Borg, 1970; Foster et al., 1995), which ITL can be defined by multiplying the RPE score by training duration (eg ITL = RPE x training duration). Also studies have shown that RPE scale has a good level of agreement with HR method for measuring ITL (Foster et al., 2001). The session-RPE (sRPE) is a valid and reliable evaluate of ITL (Herman et al., 2006), which minimally affected by the time of measuring after training (Christen et al., 2016). Also RPE for providing additional vision into the ITL experienced by athletes, often combined with HR, and blood lactate (Halson, 2014). Blood lactate concentration is usually used as a marker of exercise intensity (Schwaberger et al., 1985; Billat, 1996), which it is sensitive to variation in exercise intensity and duration (Beneke et al., 2011); also ratio of lactate to RPE is useful to determine ITL (Snyder et al., 1993).

Given that training adaptations are straightly related to the magnitude of ITL, the planning designed by instructors must provide for not only the activities to be performed, as well as the ITL desired for each training session (Nogueira et al., 2014). Some studies have found differences between the ITL planned by instructors and perceived by players, as well as, differences between the perception of ITL with inconsistent results between perceptions of both instructors and players (Landis and Koch, 1997; Foster et al., 2001; Delattre et al., 2006; Borresen and Lambert, 2009). It is worth mentioning that lack of correspondence between the perceptions can result in a negative impact on the effective planning (Landis and Koch, 1997; Borin et al. 2010). However, to the best of our knowledge, no study has investigated the differences in perceptions of training between instructors and practitioners in indoor-cycling. Therefore, the main purpose of this study is to investigate if ITL predicted by instructors is the same received and perceived by the practitioners in indoor-cycling classes. We hypothesized that as Foster et al. (2001) found, there are significant differences between the training plan that outline by the instructors and execute by the practitioners.

Methodology

Experimental Approach to the Problem

A randomized crossover research design was used for this study. All the subjects performed the exercise protocols applied (experimental situations) in the study with 48 hours' interval among them. Experimental situations involved indoor-cycling classes taught by 3 experienced instructors of the modality. Each instructor was asked to teach 3 classes of the same total training time (45 minutes) and different intensities, which include: i) easy intensity; ii) moderate intensity and; iii) hard intensity. Finally, each subject (practitioners) performed randomly 9 indoor-cycling classes, including 3 easy intensity classes, 3 moderate intensity classes and 3 hard intensity classes. The methods used to control the intensity of the classes were performed immediately before, during and after each of the classes.

Subjects

The subjects participating in this study were 5 practitioners and 3 instructors of indoor-cycling. The practitioners were 3 males and 2 females (n= 5; age= 45.6±5.5 years; weight= 84.3±6.1 kg; training experience= 1.9±0.5 years). The instructors were 3 males (n= 3; age= 36±3.4 years; weight= 79.9±3.3 kg; teaching experience= 3.6±3.4 years) (table 1).

Table 1, Characteristics of the subjects

	N			Age	Weight	Teaching experience / Training experience
	M	**F**	**Total**	**(years)**	**(kg)**	**(years)**
Instructors	3	0	3	36 ± 3.4	79.9 ± 3.3	3.6 ± 3.4
Practitioners	3	2	5	45.6 ± 5.5	84.3 ± 6.1	1.9 ± 0.5

The following inclusion criteria were considered: i) to be over 18 years of age; ii) be a practitioner of the modality for more than 6 months without interruption with a minimum frequency of twice a week. As exclusion criteria, any type of musculoskeletal injury in the last 6 months was considered. Finally, the following were adopted as discontinuity criteria: i) absence in one of the experimental situations; or ii) not complete the experimental situation. Data were collected following the ethical principles as stated in the Declaration of Helsinki proposed by the World Association of Physicians (WMA, 2008). The project behind this study was submitted and authorized by the Research Ethics Committee of University Center Foundation Institute of Education for Osasco under protocol N^{o} 0342012. All participants were informed about the research and their degree of involvement, also they signed a free and informed consent form before starting the study. However, it is worth noting that even after agreeing to participate in this study, individuals were able to withdraw their consent at any time.

Experimental Design

The whole experiment lasted 4 weeks, so the first week was devoted to anthropometric and physiological assessments and the other three weeks were dedicated to indoor-cycling classes, with 3 classes per week with a minimum interval of 48 hours between them. Thus, all practitioners, subjects in this research, performed 9 indoor-cycling classes during the experiment, being 3 classes with each instructor and 3 classes in each intensity (i.e. 3 classes easy; 3 classes moderate and; 3 classes hard). On the other hand, the instructors, subjects in this research, administered 3 indoor-cycling classes, 1 class each intensity (i.e. 1 class easy; 1 class

moderate and; 1 class hard). It is worth mentioning that all subjects (instructors and practitioners) went through 12 sessions of indoor-cycling classes to familiarize themselves with the effort perception scale (Borg RPE scale [CR-10], table 2),

The subjects underwent an anthropometric and physiological evaluation before attending the indoor-cycling classes. Particularly, in 2 primary visits to the laboratory, were evaluated variables such as: A) Anthropometric variables: i) weight; (ii) height; and B) physiological variable: i) resting heart rate (HR). Still in the first week of the experiment, each instructor prepared 3 classes with 45 minutes of total training time with different intensities, which include: i) easy; ii) moderate; and iii) hard.

After the initial week of evaluations, the implementation phase of the indoor-cycling classes, carried out in schedule, respecting the routine of the research subjects (instructors and practitioners). All classes respected the total training time of 45 minutes, which were divided into warm up, main training and cooling according to the instructor's elaboration. Classes were realized 3 parts of data collection for both, practitioners and instructors: A) before the class: i) blood lactate concentration and ii) sRPE predicted by the instructors (for instructors only [BORG CR-10]); B) during the class: i) HR and; C) after class: i) blood lactate concentration and ii) sRPE after 10 minutes (for practitioners only [BORG CR-10]).

Procedures for data collection

For the anthropometric evaluations (weight and height), A Filizola ® mechanical scale was used with 0.1 kg precision and Filizola ® stadiometer with 0.1 cm precision.

Blood lactate was measured before and immediately after each exercise protocol from capillarized blood (20 μL) using an Accutrend Lactate analyzer (Roche®, Sao Paulo, Brazil). To compare the intensity of each indoor-cycling classes, the percentage of change in blood lactate concentration between the moments before and immediately after the activity (%LAC) was determined for each individual in each indoor-cycling classes in instructors and practitioners.

The HR was measured by means of a Polar® heart hate monitor (model FT4M), in both rest and performance situations. Recording of the resting HR (HR_{rest}) was performed through previous evaluations of indoor-cycling classes where all subjects (instructors and practitioners), on two separate days with 48h intervals between them and at the same time of day (8a.m.), after having the heart hate monitor properly installed, were instructed to remain 15 minutes in absolute rest, in a dorsal decubitus, and then the resting HR was recorded. The resting HR was considered to be the mean value of the two evaluations. The maximum heart rate (HR_{Max}) was considered from the formula proposed by Miller et al. (1993): $HR_{Max} = 217 - 0.85 \times age$.

To record the average HR of indoor-cycling classes, subjects' HR was recorded every 3minutes of class and the average of the records was considered as the average HR (HR_{Aver}) of each of the classes. The relative intensity in each indoor-cycling classes ($\%HR_r$) was calculated using the formula (Desgorces et al., 2007): $\%HR_r = [(HR_{Aver} - HR_{Rest})/(HR_{Max} - HR_r)]/100$.

The session-RPE (sRPE) method, which is based on adapted Borg RPE scale (CR-10) (table 2), was used to determine the intensity of the session, the subjects (practitioners) were asked, after ten minutes (UCHIDA et al., 2014) at the end of the training session: "How was your training?". The same strategy was used to identify the intensity predicted by instructors. For this, before the beginning of the classes, the instructors, in a private and distant place of the practitioners, indicated the intensity predicted for the class through the RPE scale. To determine ITL, provided by instructors and experienced by practitioners, sRPE was multiplied by the total volume of the training session (i.e. 45minutes).

Statistical Analyses

Normality and homogeneity of variance of the data were confirmed by the Shapiro–Wilk's and Levene's tests, respectively (Heirani, Ahmadi, 2012). Data were expressed as mean and standard deviation (±SD). In order to compare the classes of different intensities and the intensity predicted by instructors and carried out by the practitioners, one-way ANOVA analysis was used, applying Tukey's post hoc test to identify the specific differences when the "F" values were significant. An alpha of 0.05 was used for all statistical tests that were performed using Graph Pad-Prism®.

Table 2, Borg's (1982) Rating of Perceived Exertion scale [CR10] modified by Foster et al. (2001).

Rating	Description
0	Rest
1	Very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	-
7	Very Hard
8	Very, Very Hard
9	Nearly Maximal
10	Maximal

Results

The objective of present study was to verify if there is a difference between the intensity planned by instructors in comparison that performed by practitioners in indoor-cycling classes. In this sense, it was proposed that each instructor prepare 3 indoor-cycling classes with distinct intensities (i.e. easy, moderate and hard). In table 3 it is possible to observe characteristics of indoor-cycling classes planned, applied and performed by the instructors in relation to the volume (e.g. total training volume, warm up volume, main training volume and cooling volume) and the intensity (e.g. %HRr, %LAC, sRPE and TL). Note that instructors planned and applied 3 similar classes in terms of volume, total and in relation to the parts of the class (Warm up, Main Training and Cooling). However, no significant differences were found between the easy, moderate and hard sessions in relation to this variable.

Table 3, Characteristics of the indoor-cycling classes planned, applied and performed by the instructors.

Level of session	N	Total training Volume (min)	Warm up Volume (min)	Main training Volume (min)	Cooling Volume (min)	Relative intensity (%HR_r)	%LAC (%)	sRPE (UA)	ITL (UA)
Easy	3	45	6 ± 0.37	33.9 ± 3.3	5.1 ± 0.36	48.5 ± 4.4	31.7 ± 5.5	1.6 ± 0.5	75 ± 25.9
Moderate	3	45	6.5 ± 0.59	33 ± 3.28	5.5 ± 0.46	63.2 ± 3¶	80.4 ± 0.1¶	3.3 ± 0.5	150 ± 24.9¶
Hard	3	45	6.4 ± 0.56	33.1 ± 2.8	5.4 ± 0.44	75.7 ± 3.2#	233.8 ± 17.7#	7.3 ± 0.5#	330 ± 26#

¶ p<0.01 in relation to easy class; # p<0.01 in relation to easy and moderate class

On the other hand, when intensity analyzing of the offered classes, it is noticed that the instructors were successful in planning and taking classes with different intensities. It was possible to observe a significant difference between the easy, moderate and hard classes in all investigated variables related to the intensity. The %HRr showed significant differences between easy and moderate classes (48.5±4.4%, 63.2±3%, p<0.01); moderate and hard classes (63.2±3%, 75.7±3.2%, p <0.01) and; easy and hard classes (48.5±4.4%, 75.7±3.2%, p<0.01). The same can be observed by means of %LAC [easy (31.7±35.5%) vs moderate (80.4±0.1%): p<0.01; moderate (80.4±0.1%) vs hard (233.8±12.6%): p<0.01 and; easy (31.7±3.9%) vs hard (233.8±12.6%): p <0.01] and, especially, by means of the predicted sRPE and ITL. The instructors planned sRPE of 1.6±0.6 UA and ITL of 75.5±25.9 UA for easy classes; for the moderate classes sRPE of 3.3±0.5 UA and ITL of 150±24.9 UA and; for the hard classes, sRPE of 7.3±0.5 UA and ITL of 330±26 UA. These results make it clear that classes with different intensities were planned and offered to the practitioners (easy vs moderate: p <0.01, moderate vs hard: p <0.01 and; easy vs hard: p <0.01). The practitioners carried out classes planned and applied by the instructors. The characteristics of same classes in relation to practitioners can be observed in table 4.

Table 4. Characteristics of the indoor-cycling classes performed by to the practitioners.

Level of session	N	Total training Volume (min)	Warm up Volume (min)	Main training Volume (min)	Cooling Volume (min)	Relative intensity (%HR_r)	%LAC (%)	sRPE (UA)	ITL (UA)
Easy	5	45	6 ± 0.37	33.9 ± 3.3	5.1 ± 0.36	59.3 ± 8.3	176.7 ± 18	3.2 ± 0.4	144 ± 4.8
Moderate	5	45	6.5 ± 0.59	33 ± 3.28	5.5 ± 0.46	64.4 ± 8.1	188.4 ± 38.5	3.7 ± 0.8	168 ± 9.2
Hard	5	45	6.4 ± 0.56	33.1 ± 2.8	5.4 ± 0.44	63.9 ± 7.8	199.9 ± 44.7	4.1 ± 0.6¶	186 ± 7.4¶

¶ p<0.01 in relation to the easy class. "N" is the number of practitioners (5) multiplied by the number of classes performed at the stated intensity (3).

As expected, there was no significant difference in total volume or volume parts of the class, exactly as predicted and realized by the instructors. However, when intensity analyzing of the classes performed by the practitioners, no significant differences were found between the easy and moderate classes or the moderate and hard classes in relation to %HRr, %LAC, sRPE or ITL. For the practitioners, a significant difference in the variables related to the intensity of the class was observed only between easy and hard classes in sRPE (easy: 3.2±0.4 AU vs hard: 4.1±0.6 AU; p <0.01) and ITL (easy: 144±4.8 UA vs hard: 186±7.4 UA; p <0.01). Thus, our results seem to show that for practitioners there was less intensity variation of the classes than what was predicted by the instructors. In fact, it was possible to observe that there was a significant difference between what the instructors predicted and what was done by the practitioners, in easy and hard intensity classes (Fig. 1).

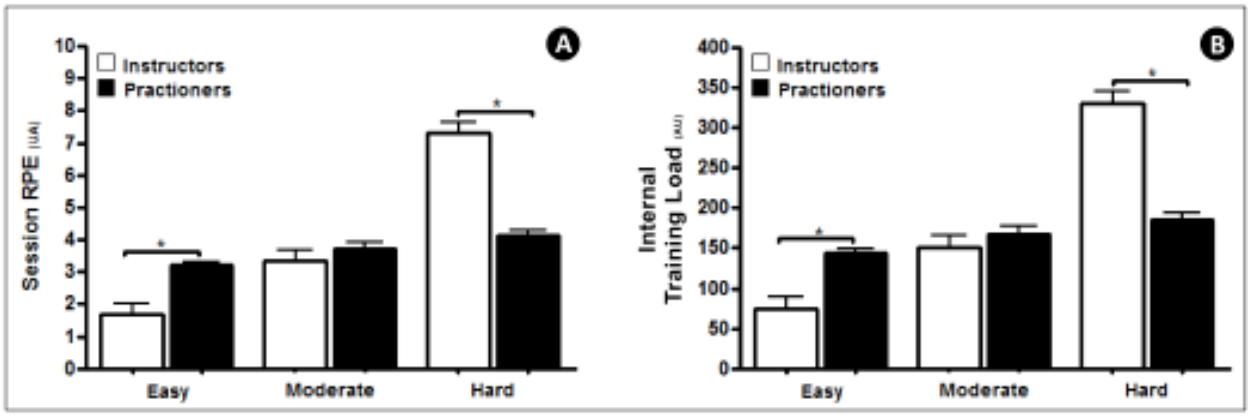

Figure 1. Comparison of sRPE (A) and ITL (B) experienced by practitioners with those planned by instructors in easy, moderate and hard indoor-cycling classes. There was a significant difference between what planned by the instructors and experienced by the practitioners in the easy and hard classes. * $p<0.01$.

In the easy designed classes, practitioners reported higher sRPE (Fig.1A) 92.77±56.8% than planned by instructors (instructors: 1.66±0.5 AU, practitioners: 3.2±0.4 AU, p=0.008). This differences between what planned by instructors and carried out by practitioners had impact on ITL (Fig.1B) in the easy session (instructors: 75±25.9 AU; practitioners: 144±18.6 AU; p=0.009). In the hard designed classes, practitioners reported sRPE (Fig. 1A) 43.33±9.9% below than that predicted by the instructors (instructors: 7.33±0.5 AU; practitioners: 4.1±0.6 AU; p=0.009), which also had effect on ITL (Fig. 1B) of the hard session (instructors: 330±25.9 AU, practitioners: 186±28.8 AU, p=0.009). Only in the moderate designed classes, there were no differences between the instructor's prediction and the practitioners practicing in both sRPE (instructors: 3.33±0.5, practitioners: 3.73±0.7, p=0.47) and ITL (instructors: 150±25.9; practitioners: 168±35.9, p=0.47). Observed by sRPE and ITL in relation to the differences between instructor-planned and experienced by practitioners can be corroborated by the relative intensity (%HRr) that instructors and practitioners presented during easy and hard classes (Fig 2A). During easy classes, practitioners experienced relative intensity 12.74±12.2% higher than instructors (instructors: 48.59±4.4%, practitioners: 59.07±8.3%, p=0.037). In classes designed to be hard, practitioners experienced relative intensity 9.98±5.8% lower than instructors (instructors: 75.78±3.2%, practitioners: 63.95±7.8%, p=0.041). Again, in the moderate designed classes there was no difference between instructors and practitioners regarding to relative intensity (instructors: 63.2±3, practitioners: 64.4±8.1, p=0.752).

The blood lactate concentration (%LAC) results presented corroborate findings based on sRPE and %HRr (Fig. 2B). As a result of difference experiences in the modality between instructors and practitioners, it was expected different %LAC-course between them, as can be observed in the easy class (instructors: 31.73±5.5%, practitioners: 176.7±14.7, p=0.028) and in the moderate class (instructors: 80.4±0.1%, practitioners: 188.4±31.5%, p=0.030). However, it is noteworthy that there was no significant difference in blood lactate concentration among easy, moderate and hard classes, in practitioners (p=0.740). Similar %LAC-course was expected, which can be observed in the instructors (p=0.002).

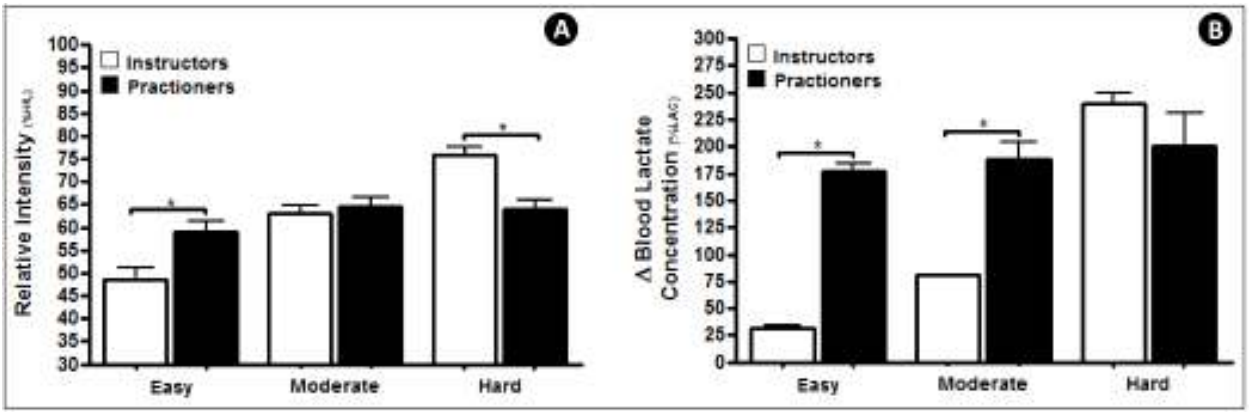

Fig 2. Comparison of $\%HR_r$ (A) and %LAC (B) experienced by instructors and practitioners in easy, moderate and hard indoor-cycling classes. * $p<0.01$.

Discussion

The main purpose of this study was to investigate if the ITL predicted by instructors is the same received and perceived by practitioners in indoor-cycling classes. Several studies have investigated relationship

between ITL predicted by coaches and performed by athletes in sports, such as soccer (Brink et al., 2014, Redkva et al., 2016, Scantlebury et al., 2017a), rugby (Scantlebury et al., 2017a), tennis (Maurphy et al., 2017), netball (Scantlebury et al., 2017a), endurance running (Foster et al., 2001) and cross-coutry running (Banners, 2017) , but there is a gap in the literature about same research in relation to other modalities, especially in relation to collective gymnastic. Modalities usually offered in fitness club such as indoor-cycling, as well as in non-athletes, active individuals who practice certain physical activity with other objectives that are not competitive. In this sense, to the best of our knowledge, this is the first study has investigated differences in training perceptions between instructors and practitioners in indoor-cycling. To do this, experienced trainers in indoor-cycling classes (3.6±3.4 years) participated in this study by preparing and teaching indoor-cycling classes in three distinct intensities (easy, moderate and hard) for experienced practitioners (1.9±0.5 years) in the modality, respecting the basic characteristics of indoor-cycling classes offered at fitness club.

Our results show that the classes prepared by the instructors were similar in relation to volume and distinct in relation to intensity (Table 3). All the physiological variables related to the intensity monitored in this study (%HRr, %LAC) showed a significant difference between the easy and moderate classes ($p<0.01$); moderate and hard classes ($p<0.01$) and easy and moderate classes ($p<0.01$). The intensity-related physiological variables corroborated the intensity predicted by instructors for similar classes by sRPE (easy: 1.6±0.5 AU; moderate 3.3±0.5 AU and; hard: 7.3±0.5 AU) and predicted ITL (easy: 75±25.9 AU; moderate: 150±24.9 UA and; hard: 330±26 AU). These characteristics were fundamental, which the main objective of this study could be answered correctly. Since it was necessary to offer different stimuli to practitioners to be able to compare the loads predicted by instructors with those realized and perceived by practitioners. Rebeca et al. (2008) investigated acute physiological responses during indoor-cycling classes in active women and demonstrated that it is a high intensity activity with a high correlation between oxygen consumption and heart rate and increase in blood lactate concentration. In addition, high correlation between HR, blood lactate concentration and sRPE in different sports are well described in the literature (Campos-Vasques et al., 2015, Scanteblury et al., 2017b, McLaren et al., 2017). Thus, the methods used in present study are shown to be safe and reliable in identifying and understanding the work intensity to which subjects, both instructors and practitioners, have been exposed.

Thus, although classes were offered in 3 different intensities to practitioners, the monitoring of physiological variables related to intensities in these subjects showed that there were no differences among the performed classes. The analysis performed from %HRr and %LAC showed that practitioners did not have distinct stimuli throughout the experiment. Still in relation to practitioners, there were differences between classes only when sRPE and ITL analyzed in the easy and hard classes. Gaudino et al. (2015) investigated factors related to external workload that could interfere with sRPE in soccer players and concluded that amount of accelerations in a training session would have a moderate effect on sRPE. This result may explain a fact that, despite we did not find a significant difference in %HRr and %LAC among offered intensities of indoor-cycling classes, practitioners reported a higher sRPE in the high intensity class (hard) than in the low intensity class (easy). Instead to increase intensity in indoor-cycling classes a commonly strategy used is to increase amount of intensity variation throughout the class. It is clear, through results of present study there are differences between planned and intended classes by instructors and the one realized by the practitioners of indoor-cycling classes in light and high intensities. There is a tendency for practitioners to reduce intensity in classes designed to promote high intensity stimulation as well as to increase intensity in classes designed to promote low intensity stimuli. In this way, the practitioners end up receiving, at all training sessions, moderate intensity stimuli.

Our results indicate that practitioners had above %HRr 12.74±12.2% ($p=0.037$) than that was performed by instructors in low intensity designed classes (easy), and %HRr 9.98±5.8% ($p=0.041$) below of what was done by instructors in high intensity designed classes (hard). Regarding sRPE and ITL, our data indicated practitioners were 92.77±56.8% higher than instructors predicted in easy designed classes and 43.33±9.9% ($p=0.009$) below than high intensity designed classes (hard) predicted by instructors. This difference, and tendency, between classes predicted by instructors and accomplished by practitioners has already been identified in works performed with coaches and athletes of various modalities. Foster et al. (2001) compared the training plan drawn up by coaches with that performed by their amateur athletes (men and women) and, in prescribed light intensity training, athletes reported sRPE 33.3% higher than what was predicted by coaches and, in prescribed high intensity training, athletes reported sRPE 12.1% below what was predicted by coaches. Only the moderate training prescribed not differences between what was predicted by the coaches and performed by the athletes. Banners (2017) conducted similar research monitoring 3024 training sessions in cross-country runners and noted that both male and female athletes tend to regress to moderate intensity training. Brink et al. (2014) found weak-moderate correlations between sRPE predicted by coaches and that performed by young soccer athletes, while Scantlebury et al. (2017a) found similar results regarding to the correlation of sRPE predicted by coaches and performed by young athletes of hockey, netball, rugby and soccer. On the other hand, Redkva et al. (2016) investigated the correlation between sRPE predicted by coaches and performed by professional soccer athletes in physical, technical and tactical training, which demonstrated a moderate-strong correlation between coaches' prediction and athletes performing, and found no difference in the sRPE between coaches and athletes in any of training models investigated.

In view of researches described, there is a trend regardless of the modality, athletes and practitioners (physically active individuals, case of the present study) to make all training sessions moderate in relation to intensity in spite of what was planned by coaches, increasing the intensity of sessions planned to be low intensity and reducing intensity of high intensity planned sessions. The exception was found by Redkva et al. (2016), which showed a moderate-strong correlation between coaches' prediction and professional soccer players performing. Contrary to the cited studies, present study and a study developed by Redkva et al. (2016) may be related to level of conditioning and time of experience in the modalities. Since in the studies that demonstrated differences between coaches and practitioners, the subjects were amateur athletes (Foster et al., 2001), young athletes (Brink et al., 2014; Banners, 2017; Scantlebury et al., 2017a) or physically active individuals (non-athletes) in the present study. Only Redkva et al. (2016) study conducted research with professional athletes, which raises the hypothesis that level of experience in the modality, relationship levels between coaches and practitioners and physical conditioning level may interfere in the accuracy between planning and conducting training sessions. In fact, all cited studies present subjects experience in the modalities more than 12 months. However, there is not information in duration of relationship between trainers/instructors and athletes/practitioners, which perhaps it is an interesting issue for future investigations. Although results of this study were corroborated by all studies that investigated the same phenomenon in amateur athletes and young athletes, it is worth noting that our research was the first study to investigate this phenomenon in active individuals practicing a collective gymnastics modality. In addition, our study was the only one that sought to corroborate results obtained by sRPE and ITL with internal load markers that are independent of subjective aspects such as %HRr and blood lactate concentration. Our results point to a large discrepancy between what is planned and what is done in collective gym classes (eg indoor-cycling, aerobics, step and others).

It is known that load control during collective gym classes is deficient. In general, in this kind of classes, no precise methods of load control are used. Instructors only instruct and motivate practitioners by means of oral instruction and music, leaving the practitioner to impose a more or less intensity on the activity (Muyor, 2013; Szabo et al., 2015). In addition, practitioners of this classes are usually individuals who seek an active lifestyle and non-competitive in relation to physical activity they perform, or at least, have an understanding about importance of diversification of the intensity in the stimuli performed (Muyor, 2013). They do not have a full understanding importance of stimuli in different intensities and they are not individually instructed on how to proceed during classes. practitioners considering a very light activity, deliberately increase their intensity until they feel comfortable with the load, and when they consider a high intensity class, deliberately reduce the intensity until they feel in a confortable intensity zone. This may explain why all classes, regardless to the intensity or performance of instructors, were carried out in a moderate zone of intensity. The importance of manipulation in training loads and adequate management of stimulus/rest are related to promote physiological adaptations (Foster et al., 1996; Hartmann et al., 2015; Coyne et al., 2018; Van Erp et al., 2018), exercise adherence (Colon et al., 2016; Fisher et al., 2016; Colon et al., 2018), prevention of injuries and overtraining-related syndromes (Foster et al., 2001; Meeusen et al., 2013; Hulin et al., 2014; Brink et al., 2014; Coyne et al., 2018), which are well established in literature. However, it is not possible if coaches do not have accurate information about what their athletes/practitioners are actually doing. So it is pointless for coaches to predict load changing throughout the training program. In this sense, it is necessary for coaches to implement effective methods of intensity control in collective gymnastics classes (eg HR, sRPE), specifically in indoor-cycling classes.

However, in spite of relevant results demonstrated by this study and methodological care in corroboration of findings through sRPE with other variables related to the internal load, current study presents some limitations that were imposed due to necessity of getting as close as possible to the work experience routine of indoor-cycling classes offered at fitness clubs. They are: i) number of subjects (instructors and practitioners): need to maintain habitual routine of classes for practitioners and instructors, inclusion criteria in relation to time of modality experience and; ii) little time of relationship between practitioners and all instructors: collective gymnastics classes in gyms usually have high turnover of coaches and practitioners, which makes it impossible to establish a lasting relationship between them, in this study, we sought to establish a similar routine to understand the relationship between predicted load by instructors and performed by practitioners that actually occurs in gyms and clubs. Thus, present study provides important information about how a workload is administered in indoor-cycling classes at fitness clubs and important points for instructors to incorporate into their work routine methods of load control, which allow to guarantee good results without risk of injury or overtraining.

Conclusion

We conclude that there is a difference between ITL predicted by coaches and performed by indoor-cycling practitioners in low and high intensity classes. Our results showed that indoor-cycling practitioners tend to maintain moderate loads of intensity regardless of the coaches' planning and instruction. Indoor-cycling instructors need to incorporate load control methods into their practices to be able to ensure that their practitioners receive the planned dose-intensity and take advantage of regular practice benefits with this

modality. Further studies should be conducted in order to understand the relationship between internal loads intend and held in other forms of collective gymnastics offered in fitness club and with different populations.

References

Armitage P and Berry G. (1987). *Statistical Methods in Medical Research*. Blackwell Scientific Publications: Oxford.

Åstrand PO, Rodahl K. (1986). *Textbook of Work Physiology*. New York: McGraw Hill.

Barnes K. (2017). Comparisons of Perceived Training Doses in Champion Collegiate-Level Male and Female Cross-country Runners and Coaches over the Course of a Competitive Season. *Sports Medicine*; 3(38): 2-9.

Beneke R, Leithauser RM, Ochentel O. (2011). Blood lactate diagnostics in exercise testing and training. *Int J Sports Physiol Perform;* 6:8–24.

Billat LV. (1996). Use of blood lactate measurements for prediction of exercise performance and for control of training. Recommendations for long-distance running. *Sports Med*; 22: 157-75.

Borg G. (1970). Perceived exertion as an indicator of somatic stress. *Scand J Rehabil Med*; 2:92-98.

Borin JP, Dias RG, Leite GS, Padovani CPR, Padovani CR. (2010). Indicadores de desempenho e percepção subjetiva de esforço entre técnico e atletas de voleibol. *Braz J Biomotricity*;4(2):123-30.

Borresen J, Lambert MI. (2009). The quantification of training load, the training response and the effect on performance. *Sports Med*;39(9):779-95.

Brink MS, Frencken WGP, Jordet G, Lemmink KAPM. (2014). Coaches' and Players' Perceptions of Training Dose: Not a Perfect Match. *International Journal of Sports Physiology and Performance, 9(3), 497–502*.doi:10.1123/ijspp.2013-0009

Campos-Vazquez MA, Mendez-Villanueva A, Gonzalez-Jurado JA, León-Prados JA, Santalla A, Suarez-Arrones L. (2015). Relationships between Rating-of-Perceived-Exertion- and Heart- Rate-Derived Internal Training Load in Professional Soccer Players: A Comparison of On-Field Integrated Training Sessions. *International Journal of Sports Physiology and Performance, 10(5): 587–592*.doi:10.1123/ijspp.2014-0294

Christen J, Foster C, Porcari JP, Mikat RP. (2016). Temporal robustness of the session rating of perceived exertion. *Int J Sports Physiol Perform*; 11:1088-1093.

Conlon JA, Haff GG, Tufano JJ, Newton RU. (2017). Training Load Indices, Perceived Tolerance, and Enjoyment Among Different Models of Resistance Training in Older Adults. *Journal of Strength and Conditioning Research, 1:* doi:10.1519/jsc.0000000000002281

Conlon JA, Newton RU, Tufano JJ, Banyard HG, Hopper AJ, Ridge, A. J., & Haff, G. G. (2016). Periodization Strategies in Older Adults. *Medicine & Science in Sports & Exercise,* 48(12): 2426–2436.doi:10.1249/mss.000000000000105

Coutts AJ, Rampinini E, Castagna C, Marcora S, Impellizzeri FM. (2007). Physiological correlates of perceived exertion during soccer-specific exercise. *J Sci Med Sport*: doi:10.1016/jsams.2007.1008.1005.

Coyne JOC, Gregory Haff G, Coutts AJ, Newton RU, Nimphius S. (2018). The Current State of Subjective Training Load Monitoring—a Practical Perspective and Call to Action. *Sports Medicine* - Open, 4(1): 2-10. doi:10.1186/s40798-018-0172-x

Delattre E, Garcin M, Mille-Hamard L, Billat V. (2006). Objective and subjective analysis of the training content in young cyclists. *Appl Physiol Nutr Metab*;31(2):118-25.

Desgorces FD, Sénergas X, Garcia J, Decker L, Noirez P. (2007). Methods to quantify intermittent exercises. *Applied Physiology, Nutrition, and Metabolism*; 32:762-769.

Fisher J, Steele J, Smith D. (2016). High- and Low-Load Resistance Training: Interpretation and Practical Application of Current Research Findings. *Sports Medicine, 47(3): 393–400.* doi:10.1007/s40279-016-0602-1

Foster C, Daines E, Hector L, Synder AC, Welsh R. (1996). Athletic performance in relation to training load. *Wis Med J*;95(6):370-4.

Foster C, Florhaug JA, Franklin J, Gottschall L, Hrovatin LA, Parker S et al. (2001). A new approach to monitoring exercise training. *J Strength Cond Res*;15(1):109-15.

Foster C, Hector LL, Welsh R, Schrager M, Green MA, Snyder AC. (1995). Effects of specific versus cross-training on running performance. *Eur J Appl Physiol Occup Physiol;* 70:367-372.

Foster C, Heimann KM, Esten PL, Brice G, Porcari JP. (2001). Differences in perceptions of training by coaches and athletes. *The South African Medical Journal* (SAMJ); 8:3-7.

Halson SL. (2014). Monitoring Training Load to Understand Fatigue in Athletes. *Sports Med*; 44 (Suppl 2): S139–S147.

Hartmann H, Wirth K, Keiner M, Mickel C, Sander A, Szilvas E. (2015). Short-term Periodization Models: Effects on Strength and Speed-strength Performance. *Sports Medicine,* 45(10): 1373–1386. doi:10.1007/s40279-015-0355-2

Heirani A., Ahmadi S. (2012). *Evaluation and Measurement in Physical Education*. Kermanshah: Razi University.

Herman L, Foster C, Maher MA, Mikat RP, Porcari JP. (2006). Validity and reliability of the session RPE method for monitoring exercise training intensity. *South Afr J Sports Med*; 18:4.

Hopkins WG. (1991). Quantification of training in competitive sports. Methods and applications. *Sports Med*; 12:161-183.

Hulin BT, Gabbett TJ, Blanch P, Chapman P, Bailey D, Orchard JW. (2014). Spikes in acute workload are associated with increased injury risk in elite cricket fast bowlers. *Br J Sports Med*; 48:708-712.

Impellizzeri FM, Rampinini E, Marcora SM. (2005). Physiological assessment of aerobic training in soccer. *J Sport Sci*;23(6):583–592.

Landis JR, Koch GG. (1977). The measurement of observer agreement for categorical data. *Biometrics*;33(1):159-74.

Mason OJ, Holt R. (2012). Mental health and physical activity interventions: A review of the qualitative literature. *J Ment Health*, 21, 274–4.

McLaren SJ, Macpherson TW, Coutts AJ, Hurst C, Spears IR, Weston M. (2017). The Relationships Between Internal and External Measures of Training Load and Intensity in Team Sports: A Meta-Analysis. *Sports Medicine, 48(3):641–658.* doi:10.1007/s40279-017-0830-z

Meeusen R, Duclos M, Foster C, Fry A, Gleeson M, Nieman D, Raglin J, Rietjens G, Steinacker J, Urhausen A. (2013). Prevention, diagnosis, and treatment of the overtraining syndrome: joint consensus statement of the European College of Sport Science and the American College of Sports Medicine. *Med Sci Sports Exerc*; 45:186-205.

Miller WC, Wallace JP, Eggert KE. (1993). Predicting max HR and the HR-VO2 relationship for exercise prescription in obesity. *Medicine and Science in Sports and Exercise*; 25(9):1077–1081.

Murphy, AP, Duffield, R, Kellett, A, Reid M. (2014). *Comparison of Athlete–Coach Perceptions of Internal and External Load Markers for Elite Junior Tennis Training. International Journal of Sports Physiology and Performance, 9(5):751–756.* doi:10.1123/ijspp.2013-0364

Muyor JM. (2013). Exercise Intensity and Validity of the Ratings of Perceived Exertion (Borg and OMNI Scales) in an Indoor Cycling Session. *Journal of Human Kinetics, 39(1): 93–101.*doi:10.2478-0072

Nogueira FCA, Nogueira RA, Coimbra DR, Miloski B, Freitas VH, Filho MB. (2014). Internal training load: perception of volleyball coaches and athletes. *Rev Bras Cineantropom Desempenho Hum*; 16(6):638-647.

Rabelo FN, Pasquarelli BN, Gonçalves B, Matzenbacher F, Campos FAD, Sampaio J, Nakamura FY. (2016). Monitoring the Intended and Perceived Training Load of a Professional Futsal Team Over 45 Weeks. *Journal of Strength and Conditioning Research,* 30(1):134-40. doi:10.1519/jsc.0000000000001090.

Redkva PE, Gregorio da Silva, S, Paes MR, Dos-Santos JW. (2016). The Relationship Between Coach and Player Training Load Perceptions in Professional Soccer. *Perceptual and Motor Skills,* 124(1):264–276.doi:10.1177/0031512516678727

Reeves A. (2012). *Social stratification, gender and sport participation*. Soc Res Online, 17, 12. Available from: http://www.socresonline. org.uk/17/2/12.

Scantlebury S, Till K, Sawczuk T, Weakley J, Jones B. (2017a). Understanding the relationship between coach and athlete perceptions of training intensity in youth sport. *Journal of Strength and Conditioning Research,* 1. doi:10.1519/jsc.0000000000002204

Scantlebury S, Till K, Atkinson G, Sawczuk T, Jones B. (2017b). The within-participant Correlation between s-RPE and Heart Rate in Youth Sport. *Sports Medicine International*, 1: 195–199. doi:10.1055/s-0043-118650

Schwaberger G, Pessenhofer H, Schmid P. (1985). Relevance of lactate determination in Sports Medicine. *Wien Med Wochenschr*; 135: 234-41.

Snyder AC, Jeukendrup AE, Hesselink MK, et al. (1993). A physiological/ psychological indicator of over-reaching during intensive training. *Int J Sports Med*; 14:29–32.

Sport England. (2012). *Active people survey* (APS); Women's participation in sport and physical activity Trends (2005– 06 to 2011– 12).

Szabo A, Gáspár Z, Kiss N, Radványi A (2015) Effect of spinning workouts on affect. *Journal of Mental Health*, 24:3, 145-149, DOI: 10.3109/09638237.2015.1019053

Van Erp T, Foster C, de Koning JJ. (2018). Relationship between various training load measures in elite cyclists during training, road races and time trials. *International Journal of Sports Physiology and Performance*; DOI: https://doi.org/10.1123/ijspp.2017-0722

Viru A, Viru M. (2000). *Nature of training effects. Exercise and sports science*. Philadelphia, PA: Lippincott Williams & Wilkins:67-95.

WMA. (2008). *World Medical Association Declaration of Helsinki*, Ethical principles for medical research involving human subjects. http://www.wma.net/en/30publications/10policies/b3/.