

Comparison of Exercise Types That Can Maintain Optimal Psychological and Physiological Intensity

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Abstract

In this study, we aimed to dance and running for the purpose of exercising exercise intensity by oneself, to have a more psychological effect. The subjects were 107 students in the Faculty of Education, subjects performed 2 exercise programs (running and dance) for 40 minutes each. Both exercise programs were taught to do with strength equivalent to RPE 12 - 13 (slightly tight). It was measured HR and RPE as physiological indicators and Waseda affect scale of exercise and durable activity (WASEDA) for psychological index. As a result, The HR of running (138.6 ± 41.3 bpm) was significant higher than the dance (113.9 ± 33.8 bpm) ($p < .001$). The RPE of running (15.3 ± 3.8) was significant higher than the dance (12.3 ± 2.7) ($p < .001$). The WASEDA score of dance (6.3 ± 2.5) was significant lower than rest (7.2 ± 3.2) ($p < .01$) and running (7.5 ± 3.3) ($p < .001$). These findings indicate that running people are better for people who want to stress the body and firmly exercise intensity rather than wanting to refresh mentally. It was thought that it is important to understand the characteristics of each exercise, select exercise according to individual goal and purpose, practice and prescribe.

Key words : Dance, Running, HR, RPE, WASEDA

Introduction

It has been clarified that moderate physical activity is effective for maintenance and promotion of health. Physical activity has safety and effective limit, and it is preferable to perform them with appropriate strength. Among them, it is said that it is preferable to perform more aerobic exercise than anaerobic for maintaining and promoting health. As exercise intensity and quantity effective for maintaining and promoting health, the Ministry of Health, Labor and Welfare said that 18 to 64 years old exercises 23Ex per for week for 3Mets per week. In addition, when exercise intensity is measured using the heart rate, it is said that exercise intensity of about 60% is said to be good and

when it is said that it is better to do it at a smiley smiley pace. There are various ways to set the intensity of exercise such as. Among them, there is a method using Borg's subjective exercise intensity (hereinafter RPE). The characteristic of RPE is that large - scale preparation such as measuring equipment is unnecessary and can be measured immediately on the spot. In addition, it is one of the features that RPE becomes approximately the heart rate when multiplied by 10. Using either method of measuring exercise intensity, setting intensity suitable for each person, and exercising is important for health promotion.

Regarding health promotion, WHO said that definition of health is not only physically good but also mentally and socially. Regarding mental health, it has already been clarified that good effects can be obtained by exercising.

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Research on the relationship between mental and exercise has been conducted using Waseda Affect Scale of Exercise and Durable Activity, which is an emotional scale that can be used for exercise scenes. WASEDA is composed of 12 items and is classified into three emotions of negative affect, positive engagement, and tranquility, and is measured by a questionnaire. Mitsukoshi et al. (2010) made a 9 - minute aerobic exercise, examine the psychological state using WASEDA during the exercise, during exercise, immediately after exercise, and the recovery period. As a result, the positive engagement increased significantly during exercise and immediately after exercise, and the restlessness significantly decreased during exercise. And the feeling of tranquility decreased significantly during exercise. There was no significant difference in negative emotions. In addition, Arai et al. (2003) caused college students to perform a bicycle ergometer exercise, and examined changes in emotion using WASEDA before and after exercise. As a result, the positive engagement increased significantly, and no significant increase or decrease was found in the sense of tranquility. Also the negative emotion decreased significantly. From the above research, it can be said that exercising affects psychological state such as positive engagement and tranquility.

Among the aerobic exercise which is considered good for maintaining and promoting health, Dance can be cited. Since 2012, dance has been compulsory in junior high school health and physical education, and it is one of the events familiar throughout his life. As a physiological and psychological effect of dance, Nakamura et al. (2004) made jogging and aerobic dance for college students, and conducted a POMS test in addition to a survey on fun and exercise competence before and after the exercise, and measured changes in consciousness and mood by exercise. As a result, the score of enjoyment was significantly higher than the aerobic dance than jogging, and the sense of exercise effect was also significantly higher than that of jogging by aerobic dance. As can be seen from the above, it can be seen that rhythmic movement, which is a feature of dance, and activities in accordance with music are effective not only in terms of physiological effects but also psychologically.

Therefore, in this study, we aim to dance and run for the purpose of exercising exercise intensity by oneself, to have a more psychological effect. Then, by comparing and examining psychological and physiological values before

and after the exercise, it helps in preparing exercise prescription for health promotion.

Method

subject

The subjects were 107 students in the Faculty of Education, and the physical characteristics of the subjects are shown in <Table 1>. This experiment subject was aimed at those who did not do sports training such as running and dancing in the past year before doing. This experiment was conducted with the approval of the Ethics Committee of Hiroshima University.

Table 1. Age, Height, Weight and BMI of the Subjects.

	Age (years)	Height (cm)	Mass (kg)	BMI (kg/m ²)
Man (n = 50)	20.6 ± 4.1	172.0 ± 7.8	58.4 ± 8.7	19.7 ± 2.6
Woman (n = 57)	19.8 ± 2.2	158.7 ± 6.5	53.5 ± 6.6	21.3 ± 2.0
mean±SD				

Measurement item

Subjects performed 2 exercise programs (running and dance) for 40 minutes each. Both exercise programs were taught to do with strength equivalent to RPE 12 - 13 (slightly tight). Exercise intensity is recommended in the guidelines of American College of Sports Medicine (1991), which corresponds to RPE 12 - 13, about 60% of the estimated maximum heart rate for subjects in this study. Running warmed up for 5 minutes and confirmed that HR of all had reached 120 beats / minute, then subjects themselves subjectively exercise intensity to run for 30 minutes, cool down 5 Min. It was performed Zumba dance as the dance program. Zumba dance is a latin dance training, which is an aerobic exercise created with a focus on securing upper and lower body momentum (John, 2012). It is a new dance event created with the aim of dancing freely according to music rather than exact dance step execution as seen in many dance events. In this study, after

confirming that the warm - up 5 minutes (100 bpm) and HR of all had reached 120 beats / minute, subjects themselves subjectively exercise main dance (110 - 120 bpm) for 30 minutes, and cool down (90 - 100 bpm). Subjects are randomly divided into two groups, the order of the programs differs from group to group, and one program on the day of January 17 and 23, in the same time zone (10: 00 - 11: 00) went.

Measurement item

We used HR and RPR as physiological indicators and Waseda affect scale of exercise and durable activity (WASEDA) for psychological index. HR wearing Polar (r 7) and measured data every 5 seconds in a row. RPE was performed by the RPE scale (Borg, 1978) and subjective exercise intensity was measured by Rating of Perceived Exertion (RPE; Onodera · Miyashita, 1976). RPE is a scale that selects one number that corresponds to perceived exercise intensity from 15 numbers from 6 to 20, measured immediately after running and Zumba dance. WASEDA is a questionnaire prepared for the purpose of evaluating emotions during transient exercise, and by selecting a response scale of 5 stages for a total of 12 questions. Evaluate by three methods, "feel nothing (1)" to "feel fairly (5)", three of feeling of overall negative emotion (negative feeling), euphoria (rising feeling), calming affirmative feeling (relax feeling) The three emotional scores range from 4 to 20 points, and its reliability and validity have been confirmed (Arai et al., 2003, 2004a). In this study, measurements were taken before and after the exercise, and changes in emotional state were measured. Emotion is a psychological concept like a mood, but in this research, it is assumed to be a thing that means a relatively short - term sensory state (Biddor Mutli, 2005).

Statistical processing

We conducted a t test to compare the changes in each feeling in HR, RPE and WASEDA of the run and dance (running, subtraction of the score after the dance minus the previous score). For WASEDA, variance analysis with group (2) × time (2) was repeated, and Bonferroni was used for the lower rank test. In addition, the hazard ratio was set to less than 5%.

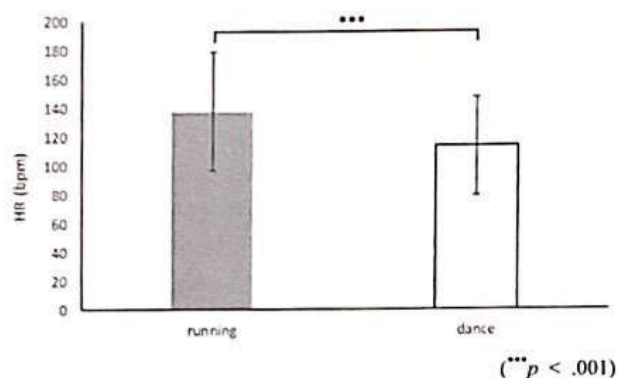


Figure 1. comparison of HR between running and dance (** $p < .001$)

Result and Conclusion

HR and RPE

<Figure 1> shows comparison of HR for running and dance. The running (138.6 ± 41.3 bpm) was significant higher than the dance (113.9 ± 33.8 bpm) ($p < .001$). The fig.2 shows comparison of RPE for running and dance. The running (15.3 ± 3.8) was significant higher than the dance (12.3 ± 2.7) ($p < .001$). According to Borg (1973), RPE multiplied by 10 is said to be roughly equivalent to heart rate. Looking at the results of this study, the RPE of running was ten times as high as 150 and the HR was 141 beats. Also, 10 times the RPE of dance was 120 and HR was 116 beats. From the above, it is thought that the result of this time is about 10 times HR of RPE, and reasonable value was obtained.

Exercise intensity actually done will be examined. In this study, it was ordered RPE of running and dance to be about 12 - 13. However, the running RPE was 15, while the dancing RPE was 12. It can be said that the dance was able to exercise with the intensity as indicated and, contrary, running exercised at a higher intensity than the instructed intensity. Nakajima et al. (1995) allowed male and female students to perform outdoor running and bicycle exercises and bicycle ergometer exercise in the room for 30 minutes at a pace that they feel comfortable, respectively. As a result, it was reported that the running increased the heart rate compared to the other two kinds of exercise. Also, according to Ito et al. (1997), when 100% was set as the full power, subjectively divided into five stages, running, jumping, and throwing motion were performed, objective effort in the order of running, throwing, has exceeded the subjective effort degree. Also from the above reports, running tends to go with higher

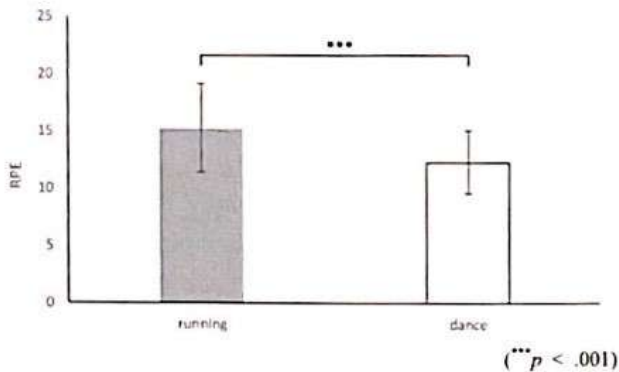


Figure 2. comparison of RPE between running and dance

exercise intensity than her own consciousness. As with the results of the previous study, the results of this study also exercised at higher exercise intensity than the target exercise intensity. On the other hand, it can be said that dance was able to exercise with exercise intensity according to target exercise intensity. It is important to keep exercise intensity beyond the safety limit and exercise intensity beyond the effective limit in case of health promotion or assuming exercise prescription for disease. In such assumption, it can be said that exercising strength can be controlled precisely and safely by oneself who dances rather than running.

WASEDA

Negative feeling

<Figure 3> shows Comparison of negative feeling score among the rest, running and dance. The score of dance (6.3 ± 2.5) was significant lower than rest (7.2 ± 3.2) ($p < .01$) and running (7.5 ± 3.3) ($p < .001$). It was a result that negative affect declined by dancing. Arai et al. (2003) conducted bicycle ergometer exercise and walking, both of which reported that negative affect had declined. In

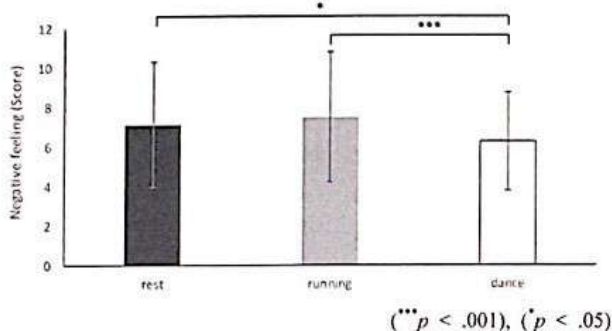


Figure 3. comparison of negative feeling score between running and dance

addition, Mitsuishi et al. (2010) exercised on an aero bike and reported that the negative affect increased during exercise and it declined after exercise. As can be seen from the above two studies, the negative affect varies depending on the type of exercise and timing of measurement. In this study, it was thought that running does not affect negative affect, and dance reduces negative affect.

Rising feeling

<Figure 4> shows Comparison of rising feeling score among the rest, running and dance. The score of running (14.0 ± 3.2) was significant higher than rest (7.7 ± 2.9) and running (9.8 ± 3.3) and the score of dance was significant higher than rest ($p < .001$). Earlier studies (Mitsuishi et al. (2010), Arai (2010), Arai et al. (2003)) have also reported that exhilaration increases after bicycle ergometer and walking exercise, and the results of this study are based on the results of previous studies it was to support. Among them, it was revealed that dance, in particular, has the effect of raising the mood more significantly more than running. The reason for this is the tempo of dance performed in this research and the method of implementation. The music used for the dance performed in this study is so - called up tempo music, and it is thought that not only exercise, but also listening to music raised feelings further. Also, since the actual dance was in the same space and was done by a large number of people, it seems that everyone felt a sense of unity that could not be obtained by one person, and had a positive influence on the mood enhancement.

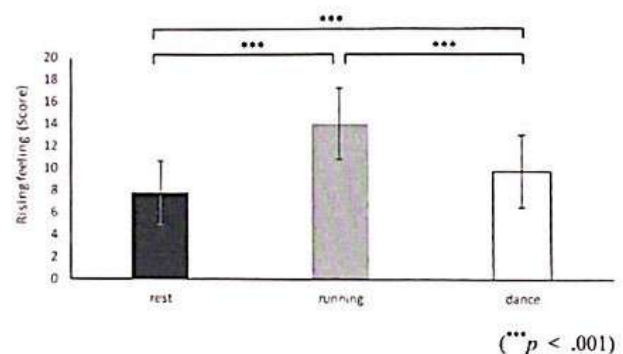


Figure 4. Comparison of rising feeling score between running and dance

Relax feeling

The score of rest (14.0 ± 3.6) was significant higher than running (8.0 ± 3.1) and running (8.4 ± 3.2) ($p < .001$). It

was a contradiction to the report that the sense of tranquility rises by walking Arai et al. (2003). However, in the report of Mitsuishi et al. (2010), it is reported that the change in the sense of tranquility when the aerobic exercise is performed with the intensity at which the heart rate is about 120bpm declines during the exercise and increases after the exercise there. In other words, after completion of the exercise, feeling of tranquility increases from sense of accomplishment finishing exercise and sense of security, and it can be said that it decreases contrarily during exercise. In this study, the feeling of tranquility temporarily decreased after exercise, but it seems that it may rise over time.

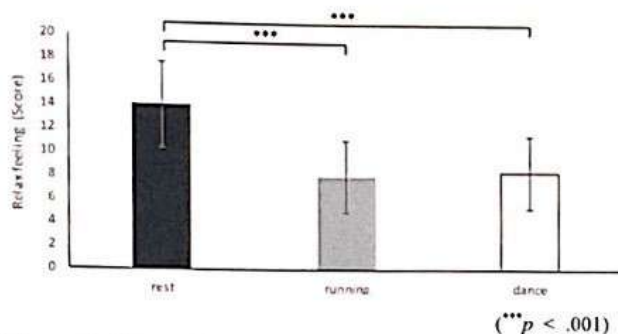


Figure 5. Comparison of relax feeling score between running and dance

Overall

Based on the results so far, if the target exercise intensity of running and dancing is RPE 12 ~ 13, actual exercise intensity was different between running and dancing. Running was done at higher exercise intensity than the goal, and dance could be done with exercise intensity consistent with the goal. Regarding the mood scale by WASEDA, negative affect was reduced by dancing. The rising feeling increased after exercise for both running and dancing, among which dance was more advanced. The tranquility fell down after the exercise, and no difference was found depending on the type of exercise.

Together with the above results, in this study, the dance with low HR showed a significantly negative affect compared to running with high HR. From this, it was thought that change in negative affect would occur depending on exercise intensity. In addition, concerning the sense of positive engagement, the dance with lower HR was a result of a higher feeling. By doing this dance, the

mood rises, but it can be said that the body is not overloaded because of the low HR. On the contrary, it can be said that running has a high HR and a load on the body, compared to an elevated mood.

In order to make use of the above results in actual exercise prescription, we must understand the merits and disadvantages of both exercises. The merit of dancing is that exercise intensity can be controlled precisely. Also, it can increase positive engagement for the load on the body and reduce negative affect. In other words, dance is considered to be an exercise suitable for people who want to refresh mentally, not overloading the body. On the contrary, running people are better for people who want to stress the body and firmly exercise intensity rather than wanting to refresh mentally. As mentioned above, it was thought that it is important to understand the characteristics of each exercise, select exercise according to individual goal and purpose, practice and prescribe.

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Received : 02/28/2018

Accepted : 06/30/2018