



EXERCISE OR RELAXATION? WHICH IS MORE EFFECTIVE IN IMPROVING THE EMOTIONAL STATE OF PREGNANT WOMEN?

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ABSTRACT

Purpose. The aim of this study was to compare the changes in emotional states in pregnant women after completing a relaxation session and a one-off physical exercise class. **Methods.** The study included 139 pregnant women between the ages of 22 to 34 years (28.59 ± 2.99 years) in their second and third trimesters of pregnancy who were participating in one of three programs: a progressive relaxation course, a physical exercise program, or a traditional childbirth education program (control group). Emotional states were assessed by McNair, Lorr, and Droppleman's Profile of Mood States immediately before (pre-test) attending their seventh respective class and then immediately after finishing it (post-test) **Results.** The pre-test emotional state of participants in all three groups was similar. Post-test, both the exercise and relaxation groups featured significantly improved emotional states, with the changes greater than those of women who attended the prenatal class. Pregnant women who participated in physical exercise were less troubled and tense and characterized by a higher level of vigor than the control group. **Conclusions.** Physical exercise may be especially helpful in coping with fatigue and feeling tired, while relaxation training is more beneficial for women with elevated levels of anxiety and depression.

Key words: exercise, relaxation, pregnancy, emotions

Introduction

Research shows that performing physical exercise at a moderate intensity by healthy pregnant women not only poses no threat to the mother or fetus, but actually contains a number of important health and physical benefits for both the mother and child [1–4]. As explained by Melzer et al. [5] in a recent literature review on this subject, regardless of the physiological changes that occur during pregnancy, pregnant women benefit the same from regular physical activity as non-pregnant women.

Physical activity is therefore an important component of a healthy pregnancy, with today's health recommendations advising expectant mothers without pregnancy-related risks or complications to perform at least 30 minutes of moderately intensive, preferably aerobic, physical exercise as often as possible, even every day [1–2, 6].

Unfortunately, research has shown that the amount of physical activity performed either during work or for leisure significantly decreases during pregnancy [7–9]. The proportion of pregnant women participating in moderate to vigorous intensity physical exercise or sport falls steadily as the pregnancy advances, where significantly more moderate to high intensity physical exercise is performed in the first and second trimester than in the third. Moreover, the duration and intensity of the

exercise performed during pregnancy is significantly reduced. Although the number of women who are lightly active remains stable during pregnancy, the proportion of women leading a sedentary lifestyle increases significantly. Studies conducted on pregnant women in the United States found that most spent more than half their day engaged in sedentary behavior and did not follow minimum physical activity recommendations [10].

The positive effects of performing proper amounts of exercise during pregnancy not only have a major impact on physical health but are also known to have a number of potential benefits on mental health. The mental well-being of expectant mothers is known to have a significant impact on pregnancy, childbirth, motherhood, and the newborn and its later development in life. Pregnant women under large amounts of stress are more at risk for miscarriages or premature birth as well as perinatal complications [11, 12]. Stress during pregnancy is linked to giving birth to small for gestational age babies in poorer psychophysical states and found to increase their risk of developmental disorders in later life [12–14].

Since prenatal stress may significantly contribute to pregnancy complications and developmental disorders, particular importance has been placed on reducing the stress levels of pregnant women. One such solution is physical exercise, at least for those women whose pregnancy is progressing normally. Numerous studies conducted on a general population have repeatedly confirmed the positive emotional changes experienced after a one-off workout. Therefore, instead of reviewing the results of individual studies, attention was focused on

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analyzing meta-analyses of the available literature. It was found that the majority of studies focused on the possibility of using physical exercise in lowering negative emotional states, such as fear and depression. Starting from 1981, more than 40 systematic reviews have been published, all of which confirmed that physical exercise reduces anxiety and depression levels [15–17]. One of the first studies of this type was performed by Yeung [18], who noted that the majority of the results show an improvement in mood after a one-off workout, regardless of gender or age or even disability. Positive effects were observed after both aerobic and anaerobic exercise of varying duration and intensity, and were usually felt up to 3–4 hours after completion. Interestingly, among the studies analyzed by Yeung [18], the one group which featured a deterioration in mood after exercise were pregnant women.

Another aspect that needs to be considered is the approach proposed by positive psychology, which places emphasis on the determinants of mental well-being. By adopting this perspective, it needs to be asked whether one-off exercise can in fact improve the indicators of positive mood such as positive affect, vigor, energy level, joy, and euphoria. Reed and Ones [19] completed a meta-analysis on this issue, addressing over 158 studies conducted between 1979 and 2005, although only two involved pregnant women. The results of their meta-analysis found significant increases in the indicators of positive arousal immediately after aerobic exercise, particularly when the levels of pre-exercise were below average. Furthermore, the positive effects of exercise at low intensity, lasting up to 35 minutes, and performed from a low to moderate frequency (intensity \times duration) were unilaterally confirmed.

Unfortunately, few of the analyzed studies investigated the effect of one-off exercise on the emotional states of pregnant women. The few that observed a decrease in the psychological indicators of depression and anxiety after a one-off aerobic workout [20]. Similar decreases in anxiety and depression levels were observed in postpartum women after participating in a 60-minute aerobic training session at moderate intensity; in addition, they also exhibited an improvement in mood and an increase in vigor [21]. A study performed on pregnant women participating in aqua-aerobics classes indicated that this type of exercise causes increases in positive mood, better well-being, a decrease in negative emotions, and a reduction in feeling tired or fatigued [22]. Similarly, after a one-off workout from the *9 Months Active* program, a group of pregnant women featured beneficial emotional changes, particularly with noted decreases in anxiety and tension levels [23].

Nonetheless, relaxation techniques are by far the most commonly applied methods for alleviating stress and anxiety. A meta-analysis by Manzoni et al. [24] found that such techniques are moderately to highly effective in reducing anxiety. Particularly effective in reducing

anxiety was meditation, although a number of other techniques (autogenic training, progressive relaxation, and mixed techniques) were also helpful. However, none of the studies covered by this meta-analysis involved pregnant women and so far little is known about the effectiveness of relaxation therapy in this population. Outside of the available meta-analyses on this subject, of some interest were the findings of Urech et al. [25], who compared the acute effects (i.e., the effect of a one-off class) of three relaxation techniques (progressive relaxation, imagery relaxation, and passive relaxation), on pregnant women. In all cases, a significant reduction in cortisol, noradrenaline, and ACTH levels was observed, with progressive and imagery relaxation also found to decrease the expectant mothers' heart rates. After further analysis, this study concluded that imagery relaxation was more effective than the other two methods in reducing cardiovascular activity as well as inducing a subjectively perceived state of relaxation.

Another study [26] on pregnant women found that an active relaxation session helped decrease anxiety levels and heart rate better than a passive relaxation method. However, passive relaxation was found to cause more significant decreases in noradrenaline levels, which did not occur in the group of pregnant women who performed active relaxation. No change in the level of adrenaline was observed in either group, although both groups featured a significant decrease in the level of cortisol.

In light of the relatively few studies that have addressed this issue, the aim of the present study was to compare the changes in the emotional states of expectant mothers who were attending an exercise training program or a relaxation course against a control group attending a traditional childbirth education course immediately before attending one of their classes and after it was completed.

Material and methods

The study included 139 pregnant women between the ages of 22 to 34 years (mean 28.59 ± 2.99 years) in their second ($n = 54$) or third trimester ($n = 85$), or between 20–34 weeks of gestation (27.96 ± 4.01 weeks). All of the participants had completed higher education and lived in a capital city; 78.4% ($n = 109$) were married, the remaining 21.6% ($n = 30$) were unmarried. All of the participants were professionally active before becoming pregnant, although at the time of the study 56.1% ($n = 78$) had stopped working. The study was approved by the Senate Ethics Committee at the Józef Piłsudski University of Physical Education in Warsaw, Poland.

The participants were recruited from women who had signed up to attend a traditional childbirth education program in two different hospitals. Those who met the initial entrance requirements (being in good health

and that this was their first single pregnancy) were allowed to choose whether they wanted to participate in a prenatal program that included relaxation sessions or a completely independent program focused solely on physical exercise. An additional condition to participate in either of these courses was medical approval declaring no contraindications for participation. Those who met the original study prerequisites but did not want to voluntarily participate in either of the research groups were used to create a control group. Additional exclusion criteria included individuals who trained systematically at home or who were already participating in organized exercise or relaxation classes as well as women with multiple pregnancies or with any pregnancy complications.

The relaxation group involved 42 women attending prenatal classes with an emphasis on practical relaxation techniques. The course lasted six weeks, with relaxation exercises held twice a week. The participants in this course performed various relaxation techniques which included breathing technique, autogenic training, imagery relaxation, and relaxation methods performed in pairs (often with their partner). The duration of each course varied depending on the subject, but ranged between 30 to 50 minutes.

The second group consisted of 56 women who completed an aerobic-strength physical exercise course based on the eight-week *9 Months Active* program. The course was conducted by qualified instructors and held twice a week, with each class lasting 50 minutes. The program focused on general fitness by increasing strength, muscle elasticity, and joint mobility with elements taken from Pilates, yoga, and exercise-ball training.

The last group was a control group, composed of 41 women participating in traditional childbirth education classes held twice a week for a period of six weeks. This program focused on educating future parents on issues surrounding pregnancy, the postpartum period, childbirth, and postnatal care. The duration of each class varied depending on the subject, but ranged between 45 to 60 minutes.

The emotional state of the participants was measured immediately before attending one of their respective classes (pre-test) and then again upon its completion (post-test) by the Profile of Mood States (POMS) by McNair, Lorr, and Droppleman, [27], used to assess five negative affective states (anger, tension, confusion, depression, and fatigue) and vigor. This tool was originally developed to monitor the effects of psychotherapy due to its sensitivity to mood changes, but has often been used to study the effects of physical exercise on emotional states. A Polish version of this assessment tool was used, which met all basic psychometric requirements.

A one-off measurement was performed during the seventh class the participants were attending. In the relaxation group, the class on that day focused on Jacobson's progressive relaxation technique, while the exercise group performed typical exercise activities as

part of the *9 Months Active* program. The control group attended a typical prenatal class that had no physical fitness, breathing, or relaxation exercises. Furthermore, none of the class content that day involved issues surrounding childbirth, as such a topic could lead to the participants experiencing anxiety and contribute to a worse emotional state. Only pregnant women were allowed to attend the exercise and relaxation classes that day, while those in the prenatal classes were allowed to attend the class with their partners. All of the classes lasted 50 minutes, an analysis was only performed on those participants who had attended all of the preceding six classes in their respective programs.

A self-designed questionnaire was also administered, collecting data on each participant (age, marital status, education, and employment status before and during pregnancy) and their pregnancy history as well as a self-assessed health and physical fitness survey (items rated on a 5-point scale, from 1 – *very bad* to 5 – *very good*).

As the selection of the participants was not randomized, the participants were compared by the use of socio-demographic variables by one-dimensional analysis of variance (ANOVA) and the chi-square test (χ^2). *A priori* analysis found significant differences among the groups in terms of the stage of pregnancy ($F = 10.31$, $p < 0.001$), with a post hoc Bonferroni correction finding that the participants in the exercise group were at a significantly earlier stage (26.12 ± 4.58 weeks) than the control group (29.27 ± 3.20 weeks, $p < 0.001$) or those participating in the relaxation class (29.14 ± 3.60 weeks, $p = 0.001$); the last two groups did not significantly differ from each other ($p > 0.1$). Differences were also noted in the proportion of women in their second or third trimester in each group ($\chi^2 = 9.25$, $p = 0.010$). The number of women in their second or third trimester participating in the physical exercise class was similar (53.6% and 46.2%, respectively), while women in their third trimester formed the majority in the relaxation group ($n = 28$, 66.7%) and control group ($n = 31$, 75.6%). No statistically significant differences were found between the groups in terms of age ($F = 0.677$, $p > 0.1$), marital status ($\chi^2 = 3.831$, $p > 0.1$), being employed while pregnant ($\chi^2 = 2.270$, $p > 0.1$), or self-assessed physical fitness levels ($F = 1.035$, $p > 0.1$). However, self-assessed health levels were found to differ ($F = 3.070$, $p = 0.055$), with pregnant women who signed up to participate in the exercise course evaluated their health slightly better (4.27 ± 0.59 points) than the control group (3.95 ± 0.67 points, $p = 0.054$), although they did not differ from those that were to participate in the relaxation group (4.05 ± 0.58). No other statistically significant differences were found between the groups ($p > 0.1$).

Results

Means and standard deviations of the participants' pre-test and post-test results from all three groups are

Table 1. Pre- and post-test scores measuring emotional states of the relaxation group, exercise group, and the control group

Variables	Relaxation group (<i>n</i> = 42)		Exercise group (<i>n</i> = 56)		Control group (<i>n</i> = 41)	
	Pre-test <i>M</i> (<i>SD</i>)	Post-test <i>M</i> (<i>SD</i>)	Pre-test <i>M</i> (<i>SD</i>)	Post-test <i>M</i> (<i>SD</i>)	Pre-test <i>M</i> (<i>SD</i>)	Post-test <i>M</i> (<i>SD</i>)
Anger	4.43 (5.32)	2.64 (4.15)	4.68 (5.10)	1.79 (3.04)	4.46 (4.69)	3.56 (4.94)
Confusion	6.83 (3.93)	4.90 (3.56)	6.16 (3.72)	3.89 (2.56)	6.90 (4.19)	6.27 (4.21)
Depression	5.24 (5.78)	3.14 (4.68)	5.46 (7.74)	2.45 (5.48)	4.46 (5.42)	3.80 (4.81)
Fatigue	6.07 (4.78)	4.24 (4.54)	5.11 (4.19)	3.50 (3.38)	4.66 (3.38)	4.39 (3.88)
Tension	6.48 (4.62)	3.10 (3.37)	5.59 (4.91)	3.38 (3.54)	6.49 (5.40)	5.54 (5.27)
Vigor	17.74 (5.55)	18.60 (5.95)	18.55 (4.54)	20.32 (4.42)	17.68 (3.83)	18.39 (4.84)

presented in Table 1. Analysis of the pre-test POMS-measured emotional states of the participants found no significant differences in the levels of anger ($F(2,136) = 0.036, p < 0.1$), confusion ($F(2,136) = 0.545, p > 0.1$), depression ($F(2,136) = 0.289, p < 0.1$), fatigue ($F(2,136) = 1,261, p > 0.1$), tension ($F(2,136) = 0.538, p > 0.1$), and vigor ($F(2,136) = 0.543, p > 0.1$), pointing to a similar emotional state among the three groups. This allowed further analysis to be performed without control of the baseline outcome measures.

Repeated measures analysis of variance (Group \times Time of measurement) was performed to determine the changes in emotional state and how they differed depending on the type of course that was attended. Since the groups significantly differed in terms of the stage of pregnancy, this variable was treated as a covariate. The post-test results were also compared using one-dimensional analysis of variance.

Here, it was found that the level of anger in the entire study group significantly decreased ($F(1,136) = 5.080, p = 0.026, \eta^2 = 0.036$) and did not depend on the type of group (effect of Group was insignificant $F(2,136) = 0.329, p > 0.1$). There was, however, a significant interaction between the groups and time of measurement ($F(2,136) = 3.342, p = 0.038, \eta^2 = 0.047$). Within-group repeated measures analysis of variance found that all participants experienced a significant reduction in anger, although the effect was stronger in the exercise group ($F(1,55) = 28.533, p < 0.001, \eta^2 = 0.342$) and relaxation group ($F(1,41) = 16.586, p < 0.001, \eta^2 = 0.288$) than in the control group ($F(1,40) = 5.308, p = 0.026, \eta^2 = 0.117$). No significant effect of trimester was found ($F(1,136) = 0.046, p > 0.1$). In the post-test, significant intergroup differences were found ($F(2,136) = 2.328, p = 0.101$).

The level of confusion of the entire group did not change significantly ($F(1,136) = 2.091, p > 0.1$) and did not vary depending on the group ($F(2,136) = 1.523, p > 0.1$). However, a significant interaction between the groups and time of measurement was observed ($F(2,136) = 3.832, p = 0.024, \eta^2 = 0.054$). Significant decreases in confusion were noted for the relaxation group ($F(1,41) = 25.95, p < 0.001, \eta^2 = 0.388$) and exercise group ($F(1,55) = 31.123, p < 0.001, \eta^2 = 0.361$), with no statistically significant changes found in the con-

trol group ($F(1,41) = 2.429, p > 0.1$). A trend was observed with the effect of trimester ($F(1,136) = 2.946, p = 0.088, \eta^2 = 0.024$), where confusion increased at more advanced stages of pregnancy. The groups were significantly differentiated in the post-test ($F(2,146) = 5.709, p = 0.004$), with the level of confusion significantly higher in the control group than the pregnant women who were exercising ($p = 0.003$).

A similar case was found for depression, with no significant main effect found ($F(1,136) = 0.359, p > 0.1$). Participation in any of the groups did not determine its level (main effect of group was insignificant $F(2,136) = 0.016, p > 0.1$). However, a significant interaction between group and time of measurement was observed ($F(2,136) = 3.805, p = 0.025, \eta^2 = 0.053$), stemming from the fact that a significant decrease in the level of depression occurred in the relaxation group ($F(1,41) = 22.391, p < 0.001, \eta^2 = 0.353$) and exercise group ($F(1,55) = 17.810, p < 0.0001, \eta^2 = 0.245$), with no statistically significant changes in the control group ($F(1,40) = 1.619, p > 0.1$). The effect of trimester was also statistically insignificant ($F(1,41) = 22.391, p < 0.001, \eta^2 = 0.353$). In the post-test no significant intergroup differences were found ($F(2,136) = 0.863, p > 0.1$).

The level of fatigue did not significantly change among the entire group ($F(1,136) = 0.080, p > 0.1$). Analysis performed on each of the individual groups confirmed a significant decrease in fatigue again for the exercise group ($F(1,55) = 8.009, p = 0.016, \eta^2 = 0.127$) and relaxation group ($F(1,41) = 5.234, p = 0.027, \eta^2 = 0.113$), with insignificant changes in the control group ($F(1,40) = 0.072, p > 0.1$). Neither was the main effect of group ($F(2,136) = 0.579, p > 0.1$) or the interaction between group and time of measurement ($F(2,136) = 1.671, p > 0.1$) found to be statistically significant. However, a significant effect of trimester was found ($F(1,136) = 4.572, p = 0.034, \eta^2 = 0.033$), with women at a more advanced stage of pregnancy featuring higher levels of fatigue. The groups did not differ significantly in the post-test measurement ($F = 0.740, p > 0.1$).

The entire study sample exhibited a significant decrease in tension ($F(1,136) = 5.899, p = 0.016, \eta^2 = 0.042$). Within-group analysis pointed to a significant decrease in tension in the relaxation group ($F(1,41) = 29.036, p <$

0.001, $\eta^2 = 0.415$) and exercise group ($F(1,55) = 18.890$, $p < 0.001$, $\eta^2 = 0.256$) with no significant changes in the control group ($F(1,40) = 2.215$, $p > 0.1$). The mean tension level did not vary depending on the group ($F(2,136) = 1.42$, $p > 0.1$), although the interaction between group and time of measurement was statistically significant ($F(2,136) = 3.670$, $p = 0.028$, $\eta^2 = 0.052$). The effect of trimester was also statistically insignificant ($F(1,136) = 0.094$, $p > 0.1$). In the post-test, significant intergroup differences were noted ($F(2,136) = 4.566$, $p = 0.012$); the tension level was higher in the control group than the relaxation group ($p = 0.022$) and exercise group ($p = 0.033$), with neither of the last two groups differing significantly from each another.

Among the last studied parameter, the level of vigor did not significantly change in the entire group ($F(1,136) = 1.233$, $p > 0.1$). Analysis on each of the individual groups confirmed a significant increase in vigor only in the participants in exercise program ($F(1,55) = 17.190$, $p < 0.001$, $\eta^2 = 0.238$). No statistically significant changes were found in the relaxation group ($F(1,41) = 1.023$, $p > 0.1$) or control group ($F(1,40) = 1.582$, $p > 0.1$). Neither was the main effect of group ($F(2,136) = 0.639$, $p > 0.1$) or the interaction between group and time of measurement ($F(1,136) = 0.718$, $p > 0.1$) found to be statistically significant. A significant effect of trimester was found ($F(1,136) = 5.744$, $p = 0.018$, $\eta^2 = 0.041$), with vigor higher in women in the second trimester. No statistically significant differences between the groups were found in the post-test measurements ($F(2,136) = 2.209$, $p > 0.1$).

Discussion

The results of the mood assessment scale found that pregnant women who participated in an exercise or relaxation session improved their emotional state. These improvements in both groups were larger than for women participating solely in traditional prenatal classes. In this last group, only a significant decrease in anger was observed. For pregnant women participating in physical exercise, an improvement in mood was seen in all indicators of emotional state, with the same seen for women in the relaxation group except in the case of vigor.

As of yet, few comparisons have been made on the effectiveness of physical exercise and relaxation as two concurrent effects on emotional well-being. The few studies that do exist compared the anti-anxiety effects of different forms of physical exercise and relaxation techniques, finding relatively minor differences between these two methods in terms of a decrease in anxiety and tension [28–30].

This study found that the emotional benefits of relaxation and physical exercise to be slightly different from each other, as evidenced when comparing the size of the effects. The levels of tension, anger, confusion, and depression were found to be smaller, albeit minimally, after completing the exercise session than the

relaxation class, although a larger decrease was noted in fatigue. Furthermore, only the exercise group presented a significant increase in vigor. On the other hand, relaxation resulted in a profound drop in negative emotional states, although the positive state of vigor did not change. Similar results were obtained by Saklofske et al. [31] when comparing the effects of walking and relaxation on the affective sphere. Both conditions caused a significant drop in tension, although only the physically active group featured increased energy levels. It seems that physical activity is at least no less effective than relaxation techniques in reducing negative emotional states, while being more effective in inducing positive states.

The results of the present study were found to be in line with those presented earlier, in which it was concluded that one-off workouts improve the emotional well-being of different groups [15–19], including pregnant women [20, 22, 23]. The effectiveness of physical exercise appears to be particularly high in bringing about those states associated with arousal, where, in the present study, only the exercise group presented a significant increase in the amount of vigor while at the same time featuring the largest decrease in fatigue.

However, the effectiveness of various relaxation methods in reducing anxiety levels has also been confirmed in the meta-analysis carried out by Manzoni et al. [24]. Additionally, a study focused on pregnant women also confirmed that participation in relaxation classes lowered anxiety levels [32]. In the present study, the relaxation class on the day of measurement was based on progressive relaxation, which had been proven to be particularly effective in both the general population [24] as well as pregnant women [25, 32]. Although the effectiveness of relaxation methods in reducing negative emotional states was slightly greater than by physical exercise, no significant change was noted in vigor. This cause and effect relationship seems to be quite logical. Relaxation in itself is based on reducing overall arousal levels. This results in a decrease in the intensity of negative emotions, but it may also be the cause of the decrease in vigor and increase in lethargy.

The obtained results seem to confirm Russell's circumplex model of affect [33]. According to this author, there exist two independent dimensions of affect, one related to valence (pleasure–displeasure) and the other to arousal (alertness–somnia). This allows four categories of affect to be distinguished: positive arousal (a pleasant state, feeling joyful excitement, energy, and vigor), positive low arousal (associated with feelings of inner peace and contentedness), negative arousal (suffering), and negative low arousal (sadness and depression). Relaxation leads to positive low arousal, causing a decrease in anxiety and tension since these states are associated with negative stimulation (or at least stabilizes their levels, as was found in the present study), and also caused a decrease in overall arousal, and, conse-

quently, an increase in feelings of pleasure. Physical exercise also led to increase in hedonistic feelings but in different way, primarily by increasing the general level of arousal that is felt as a rise in vitality, vigor, and vital energy.

None of the three analyzed groups differed from one another in terms of their emotional well-being before beginning their respective classes (pre-test). Upon finishing, however, certain intergroup differences were noted especially between those participating in the childbirth education program and the *9 Months Active* exercise program. The pregnant women taking part in physical exercise revealed lower levels of confusion and tension. No significant differences were found between the exercise and relaxation groups, however.

One of the more interesting results of the present study was the decrease in the level of anger in the control group. Prenatal classes held in traditional childbirth schools provide expectant mothers with various information and help them prepare for childbirth. This may have contributed to their improvement in mood due to not only the subject matter (infant care) but also that the fathers/partners of the child were also allowed to attend, providing an important source of support. It should also be remembered that simply being in a peaceful environment is enough to improve one's emotional state [18].

The study did have a number of limitations, beginning with the fact that the sample population was rather homogeneous: all of the participants were well-educated, living in a capital city, had a steady job before pregnancy, and had above-average incomes, all of which limits the generalization of the results. Secondly, the selection process was not randomized, as the participants chose which class they would like to take based on their own personal preferences. As a result, women in less advanced stages of pregnancy and slightly better assessing their own health naturally gravitated towards the course focusing on physical exercise. However, the effect of trimester, or how advanced the pregnancy was, was statistically controlled. The week of gestation significantly differentiated the levels of fatigue and vigor, with women in their third trimester having lower energy levels and felt more tired. This effect was not found among the other negative states (anger, confusion, depression, or tension), which is in contrast to previous studies that suggest more advanced pregnancies have increased feelings of anxiety and depression [34, 35]. Thirdly, as fathers were allowed to attend the traditional prenatal class (control group), this may have also significantly affected the emotional states of the expectant mothers.

Conclusions

Despite these limitations, the results are suggestive that a one-off exercise and relaxation session can in-

crease levels of emotional comfort in pregnant women more effectively than attending a traditional prenatal class. Physical exercise can cause an increase in energy levels, while progressive relaxation techniques can help reduce the level of negative affect. Physical exercise may be particularly useful when dealing with fatigue and feeling tired, which are often experienced during pregnancy, while relaxation techniques are likely to bring greater benefits to pregnant women with elevated levels of anxiety or depression.

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