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The Effects of Exercise on the Mood of Mentally-Challenged Adults

Laurie M. Stone

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Abstract

Research has indicated that all dimensions of mood are favourably affected by exercise to a significant extent (e.g., Hogan, 1989; Wilfley and Kunce, 1986; Berger and Owen, 1983). Recent research suggests that prolonged participation is not necessary to elicit these positive changes in affect (Pierce and Pate, 1994). Participating in a single bout of exercise can significantly produced positive changes in affect. Studies have also reported that the intensity of the exercise sessions only need to range between 60%-80% of the maximum cardiac reserve to significantly improve mood, and have also suggested that mood remains significantly improved 24 hours after completion of the exercise session (Maroulakis and Zervas, 1993). However, the extent to which these findings can be generalized to the mentally-challenged population has not been assessed. Therefore, the purpose of the research I conducted was to examine whether participation in an aerobic exercise session produced an enhancement in the mood of mentally-challenged adults. This will allow for the previous findings of a significant improvement in mood after exercise, to be generalized to the mentally-challenged population.

The Effects of Exercise on the Mood of Mentally-Challenged Adults

Mood is said to govern human cognition at all times. Therefore, it is important to identify the factors which potentially control this psychological variable. Research has indicated that all dimensions of mood are favourably affected by exercise to a significant extent. Studies that provide evidence of the psychological benefits of exercise participation have been extensively documented. Many studies have now provided the preliminary information concerning exercise as a vehicle for the promotion of psychological health.

In an earlier study, self-reported fitness of normal adults was associated with self-confidence, resiliency, self-discipline, and competitiveness (Hogan, 1989). Utilizing a similar population, significant increases in physical self-concept and reductions in tension-anxiety were detected following an 8-week prescribed exercise program (Wilfley and Kunce, 1986). At the conclusion of a 14 week swimming class (40-minute classes tri-weekly) college-aged participants reported significantly less tension-anxiety, depression-dejection, anger-hostility, confusion-bewilderment, and more vigor-activity (Berger and Owen, 1983). Similarly, Thayer (1987) demonstrated that a 10-minute brisk walk decreased tension and increased feelings of vigor. In summary, a variety of psychological benefits have been ascribed to participation in physical activity. These include (a) enhanced mental performance and concentration, (b) improved self-image and feelings of confidence and well-being, (c) perceived improvement in quality of sleep, energy level, mood, tension and stress levels, and (d) decreased anxiety, depression, and hostility (King, Taylor, Haskell, & Debusk, 1989).

To understand the results of mood experiments more efficiently, it is found that mood is consistently measured using the 65-item Profile of Mood States (McNair and Lorr, 1971). It has sound psychometric properties and has been employed successfully in many studies of exercise

and psychological well-being (e.g., Berger and Owen, 1983; Pierce and Pate, 1994). The questionnaire contains 65 adjectives which are rated on a 5-point scale ranging from "not at all" to "extremely like me". A total mood disturbance score is calculated from six subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. Subjects respond according to how they feel "right now".

Despite the well documented benefits of exercise, 40% of the American population do not exercise. An additional 40% do not exercise sufficiently to reap health benefits (Dishman, 1988). Some problems in motivating people to be physically active may be the great focus on the benefits of exercise that is (a) long in duration, (b) high frequency of sessions, (c) prolonged exercise program, and (d) high intensity levels. Recent research has changed these misconceptions.

Research suggests that prolonged participation is not necessary to elicit these positive changes in affect. McGowan, Pierce, and Jordan (1991) demonstrated that participating in a single bout of exercise significantly produced positive changes in affect in college-aged individuals. The subjects participated in either a 75-minute running, karate, or weight lifting class. Results showed significantly lower scores in total mood disturbance, tension, depression, anger, and confusion. Recent findings support this research, suggesting that chronic exercise is not necessary to produce temporary favourable changes in affect. Pierce and Pate (1994) examined the effects of a single bout of physical activity among older participants. Sixteen older women, aged 57-72 years, participated in a single 75-minute session of aerobic line dancing. They reported the single session produced significant decreases in scores on tension, depression, fatigue, and anger. There was also a significant increase in scores on vigor relative to pre-exercise scores.

Several earlier published studies do not include reports of basic methodological elements such as the intensity, duration, and frequency of exercise, thereby leaving space for speculation, misunderstandings, and confusion. For instance, numerous types of physical activity have been characterized as aerobic, frequently improperly. For example, 17- to 40-minute brisk walks, or 15 to 30 minutes of running or working on a treadmill at 40% to 85% of maximum heart rate (Maroulakis and Zervas, 1993). In 1978, The American College of Sports Medicine (ACSM) set the optimal training frequency for aerobic exercise at: between 15 and 60 minutes per session, three to five days per week, for life. Recommendations for intensity of training generally ranged between 60% and 90% of maximum heart-rate reserve. Recent studies report that recorded heart rates only need to range between 60% and 80% of age-adjusted maximum cardiac reserve values to show a significant increase in mood states after exercise. Maroulakis and Zervas (1993) calculated aerobic exercise load by self-measurement of heart rate during an aerobic class session to ensure a level of 60%-80% of maximum cardiac reserve. They reported that the total mood disturbance score significantly improved after exercising at this intensity, and despite a marked and significant decrement, scores remained significantly lower than pre-exercise levels 24 hours later.

Although many studies support the efficacy of a wide range of physical activity in producing positive changes in affect in the normal population. The mechanism through which exercise impacts subsequent behaviour has not been established. Morgan and Goldston (1987) suggested that an exercise session provides the "time-out" hypothesis. According to this hypothesis, exercise improves mood by providing a temporary escape from the problems of every-day life. In other words, thought is directed towards new interests, a shift which leads away from common life stressors. Bahrke and Morgan (1978) provide partial support for this "time-out" hypothesis

by contrasting the pattern of mood fluctuations observed in the exercising and control groups, as well as examining the relative reversal of mood factors during the day following the exercise session. They concluded that the exercise environment may provide a distraction from stressful stimuli which in turn may induce a favourable change in affect (Bahrke and Morgan, 1978).

Other researchers have proposed a theory that the elevation in beta-endorphins (an endogenous opiod) following exercise represents a psychophysiological mechanism for these favourable changes in affect after exercise (Pierce and Pate, 1994). The theory suggests that during exercise, the level of beta-endorphins is elevated in the body. Evidence shows that these neurotransmitters have a stimulatory effect, and increased concentrations significantly enhance levels of mood. Further research is required to identify underlying mechanisms through which exercise impacts changes in affect.

So far, most of the research showing improved affect after exercise has focused on samples from the normal population. The extent to which such findings might be generalized to the mentally-challenged population has not been assessed. Results on the effects of exercise on the affective state of the mentally-challenged population have been equivocal. Most of the studies measure the change in a variety of disruptive or inappropriate behaviours of mentally-challenged subjects following an exercise session. Unfortunately, these results must be interpreted cautiously because each study suffers from one or more methodological weaknesses. These weaknesses include (a) no use of an alternating treatment design, (b) unreliable recording and reporting of individual behaviours for each student, (c) no arrangement of similar activities during each observation period, (d) not having observers and teachers blind to the arrangement of different conditions, and (e) not equalizing the amounts of exercise across students.

In an unpublished manuscript, Breuning, Davis, and Hatton (1979) documented a decrease in the disruptive behaviours of institutionalized women during time periods immediately following an exercise program. Watters and Watters (1980) observed decreases of 32.7% in the level of self-stimulatory behaviour of five autistic boys during language training sessions which succeeded 8- to 10-minutes of jogging. Allen (1980) varied the duration of jogging and reported greater decreases in the disruptive behaviour of learning handicapped students as jogging duration increased from 5- to 10-minutes. Bachman and Fuqua (1983) varied the intensity and duration of jogging sessions with warm-up-only and no-exercise days. Observations were made on only three inappropriate behaviours for four trainable mentally-challenged students. Their results indicated a significant decrease in all three inappropriate behaviours for three of the four students, and an inverse relationship between the level of exercise and the amount of inappropriate behaviours for three of four students.

Drawing conclusions from such research is further complicated by clear differences in exercise treatments employed in these studies. It leaves the precise behavioural or physiological mechanism through which exercise impacts behaviour open for questions. Because decreases in inappropriate behaviours correspond with increased amounts of physical exertion, fatigue resulting from physical exertion could account for the reported decreases in inappropriate behaviours. Because fatigue could be responsible for the behaviour decrements, it is important that future research monitor some appropriate behaviours to determine the specificity of exercise effects. A relevant measure of appropriate behaviour could be a measure in the change of positive mood states following an exercise session. Furthermore, the durability of the mood effects associated with a constant level of exercise should be assessed because of obvious limitations on increases in intensity or duration of daily exercise faced by this population.

In conclusion, it is known that mood is enhanced after a single session of exercise participation for the normal population. It has also been shown that these effects may persist for up to 24 hours after the exercise session. However, the extent to which these results can be generalized to the mentally-challenged population is not known. Examining the influence of exercise paradigms on affect utilizing this population would be beneficial, given the increased interest in exercise programs for the mentally-challenged.

Therefore, the purpose of the research I conducted was to examine whether participation in an aerobic exercise session produced an enhancement in the mood states of mentally-challenged adults, and if so, whether the effects persisted for 24 hours. I believe that an aerobic exercise session of moderate intensity (60%-80% maximum cardiac reserve) will lead to a significant improvement in the mood of mentally-challenged adults. Thus, previous findings of a significant improvement of mood following exercise can be generalized to the mentally-challenged population.

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Running head: EFFECTS OF EXERCISE ON MOOD

The Effects of Exercise on the Mood of Mentally-Challenged Adults

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Abstract

Research indicates positive affective change occurs following acute bouts of exercise, but whether this improved mood may be generalized to mentally-challenged individuals is not known. The present study examined whether participation in an aerobic walking session produced an enhancement in the mood states of mentally-challenged adults, and if so, whether the effects persisted for 24 hours. Fourteen participants were aged 19 to 50 years. They participated in both a 20-minute walking session and a 20-minute no-exercise session (control session). The study was a within-subject design. The order of the treatments was also counter-balanced to avoid any carry-over effects. The Profile of Mood States was administered just prior to, and immediately after each session, as well as approximately 24 hours later. Analysis of the data indicated there was a significant improvement in mood after the walking session, but no difference after the no-exercise session. Specifically, there were significant increases in scores of vigor, confidence, clearheadedness, and elatedness relative to pre-exercise scores. After 24 hours, only scores of confidence remained significantly lower than the pre-exercise levels. Therefore, previous findings of significant improvements in mood after exercise can now be generalized to the mentally-challenged population.

The Effects of Exercise on the Mood of Mentally-Challenged Adults

The psychological benefits of exercise participation among the normal population has been extensively documented; however, little is known about the effects of exercise on the psychological well-being of the mentally-challenged population. This appears worthy of study given an increased interest in exercise programs for the mentally-challenged.

A significant number of studies have examined the psychological effects of exercise by measuring changes from baseline in mood state following an exercise session. The results of these studies support the efficacy of a wide range of physical activity in producing positive changes in affect (Berger and Owen, 1992; Maroulakis and Zervas, 1993; McGowan, Pierce, and Jordan, 1991). A variety of psychological benefits have been ascribed to participation in physical activity. These include (a) enhanced mental performance and concentration, (b) improved self-image and feelings of confidence and well-being, (c) perceived improvement in quality of sleep, energy level, tension, and stress levels, (d) decreased anxiety, depression, and hostility (King, Taylor, Haskell, and Debusk, 1989).

Research on changes in affect after exercise participation has typically involved mood changes associated with exercise over an extended period. However, recent research has suggested that prolonged participation is not necessary to elicit these changes in mood. McGowan, Pierce, and Jordan (1991) demonstrated that participating in a single bout of exercise significantly reduced total mood disturbance, tension, depression, anger, and confusion. Another important finding, is that the total mood scores remained significantly lower than pre-exercise levels more than 24 hours later. This has been

illustrated by studies that examine the durational effects of exercise programs on mood (Maroulakis and Zervas, 1993).

Most research showing improved affect after exercise has been conducted with the normal population. Subjects have varied in age, sex, and fitness levels. The extent to which these findings can be generalized to the mentally-challenged population has not been assessed. Studies showing the psychological effects of exercise on the mentally-challenged population have been equivocal. Most of the studies measure the change in a variety of disruptive or inappropriate behaviours of mentally-challenged subjects following an exercise session (Watters and Watters, 1980; Allen, 1980; Bachman and Fuqua, 1983). Unfortunately, these results must be interpreted cautiously because of methodological weaknesses such as unreliable recording and reporting of individual behaviours, and unequal amounts of exercise across students.

Drawing conclusions from such research is further complicated by clear differences in exercise intensity employed in these studies. It leaves the precise behavioural or physiological mechanism through which exercise impacts behaviour open for questions. Because decrease in inappropriate behaviours correspond with increased amounts of physical exertion, fatigue resulting from physical exertion could account for the reported results. Therefore, to determine the specificity of exercise effects on the mentally-challenged population, research needs to monitor appropriate behaviours (e.g., enhancement in mood state). Furthermore, the durability of the mood effects associated with a constant level of exercise should be assessed because of obvious limitations on increases in the intensity or duration of daily exercise faced by this population.

The purpose of the present study was to examine whether participation in an aerobic walking session produced an enhancement in the mood states of mentally-challenged adults, and if so, whether the effects persisted for 24 hours.

Method

Participants

Fourteen participants were aged 19 to 50 years and were all members of Community Living Algoma, a local agency for the mentally-challenged. Subjects were assessed on their mental and motor capacities during a pilot study, to ensure they could complete the exercise session and the questionnaire. Following a briefing on all procedures, all subjects and an agency witness provided informed consent according to a document approved by the agency (see Appendix A).

Materials

The bi-polar form of the Profile of Mood States questionnaire was administered just prior to, and immediately after each session, as well as approximately 24 hours later. This self-report questionnaire measures six bi-polar subjective mood states: composed-anxious, agreeable-hostile, elated-depressed, confident-unsure, energetic-tired, and clearheaded-confused. Each mood state is defined by a scale comprised of 12 adjectives or phrases. One pole represents the positive aspects of the dimension while the other pole refers to the more negative aspects. The form itself lists 72 adjectives to be rated on a 4-point scale in Likert format. Subjects rate feelings under the instructions, "how do you feel right now". The bi-polar form was chosen because the monopolar form measures only the negative affects such as anxiety or distress, depression, and hostile feelings. It neglects or ignores the more positive affects such as cheerfulness, agreeableness, and

composure. On this basis, the bi-polar form is intended to be applicable to both the normal and other populations, such as persons suffering from psychiatric disorders (McNair and Lorr, 1984). Many subjects required assistance with understanding some of the adjectives on the questionnaire. A supplementary sheet showing faces with expressions was provided (see Appendix B for complete proof). If this was still insufficient, a verbal definition of the word was given.

Procedure

This study incorporated a within-subject design. Subjects participated in both a 20-minute walking session and a 20-minute no-exercise session (control session). The order of the treatments was randomly counter-balanced, with seven subjects completing the walking session first, and the other seven subjects completing the no-exercise session first.

Subjects were tested individually from their homes. Meeting times were pre-arranged during the briefing session. The walking sessions were conducted with the experimenter, walking around the neighbourhood of each subject's home. All walks were a timed 20 minutes in duration, and walking surfaces were kept approximately level. All inclines or declines were avoided. The aerobic exercise load was calculated by the measurement of heart rate during the session by using a pulse-reader device. Subjects performed according to their personal capacity. Pulse rates were recorded in four 5-minute intervals. This allowed for the intensity of the walk to be adjusted during the session. Recorded heart rates needed to range between 60% and 80% of age-adjusted maximum cardiac reserve values. A formula was used to calculate the appropriate maximum cardiac

reserve range for each subject. The bottom of the range is calculated by (Max_{age} = 220 - age x 60%) and top of the range by (Max_{age}=220 - age x 80%).

Two subjects had to move to a jogging pace to keep their rates between the 60%-80% range. Both of these subjects reported being very physically active therefore their fitness levels were probably significantly higher than the other subjects.

The no-exercise sessions were also conducted individually at each subject's home, and were a timed 20-minutes. During these sessions, the subjects along with the experimenter sat outside in a neutral spot and conversed. This was the control session to help avoid the possibility of carry-over effects and to use for comparison against the exercise session.

The Profile of Mood States was administered to each subject (a) inside their home ten minutes before the beginning of each session, (b) immediately after each session, and (c) was also completed on the following day at approximately the same time and same place. All questionnaire sheets were collected immediately upon their completion so that during each administration subjects had no access to any previous responses. Each subject completed six questionnaires in total, after completing both sessions.

Results

A series of one-way analyses of variance with repeated measures were used to examine differences between pre- and post-session scores, and 24 hours later on each subscale. In addition, a total score on mood disturbance was calculated by summing the scores for the six bi-polar mood states. One-way analysis of variance with repeated measures was also calculated for this score.

The analysis of the data indicated there was a significant improvement in the total mood disturbance score ($F = 7.74$, $p < .007$) after the walking session, but no effect after

the no-exercise session (see Figure 1). Specifically, there were significant increases in scores of vigor ($F = 13.35$, $p < .001$), confidence ($F = 16.33$, $p < .001$), clearheadedness ($F = 4.19$, $p < .044$), and elatedness ($F = 12.21$, $p < .001$) relative to pre-exercise scores. All of these results are illustrated in graphs found in Figure 2 - Figure 5, consecutively. Scores for agreeability and composure remained basically unaltered across administrations. After 24 hours, only scores of confidence ($F = 4.65$, $p < .012$) remained significantly lower than the pre-exercise levels (see Figure 6). No difference was observed between the counterbalanced order of the sessions.

The results are summarized in Tables 1 and 2. Table 1 illustrates the multivariate 2 (group: walking session, no-exercise session) x 3 (conditions: before, after, 24-hours after) analysis applied to the scores on the separate mood states.

Insert Table 1 about here

Table 2 illustrates the mean and standard deviations of the six mood subscales and total mood disturbance for each of the sessions (no-exercise and walking).

Insert Table 2 about here

Further analysis reveals that all mean scores although not significant, actually improve after both sessions. However, the walking session produced greater increases. These results suggest that exercise may have an effect, but perhaps the measure was inadequate to find significance.

Discussion

As hypothesized, analyses indicated that there is a significant enhancement in the mood of mentally-challenged adults following a 20-minute walking session. As to the duration of this effect, the present study provides some indication for a relatively persisting beneficial effect of confidence 24 hours following participation in a walking session. This study was unable to provide the significant effects of all mood states following exercise, as other studies have in the past. Significance was only found in scores of vigor, confidence, clearheadedness, and elatedness. It is suggested that the questionnaire may have been too difficult for the mentally-challenged population to complete reliably. Future research should perhaps repeat this study using a mood measuring device specifically designed for the mentally-challenged population.

In this study, only scores of confidence remained significantly increased after the 24 hours delay from the exercise session. Therefore, the second part of the hypothesis, was not proven. Other studies that research the durational effect of mood after exercise have shown that all subscales of mood remained significantly enhanced 24 hours after the exercise session. The failure of this study to support these results may be once again due to the use of an ineffective measure of mood for this population.

Data showed that although the scores were not significant, all scores improved after both the no-exercise and walking sessions. Greater increases were found after the walking session. This may indicate partial support for the "time-out" hypothesis. Suggesting that both of the sessions provided a temporary escape from the problems of

everyday life. Thought was directed towards the activity of each session and perhaps the company of the experimenter, and this may have provided a shift away from common life stressors. Perhaps the theory of beta-endorphins is the reason why the walking session had greater increases in scores compared to the no-exercise session. The theory suggests that during exercise, the level of beta-endorphins is elevated in the body. Evidence shows that these neurotransmitters have a stimulating effect, and increased concentrations significantly enhance levels of mood.

In summary, present findings suggest that participation in an aerobic exercise session produces an enhancement in the mood of mentally-challenged adults, however, only levels of confidence persisted for 24 hours. Further research should employ repeated measure with smaller time intervals among administrations to examine the exact time pattern which each mood factor follows after exercise. Using this evidence, it can be stated that previous findings of a significant improvement of mood following exercise can be generalized to the mentally-challenged population.

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Table 1

Grouped Series of One-way Analysis of Variance with Repeated Measures for Six Mood Scores and Total Score.

Source	SS	MS	F	P
Total Mood Disturbance				
Condition	3601.2	3601.2	7.74	.007
Group x Condition	1318.6	659.3	1.42	.249
Agreeability				
Condition	41.44	41.44	1.85	.178
Group x Condition	29.31	14.65	0.65	.522
Composure				
Condition	17.19	17.19	1.03	.314
Group x Condition	25.31	12.65	0.76	.473
Elatedness				
Condition	220.19	220.19	12.21	.001
Group x Condition	93.74	46.87	2.60	.081
Confidence				
Condition	260.76	260.76	16.33	.000
Group x Condition	148.60	74.30	4.65	.012
Vigor				
Condition	320.19	320.19	13.35	.000

Group x Condition	20.45	10.23	0.43	.654
Clearheadedness				
Condition	78.11	78.11	4.19	.044
Group x Condition	29.79	14.89	0.80	.453

Table 2

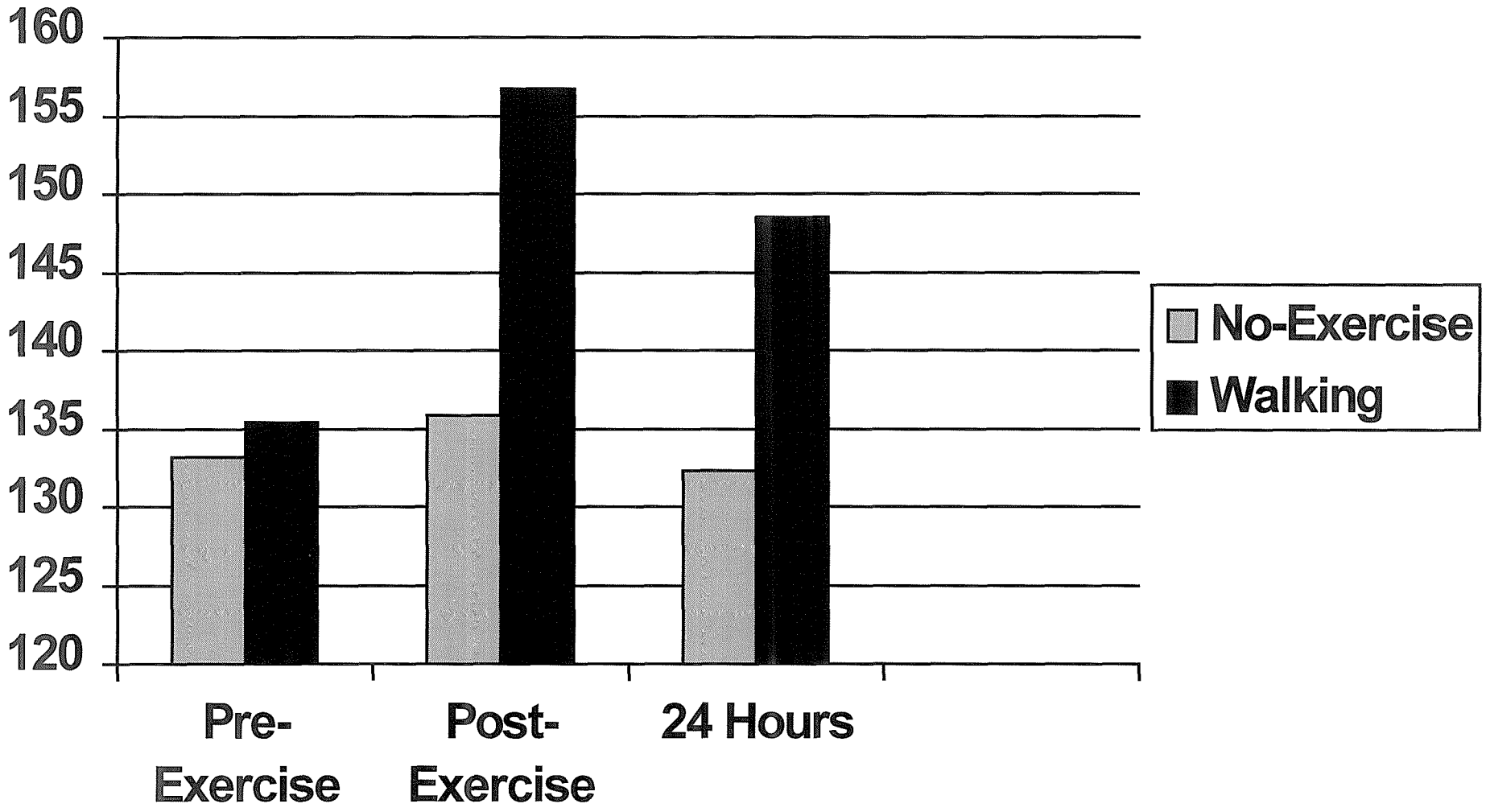
Means and Standard Deviations of Mood Subscales for No-Exercise Session and Walking Session

Group	Profile of Mood States						
	Agree-	Comp-	Elat-	Conf-	Vigor	Clear-	Total
No-Exercise Session							
Pretest							
M	27.86	23.21	24.36	17.36	21.21	19.21	133.21
SD	4.87	4.34	5.02	4.07	5.55	4.44	23.12
Posttest							
M	28.50	23.71	25.00	17.64	21.71	19.29	135.86
SD	3.94	4.50	4.69	3.97	5.53	4.48	22.21
24 Hours							
M	27.07	22.43	24.21	17.57	22.21	18.79	132.29
SD	4.55	3.94	4.87	4.54	4.90	4.46	24.32
Walking Session							
Pretest							
M	27.64	21.64	24.86	17.50	23.79	20.00	135.43
SD	5.84	4.13	4.31	3.84	5.18	4.40	24.11
Posttest							

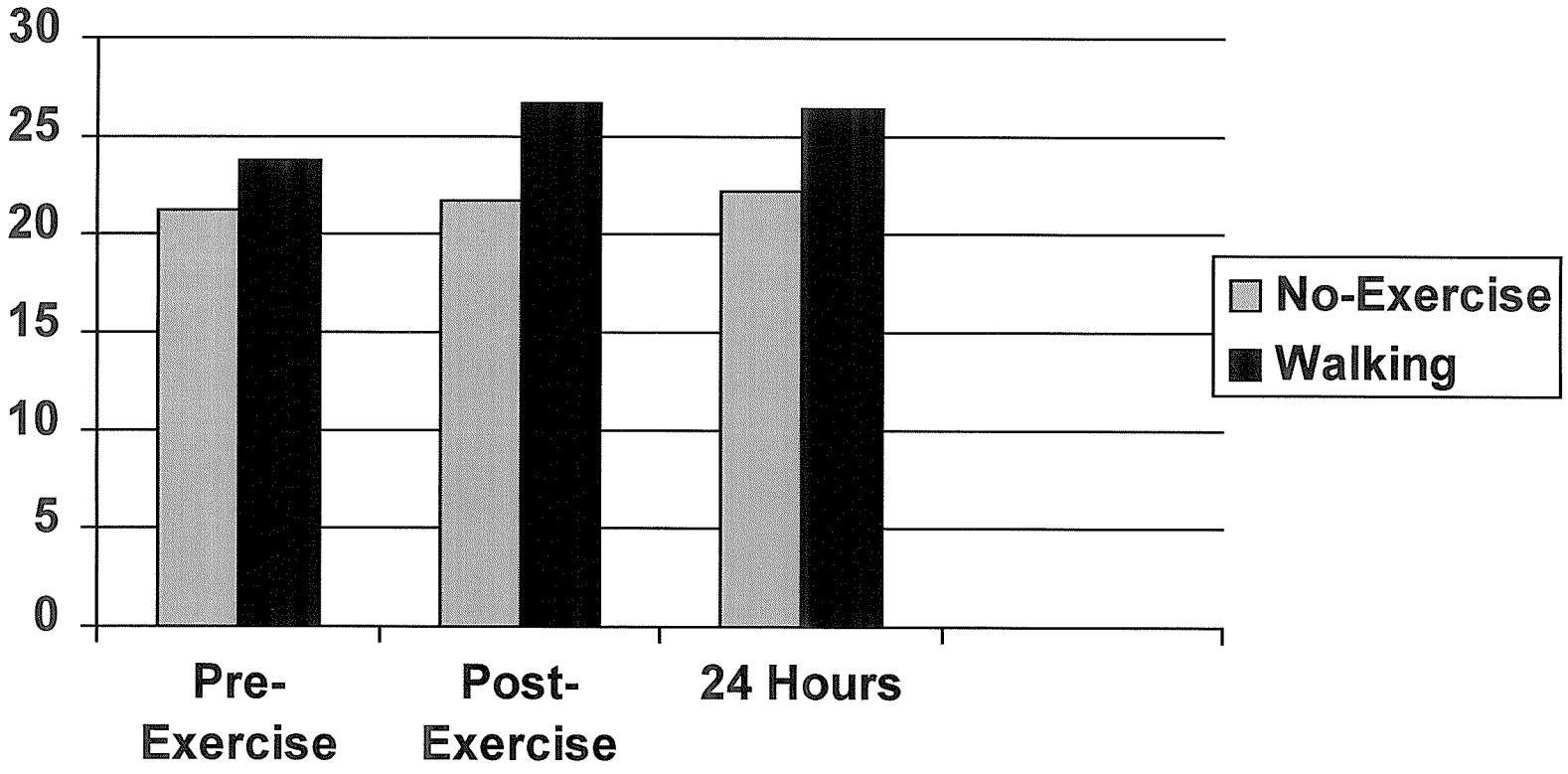
M	30.36	21.93	30.64	24.29	26.64	22.86	156.71
SD	4.81	3.81	2.47	3.20	5.00	4.15	17.30
24 Hours							
M	29.64	23.07	27.79	21.36	26.43	20.21	148.50
SD	4.14	3.79	3.56	4.24	2.59	3.95	17.08

Note. Mood subscales are Agree- = Agreeability; Comp- = Composure; Elat- = Elatedness; Conf- = Confidence; Clear- = Clearheadedness; Total = Total mood disturbance score.

TOTAL MOOD SCORE



VIGOR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Pre-Exercise
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24 Hours
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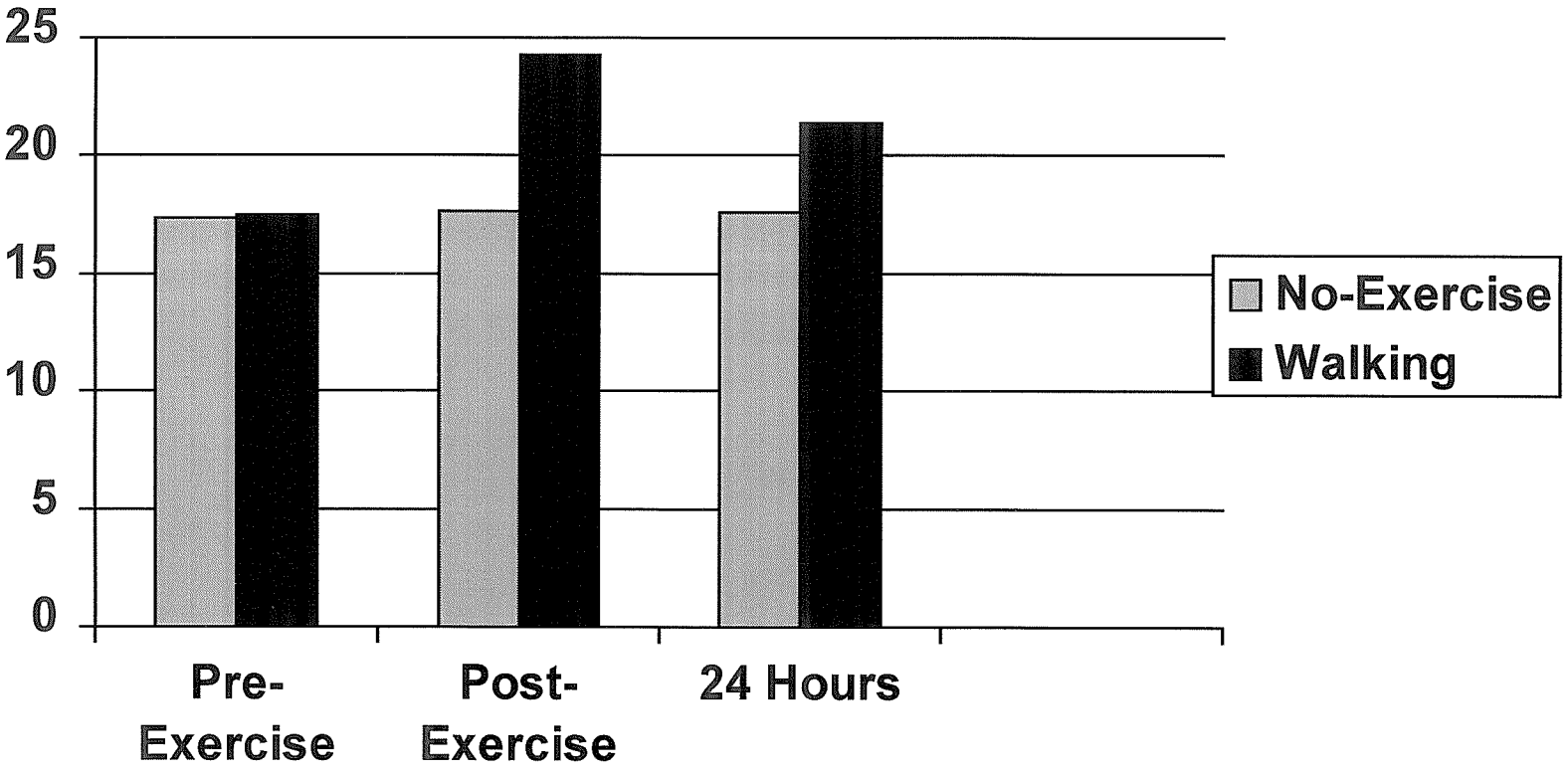
Walking

CONFIDENCE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24 Hours
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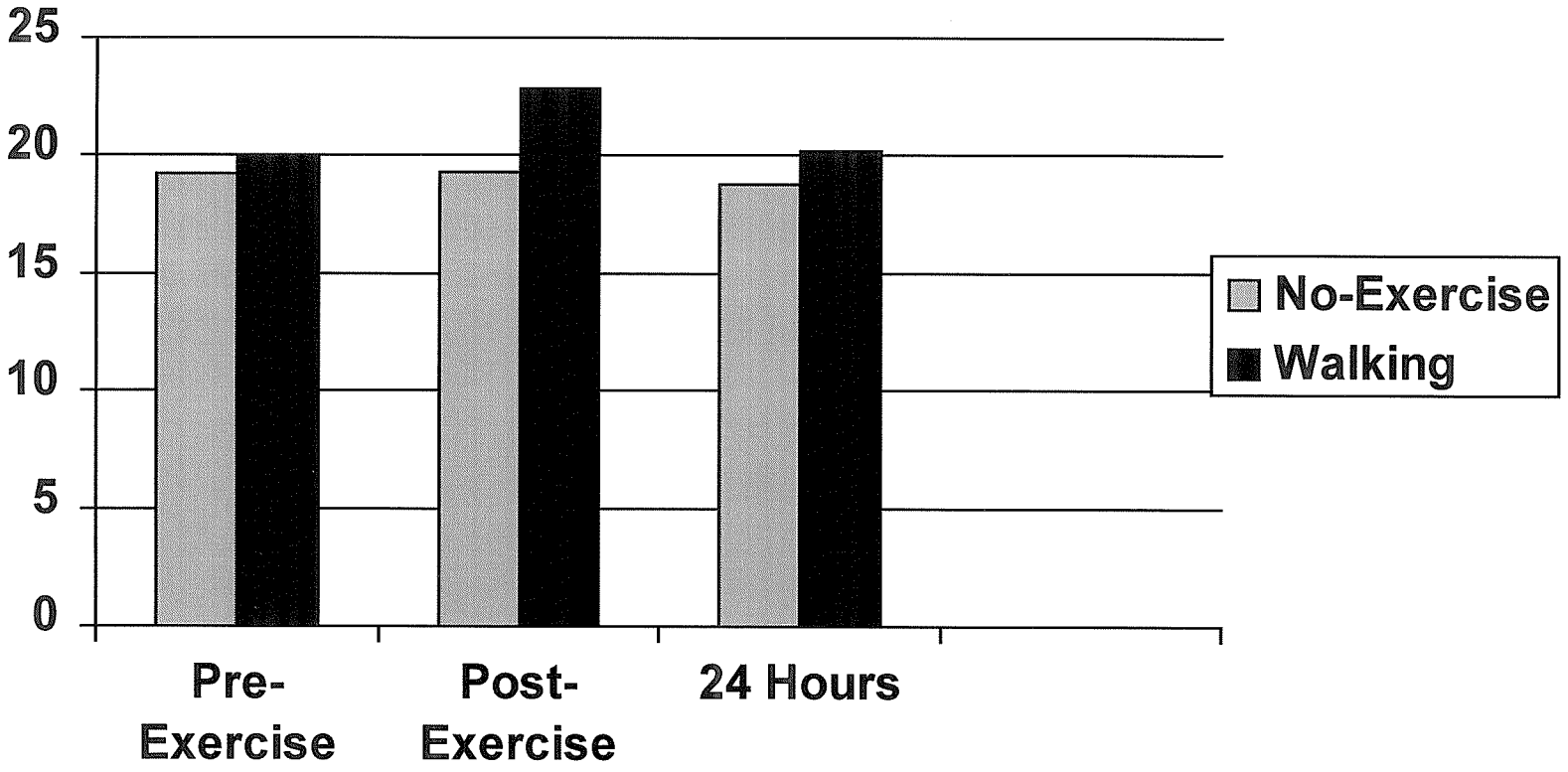
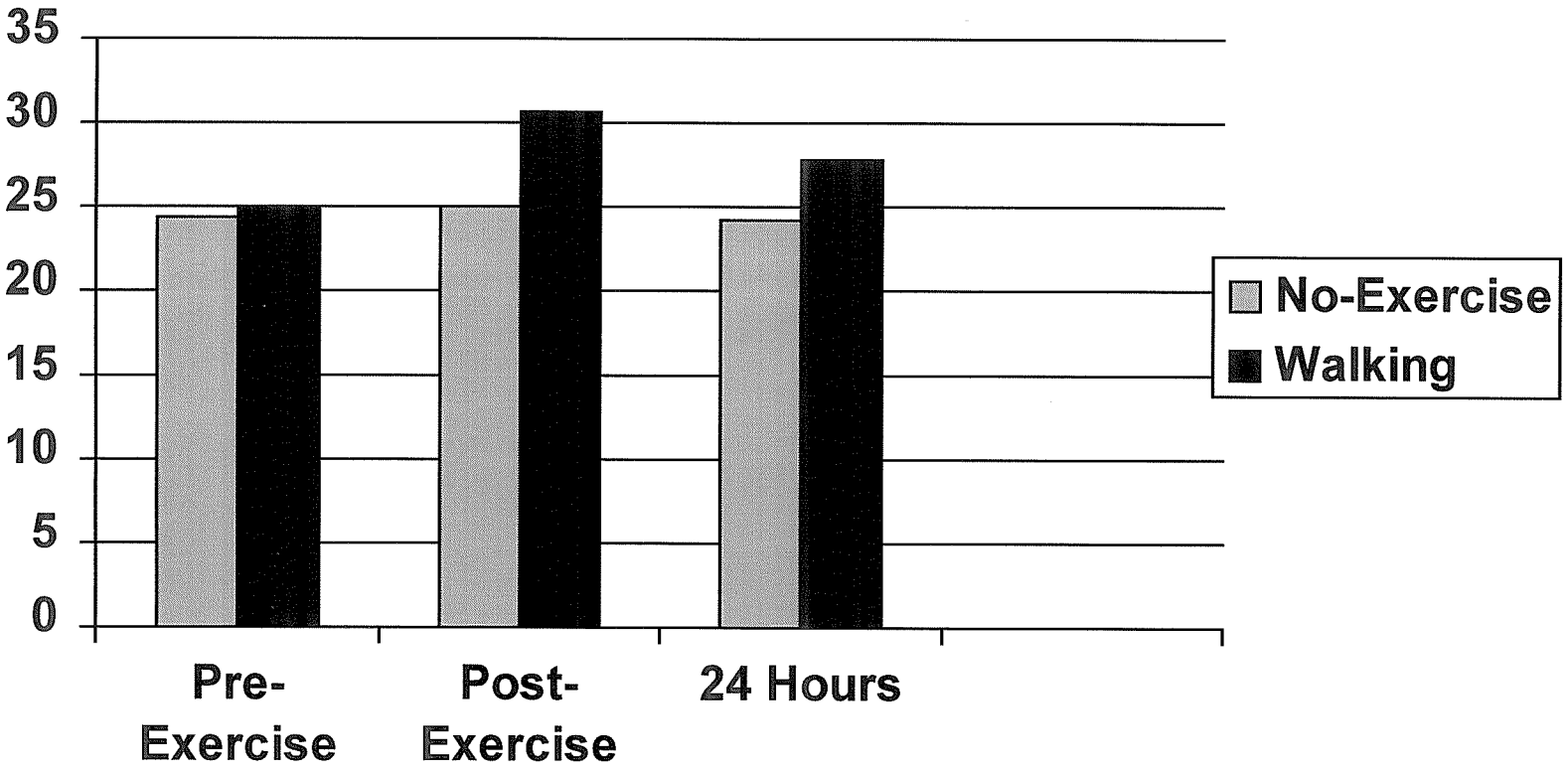
Walking

CLEARHEADEDNESS



ELATEDNESS


35
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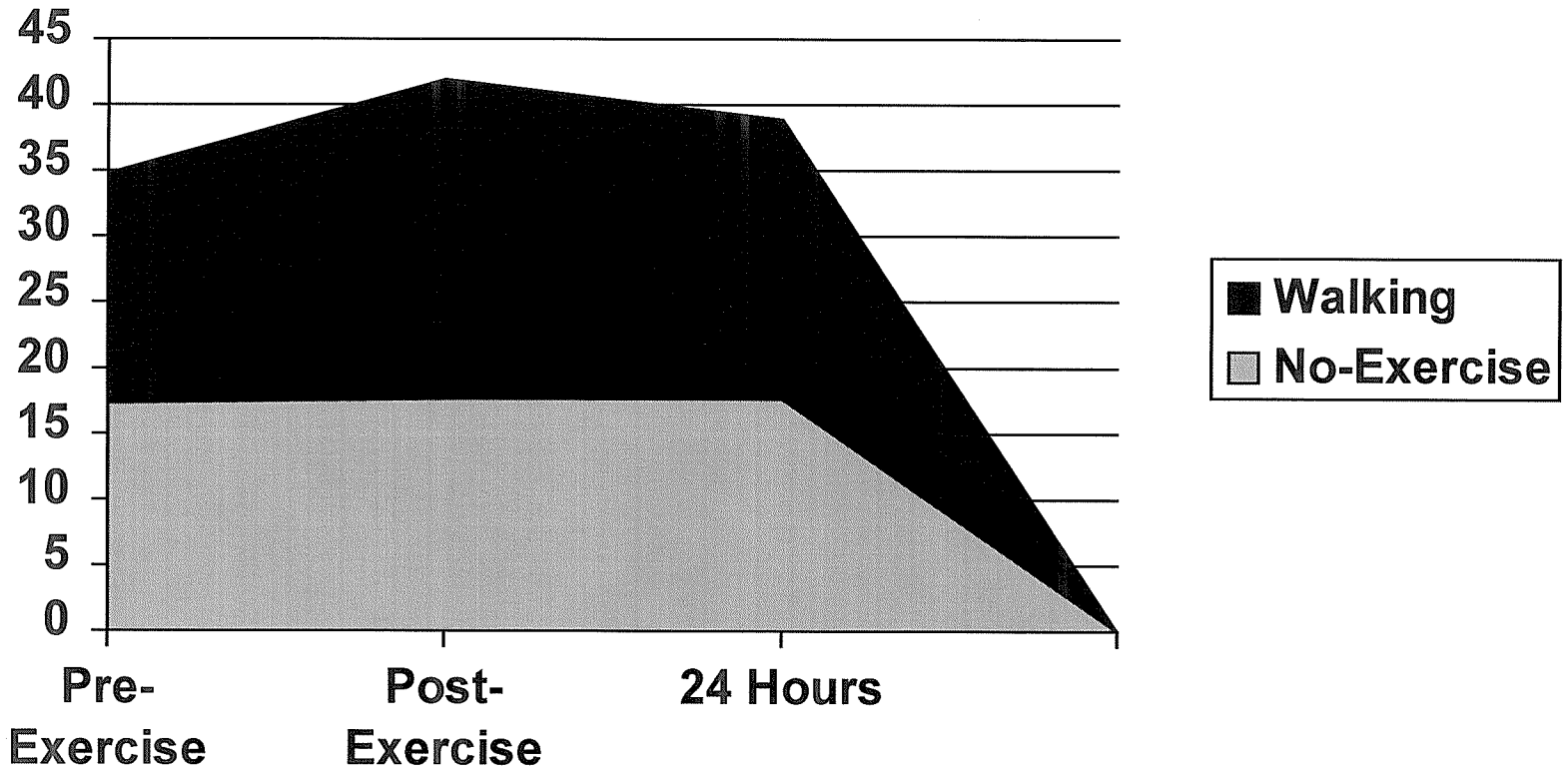
Pre-Exercise
Post-Exercise
24 Hours
No-Exercise
Walking

CONFIDENCE


45
40
35
30
25
20
15
10
5
0
Pre-Exercise
Post-Exercise
24 Hours
Walking
No-Exercise

Appendix A

CONSENT FORM - THESIS EXPERIMENTATION
(The Effects of Exercise on the Mood of Mentally Challenged Adults)

YOUR NAME:

Your willingness to participate in the experimentation for a thesis study at Algoma University is greatly appreciated. Your participation in the following experiment is unequivocally voluntary. Participants have the freedom to decline to participate in or to withdraw from the research at any time.

Participants will be protected from physical & mental discomfort, harm, and danger that may arise from the research procedures. The investigator will always retain the responsibility for ensuring ethical practices in research.

Information obtained about a research participant during the course of an investigation is confidential, unless otherwise agreed upon in advance. All instructions will be explained in complete detail before the beginning of the study. Thank you again for participating.

I agree to participate in the thesis experiment that investigates "The Effects of Exercise on Mood of Mentally Challenged Adults", which will be conducted by the Algoma University thesis student, Laurie Stone.

_____	_____
DATE	**PARTICIPANT**
_____	_____
DATE	**GUARDIAN (as needed)**
_____	_____
DATE	**WITNESS** ___
_____	_____
DATE	**INVESTIGATOR**

Appendix 18


FEELINGS VOCABULARY CHART
AGGRESSIVE
ANGRY
ARROGANT
BASHFUL
BORED
CAUTIOUS
CONFIDENT
CONFUSED
CURIOUS
DISAPPOINTED
DISAPPROVING
DISBELIEVING
DISGUSTED
ECSTATIC
ENRAGED
ENVIOUS
EXASPERATED
FRUSTRATED
GRIEVING
GUILTY
HAPPY
HORRIFIED
HURT
JEALOUS
JOYFUL
LONELY
MISERABLE
NEGATIVE
NERVOUS
OPTIMISTIC
REGRETFUL
SAD
SATISFIED
SCARED
SHOCKED
STUBBORN
SURPRISED
SUSPICIOUS
SYMPATHETIC
UNDECIDED
WITHDRAWN

Annotated Bibliography

Laurie M. Stone

Algoma University College

Allen, J. I. (1980). Jogging can modify disruptive behaviors. Teaching Exceptional Children, 12, 66-70.

Varied the duration of jogging and reported greater decreases in the disruptive behavior of learning handicapped students as jogging duration increased from 5 to 10 minutes. Unfortunately, these results must be interpreted cautiously because the study suffers from methodological weaknesses. Especially the fact that the decrease in behaviors may be attributed to increased physical exertion. Therefore, fatigue may have caused the effects.

Bachman, J. E., & Fuqua, R. W. (1983). Management of inappropriate behaviors of trainable mentally impaired students using antecedent exercise. Journal of Applied Behavior Analysis, 16, 477-484.

The effects of several levels of exercise on inappropriate behaviours of four trainable mentally impaired students were observed. Four males, ranging in age from 6 to 16 participated. Each was enrolled in a program for trainable mentally impaired (TMI) students in a public school system. All sessions were conducted in approximately 6m x 9m classrooms, at the rear of which were observation rooms which were wired for sound to allow monitoring of the classroom.

Behaviours were selected for observation based on the following criteria: they were exhibited at high rates; they were suggested as a problem behaviours by the teacher; or they interfered with academic activities. Each student was observed from the observation room during 15-minute observation periods which occurred three times per day; immediately following the student's return to the room after the exercise period, one hour after exercise, and two hours after exercise. Prior to beginning of study, each observer

practiced scoring behaviour samples until the interobserver agreement was equal to or greater than 85% for each behaviour.

Each experimental phase involved the alteration of exercise days with warm-up exercises or no-exercise days in a multi-element fashion. Phase I, daily alternating conditions of warm-up exercises and jogging at a moderate rate for a short distance; Phase II, daily alternating conditions of no-exercise periods and jogging at a vigorous rate for a moderate distance; and Phase III, jogging at a vigorous rate for a moderate distance on consecutive days. Results indicate a decrease in all three inappropriate behaviours for three of the four students and an inverse relationship between the level of exercise and the amount of inappropriate behaviour for three of the four students. The factor responsible for the absence of effects with student #23 are unclear.

It is suggested that because decreases in inappropriate behaviours corresponds with increased amounts of physical exertion, fatigue could account for the reported results. Therefore, it is important that future research monitor both inappropriate and appropriate behaviour to determine the specificity of exercise effects.

Bahrke, M. S., & Morgan, W. P. (1978) Anxiety reduction following exercise and meditation. Cognitive Therapy and Research, 2, 323-334.

This study showed that in addition to exercise, or more specifically jogging, is accompanied by a variety of psychological changes. Jogging is as effective as other stress-reduction techniques such as Benson's relaxation response, quiet rest, stress inoculation, and group interaction.

Berger, B. G., & Owen, D. R. (1992). Mood alteration with yoga and swimming; Aerobic exercise may not be necessary. Perceptual and Motor Skills, 75, 1331-1343.

This study was the first to compare the relative mood benefits of swimming and Hatha yoga. Examining the psychological benefits associated with swimming and yoga provided direct information about the relative importance of aerobic exercise in contrast to rhythmic, abdominal breathing. Swimming is high in aerobic conditioning, but Hatha yoga which is a series of gentle stretching exercises is not. College students in two swimming classes, a yoga class, and a lecture-control class completed the Profile of Mood States immediately before and after class on three occasions. Students also completed the State-Trait Anxiety Inventory on only a few days. A nine-item Lie Scale of the Eysenck Personality Inventory was reported to be valid and reliable in detecting individuals who "fake good".

Swimmers and yoga participants exercised for approximately 60 minutes per week in class settings. The multivariate analysis of variance indicated that both yoga participants and swimmers reported greater decreases in scores on Anger, Confusion, Tension, and Depression than did the control students. The consistent mood benefits of yoga supported the earlier observations that exercise need not be aerobic to be associated with mood enhancement.

A sex difference emerged when comparing yoga and swimming. Among the men, the acute decreases in Tension, Fatigue, and Anger after yoga were significantly greater than those after swimming. Yoga may even be more beneficial than swimming for men who personally select to participate. The women reported fairly similar mood benefits after

swimming and yoga. Hence, it seems that aerobic exercise may not be necessary to facilitate mood benefits. It was also noted that students with greater mood changes attended class more regularly than those who reported fewer psychological benefits. It is suggested that research should continue in this area because maximizing the immediate psychological benefits of exercise might be one way to encourage adults to be physically active.

Breuning, S. E., Davis, V. J., & Hatton, J. C. (1979). Strategic time-scheduling of physical exercise programs for the retarded; An effective procedure for reducing inappropriate behaviors. Unpublished Manuscript.

Studied the effects of aerobic exercise on a variety of undesirable behaviors with developmentally delayed persons. They documented a decrease in the disruptive behavior of institutionalized women during time periods immediately following an exercise program. This research had many methodological weaknesses, such as unreliable recording and reporting of individual behaviors for each subject, amounts of exercise equalized across subjects, and the use of an alternating treatments design. This study was not published, the article I retrieved this information from did not state why the study was unpublished. The study helped to encourage more research in this area. Other studies refer to this study with intention to replicate and extend the findings (Bachman and Fuqua, 1983).

DeVaney, S., Hughey, A. W., & Osborne, W. L. (1994). Comparative effects of exercise reduction and relaxation training on mood states and Type A scores in habitual aerobic exercisers. Perceptual and Motor Skills, 79, 1635-1644.

This study investigates the comparative effects of exercise reduction and relaxation training on dysphoric mood states and Type A scores in persona who exercise regularly. Using their scores on the Profile of Mood States and the Jenkins Activity Survey, 57 subjects were randomly divided into three matched groups based on age, gender, and exercise regimen. Subjects in the control group maintained their current exercise regimen, those in the second group reduced their exercise regimen to include no more than five hours of aerobic activity per week. Subjects in the third group maintained their current exercise regimen and attended five, 1 1/2 hour relaxation training sessions.

Both tests were administered again after ten weeks. The results indicated no statistically significant difference among group means for the dependent variable (Type A scores, Tension/Anxiety, Depression/Dejection, and Anger/Hostility). Anxiety, depression, and hostility (Type A scores) were not affected significantly by either reduction of aerobic activity or relaxation training, which seems to contradict previous reports that aerobic exercise reduces dysphoric mood.

The current study was subject to several limitations. First, the sample was not randomly selected. Second, the results may not be readily generalizable to other populations. Participants were predominantly upper-middle class Caucasians who belonged to various exercise-oriented organizations. Third, anaerobic exercise was not considered. Finally, instrumentation could be a limiting factor. Questionnaires such as the Profile of Mood States rely on subjective perceptions rather than direct behavioural observations.

Dishman, R. K. (1988) Overview. In R. K. Dishman (Ed.), Exercise Adherence its Impact on Public Health. Champaign, IL: Human Kinetics. Pp. 1-9.

This report indicated that despite the well documented benefits of exercise, 40% of the American population do not exercise. An additional 40% do not exercise sufficiently to reap health benefits. One problem in motivating people to be physically active may be the great focus on the benefits of jogging and other types of high intensity exercise which recently has been moderated.

Conscious and unconscious perception of mood enhancement may motivate exercisers to return for more benefits. Since 80% of the American population do not exercise sufficiently to reap health benefits, insight into factors promoting exercise adherence is crucial when encouraging people to exercise.

Hogan, J. (1989). Personality correlates of physical fitness. Journal of Personality and Social Psychology, 56, 284-288.

Numerous studies have examined the relationship between physical activity and various psychological indices. This study showed that self-reported fitness of normal adults was associated with self-confidence, resiliency, self-discipline, and competitiveness. This study did not use the Profile of Mood States. It also did not control for the varying amounts of physical activity. However, this study did contribute to the mass evidence of enhanced psychological indices following exercise for the normal population.

King, A. C., Taylor, C. B., Haskell, W. L., & DeBusk, R. F. (1989). Influence of regular aerobic exercise on psychological health: A randomized, controlled trial of healthy middle-aged adults. Health Psychology, 8, 305-324.

A variety of psychological benefits have been ascribed to regular participation in physical activity. These include (a) enhanced mental performance and concentration, (b)

improved self-image and feelings of confidence and well-being, (c) perceived improvement in quality of sleep, energy level, mood, and tension, and stress levels, and (d) decreased anxiety, depression, and hostility.

They showed that exercise in normal populations may only influence psychological variables associated with physical changes, i.e., perceived fitness, satisfaction with physical shape, physical self-concept.

Maroulakis, E., & Zervas, Y. (1993). Effects of aerobic exercise on mood of adult women. Perceptual and Motor Skills, 76, 795-801.

This study examined whether participation in an aerobic class produces an enhancement in the mood state of exercising women, whether any effects persist 24 hours later, and whether exercising in the morning or in the afternoon leads to differential effects. Ninety-nine women ranging in age from 19 to 55 years participated. Of those, 77 were exercisers recruited from a fitness club.

The Profile of Mood States was used to assess mood before exercising, immediately after the exercise which lasted for approximately 30 minutes, and it was also completed on the following day at the same time. The members of the control group complete the questionnaire following the same time pattern at their workplaces. The aerobic exercise load was calculated by self-measurement of heart rate during the session. Subjects performed according to their personal physical capacity. Recorded heart rate ranged between 60% and 80% of age-adjusted maximum cardiac reserve values.

Results indicated that all dimensions of mood, with the interesting exception of fatigue, were favourably affected by exercise to a significant extent. One day later, however, depression and vigor exhibited a significant regression towards the pre-exercise

levels, leaving the mean scores on only anger significantly lower than the pre-exercise level. The total mood disturbance score was significantly improved by exercise and remained significantly lower than pre-exercise level 24 hours later. These results indicate that acute aerobic exercise of moderate intensity leads to a significant improvement in mood. No difference was observed in the effectiveness of exercise to improve mood between exercising in the morning or in the afternoon.

Further research should employ repeated measures with smaller time intervals among administrations to examine the exact time pattern which each mood factor follows after exercise. Also noted that group members were not randomly assigned. Thus, self-selection may have influenced the results to a certain extent.

McGowan, R. W., Pierce, E. F., & Jordan, D. (1991). Mood alterations with a single bout of physical activity. Perceptual and Motor Skills, 72, 1203-1209.

Although numerous studies have examined the relationship among affect, personality, and physical activity, results are equivocal. This study addressed two identified weaknesses, length of exercise regimen and improper selection of subjects. Subjects were 72 college student volunteers enrolled in one of the three 75-minute activity classes (karate, n=11; weight training, n=26; jogging, n=25) or an exercise science lecture course (n=10). The Profile of Mood States was administered prior to and immediately after exercise bouts.

Although no physiological measures were employed in the study, researchers observed that cardiovascular work demands of karate class were somewhat less than the running class or the weight-training class. Therefore, the failure of the karate class to show

significant differences between pre- and post-scores could reflect a lower work demand or accomplishment.

Analyses indicated that participation in a single bout of exercise significantly reduced total mood disturbance, tension, depression, anger, and confusion. Research should continue to be done to examine the influence of single bout of exercise and longitudinal paradigm of affect of various ages and populations.

McNair, D., & Lorr, M. (1971). Manual for the Profile of Mood States. San Diego, CA: Educational and Industrial Testing Services.

Gives a description of the profile, also the purposes and uses of the scale. Gives complete instruction on method of administration and scoring. Factor analytic studies are listed, along with background studies. Validity information is provided, with details of recent validity studies.

Morgan, W. P., & Goldston, S. E. (1987). Exercise and Mental Health. Washington, DC: Hemisphere.

This article scrutinizes the effects of various physical activity paradigms, arguing that many studies have been improperly designed. Weaknesses cited have included time periods too brief for significant treatment effects. Problems with external validity, i.e., generalizing results from pathologically depressed or anxious subjects to normal populations. Among normal populations, typically reported psychological indices have been relatively insensitive to change.

Pierce, E. F., & Pate, D. W. (1994). Mood alterations in older adults following acute exercise. Perceptual and Motor Skills, 79, 191-194.

Limited research indicates positive affective change following acute bouts of exercise. The purpose of the present study was to examine effects of exercise on affect among older participants and specifically changes in mood state after a single bout of exercise. Sixteen trained women were assessed using the Profile of Mood States prior to and immediately following a 75-minute session of aerobic line dancing.

The analyses indicated a significant decrease in mood ratings of Tension, Depression, Fatigue, and Anger, and a significant increase in scores on Vigor relative to pre-exercise (control) scores. The total mood disturbance score was significantly higher following the exercise session. No significant difference was found between ore- and post-exercise measures of Confusion.

The mechanism for such an exercise -induced change has not been established, but, the study suggest the exercise environment may provide a distraction from stressful stimuli which in turn may induce a favourable change in affect. The study also introduces the theory of Beta-endorphins.

Overall, the findings of the study support previous research suggesting that chronic exercise is not necessary to produce temporary favourable changes in affect. However, previous studies have examined younger groups than that of the present study. Also, it may be argued that a critical threshold of exercise intensity or duration is necessary to produce significant changes in affect. Further study which incorporates controlled exercise treatments as well as research designed to identify a critical threshold of exercise for significant changes in affect is encouraged. Inclusion of a control group who do not exercise is needed.

Thayer, R. E. (1987). Energy, tiredness and tension effects of a sugar snack versus moderate exercise. Journal of Personality and Social Psychology, 52, 119-125.

Demonstrated that a 10-minute brisk walk decreased tension and increased feelings of vigor. Used a normal population, and the Profile of Mood States. Argues that the use of intact classes limited the interpretation of the data. Stating that the naturalistic setting reflected every-day conditions that occur in most exercise classes and provided a more accurate view of the subtle relationship between mood and exercise than is possible in a laboratory setting.

Also provided evidence that exercising beneath one's aerobic training zone could be mood enhancing. Although this study was limited in scope, results supported findings of earlier studies indicating that a prolonged exercise regimen or increase in fitness level was not necessary to elicit positive changes in affect.

Watters, R. G., & Watters, W. E. (1980). Decreasing self-stimulatory behavior with physical exercise in a group of autistic boys. Journal of Autism and Developmental Disorders, 12, 65-81.

Observed decreases in the self-stimulatory behavior of five autistic boys during language training sessions which succeeded 8 to 10 minutes of jogging. Unfortunately, these results must be interpreted cautiously because the study suffers from some methodological weaknesses. Small sample of subjects were used, there was no use of alternating treatments, unreliable recording and reporting of individual behaviors for each subject. Also the amount of jogging was not equalized across subjects. And lastly,

fatigue may have been the reason for the decrease in self-stimulatory behavior. Again it is suggested that appropriate behaviours need to be studied with these populations.

Wilfley, D., & Kunce, J. (1986). Differential physical and psychological effects of exercise. Journal of Counseling Psychology, 33, 337-342.

Utilizing a normal population, they found significant increases in physical self-concept and reductions in tension-anxiety were detected following an 8-week prescribed exercise program. They suggested that only highly stressed or poorly conditioned subjects would experience significant changes in affect from a prescribed exercise program.

While it is impossible to control all moderating variables, a simple model of covariance may be helpful in controlling for pre-exercise session affect. They found that the benefits of exercise appeared to be strongly related to initial levels of stress. Rather than singularly assessing affect at the beginning of the study and periodically throughout the study, measures of affect could be assessed at the beginning and the end of selected exercise bouts. Pre- and post-exercise regimen affect scores could then be purified by utilizing pre-exercise affect scores as covariates.