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PSYCHOLOGICAL BENEFITS OF EXERCISING WITH ANOTHER

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SUMMARY

This study sought to determine whether exercising with another person improves the psychological benefits of exercise relative to exercising alone. One hundred and fifty-five participants completed a series of questionnaires measuring levels of tension, calmness, energy and tiredness before exercise, immediately following exercise and later that day before bedtime. Participants exercised on a stationary laboratory bicycle for 30min either alone, with another person of the same sex or with a person of the opposite sex. Results suggest that exercising alone or with others did not differentially impact upon mood. All groups equally experienced mood benefits after exercising. Depression was found to be positively correlated with perceived exertion and women were found to report greater exertion when exercising alone than when exercising in mixed pairs.

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INTRODUCTION

More than 60% of American adults do not regularly participate in the recommended amount of physical activity and an alarming 25% do not participate in any physical activity at all (Centers for Disease Control, 1999). Even more remarkable is the fact that nearly half of all young people, between the ages of 12 and 21yrs old, do not engage in vigorous exercise on a regular basis and 14% do not participate in any physical activity at all (Exercising Your Options, 2000). According to the Center for Disease Control and the American College of Sports Medicine, at least 30min of moderate intensity activity on most, but preferably all, days of the week or at least 20min of vigorous intensity activity on at least three days of a week are recommended to maximise health and wellness (Exercising Your Options, 2000).

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ABBREVIATIONS:

AD-ACL	activation-deactivation adjective check list
BFCS	Babula Ferlic communication scale
MC-SDS	Marlowe Crowne social desirability scale
PES	perceived exertion scale

KEY WORDS:
exercise
psychological benefits
social interaction

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Not surprisingly, thirteen and a half million Americans have coronary heart disease and one and a half million suffer from a heart attack each year; eight million Americans have adult-onset (non-insulin-dependent) diabetes, over sixty million Americans are overweight, fifty million Americans have high blood pressure, two hundred and fifty thousand Americans suffer from a hip fracture each year and ninety-five thousand Americans are diagnosed with colon cancer every year (Centers for Disease Control, 1999). Many of these illnesses can either be prevented or improved through lifestyles that include regular physical activity (Blair et al, 1989; Brill et al, 1992; Gauvin and Spence, 1995). Exercise has also been shown to reduce the risk of developing or dying from some of the leading causes of illness and death in the United States as well as helping to control weight and build and maintain healthy bones, muscles and joints (Centers for Disease Control, 1999; Exercising Your Options, 2000; Taylor, 1999).

In addition to the variety of physical health benefits from exercise, research also suggests that exercise provides an abundance of psychological benefits, especially improvement in mood and the ability to cope with stress (Atchiler and Motta, 1994; Berger et al, 1998; Plante, 1999; Plante and Rodin, 1990; Plante et al, 2000; Steptoe et al, 1998). Although no single coherent theory exists that adequately explains how exercise induces these benefits, several hypotheses exist that attempt to explain the relationship between exercise and improved psychological benefits, including biological, psychological and social influences.

Despite all the apparent health benefits of exercise, many Americans do not maintain regular exercise. On average, only half of the people who begin a voluntary exercise programme continue to participate in that programme six months later (Taylor, 1999). Frankish et al, (1998) assert that the relationship between health and active living is influenced by the social, racial, emotional and socio-economic factors that affect an individual's decision to engage in an active lifestyle. Age, gender, race and social support are all major factors influencing a person's decision to exercise.

In this study the role of social exercise (i.e. exercising with another person rather than alone) was of particular interest. Social support has been shown to be associated with effective long term weight maintenance (Jeffery and Wing, 1995; Jeffrey et al, 2000) and to be helpful in smoking cessation (Hall et al, 1993; Hatukami et al, 1996;

Hughes, 1993; Ockene, 1986). In a study completed by Jeffery and Wing, (1999) examining the positive benefits of social support upon weight loss, participants were found to be significantly more likely to maintain weight loss if they participated in the programme with friends rather than alone. In addition, the most successful smoking cessation programmes are those that involve group support and social interventions (Hall et al, 1993; Hatukami et al, 1996; Hughes, 1993; Ockene, 1986).

Social support has also been shown to increase adherence to medication regimens and to increase the likelihood that one would use appropriate health services (Kulik and Mahler, 1980). Moreover, social support has been found to improve psychological health in general by helping people cope with stress more successfully than they would without such support (Sarason et al, 1997). Conversely, lack of social support has also been associated with higher levels of stress (Dunkel-Schetter and Wortman, 1981). Social support also appears to decrease the likeliness of illness, to aid in recovery from illness and to speed up recovery for those who are already ill (Kulik and Mahler, 1980; Wallston et al, 1983).

Given that social support has also been shown to assist people in engaging in more healthy behaviour and that exercise has been shown to improve mood, it is probable that exercising with others may improve mood and psychological functioning and also may help people maintain an exercise programme. Specifically exercising with others might increase the psychological benefits of exercise due to the social nature of the activity. This might help explain some of the reasons why exercise makes people feel better regardless of the improved physiological changes that regular exercise provides. Although merely exercising with another person may not truly constitute social support, the social nature of group exercise (even with strangers such as in a health club) might contribute to an improved psychological effect.

Little research has been conducted on the relationship between social exercise and the psychological benefits of exercise in a laboratory setting. However, a previous study by Plante et al, (2000) studied healthy college students who were assigned to one of three conditions: exercising alone, exercising with another person while talking or exercising with another person while not talking. All participants exercised on a laboratory stationary bicycle for 30min at a moderate

intensity. Questionnaires were used to measure the participants' level of tension, calmness, energy and tiredness prior to exercising, after exercising and before bedtime. Results suggested that exercise increases feelings of energy and calmness and decreases feelings of tiredness. In addition, results indicated that exercising with another person, as compared to exercising alone, whether or not talking occurred, increased levels of calmness and tiredness.

The purpose of this study was to further investigate the contribution of social exercise on mood states. Social exercise in this study was defined as completing an exercise workout in the presence of another exerciser doing the same activity (e.g. biking). This study expands on the work of Plante et al, (2000) by examining different participation conditions. In the current study, five conditions were used: women exercising alone, men exercising alone, two women exercising together, two men exercising together and one woman and one man exercising together. Rather than inducing or restricting conversation between participants, participants were free to talk as much or as little as they liked and their conversation frequency was rated by the laboratory assistant. In this study, we hypothesised that exercising in the presence of another exerciser, with or without conversation, would result in more positive mood changes than exercising alone.

METHOD

Participants

The sample population consisted of 155 undergraduate students (68 men and 87 women) who ranged in age from 17-24yrs (mean=18.54, standard deviation=0.91).

Measures

Marlowe Crowne Social Desirability Scale (MC-SDS) (Crowne and Marlowe, 1960). This scale was designed to measure social desirability or defensiveness and consists of 33 true-false statements (Crowne and Marlowe, 1960). The MC-SDS has been found to maintain adequate internal consistency (KR-21=0.75) and construct validity (Crowne and Marlowe, 1960; Strahan and Gerbasi, 1972).

Activation-Deactivation Adjective Check List (AD-ACL) (Thayer, 1978; 1986). The AD-ACL is a brief and frequently used self-report checklist designed to measure momentary mood states. Thayer, (1978;

1986) reports that the AD-ACL has adequate reliability and validity and has been used in a number of psychological and biopsychological investigations involving exercise.

Perceived Exertion Scale (PES) (Borg, 1982; 1985). The PES was used to evaluate the participants' perceived level of exertion where 6=very light exertion and 20=very hard exertion. The PES is frequently used in exercise research and has adequate reliability and validity (Borg, 1985).

Babula Ferlic Communication Scale (BFCS). The BFCS was designed for this study to measure the level of communication (speech, responsiveness, body language and facial expression) between two subjects as perceived by the experimenter. The BFCS uses a five point scale where 0=no communication and 4=constant communication.

Procedure

To inform participants about the procedures of the study and obtain informed consent, students were invited to one of two orientation sessions prior to their laboratory participation. All participants were told about the study, had their questions answered, signed a consent form and were asked to complete several questionnaires. Following the orientation meeting, participants signed up for a laboratory session with a research assistant. At the orientation meeting, participants were asked to refrain from all exercise on the day of their scheduled session. On the day prior to their scheduled laboratory session, a research assistant called the participants to confirm their appointment and remind them to abstain from exercise prior to and following the exercise session. All contact with participants by telephone was scripted to minimise potential experimenter influence.

Participants were randomly assigned to one of the five 30min experimental conditions. The first consisted of women who exercised alone and was one of the control conditions (condition 1). The second condition consisted of men who exercised alone and was the other control condition (condition 2). In both of these conditions participants rode a Monark Ergomedic stationary bike alone, thus excluding the possibility of interacting with another participant. In the third, fourth and fifth conditions, two Monark Ergomedic stationary exercise bikes were set up side by side at a slight inward angle, allowing for the possibility of interaction between two participants. Condition 3 involved two women exercising together. Two men exercised together in

condition 4. In condition 5 one man and one woman exercised together. Prior to the presentation of one of the five laboratory experiences, participants completed a questionnaire assessing their levels of calmness, tension, tiredness and energy using the AD-ACL.

Participants in every condition were instructed to get on an exercise bike and adjust the seat to their level of comfort. A heart rate monitor was then attached to each participant's earlobe. The heart rate monitor continually assessed the participants' heart rate. Participants were also asked to evaluate their level of exertion on a scale of 6-20 at 5min intervals during the 30min exercise period by pointing to a scale held up by the experimenter.

Participants were then instructed to ride the exercise bike for 30min at a speed with which they were comfortable. After 30min, participants completed the AD-ACL again and rated their enjoyment of the exercise. They were given the same questionnaire to take home and complete before bed. Participants were instructed to return the completed questionnaire to a drop box in the psychology department the following day. Following the 30min exercise session the experiment assessed the level of communication between participants throughout the 30min session using the BFCS.

RESULTS

Means and standard deviations for perceived exertion, social desirability and stress are located in Table 1. Table 2 contains the means and standard deviations for the AD-ACL mood scores (i.e. energy, tiredness, calmness and tension) prior to (time 1) and directly after (time 2) exercise. To ensure that no significant group differences existed between the conditions, the baseline mood score, social desirability and enjoyment were evaluated with one-way between-subject ANOVAs. No differences among groups emerged ($p>0.05$).

A series of one-way within-subject ANCOVAs were conducted on the time 2 (directly after exercise) AD-ACL mood scores by condition. The communication level and pre-experimental (time 1) AD-ACL mood scores were co-varied in the data analysis. The mood scores of participants did not differ ($p>0.05$). A series of paired sample *t*-tests were conducted on baseline mood scores (time 1) and mood scores obtained directly after exercise (time 2) for energy, tiredness, calmness and tension.

TABLE 1: Exertion and stress by condition.

Condition		Exercising alone		Paired exercise		
		Female (n=30)	Male (n=27)	Female (n=45)	Male (n=29)	Mixed (n=24)
Exertion	M	12.92	12.66	13.38	12.65	11.97
	SD	1.44	1.45	1.34	1.26	2.07
Baseline stress	M	5.87	6.43	5.98	7.02	5.90
	SD	1.68	2.07	1.78	2.03	1.98
Stress after exercising	M	7.37	6.59	7.04	7.19	6.44
	SD	2.62	1.78	2.13	1.57	1.93
Evening stress	M	5.23	5.00	6.26	7.18	6.96
	SD	1.84	2.62	2.66	1.66	1.88
Social desirability	M	15.77	14.15	13.42	14.62	15.25
	SD	5.58	4.57	5.39	6.03	5.57

Across all groups energy increased [$t(153)=-10.33$, $p<0.01$], tiredness decreased [$t(153)=9.82$, $p<0.01$], calmness decreased [$t(154)=7.138$, $p<0.01$] and tension scores did not change ($p>0.05$). Thus, for all groups exercise resulted in an immediate increase in energy level, as well as a decrease in tiredness and calmness.

The six measurements of exertion were averaged for each subject and the obtained mean was used as their overall exertion score. A one-way between-subjects ANOVA conducted on self-reported exertion scores found a significant condition main effect where female pairs reported greater exertion than mixed gender pairs [$F(4, 151)=3.71$, $p<0.01$]. Furthermore, there was a significant positive correlation between depression (Symptom Checklist SCL-90-R) and self-reported exertion, [$r=0.32$, $p<0.01$]. Those scoring higher in depression generally reported higher levels of exertion.

Stress immediately following exercise (stress 2) was analysed using a one-way between-subjects ANCOVA by condition, where baseline stress (stress 1) was used as a co-variate. No significant difference was found ($p>0.05$). Stress in the evening (stress 3) was analysed in a between-subjects ANCOVA by condition, where baseline stress (stress 1) was used as a co-variate. A significant condition main effect was

TABLE 2: AD-ACL mood scores.

Condition		Exercising alone		Paired exercixe			
		Female (n=30)	Male (n=27)	Female (n=45)	Male (n=29)	Mixed (n=24)	Total
Energy 1	M	11.23	12.74	11.18	11.97	11.17	11.61
	SD	4.26	3.16	3.32	3.53	3.82	3.61
Energy 2	M	14.97	14.15	14.73	15.31	14.42	14.74
	SD	3.48	3.53	3.55	3.09	3.61	3.44
Tired 1	M	13.13	11.11	13.42	11.79	11.54	12.37
	SD	3.50	3.87	3.38	3.49	3.95	3.68
Tired 2	M	8.63	9.30	9.20	8.72	9.17	3.01
	SD	3.18	3.33	3.70	3.13	3.52	3.37
Calm 1	M	12.43	11.7	12.11	11.66	11.83	11.97
	SD	3.24	3.16	2.84	2.73	2.7	2.91
Calm 2	M	9.60	10.81	9.40	9.83	9.67	9.81
	SD	2.40	2.69	2.90	3.06	2.96	2.82
Tense 1	M	8.67	8.67	9.22	8.41	8.54	8.76
	SD	3.35	2.29	3.19	2.51	2.89	2.90
Tense 2	M	8.23	9.41	9.27	9.14	8.63	8.97
	SD	2.88	2.61	2.74	2.36	2.43	2.63

found [$F(4, 151)=5.25$, $p<0.01$]. Tukey_{HSD} post hoc analysis revealed that mixed and male pairs experienced higher levels of stress than males who exercised alone.

DISCUSSION

The purpose of this study was to examine if the psychological benefits of exercise were improved when exercising with another person as compared to exercising alone. Contrary to our hypothesis, we found that mood did not differ between exercise groups. Mood actually improved between baseline measurements and measurements immediately following exercise (time 2) equally for the 5 groups. This finding is consistent with previous research that suggests that exercise produces positive psychological benefits (Altchiler and Motta, 1994; Berger et al, 1998; Plante et al, 2000; Steptoe et al, 1998).

Contrary to the results found by Plante et al; (2001), exercising alone or with others did not differentially impact mood responses in this study. Social support has been shown to be effective in increasing one's adherence to medical regimens (Kulik and Mahler, 1989), weight maintenance (Jeffery and Wing, 1999; Jeffery et al, 2000) and smoking cessation programmes (Hall et al, 1993; Hatukami et al, 1996; Hughes, 1993; Ockene, 1986). It may be that social support helps adherence to these programmes but does not actually produce improved psychological benefits. It would be useful to evaluate whether exercising with a partner helps maintain adherence to a long-term exercise programme, which was not evaluated in the current study.

Female pairs were found to report greater exertion than mixed pairs. It may be that when mixed gender interactions are occurring men and women tend to downplay their exertion levels or perhaps are more distracted by their exercise experience. In future studies it may be useful to examine reported self-exertion and actual RPM's to evaluate perceived versus real exertion.

Depression was found to be related to exertion such that individuals who were more depressed were more likely to report high levels of exertion. Depressed people often find tasks hard to do and it may be that the more depressed individuals perceive that they are working harder.

The limitations of this study must be considered. The study used a relatively small homogenous sample of college students. The sample was especially small for male and mixed gender pairs. As the study was conducted within a laboratory it is unclear whether the results will generalise to experiences outside of the laboratory environment. Future studies should incorporate a larger and more diverse sample. Another limitation of the study was that it examined the immediate effects of exercise. Therefore, we cannot conclude that the psychological benefits obtained from the experimental group were long lasting. However, previous research has demonstrated that the mood effects of exercise, regardless of the length and intensity, last for at least 2hrs (Landers and Petruzzello, 1994).

Future research should further investigate the effects of social exercise. It would be useful to evaluate whether paired exercise results in more compliance to an exercise programme in a real life setting.

Furthermore, most, if not all, of our participants were presumed to not be friends with each other prior to being paired for the study. It may be helpful to examine the benefits of exercising with someone known to the participant.

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