Motivation and Running: The Opponent-Process Theory

An Honors Thesis (ID 499)

by

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There have been numerous studies conducted recently in an attempt to pinpoint the motivation behind why so many people run. Non-runners find it difficult to fathom running as being pleasant and enjoyable when it appears so demanding and painful. Some people, on the other hand, begin to show symptoms of addiction to running after they have practiced the passtime for a certain period. A day's run that is missed may cause a negative physiological or psychological state very similar to withdrawal symptoms from a drug. Solomon and Corbit (1974) have suggested the Opponent-Process Theory as characterizing human motivation to run. This theory proposes an opponent process being activated for every initial process, in an attempt to return the body to its neutral state. This process has been demonstrated to occur with drugs. Howley (1976) and Davis (1973) have shown that jogging will increase the level of norepinephrine in the body to as much as four times that of the body's normal level. Amphetamines, which stimulate the output of norepinephrine, have been known to be addicting for some time (Solomon and Corbit, 1974). Therefore, it is reasonable to assume that people can become addicted to running, and that the Opponent-Process Theory may be at work because of the chemical changes brought about by running and the reactions that take place inside the body.

Since norepinephrine appears to produce arousal and elation, it could be involved in the process that opposes the aversive process of running. The initial process--here, running and its accompanying aches and pains--is held to decrease in strength after many stimulations. This means that one could develop a tolerance to running. Conversely, the opponent process is assumed to begin more speedily and to grow in strength each time it is reactivated by the initial process, or running (Church, 1966). In this case, the opponent process would be the runners' "high" or the euphoric state so many runners experience.

The purpose of the present study is to investigate the Opponent-Process Theory of Motivation and to examine any relationship found between the model and the passtime of jogging. The model proposes an aversive "A" state which leads the runner away from a state of neutrality through experiencing the aches and pains of running. This A state triggers an oppoasing "B" state, ro the runner's "high", which is a euphoric feeling initiated by the body to cancel out the A state and return the body to the normal state. The model further suggests that time and repetition weaken the A state while strengthening the B state. Thus, predicted from this model are the following three hypotheses: 1) Elite or experienced runners will feel worse just prior to a day's run due to abstinence from their daily "fix" of running. 2) During the run, the novice runner would feel worse than the elite because his/her aversive A state (the aches and pains of running), is still stronger than the pleasurable high of the B state. The elite runners should only feel a small amount of discomfort when running due to their strengthened opponent B state and built tolerance to running, or weakened A state. 3) The experienced runners would be subject to a euphoric state after completing their run, and that this state should be lengthier and stronger than any similar state experienced by the novice runners.

Method

A questionnaire was used to assess descriptions of the strength of the proposed opposing states for the runners. Fifteen questionnaires were distributed to a jogging class inperson and completed during the class session, while 31 were sent to chosen runners through Campus Mail. These were then completed by the subjects and returned through the mail.

Our sample of runners consisted of two classes: novice and elite. The novice runners were participants in a PEG 113 jogging class, and were defined as having run for less than six months, for three or less days per week. The elite runners were chosen due to their participation in a Ball State Intramural Cross Country Meet, and were defined

as having run for six months or more for at least three days per week.

The novice group was comprised mainly of 18-21 year-olds, and there were 9 females and 7 males. The novice median weight was between 125 and 150 lbs. The median height was within the 5'6" to 6' range. The elites had 12 males and only 2 females in their group. They were older, varying from 21 to 46 years of age, and somewhat heavier, the median weight being within the 150-175 lb. range. The median height, however, was equal to that of the novice group.

Results

An exact 50% of the questionnaires mailed out were returned completed (elites). The questionnaires were then examined for the states before, during and after the run of each subject, (questions 9, 10, and 11 on the questionnaire). T-tests significant to the .05 level of confidence were used to test for any significant differences between the two groups.

Prior to their day's run, the novice group was found to feel significantly less pleasant on three measures than the elite group. The novice runners scored closer to the negative poles of these three word pairs: exhilarated-painful, alert-drowsy, and happy-depressed.

------Insert Table 1.-------

No significant differences were found when attempting to assess the runner's experiences while they ran. However, the elite group mean responses indicated their runs to be much more toward the positive pole of the adjective pairs, except for the alert-drowsy measure. (This was not a significant difference.)

------Insert Table 2.------

Again, the same phenomenon occurs with the comparison of the elites and novice after they have run. The novice group scored closer to the negative poles for all word pairs, except the alert-drowsy measure. (Again, not a significant difference.)

-------Insert Table 3.------

The novice group generally felt the aftereffects of their run from 1-3 hours, while the elite group usually reported an afterstate lasting for 2-3 hours. (See Table 4.).

In reference to missing a day's run, the median response for the novice group was "fat" with "guilty" marked equally as often. The elite group's median responses to the same question were "anxious" and "tired". (See Table 4.). Both the elite and the novice runners stated that missing a day's run is sometimes preferable to running that day, and both groups find that they experience much less pain now than when they first began to run. The novice group labels the feeling they receive after finishing a run as a strong feeling, but the elite runners more often label this feeling as very strong. Both groups replied that missing a run does not affect them as much as running itself affects them.

------Insert Table 4.------

Both groups preferred the feeling that occurs after finishing a run to the actual running itself. Both groups also agree that the longer they run, the better they feel and the longer this sense of well-being lasts after finishing their run.

Discussion

Our results have shown that there is little signigicant difference in how the runners, both novice and elite, view the states that have been assumed to comprise the Opponent-Process. Both the novice and the elite seemed to feel fairly comfortable just prior to their run, with the novice group feeling sifnificantly less comfortable on three measures, as shown in Table 1. Predicted from the model, the elite runners should have felt worse at this time due to abstinence from running before they set off on their daily run. However, the discomfort the novice group was experiencing before their run could be explained in terms of their dread of the pain they know they are about to engage in during the run. This possibility should be examined in any further testing of the model.

Also hypothesized was that during the run, the novice runner would feel worse than the elite because his aversive A state (the aches and pains of running) is still stronger than the pleasurable high of the B state. Also, the elites should feel only a small amount of discomfort when running due to their strengthened opponent B state and built tolerance to running. Again, however, both groups seem to show no significant differences in the amount of pleasure or pain they experience while running. Perhaps the elites run harder and longer to fight their tolerance and yet increase their norepinephrine levels, or their B states. Or perhpas the elite runners run faster, due to physical conditioning, and therefore endure equal amounts of pain as do the novice runners. Both these points should be tested before rejecting the Opponent-Process Theory.

When the run is over, the Opponent-Process model would predict the elite group to experience a euphoric state for a longer temporal period and it should be a stronger feeling than that experienced by the novice group. Observable in Table 3. is the fact that while there is no significant difference in the quality of the B state for the two groups, a difference in the intensity and duration could very well be at work. Table 4. shows the differences between the two groups of runners in regard to these two measures in questions #13 and #17. The mean response concerning the duration of the B state was 2-3 hours for the elite group, and only 1-3 hours for the novice group. Question #17 shows the mean response qualifying the intensity of the B state as "very strong" for the elites and only "strong" for the novice group. Therefore, the B state is stronger and longer in duration for the elite runners than for the novice runners. This supports the model.

Altogether, there is intermittent and sparse evidence supporting the three hypotheses stated at the beginning of this experiment. Ambiguity in some of the questions in the questionnaire may have caused some problems, and also the low rate of return could have contributed to the problem. Further investigations into this area perhaps could

could find a way around using the Semantic Differential, which seemed to be difficult for the runners to answer, since their experiences depend on so many different variables, (e.g. the speed they run, how many miles covered, personal problems, the weather, etc.).

Table 1.

Feelings Prior to Running

	MEANS		
	Novice	Elite	t-values
pleasant-unpleasant	3.625	3.1538	1.04
exhilarated-painful	3.56	2.62	2.59*
enjoyment-boredom	3.68	2.78	1.96
energized-exhausted	3.56	2.64	1.78
relaxed-tense	3.12	.08	-.14
alert-drowsy	4.18	1.43	2.48*
happy-depressed	3.56	1.27	2.30*

*p .05

Table 2.

Feelings During Running

MEANS

	Novice	Elite	t-values
pleasant-unpleasant	3.05	.05	.118
exhilarated-painful	3.93	.47	.792
enjoyment-boredom	3.05	.39	.7919
energized-exhausted	3.37	2.58	.155
relaxed-tense	3.33	2.5	1.463
alert-drowsy	2.12	2.21	-.2225
happy-depressed	3.06	2.61	1.10

Table 3.

Feelings After Running

MEANS

	Novice	Elite	t-values
pleasant-unpleasant	2.06	1.71	.845
exhilarated-painful	2.75	2.0	1.27
enjoyment-boredom	2.0	1.71	.90
energized-exhausted	2.37	2.0	.559
relaxed-tense	1.75	1.538	.736
alert-drowsy	1.75	2.214	1108

Table 4.

Feelings of Novice and Experienced Runners

Question #	Median Answers: Novice	Elite
12)	28.57% (fat) 28.57% (guilty)	20% (anxious) 20% (tired)
13)	33% (1-2 hrs.)	33% (2-3 hrs.)
14)	53% (sometimes)	53% (sometimes)
15)	82% (less than when first started running)	98% (less than when first began
16)	53% (stronger)	67% (stronger)
17)	67% (strong)	53% (very strong
18)	34% (weaker)	40% (weaker)
19)	75% (Agree)	53.84% (Agree)
20)	93.3% (Agree)	92.85% (Agree)
21)	81.25% (Agree)	85.72% (Agree)

Bibliography

1) Howley, E.T. "The effect of different intensities of exercise on the excretion of epinephrine and norepinephrine." Medicine and Science in Sports, 1975, p.7

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3) Solomon, R.L. and Corbit, J.D.,"Opponent-Process Theory of Motivation--Cigarette Addiction." Journal of Abnormal Psychology, vol. 81(2), p. 158-171

4) Solomon, R.L. and Corbit, J.D., "Temporal Dyanmics of Affect." Psychology Review, vol. 81, p. 119-145

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RUNNING SURVEY

MOTIVATION RESEARCH STUDY

The followung survey is merely to gain information about you and your running experiences that are relevant to the study. Please answer all questions that apply to you and rest assured that the information will be totally confidential.

1. What is your age? _____

2. How tall are you? _____

3. What is your weight? _____

4. Sex: Female ____ Male ____

5. Which time period comes nearest to describing how long you have been running regularly? a) 1 month b) 3 mo.'s c) 6 mo's d) 1 year e) 2 years or more.

6. On the average, how many days per week do you run?
a) 2 or 3 b) 4 or 5 c) 6 or 7.

7. How many minutes per day do you run? a) 20-30 b) 30-40 c) 40-50 d) 50 or more.

8. Do you enjoy your day's run? a) never b) rarely c) sometimes d) usually e) always.

9. How do you feel PRIOR to your run?

pleasant unpleasant

1 2 3 4 5 6 7

exhilarated painful

1 2 3 4 5 6 7

joy boredom

1 2 3 4 5 6 7

energized exhausted

1 2 3 4 5 6 7

relaxed tense

1 2 3 4 5 6 7

alert drowsy

happy depressed

1 2 3 4 5 6 7

10. Using the same rating procedure, how do you feel DURING your run?

pleasant unpleasant

1 2 3 4 5 6 7

exhilarated painful

1 2 3 4 5 6 7

enjoyment boredom

1 2 3 4 5 6 7

energized exhausted

1 2 3 4 5 6 7

relaxed tense

1 2 3 4 5 6 7

alert drowsy

1 2 3 4 5 6 7

happy depressed

1 2 3 4 5 6 7

11. Using the same rating procedure once again, how do you feel AFTER your run?

pleasant unpleasant

1 2 3 4 5 6 7

exhilarated painful

1 2 3 4 5 6 7

joyful boredom

1 2 3 4 5 6 7

energized exhausted

1 2 3 4 5 6 7

relaxing tense

1 2 3 4 5 6 7

alert drowsey

1 2 3 4 5 6 7

12. If a day's run is missed, do you feel: anxious___, fat___, happy___, relieved___, depressed___, tired___, guilty___, unable to sleep___, or unchanged.

13. How long do you feel the above states after running? a) 0-½ hour b) ½-1 hour c) 1-2 hours d) 2-3 hours.

14. Missing a day's run is a) never b) rarely c) somtimes d)usually e) always preferable to running that day.

15. The pain of running now is a) more b) the same as c) less than when you first started running.

16. The psychological state that occurs when you miss a run is: a) stronger b)the same as c) weaker than the state that occurred when I first started running.

17. If you feel relaxed and good after running, this state is: a) very strong b) strong c) moderate d) slight e)weak.

18. How would you rate the strength of the feeling you get when you miss a run in comparison with the feeling you get WHILE running? a) much stronger b) stronger c) the same as d) weaker e) much weaker.

19. I prefer the feeling that occurs after I finish running to the actual running itself? Agree___, Disagree___

20. The longer I run, the better I feel and the longer this sense of well-being lasts after finishing my run. Agree___, Disagree___

21. The longer I run, the less painful running seems to be. Agree___, Disagree___