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ABSTRACT

The study reported here assessed individuals' selection of excessive exercise dependent behaviors as they relate to self-esteem, family environment, and perceptions of family members exhibiting dysfunctional behaviors or addictions. A survey was taken of exercisers from a stratified random sample of competitive triathletes selected from the national membership of TRI FED USA (N=112), from voluntary participants (N=185) in the 1991 Gatorade Ironman World championship, and from a national random sample (N=520) of health club members. Participants from TRI FED and the health clubs completed demographic information sheets (assessing addictive/obsessive behaviors in athletes and family members), the Exercise Enjoyment Questionnaire (EEQ), and the Perceived Family Environment Questionnaire (PFEQ). Participants from the Gatorade championship were given the same forms (excluding the PFEQ and the family portion of the demographic questionnaire). Exercisers self-selected the exercise category that best fit their exercise behavior from the following: low level, moderate, and heavy exerciser. Exercise dependence was found to occur in 9 percent of exercisers and in larger numbers as exercise intensity increased; the dependent exercisers had significantly higher levels of psychological and physical dependence than non-dependent exercisers as well as family histories of dysfunctional behavior. Eight tables display the survey results. (Contains 23 references.) (CK)

FACTORS THAT PREDICT NEGATIVE VERSUS POSITIVE ADDICTIONS IN OFFSPRING: ARE DEPENDENT EXERCISERS DIFFERENT THAN VICTIMS OF OTHER ADDICTIONS?

Presentation made by Terri M. Manning, Ed.D. Assistant Professor of Health Behavior, The University of North Carolina at Charlotte and Craig Morrison, Ed.D., Associate Professor of Physical Education, The Univeristy of Southern Utah. Program presented at the annual National Convention for the American Alliance for Health, Physical Education, Recreation and Dance, April 18, 1996, Atlanta, Georgia.

Introduction

In looking at addictive behaviors in offspring, common family background variables arise that may act as predictors of excessive behavioral outcomes. It seems that children who grow up in certain types of families (dysfunctional behaviors or addictions in parents) are somewhat predisposed to certain levels of participation in any behavior they choose. Children raised in "dysfunctional" families seem to get several messages. One of those messages is "nothing worth doing is worth doing half way" and another seems to be "you are what you accomplish, therefore, who are you if you accomplish nothing". It is common for children who are raised in dysfunction families to become task-oriented, accomplishment-oriented, competitive and intensively involved in any activity they pursue. Many offspring from dysfunctional families select negative behaviors in which to funnel their energies such as drugs, alcohol, gambling, sexual addictions, etc. This selection of negative excessive behaviors will be discussed later in this paper but may be related to self-esteem, overall family environment or parenting style and perceptions of the individual offspring. Others seem to funnel their energies into positive behaviors such as work, exercise and health-enhancing activities. Never-the-less, there seems to be an inability in these offspring to do things in moderation, a tendency toward over-invovlement and an excessively task-oriented nature.

Exercise Dependence

Exercise is a protective behavior that is encouraged by today's health professionals to prevent the onset of weight disorders and disease. However, as with many behaviors, the possibility of excesses does exist. By far the majority of exercisers do so at a moderate level, getting their daily 45 minute to one-hour routine in every morning before they start their day. But for many, the morning exercise routine becomes a progressively longer activity until many find themselves exercising three to four hours per day, highly competitive, scheduling their whole lives and that of their families around their training schedule and being virtually unable to give it up. This activity level begins to disrupt their lives, their mood and their intimate relationships.

Exercise dependence has been researched for approximately 20 years with some interesting findings. Exercise dependence has been defined in the literature in the following ways:

1) Negative affect (anxiousness, depression, irritability, guilt, tension or uneasiness) experienced in the absence of a drug, object, or activity (associated with the amount of withdrawal experienced) (19) and

2) Demonstrating psychological and/or physiological dependence upon a regular regimen of running (20).

Researchers have also noted that dependent exercisers have been found to: feel that exercise is extremely fulfilling to them, exercise despite injury, exercise despite extreme weather conditions, schedule all other activities around their exercise activities, experience an inability to cope with life without exercise, have a "fear of fat", consider exercise as the high point of their day and place extreme value on the activity (6, 12, 13, 15, 17, 20, 22, 23). Terms used to describe extreme exercise are: compulsion, positive addiction, obligatory running, running

addiction, running anorexia, and morbid exercising (1, 7, 11, 12).

However, as can be seen in Table I, previous research in the area of exercise dependence, done mostly in the 70's and 80's, was done using non-random techniques, many with small samples and mostly utilizing male runners (4, 8, 12, 13, 18, 20, 21, 23). Data for this presentation were obtained from a large randomly selected sample (N = 811), using both males and females (approximately 50/50), a variety of age groups and representative numbers from several levels and types of exercise. The sample for this study consisted of 811 exercisers from three different environments: 1) a stratified random sample of 112 competitive triathletes selected from the national membership of TRI FED USA, 2) a group of 185 voluntary participants (representing 19 countries) competing in the 1992 Gatorade Ironman World championship in Kialua-Kona, Hawaii, and 3) a national random sample of 520 health club members representing 85 health clubs from 42 states in the United States of America. The entire sample consisted of 408 males and 403 females with a mean age of 41 (s.d. = 13.8, range of 16-93). Participants from Trifed and the health clubs were mailed a cover letter (including informed consent), a demographic sheet (assessing addictive/obsessive behaviors in athletes, siblings, parents and grandparents), the Exercise Enjoyment Questionnaire (EEQ) (10, 15), the Perceived Family Environment Questionnaire (PFEQ) (14) and a return, self-addressed, stamped envelope. Participants from the Gatorade Ironman World championship were given all the same forms (excluding the PFEQ and the family portion of the demographic questionnaire) in their pre-race packets. The EEQ is a 20-item questionniare that has been previously researched and published (10, 15). The 20-item scale is answered on a likert scale and measures attitudes and perceptions toward exercise, commitment to the activity and behavioral factors related to exercise. The EEQ

has been previously factor analyzed and the first factor "exercise as fulfillment to the exerciser" which consists of six questions, has been determined to be the most predictive of exercise dependence and accounting for the most variance between exercisers. Questions that comprise Factor One, "exercise as fulfillment to the exerciser", can be seen in table 2.

Exercisers in this study were asked to self-select the exercise category that **best fit** their exercise behavior from the following: *low level* - exercising three days a week or less for no more than 30 minutes per session, *moderate exerciser* - exercising four or five days per week for 30-45 minutes per session, *heavy exerciser* - exercising seven day a week for 45 minutes to one hour per session and *endurance exerciser* - participating in endurance activities and the level of training necessary to perform in these events. Participants were also asked to record the number of miles per week they walked/ ran/ jogged, swam and biked. The self reported exercise levels and exercise participation of the 811 participants can be seen in Table 3.

Exercise Dependence as Related to Other Addictions

Previous research on exercise dependence has described exercisers and their behaviors but has never attempted to compare dependent exercisers and their attitudes toward exercise with other addictions. In other words, do dependent exercisers behave toward and perceive exercise any differently than a drug addict would behave toward and percieve their drug of choice? To answer that question, characteristics of exercisers in this study were compared to the diagnostic criteria used for drug and alcohol dependence. The characteristics that alcoholics and drug dependent individuals most often display according to the *Diagnostic and Statistical Manual, IV* are those of tolerance, withdrawal, psychological and physical dependence on their substance of choice.

Tolerance:	is reduced pharmacological effect from a given dosage amount (feeling they need more and more).
Withdrawal:	is feeling physical changes when the substance is removed from the system (physical or psychological).
Psychological dependence:	is a great deal of time being spent in pursuit of the substance; important social, occupational or recreational activities are given up or reduced because of substance use; and substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.
Physical dependence:	is characterized by withdrawal and tolerance; taking larger amounts of the substance over a longer period than intended; a persistent desire or unsuccessful attempt to cut down; and physical symptoms (illness) in the absence of the drug or substance (2).

For comparison purposes, subscales were calculated for withdrawal, tolerance, psychological dependence and physical dependence for exercisers in this study based on their answers on the EEQ (see table 4).

Findings

In order to determine if significant differences occured in tolerance, withdrawal, psychological and physical dependence between groups based on levels of exercise dependence (non-dependent, moderate/borderline and dependent exercisers), separate analysis of variance tests were calculated (see table 5). It was determined that significant differences did occur between all groups on all four variables. The characteristics used to diagnose chemical dependency in patients could be accurately predicted based on differences in exercise dependence levels in subjects in this study. The portion of the sample who were classified as dependent exercisers (approximately 9%) had higher levels of tolerance to exercise, withdrawal when

exercise was removed, physical dependence and psychological dependence than those not classified as exercise dependent.

To determine if exercise dependence (as measured by factor 1 on the EEQ) was more common in heavier exercisers, self-selected exercise categories and exercise distances were compared across levels of exercise dependence (see table 6). It was found that exercise dependence occurred in all levels of exercise but occurred in greater percentages as exercise intensity increased. Since Factor 1 indicates exercise as fulfillment to the exerciser, individuals at all levels of exercise can rank high on this factor regardless of time devoted to the activity. Exercisers can still be dependent on exercise as fulfillment whether they are attending an aerobics class three days a week or running and training three hours every day. The key variable in exercise dependence is a psychological one, "if exercise is fulfilling to the exerciser, what happens to them when it is removed?"

Family Variables

Family environment has been found to be related to multiple addictions or behavioral excesses in offspring. Offspring who develop dependencies or dysfunctional behaviors have been found to be raised in families with poorer family environment, parenting styles and with excessive or dysfunctional parental behaviors role modeled to them as children. One issue of interest to researcher is "why do some offspring funnel their excessive energies into positive or society-validated activities such as work, exercise, risk-taking (hang-gliding, parachuting, rock climbing) or positive eating and health habits while other participate in negative, self-destructive behaviors such as drugs, alcohol, gambling, sexual addictions or relationship addictions?" In order to determine if subjects in this study perceived themselves to have participated in any or multiple

addictive behaviors, they were asked if they had themselves participated in any of the following behaviors or conditions at an excessive level: gambling, drugs or alcohol, extreme forms of exercise, sexual activity, eating disorders, work, risk-taking behavior or addictive relationships. To determine what was role modeled to them as children, subjects were also asked if any of their siblings, parents or grandparents had the following dysfunctional conditions: obesity, alcoholism or drug abuse, extreme religious rigidity, chronic physical illness, emotional or mental illness, workaholism, physical abusiveness, emotional abusiveness, emotional unavailability or sexual promiscuity. The percentages of parents and grandparents with dysfunctional behaviors were compared by conditions in offspring (see table 7). It was found that all subjects with any excessive behaviors or conditions (N=250, 31%) had a higher percentage of parents and grandparents with dysfunctional behaviors than those subjects with no excessive behaviors or conditions (N=567, 69%). Of particular interest was the subjects themselves and their participation in multiple addictive/excessive behaviors. It appears that many of them have jumped from one excess to the next in an attempt to cope with life or find something into which they could pour their energies. With each excessive behavior reported in this sample, 58-100% of the sample had participated in another excessive behavior.

Family environment (family of origin) was also examined using the Perceived Family Environment Questionnaire (PFEQ) (14). Subjects filled out the 30-item PFEQ, an instrument previously used to predict drug and alcohol usage among offspring based on individual perception of family environment. The PFEQ has five subscales: family health and parenting style, parental support, independence, abuse and parental control plus a point total for the entire instrument. Previous research with the PFEQ showed that offspring that develop negative addictive behaviors

(drugs/alcohol, eating disorders) perceived their family environment as less desirable than those offspring with no dysfunctional behaviors. The exercisers in this study had a mean family environment score of 115 (77th percentile) with only 3% rating their family environment below the 50th percentile. This is interesting since many of them had negative behaviors role modeled to them as children (see table 7). In comparing the participants in this study with those in a previous study, the breakdown on the PFEQ subscales was as follows (see table 6). Offspring who developed drug/alcohol addiction had negative behaviors role modeled to them as children and perceived their family environment very negatively. They, in turn, developed negative addictive behaviors. The exercisers in this study had negative behaviors role modeled to them as children yet the perception of family environment was high. These subjects may have gotten the "excessive particpation" message from parents but the parenting style was healthy enough that subjects chose healthy behaviors in which to funnel their "excessive" energy.

An important aspect of family environment seems to be individual perceptions of offspring. Even if the parents participate in negative behaviors or addictions, if the family health and parenting style are perceived as relatively normal, offspring appear to participate in fewer self-destructive behaviors. Exercisers in this study had high perception of family environment even though many of them appear to have had negative behaviors role modeled to them as children. A positive perception of the family may be the protective factor for offspring with those perceiving higher levels participating in society-validated excessive behaviors and those with the lowest perceptions selecting self-destructive behaviors.

Overall Findings of This Study

Exercise dependence (as predicted by the EEQ) was a condition that occurred in a

relatively small percentage of exercisers in this study (9%) and accross all levels of exercise participation. Exercise dependence did occur in larger numbers as exercise intensity or distance completed in various exercise activities increased. The dependent exercisers in this study did have characteristics (attitudes and behaviors) similar to individuals with drug and alcohol dependence. They had significantly higher levels of tolerance, withdrawal, psychological and physical dependence than non-dependent or borderline dependent exercisers. Excessive exercisers had family histories of dysfunctional/addictive behavior in parents, siblings and grandparents yet perceived their family environment as positive.

Discussion

An understanding of exercise dependence and a tool to measure it could be of great use to orthopedists and those who work with sport and non-sport injuries. The resultant diagnosis of exercise dependence could help explain why individuals have great difficulty laying off when injured or cutting back on activity when ill.

Exercise is a health-promoting activity and the majority of efforts in this country have been focused toward getting sedentary individuals to begin exercising, not in getting those who over-exercise to stop or cut back. However, there are exercisers whose body image, self-esteem and mental health are directly related to the amount of time spent exercising. If asked to cut back, they experience the same type of withdrawal, psychological and physiological effects that one would see in a drug addict who has had the drug removed from their system.

The majority of exercisers exercise for the health benefits it brings but with many, the quest for health has ceased and compulsion has taken over. A dependent lifestyle is not a positive choice even if the dependence or excess is focused toward a health enhancing activity.

Table 1

Exercise Dependence
Previous Research by Gender and Exercise Type

Research	Year	Gender	Number	Exercise Type
Sachs & Pargman	1979	Male	12	runners/other
Hailey & Bailey	1982	Male	60	runners
Yates, Leehey & Shisslak	1983	Male	60	runners
Blumerthal, O'Toole, Chang	1984	Male Female	43 24	runners anorexics
Goldfarb & Plante	1984	Male Female	136 64	running running
Weight, Noakes	1987	Female	125	runners
Pasman, Thompson	1988	Mixed Mixed Mixed	30 30 30	runners weight lifters sedentary
Coen, Ogles	1993	Male Male	119 143	runners marathon runners

Total number of subjects from all studies equal 876, only 29% were women and 90% were runners.

Table 2

Factor One
Exercise as Fulfillment to the Exerciser

Questions related to this factor are: (Eigen value = 4.44, variance accounted for = 22%)

1. Training and exercise are vitally important to me.
2. My life is so much richer as a result of exercise and training.
3. I would arrange or change my schedule to meet the needs of exercise and training.
4. Exercise and training are essential for me to feel at my best.
5. Exercise is necessary to cope with life.
6. I could easily give up heavy exercise (*).

Range = 6 - 30
Mean = 24
Standard Deviation = 4

Items on this scale were summed and based on means and standard deviations, the following groups arose:

Group One - low level (non dependent exercisers) Score Range = 0 - 20
More than one standard deviation below the mean

Group Two - moderate level (borderline) Score Range = 21 - 28
Between one standard deviation below and one above the mean

Group Three - high level (exercise dependent) Score Range = 29 - 30
More than one standard deviation above the mean

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* (this item was inversely scored)

Table 3

Exercise Practices by Self-selected Exercise Level
Distance per week

Self-selected Exercise Level	N	Percent	Miles run/walk	Miles swim	Miles bike
Low Level Exerciser	56	6.8%	5.3	1.2	18.3
Moderate Exerciser	264	32.3%	7.6	1.8	25.3
Heavy Exerciser	152	18.6%	9.7	1.9	43.9
Endurance	151*	18.6%	23.2	3.5	80.9
Ironman Competitors	185	22.8%	38.0	5.8	171.7

(*) Includes 112 triathletes and 39 endurance athletes from health clubs

Table 4

Characteristics of Exercise Dependence as Compared to Characteristics of Drug and Alchol Dependence

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The presence of *tolerance* was measured by the following questions:

1) If I only do one type of exercise in a day, I feel I haven't worked out hard enough.
2) To miss a day of exercise or training is sheer relief (*).

The presence of *withdrawal* was measured by the following questions:

1) When I miss a day of exercise, I don't feel as well (sluggish, lethargic, constipated, mentally disoriented, etc.) as I do when I exercise consistently.
2) When I miss a day of exercise, I feel anxious, depressed, irritable, guilty, tense or uneasy.

Physical dependence was measured by the following questions:

1) I could easily give up heavy exercise (*).
2) When I injure myself, I lay off or cut back on exercise until I am healed (*).
3) When I miss a day of exercise, I don't feel as well (sluggish, lethargic, constipated, mentally disoriented, etc.) as I do when I exercie consistently.

Psychological dependence was measured by the following questions:

1) Exercise and training are essential for me to feel at my best.
2) I never feel as great a sense of accomplishment in any other area of my life as I do when I've had an optimum day of training.
3) Exercise is necessary to cope with life.
4) I keep complex records of my exercise and training.
5) When I miss a day of exercise, I feel anxious, depressed, irritable, guilty, tense or uneasy.

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* (These items were inversely scored)

Table 5

Analysis of Variance Summary Table
Exercise Dependence Level by Characteristics of Addiction

Group by Exercise Level	Withdrawal	Tolerance	Physical Dependence	Psychological Dependence
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
F-Value (p.)	**63.0** (.000)*	**27.1** (.000)*	**147.2** (.000)*	**175.9** (.000)*
Group One (non-dependent)	5.3 (1.7)	6.1 (1.3)	7.9 (1.7)	11.9 (2.5)
Group Two (moderate/borderline)	6.8 (1.8)	6.6 (1.5)	10.2 (1.8)	16.1 (2.8)
Group Three (dependent)	7.9 (1.9)	7.6 (1.7)	12.0 (1.4)	19.0 (2.9)

*** Differences existed between all three groups at p. = <.001.**

Table 6

Self-selected Exercise Category and Distance in Activity by Predicted Level of Exercise Dependence

	Group 1 Non-dependent Exercisers (N=157) 20%	Group 2 Moderate to Borderline Exercisers (N=570) 71%	Group 3 Dependent Exercisers (N=71) 9%
Low Level Exerciser	19%	4%	0%
Moderate Exerciser	39%	33%	23%
Heavy Exerciser	9%	20%	25%
Endurance	19%	19%	14%
Ironman Competitor	13%	24%	38%
Distance to activities			
Miles Walk/jog/run	17.5	19.8	24.1
Mile Bike	75.4	88.9	116.5
Miles Swim	4.0	4.3	6.6

Table 7

Percentage of First Degree Relatives with Excessive/addictive Behaviors by Excessive/addictive Behaviors in Study Subjects:

Subjects with the Following Excessive Conditions	Percent of the following family members with Excessive/ Addictive Conditions: Self	Siblings	Mothers	Fathers	Grand-parents
Subjects with no past history of excessive/addictive behaviors	0	22%	29%	37%	28%
Subjects who have or have had Drug or alcohol problems	73%	73%	68%	78%	58%
Subjects who have or have had gambling problems	100%	11%	11%	22%	12%
Subjects who have or have had extreme exercise behavior	58%	58%	45%	63%	40%
Subjects who have or have had Sexual addictions	88%	59%	49%	63%	47%
Subjects who have or have had Eating Disorders	75%	52%	64%	80%	49%
Subjects who have or have had Work Addiction	71%	61%	58%	73%	41%
Subjects who have or have had Risk-taking behaviors	78%	76%	39%	56%	61%
Subjects who have or have had Relationship addictions	83%	66%	60%	77%	51%

Table 8

Perceived Family Environment Subscales
by Groups

Factor 1	Family Health and Parenting Style (range 16 - 80)
	67% of alcoholics and addicts rated their families 53 or below on this factor 64% of exercisers rated their families above 53 on this factor
Factor 2	Parental Support (range 6 - 30)
	65% of alcoholics and addicts rated their families 20 or below on this factor 69% of exercisers rated their families above 20 on this factor
Factor 3	Parents Encouraging Independence in Offspring (range 4 - 20)
	65% of alcoholics and addicts rated their families 13 or below on this factor 82% of exercisers rated their families above 13 on this factor
Factor 4	Parental Abuse of Offspring (physical and mental) (range 5 - 25)
	71% of alcoholics and addicts rated their families 18 or below on this factor 80% of exercisers rated their families above 18 on this factor
Factor 5	Parental Control over Offspring (range)
	43% of alcoholics and addicts rated their families 18 or below on this factor 80% of exercisers rated their families aboe 18 on this factor

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