Self Determination Theory:
A Study of the Relationship Between Causality Orientation and Exercise Preference

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B.A. in Biology, May 2010, Wayne State University

A thesis submitted to

The Faculty of
The School of Public Health and Health Sciences
of The George Washington University
in partial fulfillment of the requirements for the degree of
Master of Science

May 19, 2013

Thesis directed by

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Acknowledgments

The author wishes to acknowledge all of those who contributed their time and most importantly, their support throughout this journey. First, thank you to my husband Keith. Your positive attitude, encouragement and sacrifice over the last two years made this possible. Thank you to Dr. Amanda Visek for guiding me successfully through this, at times, very challenging process and for allowing me the room to grow as a writer, researcher and individual. To Avinash Chandran and Kate Gampfer, thank you for the many hours you spent assisting with data analysis, and to Dr. Loretta DiPietro and Dr. Melisa Napolitano for their advice and guidance as committee members during my proposal and thesis defense.

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Self Determination Theory: A Study of the Relationship Between Causality Orientation and Exercise Preference

The health benefits associated with exercise are well documented and every year people pledge to increase their physical activity. Yet, physical inactivity is the fourth leading risk factor for global mortality (World Health Organization, 2012). The American Council on Exercise (ACE, 2010) reports a 50% attrition rate among new health club members within the first six months of beginning an exercise program. While educating individuals of the health risks associated with inactivity can initiate exercise participation, it is rarely enough to sustain motivation to maintain the behavior (Kimiecik, 1998). Among the many theories that explain health-related behaviors such as exercise, the self-determination theory (SDT; Deci & Ryan, 1985) has gained considerable support in recent years for understanding exercise motivation relative to participation and attrition.

SDT defines motivation for a behavior as lying on a continuum of self-determination and distinguishes between three types: *intrinsic, extrinsic* and *amotivtation* (see Figure 1; Ryan, Williams, Patrick & Deci, 2009). The ends of the continuum are defined by *intrinsic motivation*, described as engaging in exercise because it is inherently enjoyable and *amotivation* characterized by lacking desire or volition to initiate exercise. Between these two motivational anchors lays extrinsic motivation. When exercise is extrinsically motivated it is initiated and maintained by a source separate from the activity itself which facilitates an *external perceived locus of causality* for the behavior. Extrinsic motivation includes four behavioral regualtions: *external, introjected, identified and integrated.* These behavioral regulations describe *why* the individual is engaging in exercise as well as the level of self-determination experienced with the activity (Sebire, Standage & Vansteenkiste, 2011).

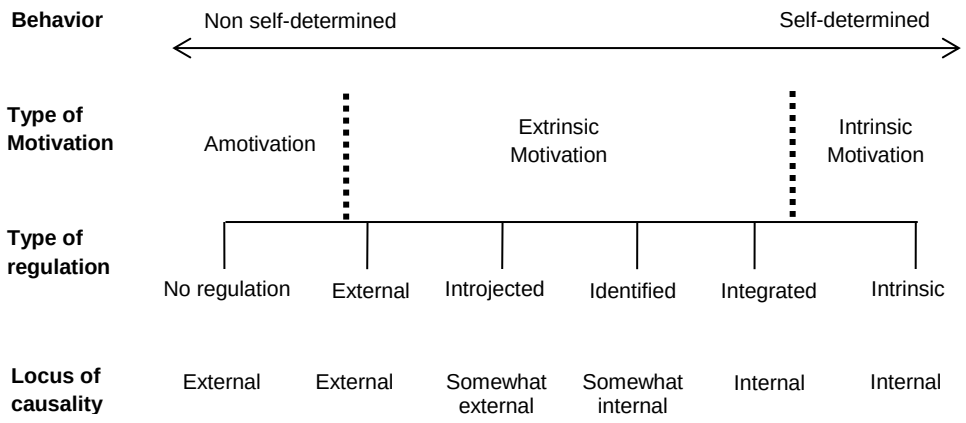

Figure 1. Motivation Continuum. Adapted from "Handbook of Self-Determination Research" by Deci and Ryan, 2002, pg 16.

For example, when a person trains for the *Nike* Women's Half-Marathon for the purposes of receiving a Tiffany's finishing necklace, the runner's behavior is externally regulated and running becomes contingent on receiving the necklace at the end of the race. As a result, this person is less likely to focus on developing and internalizing enjoyable running experiences (Kimiecik, 1998). However, as the purpose for engaging in exercise becomes more internalized as seen with *identified regulation* (e.g. "I identify exercise as a personally important behavior") and *integrated regulation* (e.g. "Healthy people exercise and I value being healthy") it becomes increasingly unified with the individual's sense of self and more likely to be maintained even if the reward or outcomes are removed (Deci & Ryan, 2002). When exercise is fully internalized as with intrinsic motivation, the behavior is initiated from *within* the individual, defined as an *internal perceived locus of causality*. Internalization optimally occurs when a person's behavior fulfills three psychological needs: *autonomy* (freedom to choose), *competence* (sense of mastery) and *relatedness* (feeling connected to others). Intrinsic motivation for a behavior is posited to be strengthened when the behavior fulfills these psychological needs thus increasing the likelihood of long-term exercise participation (Moustaka et al., 2012). Although SDT acknowledges the innate desire of individuals to integrate and internalize their behaviors, it also addresses the

social-contextual influences on this process. Environments can support or thwart an individual's psychological needs thus influencing the level of internalization and type of motivation experienced. SDT defines environments as: (a) *informational*, supporting the basic psychological needs, (b) *controlling*, featuring rewards, punishments, or external pressures to achieve a specific outcome, and (c) *amotivating*, promoting feelings of incompetence or failure (Hagger & Chatzisarantis, 2011). For instance, Moustaka et al. (2012) noted increased exercise participation among women attending exercise classes designed specifically to support autonomy and competence by giving a choice of modified exercises and positive feedback from the instructor. However, environments that introduce external rewards or punishments have been shown to undermine intrinsic motivation by supporting an external perceived locus of causality towards the behavior (Hagger & Chatzisarantis, 2011).

Although, the characteristics of the environment are important, SDT also acknowledges personality-like differences identified as *causality orientations* that influence an individual's proclivity to perceive and orient themselves in that environment (Rose et al., 2001). Indeed, two people can exercise in the same environment and perceive it differently. For example *autonomy-oriented* individuals have the ability to interpret more environments as informational and find ways to express self-determination when exercising; while *control-oriented individuals* find external controls imposed by the environment (e.g. "I have to meet with my trainer") or the individual themselves (e.g. "I need to lose five pounds") to regulate their exercise behavior (Rose et al., 2001). Individuals that are *impersonal oriented* typically demonstrate low competence in their ability to exercise thus finding many exercise environments amotivating. Although individuals experience varying levels of all three orientations, one orientation is typically dominant.

More recently, SDT also includes the concept of *goal contents* as an additional motivational concept that further aids in understanding exercise behavior (Sebire et al. , 2011) . Goal content defines *what* the exerciser is trying to achieve (e.g. lose weight) in contrast to

behavioral regulation which addresses *why* the individual is exercising (e.g. to fit into my wedding dress). The foci of an individual's goals are classified as either (a) *intrinsic* (i.e. health management, skill development and social affiliation) and support the basic psychological needs or (b) *extrinsic* (i.e. social recognition and image) which are typically outcome oriented focused externally from the activity itself (Standage & Ryan, 2012).

Because an individual's predominant causality orientation influences the way they perceive and orient themselves with their environment (Deci & Ryan, 1985), it is plausible that the focus of their goal content for exercise may be influenced by their orientation. Ingledew & Markland (2008) note that participation motives partially mediate the relationship between personality traits (related to, but distinct from causality orientations; Deponte, 2004) and behavioral regulations; however, the relationship between exercise causality orientations and goal contents has yet to be explored. Likewise, it is conceivable that the client or patient's primary mode of exercise will also be associated with their predominant orientation. For instance, most health club members have access to personal trainers, group exercise classes, and equipment to exercise independently, each of which present varying exercise environments. Yet, to date, no study has investigated the influence of causality orientation on primary mode of exercise.

Therefore, the purpose of this study was to extend our understanding of the influence of causality orientation on exercise preference as well as goal contents, behavioral regulations, and exercise participation. Figure 2 illustrates the initial model partially adopted from Ingledew & Markland (2008) which displays the proposed paths of positive and negative associations between the aforementioned constructs of SDT.

Methods

This study was a cross-sectional descriptive survey design. Previous research provided both theoretical (Deci & Ryan, 2002) and evidential (Ingledew & Markland, 2008) support for the

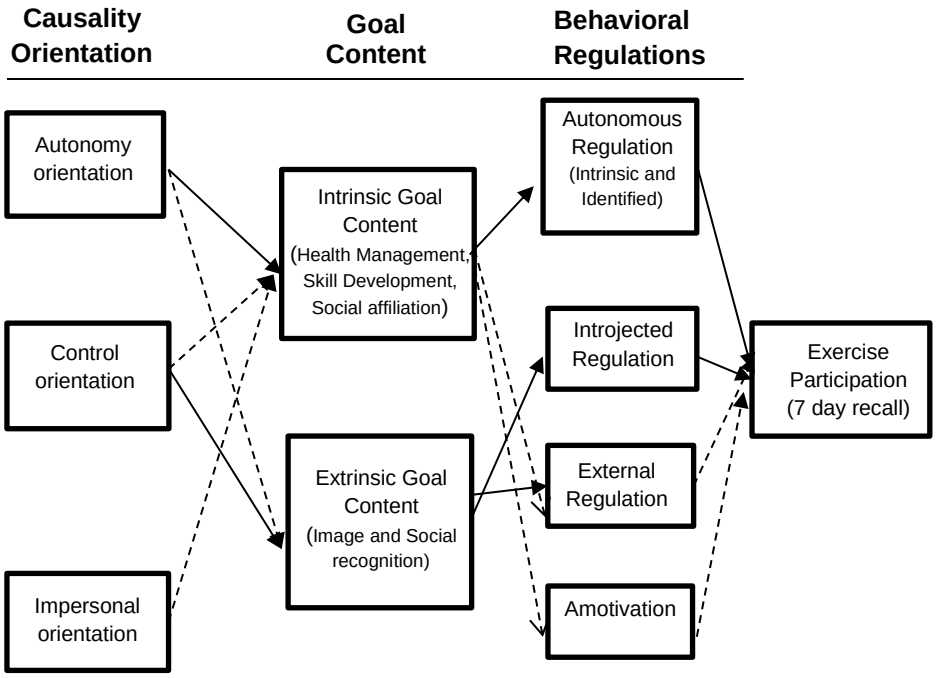

Figure 2. Hypothesized model partially adopted from Ingledew & Markland (2008). Dashed lines represent negative associations. Solid lines represent positive associations.

hypotheses being tested.

Participants

The sample consisted of 243 predominantly white, non-Hispanic participants (58% women, 42% men) between 25-60 years old. Because the desired focus of this study was on volitional, leisure-time activity in sedentary workers or those with sedentary daily routines, inclusion criteria excluded those who sat for less than seven hours on an average weekday to control for those with laborious occupations.

Procedures

Participants were recruited from seven sport and health clubs in the D.C. metropolitan area via a member's only e-mail distribution list. Health club members were informed of the study and invited to participate via a secure-online survey link. Identical paper surveys were completed by 11 participants recruited in person. Participants provided informed consent by indicating "I Agree" in order to access the survey. The secure-online survey assessed basic socio-demographics, sitting behavior (e.g. "During the last 7days how much time did you usually spend sitting on a week day?"), and primary mode of exercise (i.e., personal training, group exercise class or exercise independently), followed by measures of SDT including exercise causality orientation, goal contents, and behavioral regulations. On average, participants completed the survey in five to 10 minutes. The study protocol was approved by the Institutional Review Board of The George Washington University.

Measures

Exercise Causality Orientations. The Exercise Causality Orientations Scale (ECOS; Rose et al., 2001: see Appendix A) is an exercise-specific version of the General Causality Orientations Scale developed by Deci & Ryan (1985). The ECOS consists of seven common scenarios in an exercise setting. Each scenario is followed by three reactions representing autonomy, controlled, and impersonal orientations. A seven-point Likert scale ranging from 1 (*very unlikely)* to 7 (*very likely*) is used for each response. A composite score for each orientation was totaled with the dominant orientation scoring highest. Rose et al., (2001) determined after removing and rewording several scenarios (from 19 down to seven) the ECOS has good factorial validity.

Exercise Goal Contents. The Goal Content for Exercise Questionnaire (Sebire et al., 2008: see Appendix B) consists of 20 items representing five subscales assessing different exercise goals. Each item is ranked on a seven-point Likert scale ranging from 1 (*not at all*

important) to 7 (*extremely important*). The questionnaire is scored by taking the mean importance rating of all intrinsic (i.e., social affiliation, health management, and skill development) and extrinsic (i.e., social recognition and image) goal content. The GCEQ has been shown to have internal validity, construct validity, and gender invariance (Sebire et al. 2008).

Behavioral Regulations. The Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2: Markland & Tobin, 2004), includes five scales that assess the varying levels of self-determined regulation (see Appendix C). Each scale has three to four responses to the question "Why do you engage in exercise?" on a 5-point Likert type scale ranging from 0 (*not at all true for me*) to 4 (*very true for me*). Markland & Tobin (2004) established the reliability and validity of this measure.

Physical Activity. The International Physical Activity Questionnaire (IPAQ: Appendix D) specifically the recreation, sport and leisure time activity scale (Cora et al., 2003) was used to assess leisure time physical activity. The questionnaire was scored as a continuous variable measuring the total leisure-time MET-minutes/week.

Results

Of the nearly 10,000 members on the e-mail distribution list, approximately six percent responded with 243 meeting standards of completeness and inclusion criteria (age 25-60, average daily sit time ≥ seven hours). For time variables that measured average daily activities, responses with a value over 20 (in hours) were divided by seven as instructed by the IPAQ (2005) scoring protocol. Missing values in the ECOS, GCEQ, and BREQ2 were imputed with the series mean of the sample for that item (George & Mallory, 2003). The ECOS demonstrated the highest levels of missing values; however after checking for internal consistency the scales autonomy (α=0.70), control (α=0.67) and impersonal (α=0.64) were consistent with previous studies (Rose et al., 2001 & Kwan et al., 2011) . Due to small cell counts, 'Race' was re-coded to include 'White'(86.4%), 'Black' (7%), and 'Other' (6.6%) where 'Other' included Asian, Native Hawaiian or Other Pacific Islander, and Other.

Hypothesis 1

There will be group differences in exercise causality orientations and exercise preference within health club members. Initial comparison of mean values indicated varying levels of causality orientations within each group (see Figure 3).

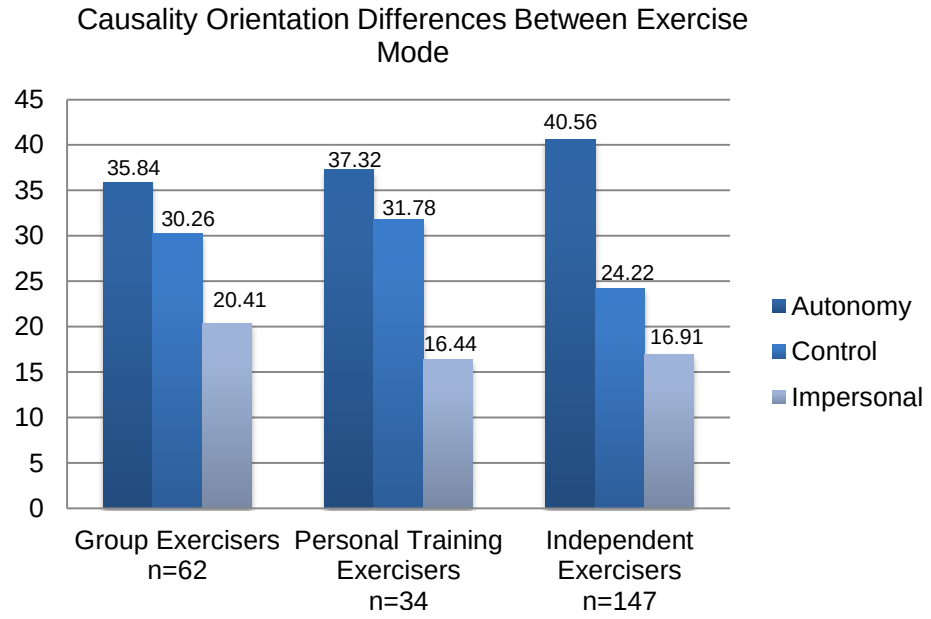

Figure 3. Initial comparison of means show the varying levels of causality orientations within different groups of exercisers.

Significance was tested using a one-way ANOVA for each causality orientation. Significant differences were observed in autonomy orientation $F(2,240) = 15.80$, $p<.001$, control orientation $F(2,240) = 25.33$, $p<.001$, and impersonal orientation $F(2,240) = 7.59$, $p<.001$. Table 1 displays post-hoc testing results for orientation differences between modes of exercise. Independent exercisers displayed the highest levels of autonomy orientation which resulted in a large effect when compared to group exercisers ($d = 0.82$) and a moderate effect size with personal training exercisers ($d = 0.54$). Significant group differences in control orientation revealed large effect sizes between group exercisers and independent exercisers ($d = 0.88$) as well as personal training exercisers and independent exercisers ($d = 1.04$). Lastly, group exercisers displayed the highest level of impersonal orientation resulting in a moderate effect sized between personal training

exercisers (d = 0.63) in addition to independent exercisers (d = 0.53).

Table 1. Exercise Preference and Differences in Causality Orientations

	Group Exercisers		Personal Training Exercisers		Independent Exercisers	
	Mean	SD	Mean	SD	Mean	SD
Autonomy	35.84_{a} **	5.72	37.31_{b} *	6.21	$40.55_{a,b}$	5.75
Control	30.25_{a} **	6.23	31.77_{b} **	7.00	$20.40_{a,b}$	7.09
Impersonal	$20.40_{a,b}$	7.09	16.43_{a} *	5.36	16.91_{b} **	6.10

Note: Subscripts denote statistical differences between groups. *, ** represent significance at *p<0.01* and *p<0.001 respectively*

Hypothesis 2

Exercise causality orientations will be associated with behavioral regulations. A Spearman correlation matrix was used to test Hypothesis two. The bivariate correlation of means were examined for each sub-scale and results are indicated in Table 2.

Table 2. Spearman's correlation matrix

	1	2	3	4	5	6	7
1. Autonomy	--						
2. Control	-0.153	--					
3. Impersonal	-0.405**	0.289**	--				
4. Autonomous	0.465**	-0.071	-0.272**	--			
5. Introjected	-0.055	0.165**	0.244**	0.087	--		
6. External	-0.250**	0.253**	0.385**	-0.371**	0.235**	--	
7. Amotivation	-0.257**	0.098	0.275**	-0.304**	0.039	0.384**	--

Note. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 3

Causality orientations will be associated with goal contents and behavioral regulations will mediate the relationship between goal contents and exercise participation. The associations between exercise causality orientations, goal contents, behavioral regulations and physical activity illustrated in the conceptual model in Figure 2 were tested controlling for age, gender and

race using path analysis regressions of the mean scores for each subgroup (see Figure 4). Only significant correlation paths are shown in Figure 4.

Discussion

The purposes of this study were to test the unexplored relationships of causality orientations and exercise preference as well as their associations with variables known to correlate with physical activity. The results of this study support the theoretical tenets of SDT illustrating that individuals have varying levels of causality orientations with one orientation

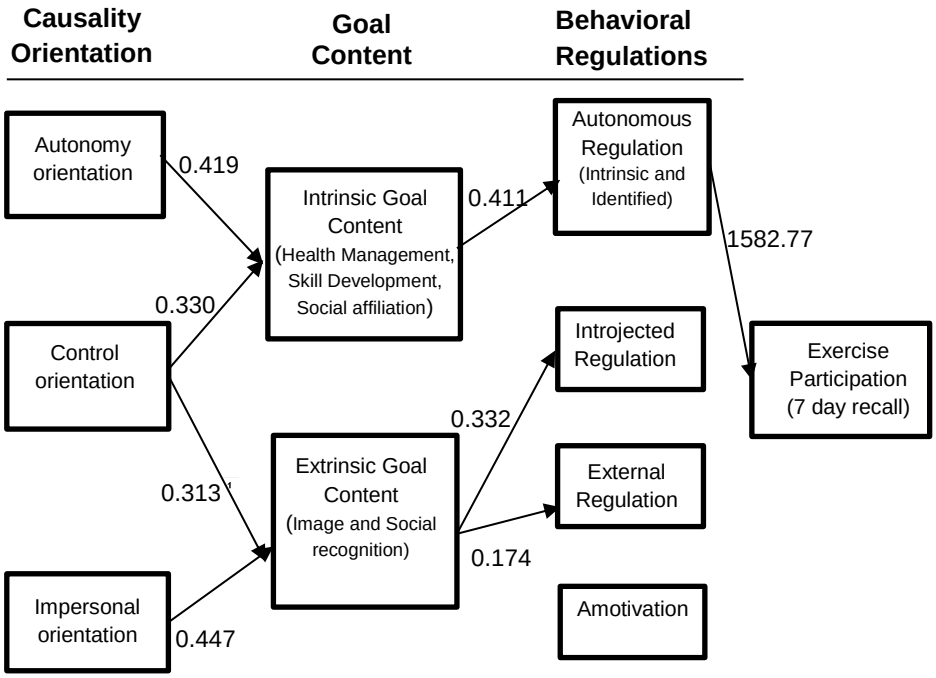

Figure 4.. Hypothesis three. Path analysis regression coefficients significant to p <.001

typically dominant. Independent exercisers displayed significantly higher levels of autonomy orientation than both personal training exercisers and group exercisers. When comparing environmental contexts, exercising independently presents fewer environmental controls than a group exercise or personal training environment. This supports the notion that autonomy-oriented individuals will seek out and find ways to self-regulate their behavior, and exercising independent

of instruction best allows them to do this. Autonomy was displayed as the predominant orientation in all three modes of exercise which was a surprising finding. However, the level of level of physical activity reported suggests that this was a relatively active population which may have influenced the level of autonomy orientation displayed across the different groups of exercisers.

Nevertheless, personal training exercisers displayed the highest level of control orientation, resulting in large effect sizes when compared to independent exercisers. A surprising outcome was the similar levels of control orientation between personal training exercisers and those reported by group exercisers which were also much greater than independent exercisers. Although different than what we initially expected to see, this too aligns with the theoretical tenets suggesting that individuals with high levels of control orientation seek out external sources by which they regulate their behavior. Both group classes and personal training environments provide structured exercise lessons in which the trainer or instructor dictates the program agenda. These individuals will likely identify with the supervised activity and scheduled appointment and class times which provide a level of accountability to regulate their behavior.

Moreover, the group differences in impersonal orientation also yielded significant findings that align theoretically with SDT. Group exercisers displayed the highest level of impersonal orientation which was greater than both personal training and independent exercisers. As previously stated, impersonal oriented individuals typically lack feelings of perceived competence and view many environments as overwhelming. Personal training and independent exercisers displayed similar but much lower levels of impersonal orientation than group exercisers. From this it would be plausible to suggest that independent exercisers experience higher perceived competence levels allowing them to exercise freely; while personal trainers offer one-on-one instruction with positive feedback ultimately supporting the client's need for competence by learning to correctly perform the exercises. On the other hand, group exercise classes are typically comprised of higher student to instructor ratios, making it difficult to provide

positive feedback specific to each student. Without direct attention it may be easier to participate in a group exercise environment and still lack perceived competence in the activity.

As mentioned earlier several variables influence an individual's physical activity level which emphasizes the importance of the model tested in Figure 2. Interestingly, the path of positive associations between autonomy orientation, intrinsic goal content, autonomous regulation and physical activity suggest that there may be a mediating effect of goal content between autonomy orientation and autonomous regulation. The relationship between autonomy orientation and extrinsic goal content, though not significant suggests that autonomy oriented individuals place less importance on extrinsic goals than intrinsic goals. Again this supports the notion that autonomy-oriented individuals will interpret more environments as informational and find ways to self-regulate their behavior. This may be easier to do when the individual's aspirations are focused inward on bettering themselves rather than outward on appearance or social recognition type goals. Similar levels of association with intrinsic and extrinsic goals, suggest that control oriented individuals place a comparable emphasis on both types of goals. This has important implications for the group instructor and personal trainer, since these clients have higher levels of control orientation. With a better understanding of how a member's orientation influences the mode of exercise they are drawn to and the type of aspirations they emphasize, group instructors and personal trainers can tailor the exercise environment to emphasize importance of both intrinsic and extrinsic goals to help initiate exercise participation. However, as the program progresses the focus should begin to shift toward fostering the psychological needs and emphasizing more intrinsic goals, thereby increasing the level of autonomous regulation and thus physical activity.

Limitations

The findings of this study are generalizable to predominantly white, non-Hispanic health club members between the ages of 25-60 living in an urban environment. With a relatively active population and a response rate of six percent some selection bias may be present with the results.

Although the survey was sent to nearly 10,000 e-mails, spam -filters, outdated e-mail addresses amongst several other factors may have influenced the number of people who actually received the survey, thus possibly increasing the real response rate. The survey was fairly long and no incentive was offered. Future studies may want to reduce the amount of questions asked and or offer an incentive.

Conclusion

In the United States alone, there are a reported 51 million exercisers with memberships at for-profit health clubs (IHRA, 2012). However 50% of new exercisers drop out within the first six months of beginning an exercise program. The findings from this study can be used to further understand the role of causality orientations in exercise behavior, which can assist health and fitness professionals and administrators to better understand the persons utilizing their facilities. This would allow them to tailor the motivational climate in which they promote healthy exercise behaviors in an effort to foster exercise maintenance. For example, customizing the marketing approach to equally emphasize both intrinsic and extrinsic goals would likely produce greater member interest and possibly retention in a health club that relies highly on group exercise class and personal training participation since those members typically present high levels of control orientation. In addition, this study has the potential to make a significant public health impact with regard to physical activity and exercise behavior if the tenets of SDT and this study's findings relative to causality orientations are applied at the community level. For instance, consider the number of children, adults, and older persons that have access to community recreation centers as a source of physical activity and exercise. Many recreation centers only offer equipment to exercise independently and therefore may find more success with emphasizing intrinsic goals since the persons utilizing these centers within the community would likely display higher levels of autonomy orientation. Such a person-centered approach toward exercisers, based on their motivational orientations, may in fact lead to increases in self-determination and

consequently to greater maintenance of physical activity, a health behavior that has both disease prevention and health promoting effects.

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Appendix A

THE EXERCISE CAUSALITY ORIENTATIONS SCALE

Below are a series of situations that people can find themselves in with regard to exercising. Each situation is followed by three responses (a, b and c) that represent different ways in which people could react. Please imagine yourself in each situation and circle a number on the scale below EACH response (a, b AND c) to indicate the extent to which EACH response would be characteristic of you in that situation. There are no right or wrong answers and no trick questions. We simply want to know the extent to which you think you would react in these different ways to each situation.

1 You are beginning a new exercise programme. You are likely to:

a) Attend a structured exercise class where an exercise leader is telling you what to do.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) Decide for yourself which type of exercise you would like to complete.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) Tag along with your friends and do what they do.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

2 You are asked to keep a record of all the weekly exercise you have completed in an exercise diary. You are likely to view the diary:

a) As a reminder of how incapable you are at fulfilling the task.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) As a way to measure your progress and to feel proud of your achievements.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) As a way of pressurizing yourself to exercise.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

3 In order to monitor how well you are doing in an exercise program you are likely to want to:

a) Be given a lot of praise and encouragement from others.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) Evaluate your own performance and provide yourself with positive feedback.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) Just hope that what you are doing is correct.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

4 You have been exercising regularly for 6 months but recently you have been missing sessions and are finding it hard to get motivated to exercise. You are likely to:

a) Approach someone to help motivate you.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) Ignore the problem, nothing can be done to improve your motivation.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) Employ your own strategies to motivate yourself.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

5 You have been told that setting goals is a good way to motivate yourself to exercise. You would likely:

a) Set your own realistic but challenging goals.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) Make someone important to you set goals for you to aim for.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) Not set goals because you may not be able to live up to them.

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

6 During a discussion with an exercise counsellor he/she presents many options on the best way for you to exercise to achieve fitness and health benefits. It is likely that your first thought would be:

a) What do you (the exercise leader) think I should do?

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

b) What do I think is the best option for me?

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

c) What has everyone else done in the past?

1	2	3	4	5	6	7
Very unlikely			Moderately likely			Very likely

7 During an exercise session how hard you are working out is likely to be governed by:

a) The intensity you have been told to exercise at.

1	2	3	4	5	6	7
Very unlikely			Moderately likely		Very likely	

b) What everyone around you is doing.

1	2	3	4	5	6	7
Very unlikely			Moderately likely		Very likely	

c) How you are feeling whilst exercising at the intensity you choose.

1	2	3	4	5	6	7
Very unlikely			Moderately likely		Very likely	

Thank you very much for completing this questionnaire

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Appendix B

The Goal Content for Exercise Questionnaire (GCEQ)

Exercisers might have very different goals on their minds when doing exercise. The following questionnaire explores the kind of goals you might have in mind while exercising. Please indicate to what extent these goals are important for you when exercising. Please be as honest as possible.

	Not at all important		Moderately Important			Extremely Important	
1. To connect with others in a meaningful manner	1	2	3	4	5	6	7
2. To improve the look of my overall body shape	1	2	3	4	5	6	7
3. To increase my resistance to illness and disease	1	2	3	4	5	6	7
4. To be well thought of by others	1	2	3	4	5	6	7
5. To acquire new exercise skills	1	2	3	4	5	6	7
6. To share my exercise experiences with people that care for me	1	2	3	4	5	6	7
7. To improve my appearance	1	2	3	4	5	6	7
8. To increase my energy level	1	2	3	4	5	6	7
9. To be socially respected by others	1	2	3	4	5	6	7
10. To learn and exercise new techniques	1	2	3	4	5	6	7
11. To develop close friendships	1	2	3	4	5	6	7
12. To be slim so to look attractive to others	1	2	3	4	5	6	7
13. To improve my overall health	1	2	3	4	5	6	7
14. To gain favourable approval from others	1	2	3	4	5	6	7
15. To become skilled at a certain exercise or activity	1	2	3	4	5	6	7
16. To form close bonds with others	1	2	3	4	5	6	7
17. To change my appearance by altering a specific area of my body	1	2	3	4	5	6	7
18. To improve my endurance, stamina	1	2	3	4	5	6	7
19. So that others recognise me as an exerciser	1	2	3	4	5	6	7
20. To develop my exercise skills	1	2	3	4	5	6	7

Original citation: Sebire, S. J., Standage, M., & Vansteenkiste, M. (2008). Development and validation of the goal content for exercise questionnaire. *J Sport Exerc Psychol, 30*, 353-377.

Appendix C

EXERCISE REGULATIONS QUESTIONNAIRE (BREQ-2)

Age: _____ years Sex: male female (please circle)

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

		Not true for me		**Sometimes true for me**		**Very true for me**
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4

		Not true for me		Sometimes true for me		Very true for me
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don't	0	1	2	3	4
12	I don't see the point in exercising	0	1	2	3	4
13	I feel like a failure when I haven't exercised in a while	0	1	2	3	4
14	I think it is important to make the effort to exercise regularly	0	1	2	3	4
15	I find exercise a pleasurable activity	0	1	2	3	4
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4
17	I get restless if I don't exercise regularly	0	1	2	3	4
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19	I think exercising is a waste of time	0	1	2	3	4

Thank you for taking part in our research

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Appendix D

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the last 7 days solely for recreation, sport, exercise or leisure.

20. During the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?

_____ days per week

No walking in leisure time -→ Skip to question 22

21. How much time did you usually spend on one of those days walking in your leisure time?

_____ hours per day

_____ minutes per day

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?

_____ days per week

No vigorous activity in leisure time-→ Skip to question 24

23. How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?

_____ hours per day

_____ minutes per day

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?

_____ days per week

No moderate activity in leisure time -→ Skip to PART 5: TIME SPENT

25. How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?

_____ hours per day

_____ minutes per day

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

26. During the last 7 days, how much time did you usually spend sitting on a weekday?

_____ hours per day

_____ minutes per day

27. During the last 7 days, how much time did you usually spend sitting on a weekend

day?

_____ hours per day

_____ minutes per day