Original Article

Influence and interpretation of intrinsic and extrinsic exercise motives

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ABSTRACT

This study explores the relationships between, and perceptions of, various exercise motivations and exercise adherence. The application of self-determination theory to exercise motivations research has demonstrated the importance of intrinsic motivations, however, the influence of extrinsic motivations has not been thoroughly examined. This study placed exercise motive perceptions along the Organismic Integration Theory's (OIT) spectrum of motivations, and identified associations between those interpretations and exercise adherence. Participants (812 college students) completed an online survey detailing their exercise motivations and participation. The Exercise Motivations Inventory-2 (EMI-2) was used to measure exercise motivations, and participants provided open-ended explanations for their ratings of each motivational sub-construct. Total exercise scores were calculated by assigning MET values to exercise bouts using the Leisure Time Exercise Questionnaire. Multiple regression analyses revealed stress management, enjoyment, competition, and weight management as predictors of exercise, and appearance as a negative predictor for females. Analysis of the open-ended motive explanations found participants held diverse perspectives on the health, appearance, weight management, and fitness motivations. The varying interpretations of health and appearance motives ranged across the OIT. Based on motivation theory, they may be conducive to the process of internalization, meaning they may develop into more intrinsic motivations as participants achieve goals and develop a sense of value for the exercise activities. Additional patterns were identified that require further research, including a gap between genders with respect to exercise enjoyment, and the difference between weight management and appearance as predictors of exercise adherence. **Key words:** EXERCISE ADHERENCE, SELF-DETERMINATION THEORY, EXERCISE MOTIVATIONS INVENTORY-II, ORGANISMIC INTEGRATION THEORY

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INTRODUCTION

The World Health Organization (WHO) reports that 1 in 4 adults, and 80% of the world's adolescent population are not sufficiently physically active (WHO, 2016). In 2014, the U.S. Center for Disease Control's State Indicator Report on Physical Activity reported that half (52%) of U.S. adults met the CDC's 2008 guidelines for aerobic activity (Centers for Disease Control and Prevention, 2014). Within the college/university demographic, studies have reported very low physical activity patterns across the globe such as in Australia (67% having low levels of PA) and the United Kingdom (73% male and 79% female not meeting PA guidelines), and research has identified higher levels of physical inactivity in developing countries as compared with North-Western Europe and the United States (Plotnikoff et al., 2015; Haase et al., 2004; Australian Bureau of Statistics, 2012). In the U.S., the American College Health Association National College Health Assessment II (ACHA-NCHA II) found that only 47.4% of college students met the CDC's guidelines for physical activity (ACHA, 2012). Concern over this low proportion of active citizens due to the known health risks associated with inactivity, have led to an insurgence of research related to exercise motivations. This study's purpose is to add to the significant body of exercise motivations research by examining how motivations influence the exercise behaviors, and how motives found to be influential are interpreted by college students.

Prominent among the exercise motivations literature is the examination and application of self-determination theory (Deci and Ryan, 1985; Ryan and Deci, 1980). Self-determination theory grew from earlier work on intrinsic and extrinsic motivations, and posits that people are inherently self-motivated and persistent, however three major needs (competence, relatedness, and autonomy) must be met for sustained commitment (Deci and Ryan, 2002). True intrinsic motivation, characterized by enjoyment and interest, has been demonstrated to be strongly associated with sustained exercise patterns (Markland and Tobin, 2010; McDonough and Crocker, 2007; Thøgersen-Ntoumani and Ntoumanis, 2006). Extrinsic motivations for exercise, which include all motivations that do not fit with the above definition of intrinsic motivation, have received less research attention and are less well understood. Some studies have found extrinsic motivations to have little to no association with, or to be negatively associated with exercise commitment (Ingledew and Markland, 2008); however recent work has brought attention to the inherent complexity of extrinsic motivations and called for further examination (Teixeira et al., 2012).

Considering the nation's current low physical activity rates, it is likely that many people do not associate true enjoyment with exercising, or feel true competence and autonomy over their exercise goals; and therefore exercise for other, more extrinsic goals. Previous research has demonstrated this to be true within the college student demographic, where motives such as improving one's appearance, ill-health avoidance, and weight management have been rated higher than enjoyment (Kulavic et al., 2013). Moreover, Ednie and Stibor (2016) found these extrinsic motives to be rated consistently high, even within groups that demonstrated the highest levels of fitness. This study responds to the need for more research to understand the complexities associated with extrinsic motivation.

The Organismic Integration Theory (OIT), developed by Deci and Ryan (1985) as part of self-determination theory, outlines four different forms of extrinsic motivation, each representing a different level of autonomy: external regulation (e.g. satisfying external demands or obtaining external rewards); introjection (e.g. avoiding guilt or to gain pride); identification (accepting exercise for its importance); and integration (assimilating the identified regulations as they align with ones values and needs). Although the extrinsic motivation types do not represent a continuum (i.e. one does not need to progress through each to develop intrinsic motivation), they can develop into more self-determined, intrinsic motivations (Deci and Ryan, 2000). For example, a

person could begin exercise because of an external regulation (e.g. a reward), and their positive exercise experiences could allow them to develop interest and enjoyment in exercise, causing an orientation shift to a more intrinsic motivation. This shift to a more intrinsic motivation has been named "internalization", and studies in school-based behavior have documented improvements in engagement and performance as an extrinsic motivation becomes internalized (Connell and Wellborn, 1990; Miserandino, 1996; Ryan et al., 1997).

Extrinsic motives are inherently complex, and asking study participants simply to rate the influence of a particular motive causes diverse meanings to be grouped as one. In their systematic review of the research applying self-determination theory to exercise, Teixeira et al. (2012) emphasized the importance of understanding how extrinsic motivations are interpreted. They provided an example of how a participant who indicates they are highly motivated for appearance reasons (extrinsic motive) could strive to seek praise from a partner (controlled motivation) and/or could personally value a fit appearance (this would be a more autonomous and internal motivation). Also, a few studies, contrary to most, have identified positive relationships between introjected regulations, which are extrinsic motivations to avoid guilt or improve self-esteem, and sustained exercise behavior (Duncan et al., 2010; Wilson et al., 2004), however, qualitative data explaining such associations is very limited. Moreover, studies examining the internalization process within the context of exercise are lacking. The purpose of this study is to explore the meaning behind exercise motives that are found to be predictive of, or are rated highly as important for exercise adherence.

METHODS

Participants

Participants were undergraduate students, recruited from an undergraduate general education health and fitness course, who completed the study as an option to obtain course credit. Participants (N=812) were split nearly equally for gender, and ranged in age from 17 to 42 although the bulk were traditional aged college students (M=19.08, SD=1.83). The sample provided a complete range of how physically active the participants considered themselves to be, yet the bulk (78%) of participants reported spending very little money ($25 or less) on exercise and related equipment per month (table 1).

Table 1. Study participants.

Gender	Age	Participant self-rating for physical activity	Money spent per month on exercise and related equipment
Male: 48% (391) Female: 52% (421)	17-18yrs: 42% (325) 19-20yrs: 47% (379) 21-22yrs: 7% (58) 23-24yrs: 2% (15) 25+yrs: 2% (14)	1. Not active: 5% (42) 2.: 22% (179) 3. Active: 34% (272) 4.: 21% (171) 5. Very Active: 18% (148)	$0-25: 78% (627) $26-50: 16% (126) $51-75: 4% (33) $76-100: 1% (13) $100+: 1% (7)

Procedures

The online survey was administered via the course website using Qualtrics Online Survey Software, after permission was obtained by the college Institutional Review Board. The survey inquired about student demographics, exercise patterns and experiences, and exercise motives. An adapted version of the exercise motivations inventory-2 (EMI-2) was used to measure exercise motives and to seek participants' explanations for their motive ratings.

Measures

Total exercise scores

A series of survey questions inquired about the participants' exercise patterns within the past week, and within an average week over the past year. Exercise frequency and duration were recorded, and an adapted version of the validated Leisure Time Exercise Questionnaire (LTEQ) was used to measure exercise patterns (Godin and Shepherd, 1985; Jacobs et al., 1993). Participants also characterized their exercise bouts using the Borg measure to further ascertain exercise intensity (Borg, 1982; Scherr et al., 2013). A total exercise score was calculated by weighing and summing the participants' moderate and strenuous frequency dimensions by the associated MET value (metabolic equivalent of physical activity in multiples of resting oxygen consumption). Moderate and strenuous bouts of exercise lasting at least 20 minutes were multiplied by 5 (moderate) and 9 (strenuous), and added to identify a total exercise score, consistent with methods used by Wilson et al. (2004). The reported exercise patterns were also compared with the 2011 ACSM exercise recommendations for fitness (Garber et al., 2011) to determine whether participants met the recommended activity levels.

Exercise motivations analysis

The Exercise Motivations Inventory-2 was adapted and used to measure the participants' exercise motivations (Markland and Ingledew, 1997). The EMI-2 comprises 14 sub-scales of motivations including psychological, social, health, and physical components. The EMI-2 has been validated, has demonstrated the ability to differentiate between motivational components, and has been applied in a variety of studies (Kilpatrick et al., 2005; Maltby and Day, 2001; Huang et al., 2007).

In order to gain perspective on the different meanings participants associate with each motivational construct, participants were asked to explain the reasons for their ratings, in open-ended question format, for each of the 14 motivational constructs within the EMI-2. The descriptive responses were open-coded and response categories were developed for prominent explanations for each motivational construct following methods outlined by Elliott and Timulak (2005). Open-ended responses that were mentioned by at least 10 participants were included in the results.

Analysis

The data were screened for missing values, outliers, and evaluated for conformity with the assumptions associated with multiple regression analysis. Linear multiple regression analyses were used to analyze the relationships between exercise motives and total exercise scores. Separate multiple regression analyses were conducted to predict the exercise behavior consequences of motives dependent on gender. One-way analyses of variance (ANOVA) tests with Tukey's Honestly Significant Differences (HSD) tests for multiple comparisons (or chi-square (c^2) where applicable) were used to identify differences in motive ratings and open-ended motive explanations based on total exercise scores.

RESULTS

Total exercise scores

The total exercise scores (table 2) were higher for male as compared with female participants, and significantly correlated (r= .41, p<.001). Comparison of the participant-reported exercise patterns to the ACSM's 2011 exercise recommendations for healthy adults (Garber et al., 2011) revealed 57% percent of the total sample maintained habits that met the guidelines, where male and female patterns were nearly even at 58% and 57% for male and female participants, respectively.

Table 2. Total exercise scores of the complete sample, male, and female participants.

	Item Mean	Male	Female	*n*	F	*p*	η^2
Total exercise score[a]	41.88	44.40	39.60	678	5.26	.02	.01

[a]Total exercise score was calculated by weighing and summing the participants' moderate and strenuous exercise frequency dimensions by the associated MET value, (moderate frequency dimension X 5)+(strenuous frequency dimension X 9).

Exercise motive ratings

Overall, positive health and appearance were the two top-rated motives for exercise, both with mean ratings above 4 on a 5-point scale (4.28 and 4.09, respectively). Weight management and ill-health avoidance followed, with mean ratings above 3.5 (3.88 and 3.78, respectively). Conversely, competition, affiliation, and social recognition were the lowest-rated motives, all with means below 3.0 on the 5-point scale (table 3).

Male and female ratings differed across 11 of the 14 motives. Female participant ratings of the health, fitness, appearance, revitalization, and stress management motives were significantly higher than male ratings. Mean male participant ratings were higher than those of females for enjoyment, challenge, competition, and social motives.

Table 3. Exercise motive ratings for total sample, male, and female participants.

	Item Mean[a]	Male	Female	*df*	F	*n*	η^2
Strength & endurance	4.33	4.24	4.41	1	6.81**	803	.01
Positive health	4.28	4.13	4.42	1	20.84***	801	.03
Appearance	4.10	3.99	4.20	1	6.60*	803	.01
Weight management	3.89	3.65	4.12	1	26.67***	802	.03
Ill-health avoidance	3.78	3.75	3.81	1	0.50	804	.00
Nimbleness	3.67	3.59	3.75	1	3.23	802	.00
Revitalization	3.64	3.57	3.70	1	2.39	802	.00
Stress management	3.63	3.45	3.80	1	16.02***	803	.02
Enjoyment	3.31	3.48	3.14	1	13.70***	804	.02
Challenge	3.19	3.42	2.98	1	20.80***	790	.03
Competition	2.93	3.39	2.49	1	76.78***	801	.09
Affiliation	2.91	3.11	2.72	1	16.89***	800	.02
Social recognition	2.47	2.76	2.20	1	34.48***	802	.04
Health pressures	2.19	2.46	1.93	1	32.81***	803	.04

*p<.05, **p<.01, ***p<.001.

[a]Exercise motive ratings were based on a scale of 1, not at all true for me; to 5, very true for me.

Exercise motives and total exercise scores

The multiple regression model with all motives as predictors of total exercise scores was completed for the whole sample, and repeated for males and females, separately. The total sample regression showed the motives predicted a significant proportion of variance in total exercise scores, where the model produced R^2=0.12, F (14, 647) = 6.15, p<.001. As detailed in table 4, the stress management scale had a significant positive regression weight for male participants; and the revitalization, weight management, and fitness scales had significant positive weights for females (indicating participants with higher scores on these scales were expected to have higher total exercise scores, after controlling for other variables in the model). Female ratings of the appearance motive had significant negative weight, indicating that after accounting for the other motive rating scores, female participants with higher appearance rating scores were expected to have lower total exercise scores.

Table 4. Multiple regression results with motives as predictors of total exercise scores.

	Total			Male			Female		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Stress management	3.17	1.08	.14**	6.24	2.07	.23**	1.97	1.30	.10
Revitalization	.59	1.23	.02	-1.67	2.25	-.06	2.95	1.50	.14*
Enjoyment	3.24	1.19	.15**	3.61	2.40	.13	2.30	1.36	.12
Challenge	-.25	1.13	-.01	-1.43	2.16	-.05	.78	1.30	.04
Social recognition	.89	.91	.05	.06	1.67	.00	1.48	1.11	.08
Affiliation	.04	.92	.00	1.31	1.85	.05	-.46	1.05	-.03
Competition	2.26	.94	.13*	1.71	1.74	.07	1.78	1.12	.11
Health pressures	-.49	.94	-.02	-.86	1.73	-.03	.31	1.17	.02
Ill-health avoidance	-.60	1.15	-.03	.56	2.39	.02	-1.78	1.20	-.09
Positive health	-2.25	1.63	-.08	-2.6	2.83	-.07	-1.16	1.78	.04
Nimbleness	-1.04	1.14	-.05	-1.26	2.20	-.04	-.90	1.35	-.04
Weight management	2.55	1.02	.12*	1.79	1.66	.07	5.29	1.49	.26***
Improve appearance	-2.00	1.24	-.08	-.21	2.07	-.01	-4.28	1.61	-.20**
Strength & endurance	2.21	1.64	.07	.63	2.88	.02	4.52	2.18	.16*

*$p<.05$. **$p<.01$. ***$p<.001$.

Exercise motive explanations

The open-ended explanation codes for each motive provided further context for the ratings. The most prominent codes for several of the motives reflected the opposite extremes of exercise experiences; for example 46% of respondent explanations for enjoyment as a motive were that *exercise is fun, enjoyable, they like it* (an intrinsic perspective); while 32% explained exercise is *not enjoyable* (state of amotivation). In addition to these opposite extreme explanations, many respondents described the motives in such a way that provides insight into the extrinsic motivation spectrum, as well as complexities within intrinsic motivations (table 5).

Exercise code patterns based on total exercise score

In order to identify patterns in exercise motive codes according to total exercise scores, chi-square tests were completed using the codes and total exercise scores corresponding to: 1) participants who did not meet ACSM recommendations for physical activity (this also represented the 1-49th percentile of total exercise scores); 2) 50th-75th percentile of total exercise scores; and 3) 76th percentile of total exercise scores and above. Very few differences between these three groups were identified in the frequency of exercise motive code responses. The differences that did occur reflected the enjoyment, challenge, and competition motives.

For the enjoyment motive codes, a greater proportion (45%) of participants who indicated they *do not find exercise enjoyable* were in the group who do not meet the ACSM recommendations ($c^2(6, N=172) = 12.93$, $p=.04$). With respect to the challenge motive explanations, a greater proportion of the participants in the 76th percentile and above group (47%) stated that they *push themselves to improve* as compared with the other two groups ($c^2(8, N=170) = 17.28$, $p=.03$). For the competition motive, a greater proportion of the 76th percentile and above group (43%) indicated that they were *competitive*, as compared with the other groups ($c^2(8, N=186) = 33.70$, $p=.00$).

Table 5. Exercise motive explanation codes.

Exercise Motive	Coded Open-ended Responses
Positive health	*Exercise makes me feel good (35%), Want to be/stay healthy (27.8%), Health maintenance is important (19.2%), Tired of being unhealthy/want to be more healthy (17.7%)*
Improve appearance	*My body looks better when I'm fit (37.1%), Want to continue to gain confidence about my appearance (19.9%), Want to look better (15.1%), Already feel good about my appearance (13.4%), Want to look thinner (11.3%), Want to gain muscle definition (7.5%)*
Weight management	*Want to lose weight / weight is a struggle (37.1%), Need to watch my weight (35.6%), I'm currently a good size (19.3%), I'm trying to gain weight (7.9%)*
Ill-health avoidance	*Want to be healthy (52.3%), Exercise is important for health (20.6%), Motivated by risk factors (10.3%), Have an existing condition (9.8%), Not worried / N/A (7.0%)*
Health pressures	*N/A (61%), Rest (rather than exercise) is the best solution (15%), specific injury listed (12%), Have used exercise for illness/injury recovery sometime in the past (7%), specific illness listed (5%).*
Revitalization	*Feel energized, refreshed, motivated (77.9%), Not revitalizing (16.9%), Feel better about myself (5.1%)*
Stress management	*Calming, helps decompress (45.0%), Get's my mind off stressors (20.6%), Feel better (14.8%), Does not help / I relieve stress in other ways (10.0%), I am not stressed (9.6%)*
Enjoyment	*Fun, enjoyable, like it (46.2%), Not enjoyable (31.8%), Enjoy the benefits (improved body) of exercising (12.8%), Only enjoy particular activities (9.2%)*
Challenge	*Challenge is fun/engaging (35.1%), I push myself to improve (29.8%), I exercise for leisure, not challenge (23.0%), I'm not competitive/don't enjoy challenge (7.3%), Challenge improves self-confidence (4.7%)*
Competition	*I'm not competitive (37.3%), I am competitive (25.5%), Competition makes exercise more fun (19.3%), I exercise more for fun/recreation (9.9%), I compete with myself (8.0%)*
Affiliation	*Good way to spend time together (46.0%), Exercise by myself (23.7%), Friends are motivating / make exercise easier (15.6%), My friends don't exercise [much] (14.7%)*
Social recognition	*Not in it to impress others / don't want the attention (65.6%), It's nice to be noticed/complimented (29.7%), I'm proud of my accomplishments (4.8%)*
Nimbleness	*I'm more motivated and energetic when I'm in shape (41%), Want to be more able/less tired (22%), Feels good to be capable/useful (13%), Already nimble without exercising (13%), Don't see the connection between exercise and efficiency (11%)*
Strength & Endurance	*Want to improve my fitness (37%), Being fit feels good (33%), Want to improve myself/my health (30%)*

DISCUSSION

The study provides insight about the relationships between various exercise motivations and exercise adherence, and how motivations are perceived within a large sample of college students. The results also shed light on differences between how male and female participants are motivated for exercise. The participant ratings of each motive gave context as to the importance of the motives for the whole college sample, as well as for males and females, separately. The EMI-2 motives were analyzed to identify which motives predict exercise adherence. Participants provided explanations for their ratings for each of the 14

EMI-2 motive categories, and the open-coded analysis of those explanations provided a better understanding of their ratings. The codes were further analyzed for relationships based on exercise commitment. The results were compared with Ryan and Deci's (2000) model of extrinsic and intrinsic motivation in order to explore the internalization process for motivations that are initially extrinsic.

Intrinsic motivations: Enjoyment, stress management and revitalization

Enjoyment, by definition is an intrinsic motive, and was expected to be associated with sustained exercise patterns based on previous research (Markland and Tobin, 2010; McDonough and Crocker, 2007; Thøgersen-Ntoumani and Ntoumanis, 2006). The regression analysis revealed enjoyment as a predictor of total exercise scores for the whole sample, but not a significant predictor for male or female groups independently. The mean rating for enjoyment was 3.3 on the 5-point scale and was higher for male than female participants. Enjoyment was rated lower than the other health, appearance, and self-determined motives, and only higher than the most typically externally regulated and introjected extrinsic motives such as competition and social recognition. The bulk of participants provided straight *enjoy/do not enjoy statements* for their open-ended explanations. However, 9% of participants explained that they *enjoyed only particular exercise activities*, indicating they may only feel an intrinsic motivation for exercise given specific contexts. Also, nearly 13% of respondents explained that they *enjoyed the benefits* (most stated improvements to their bodies) of exercising, which, given the context of their explanations, tended to be more of an introjected interpretation. A greater proportion of those who *do not enjoy* exercise tend not to maintain the ACSM's exercise recommendations for health. Considering the association between exercise enjoyment and adherence, further research into the difference found in this study between how males v. females enjoy exercise is needed.

Although their mean overall ratings were not exceptionally high (at 3.6/5), both stress management and revitalization were significant predictors of total exercise scores. The open-ended explanations for these ratings were straightforward, representing attitudes about exercise – either positive, negative, or denying the benefit (i.e. statements about *not being stressed in the first place*). In general, it appears that participants who experience a sense of stress management and/or revitalization from exercise, experience them as integrated, or even intrinsic motivations.

Health-focused motives

Three of the 14 exercise motives reflected health: health maintenance; ill-health avoidance; and health pressures. None of these motives were significant predictors of total exercise scores. The mean ratings for health maintenance and ill-health avoidance were within the top five most highly rated motives, and health pressures was the lowest rated of all the motives with the majority of open-ended responses being that health pressures were *not applicable*. The health maintenance and ill-health avoidance explanations contained a series of interpretations that spread across the types of extrinsic motives for exercise. The most common explanation (35% of responses) for positive health was that e*xercise makes participants feel good*, which aligns with integrated, or intrinsic motivation. Over half of the explanations for ill-health avoidance, and 28% of those for positive health were statements about *wanting to be/stay healthy*. These explanations could represent identification-type extrinsic motivations, which incorporate a conscious valuing of exercise, however, the contexts tended to be non-committal, meaning many of the participants who gave this explanation did not demonstrate healthy exercise behaviors. Another 20% of participants also provided statements about the *importance of exercise for health* for each the positive health and ill-health avoidance motives. Those explanations were even less committal, and most likely represented a more externally regulated motivation (i.e. they are aware that exercise is important, but do not act on it). This range in interpretation across several (external regulation, identification, integration-intrinsic) types of motivation

suggests that health-related exercise motives are complex, and raises the possibility that a process of internalization could occur as suggested by Ryan (1995). Participants who at first have externally regulated health-based motives can gradually develop a more integrated association, if their external regulations are not overly controlling.

Appearance and weight management

The results provided insight into and raise further questions about how appearance and weight management motives influence exercise behavior. The mean rating scores for both motives were high (near or above 4 out of 5) with female ratings higher than male. However, the regression analyses identified a notable difference between how weight management and appearance predict exercise behavior for female participants. Weight management was a positive predictor for the sample as a whole, and for the female-only group. Appearance, however, was not found to be a significant predictor for the whole sample, and results indicated it was a strong, negative predictor of total exercise scores for the female-only group. The regression results predicted every one-point increase in appearance motive ratings associated with a five-point decrease in total exercise scores for females. The open-ended explanations for appearance were more complex than for weight management, where weight management explanations were more factual (i.e. *weight is a struggle*, *need to watch weight*, *I'm a good size*, *trying to gain weight*) as compared with the appearance explanations, which reflected a greater spread across the extrinsic motivations, including *aspirations to look better*, *wanting to gain confidence,* and *appreciating how exercise makes one look and feel better*. The difference in how appearance and weight management were explained, and the striking difference in their relationship with exercise adherence for females in particular, warrant further research.

Challenge and competition

Competition was found to be a positive predictor of exercise adherence for the sample as a whole. The mean ratings for both challenge and competition motives were mid-range (3 on the 5-point scale), however male participants rated both motives significantly higher than females, especially the challenge motive, where female ratings were nearly a full point lower on the 5-point scale. The open-ended explanations for both of these motives represented only the motivational extremes – containing integrated/intrinsic explanations such as *challenge is fun/engaging*, and *I am competitive*; and amotivated explanations, such as *I'm not competitive/don't enjoy challenge*. A significantly greater proportion of the participants most committed to exercise (76th percentile and above on total exercise scores) provided the more integrated/intrinsic explanations; *I push myself to improve*, and *I am competitive*. The results for challenge and competition lacked the spread of explanations across types of extrinsic motivation, and therefore may not support the process of internalization as was discussed for the health-focused motives. Overall, the results indicate that challenge and competition are embraced mostly by individuals who are already committed to exercise. As such, it is concerning that 46% of the competition explanations by female participants were that they are *not competitive*.

Other motives representing OIT extremes: nimbleness, strength & endurance, affiliation and social recognition

The explanations for nimbleness, strength & endurance, affiliation and social recognition represented the integrated and amotivated extremes with either integrated explanations (such as *exercise is a great way to spend time with friends*) or amotivation explanations (such as *not in it to impress others/don't want the attention*). Strength & endurance was the highest rated of all motives and a predictor of exercise for female participants. Affiliation and social recognition were rated notably lower at below 3 on the 5 point scale (although males rated them more highly as compared with female participants). Even though the ratings for these items differed, their lack of predictive association with exercise scores (with the exception of strength

& endurance) and the lack of spread within explanations; it appears these motives, similar to challenge and competition, come into play more for individuals who have already developed a more internal motivation for exercise.

CONCLUSIONS

This study has identified EMI-2 series motives that predict exercise adherence, and examined how exercise motives were perceived by a sample of college students. Intrinsic motivation, known to be positively associated with exercise commitment, is characterized by enjoyment and interest (Deci and Ryan, 2002). In this study, enjoyment was found to predict exercise adherence, however it was rated lower than health and appearance-related motives and half of the study participants explained that they do not enjoy exercise.

According to motivation theory, extrinsic motivations that are not fully amotivational can often develop into more intrinsic motivations given supportive circumstances. In this study, health and appearance motives spanned the spectrum of extrinsic motivations and therefore may be conducive to internalization. Explanations for other motives, including stress management, revitalization, challenge, competition, affiliation and social recognition represented only the intrinsic and amotivation extremes, and therefore likely only develop once an intrinsic motivation for exercise is achieved. Further research into the process of internalization should explore important determinants related to health, fitness, and appearance.

The results identified additional future research needs, such as the gap between the proportion of male, versus female participants who enjoy exercise; and the difference between weight management and appearance as predictors for exercise among females. Further research into the internalization of extrinsic motives is also warranted in such a time where it is crucial for our global society to improve healthy exercise habits.

REFERENCES

1. American College Health Association. (2012). College Health Association – National *college health assessment II: Reference group executive summary fall 2011*. Hanover, MD: American College Health Association.
2. Borg, G.A. (1982). Psychophysical bases of perceived exertion. *Med Sci Sport Exer, 14*(5), 377-381.
3. Centers for Disease Control and Prevention (2014). State indicator report on physical activity. Atlanta, GA: U.S. Department of Health and Human Services.
4. Connell, J.P., & Wellborn, J.G. (1990). Competence, autonomy and relatedness: A motivational analysis of self-system processes. In M.R. Gunnar & L.A. Sroufe (Eds.), The Minnesota symposium on child psychology, Vol. 22, (pp. 43-77). Hillsdale, NJ: Erlbaum.
5. Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and self-setermination in human behavior. New York: Plenum.
6. Deci, E.L., & Ryan, R.M. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemp Educ Psychol, 25(1), 54-67.
7. Duncan, L. R., Hall, C. R., Wilson, P. M., & Jenny, O. (2010). Exercise motivation: A cross-sectional analysis examining its relationships with frequency, intensity and duration of exercise. Int J Behav Nutr Phy, 7(7). http://www.ijbnpa.org/content/7/1/7
8. Ednie, A.E., & Stibor, M. (2016). A comparison of fitness ratings to exercise patterns and motivations among college students. J Kinesiol Wellness, 4(1). http://www.wskw.org/sites/wskw.org/files/fitness_motivations_ednie.pdf

9. Elliott, R., & Timulak, L. (2005). Descriptive and interpretive approaches to qualitative research. In J. Miles & P. Gilbert (Eds.), A Handbook of research methods for clinical and health psychology (pp. 147-159). Oxford, England: Oxford University Press.
10. Garber, C.E., Blissmer, B., Deschenes, M.R., Franklin, B.A., Lamonte, M.J., Lee, I., Nieman, D.C., & Swain, D.P. (2011). Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. Med Sci Sport Exer, 43(7), 1334-1359.
11. Godin, G., & Shepherd, R. (1985). A simple method to assess exercise behavior in the community. Can J Appl Sport Sci, 10(3), 141-146.
12. Haase, A., Steptoe, A., & Sallis, J.F. (2004). Leisure-time physical activity in university students from 23 countries: associations with health beliefs, risk awareness, and national economic development. Prev Med, 39(1), 182-190.
13. Huang, C., Lee, L., & Chang, M. (2007). The influence of personality and motivation on exercise participation and quality of life. Soc Behav Personal, 35(9), 1189-1210.
14. Ingledew, D. K., & Markland, D. (2008). The role of motives in exercise participation. Psychol Health, 23(7), 807-828.
15. Jacobs, D.R., Ainsworth, B.E., Hartman, T.J. & Leon, A.S. (1993). A simultaneous evaluation of 10 commonly used physical activity questionnaires. Med Sci Sport Exer, 25(1), 81-91.
16. Kilpatrick, M. & Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. J Am Coll Health, 54(2), 87-94.
17. Kulavic, K., Hultquist, C.N., & McLester, J.R. (2013). A comparison of motivational factors and barriers to physical activity among traditional versus nontraditional college students. J Am Coll Health, 61(2), 60-66.
18. Maltby, J. & Day, L. (2001). The relationship between exercise motives and psychological well-being. J Psychol, 135(6), 651-660.
19. Markland, D., & Ingledew, D.K. (1997). The measurement of exercise motives: Factoral validity and invariance across gender in a revised exercise motivations inventory. Brit J Health Psych, 2(4), 361-376.
20. Markland, D., & Tobin, V. J. (2010). Need support and behavioural regulations for exercise among exercise referral scheme clients: The mediating role of psychological need satisfaction. Psychol Sport Exerc, 11(2), 91-99.
21. McDonough, M. H., & Crocker, P. R. E. (2007). Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. J Sport Exercise Psy, 29(5), 645-663.
22. Miserandino, M. (1996). Children who do well in school: Individual differences in perceived competence and autonomy in above-average children. J Educ Psychol, 88(2), 203-214.
23. Plotnikoff, R.C., Costigan, S.A., Williams, R.L., Hutchesson, M.J., Kennedy, S.G., Robards, S.L., Allen, J., Collins, C.E., Callister, R., & Germov, J. (2015). Effectiveness of interventions targeting physical activity, nutrition and healthy weight for university and college students: a systematic review and meta-analysis. Int J Behav Nutr Phy, 12: 10p.
24. Ryan, R.M. (1995). Psychological needs and the facilitation of integrative processes. J Pers, 63(3), 397-427.
25. Ryan, R.M., & Deci, E.L. (2002). Overview of self-determination theory: An organismic dialectical perspective. In R.M. Ryan & E.L. Deci (Eds.), Handbook of self-determination research. Rochester, N.Y.: The University of Rochester Press.

26. Ryan, R.M., Kuhl, J., & Deci, E.L. (1997). Nature and autonomy: Organizational view of social and neurobiological aspects of self-regulation in behavior and development. Dev Psychopathol, 9(4), 701-728.
27. Scherr, J., Wolfarth, B., Christly, J.W., Pressler, A., Wagenpfeil, S., & Halle, M. (2013). Associations between Borg's rating of perceived exertion and physiological measure of exercise intensity. Eur J Appl Physiol, 113(1), 147-155.
28. Teixeira, P.J., Carraca, E.V., Markland, D., Silva, M.N., & Ryan, R.M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. Int J Behav Nutr Phy, 9(1), 78-108.
29. Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise behaviours, cognitions and physical self-evaluations. J Sport Sci, 24(4), 393-404.
30. Weinstock, J. (2010). A review of exercise as intervention for sedentary hazardous drinking college students: rationale and issues. J Am Coll Health, 58(6): 539-544.
31. World Health Organization. (2016). Physical Activity Fact Sheet. Retrieved November 27, 2016 from: http://www.who.int/mediacentre/factsheets/fs385/en/.
32. Wilson, P.M., Rodgers, W.M., Fraser, S.N., & Murray, T.C. (2004). Relationships between exercise regulations and motivational consequences in university students. Res Q Exercise Sport, 75(1), 81-91.