

The Relationship Between Exercise Motives and Physical Self-Esteem in Female Exercise Participants: An Application of Self-Determination Theory¹

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This study examined the relationship between exercise motives and physical self-esteem (PSE) in physically active females using Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000). Female exercise participants recruited from university-based exercise classes reported their motives for exercise during Week 2, and their levels of PSE during Week 12, of a 15-week exercise class. Bivariate correlations indicated that exercise motives displayed a graded pattern of relationships. They also suggested that only autonomous exercise motives were associated with higher PSE. Discriminant function analysis revealed that more autonomous exercise motives correctly classified 83.3% of the high PSE group and 88.9% of the low PSE group. These findings support Ryan and Deci's assertions and suggest that autonomous exercise motives may play an important role in positive PSE in the exercise domain. These findings advance the application of SDT in the exercise domain and further our understanding of PSE development.

Recent research (Ebbeck & Weiss, 1998; Eklund, Whitehead, & Welk, 1997) and commentary (Fox, 1997) suggest that there has been a surge of interest in furthering our understanding of positive self-perceptions in the physical domain. This interest is hardly surprising given the robust links between physical self-perceptions, such as physical self-esteem (PSE) and self-concept, and facets of physical fitness (Marsh, 1993), participation in physical activity (Whitehead & Corbin, 1997), and overall mental health (Sonstroem & Potts, 1996). Despite these encouraging findings, a comprehensive understanding of the processes

that operate within the self-system and give rise to physical self-perceptions remains unclear. Calls for more research elucidating mechanisms of physical self-perception development have been forthcoming (see Fox, 1997, for a review).

Fox (1997) noted that perceived competencies form the cornerstone of contemporary self-perception models and dominate the development of both self-perception measures (Fox & Corbin, 1989; Marsh, 1996) and research (Ebbeck & Weiss, 1998) examining the determinants of self-esteem in the physical domain. This approach has been useful in identifying the content (Fox & Corbin, 1989; Marsh, Richards, Johnson, Roche, & Tremayne, 1994) and structure (Marsh, 1993, 1996) of the self by placing global self-esteem at the apex of a hierarchy underpinned by the self-perceptions that are pertinent to important life domains (e.g., physical, emotional, social, academic). However, some research indicates that changes in both physical self-worth and global self-esteem occur in the absence of shifts in domain-specific competencies (Crocker, Chad, Hubert, & Graham, 1994; McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000; Page, Fox, MacMannus, & Armstrong, 1994). These findings suggest that other psychological mechanisms may play an influential role in shaping and sustaining positive physical self-perceptions. Consequently, Fox (1997) has called for additional research examining the processes responsible for the formation of the physical self-perceptions that complement the current evidence centered on domain-specific competencies. The purpose of this study was to examine the relationship between autonomous exercise motives and PSE in female exercise participants on the basis of arguments forwarded by Self-Determination Theory (SDT; Deci & Ryan, 1985, 1995; Ryan & Deci, 2000).

Self-Determination Theory

SDT proposes that motives (called "regulations" in SDT parlance) reside along a self-determination continuum. It also specifies the psychological conditions (called "nutriments" in SDT parlance) responsible for motivational development and overall psychological well-being (Deci & Ryan, 1985; Ryan & Deci, 2000). According to the theory, social contexts that satisfy the psychological need for competence, autonomy, and relatedness facilitate the development of more self-determined regulations, which, in turn, underpin both task persistence and psychological well-being (Ryan & Deci, 2000; Sheldon, Elliot, Kim, & Kasser, 2001). *Competence* refers to interacting effectively with one's environment by mastering challenging tasks (White, 1958). *Autonomy* involves feeling free to choose one's own behavior and, more importantly, specifies that one's behavior emanates from an internal perceived locus of causality (deCharms, 1968). Finally, *relatedness* refers to feeling meaningfully connected to others within a given social milieu (Baumeister & Leary, 1995).

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According to SDT, extrinsic regulations span a continuum that ranges from being highly controlling to having more volitionally endorsed internalizations (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000). In the exercise domain, *external regulation* represents the least self-determined form of extrinsic motivation and involves exercising to satisfy an external demand. *Introjected regulation*, the next point along the continuum, involves feeling coerced to exercise in order to avoid negative feelings or to support conditional self-worth. Finally, *identified regulation* refers to participating because of the important benefits associated with exercising, even though the behavior itself is not inherently enjoyable.³

Conceptually, identified regulation represents the lower boundary of self-determined regulation, but it is still considered to be extrinsically motivated because the reasons for the behavior itself are instrumental. In addition to extrinsic motives, SDT also contends that behavior can be *intrinsically regulated* when participation is undertaken volitionally for the pleasure, satisfaction, and interest derived from exercise itself (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000). From the perspective of SDT, all behaviors regulated via intrinsic motives are self-determined and, therefore, intrinsic regulation conceptually represents the upper boundary of self-determined motivation.

The continuum proposed by SDT posits that motives are underpinned by varying degrees of psychological need satisfaction, such that adjacent constructs along the motivational continuum will be more positively associated with one another than with distal constructs (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000). Given that previous research indicates that greater need satisfaction is associated with the quality of motivational development (Ryan, 1995; Sheldon et al., 2001), it follows that the motives nurtured by different degrees of need satisfaction underpin various consequences. SDT contends that intrinsic regulation predicts the most positive motivational consequences, and evidence in a broad array of domains now supports this contention (see Vallerand, 1997, for a review). Ryan (1995), however, contends that "the lion's share of social development concerns the assimilation of culturally transmitted behavioral regulations and valuations that are neither spontaneous nor inherently satisfying" (p. 405). One implication of Ryan's assertion is that even though some people do enjoy exercising per se, a number of people are not intrinsically motivated to exercise (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). From the perspective of SDT, this suggests that people internalize the value associated with regulating exercise behavior, even though physical activity itself is not inherently pleasurable or

satisfying. Therefore, it seems that the quality of regulation responsible for different motivational consequences is worthy of further investigation, particularly in those domains (such as exercise) where the target behavior is unlikely to be construed as being enjoyable.

Recent research (Kernis, Paradise, Whittaker, Wheatman, & Goldman, 2000) and commentary (Deci & Ryan, 1995) present a cogent argument linking the quality of motivation with both the level and type of self-esteem. Deci and Ryan contend that the foundations responsible for nurturing true self-esteem are "developed as one acts volitionally (i.e., autonomy), experiences an inner sense of efficacy (i.e., competence), and is loved for (i.e., feels related to) who one is rather than for matching some external standard" (p. 33). The study by Kernis et al. supports this contention, indicating that global perceptions of self-worth are negatively associated with external and introjected regulations and positively linked with more autonomous identified and intrinsic regulations. In line with this argument, it seems reasonable to suggest that autonomous regulations for physical activity may underpin PSE, as well as more globalized perceptions of self-worth. Therefore, the purpose of this study was to examine the relationship between autonomous exercise motives and PSE.

The current study contributes to, and extends, the current literature by advancing the theoretical framework employed in the study of physical self-perceptions within the exercise domain. This study represents an initial attempt to consider SDT's regulatory continuum (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000) as a viable theoretical framework for explaining differences in physical self-perceptions in physically active females. By examining the link between autonomous exercise motives and PSE, this study explores Fox's (1997) assertion that perceived autonomy represents an important psychological mechanism responsible for the development of positive physical self-regard. These relationships may be particularly important in women, given that population health research indicates that females are less physically active than their male counterparts (Craig, Russell, Cameron, & Beaulieu, 1999), suggesting that there is a need to further our understanding of the psychological mechanisms regulating women's physical activity participation.

Based on both SDT and recent commentary (Deci & Ryan, 1995; Fox, 1997; Whitehead & Corbin, 1997), three specific hypotheses were formulated and examined in the current study. First, we hypothesized that the motives representing SDT's regulatory continuum would display an ordered pattern of relationships such that adjacent constructs would be more positively associated with one another than with distal constructs. Second, we hypothesized that autonomous motives (intrinsic and identified regulations) would be more positively associated with PSE than would controlling motives (introjected and extrinsic regulations). Finally, we hypothesized that only autonomous exercise motives would predict the membership of female exercisers in high or low PSE groups.

³In the broader context of Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), there is another form of extrinsic motivation termed *integrated regulation*. Integrated regulation occurs "when identified regulations have been fully assimilated to the self" (Ryan & Deci, 2000, p. 62). It conceptually represents a point along the motivational continuum between identified and intrinsic regulation.

Method

Participants

Participants were 114 women enrolled in campus recreation exercise classes (M age = 25.98 years, SD = 11.17). The participants were enrolled in a 15-week exercise class that focused predominantly on cardiovascular fitness exercises (e.g., aerobic dance, cycling, swimming, walking). All exercise classes were held twice per week for the 15-week period, lasted approximately 50 min, and were taught by qualified fitness instructors. Participants completed measures of exercise motives at Time 1 (Week 2 of the class) and a measure of PSE at Time 2 (Week 12 of the class).

Measures

Demographics. Participants provided their age, sex, height, and weight at the time of data collection. Body Mass Index (BMI) values were computed for participants by dividing their weight by their height squared (Kg/M^2). BMI values are commonly used as a global indicator of physical health in asymptomatic populations, with healthy values typically ranging from 20 to 25 (Kerney, 1995). An examination of the descriptive statistics suggested that participants in this sample had BMI values ($M_{\text{BMI}} = 22.71$, $SD = 2.89$) that fell within the limits defining the healthy range.

Behavioral Regulation in Exercise Questionnaire (BREQ). Participants completed the BREQ (Mullen, Markland, & Ingledew, 1997), a 15-item self-report measure assessing the reasons that people exercise. The BREQ operationalizes exercise motivation along a graded self-determination continuum and includes scales assessing *extrinsic* (e.g., "I exercise because other people say I should"), *introjected* (e.g., "I feel guilty when I don't exercise"), *identified* (e.g., "I value the benefits of exercise"), and *intrinsic* (e.g., "I exercise because it's fun") exercise motives. Following the stem, "Why do you exercise?", participants respond to each item on a 5-point Likert scale ranging from 1 (*not true for me*) to 5 (*very true for me*). Previous research has supported the factorial (Mullen et al., 1997) and discriminant (Mullen & Markland, 1997) validity of the BREQ in exercise populations.

Physical self-esteem (PSE). PSE was assessed using the physical self-concept subscale of the Physical Self-Description Questionnaire (PSDQ; Marsh et al., 1994). This scale provides a global evaluation of the degree or level of positive feelings a person holds about his or her physical self (Marsh, 1996; Marsh et al., 1994). Psychometric support for this subscale has been established through extensive factor analytic and multitrait-multimethod procedures (Marsh, 1996; Marsh et al., 1994). Participants responded to six items (sample item: "I feel good about the way I look and what I can do physically") on a 5-point Likert

scale ranging from 1 (*false*) to 5 (*true*). Consistent with the recommendations of Marsh et al. (1994), item parcels were formed by averaging consecutive pairs of items to reduce the six individual items into 3-item parcels (two items per parcel), which were then averaged to form the PSE scale score for each participant.

Procedures

After obtaining permission from the class instructor, exercise participants were informed about the purpose of the study at the start of a regularly scheduled exercise class. At the end of the class, participants were given an opportunity to ask questions regarding the nature of the study and were invited to participate. Informed consent was obtained from each participant prior to data collection. Data collection occurred at two time points. During the first data collection (January), which was 2 weeks after the start of the exercise class, participants completed measures assessing demographic information and exercise motives. During the second data collection (April), which was 10 weeks after the assessment at Time 1, participants completed a measure of PSE.

Data Analysis

Data analyses occurred in three stages. First, descriptive statistics and internal consistency estimates (coefficient alpha; Cronbach, 1951) were calculated for all relevant study variables. Second, Pearson correlations were computed among all study variables to examine bivariate relationships for the total sample. Third, a predictive discriminant function analysis was performed to determine whether females categorized into either higher or lower PSE groups could be classified on the basis of their BREQ scores. Consistent with the recommendations of Pedhazur (1997), variables with structure coefficients greater than .30 were used to define the functions.

The two PSE groups were formed on the basis of an extreme group split of the PSE data ($M_{\text{PSE}} \pm 1 SD$). These procedures were deemed necessary for both theoretical and applied reasons. From a theoretical standpoint, previous research has demonstrated that low self-esteem is associated with self-concept instability (Kernis et al., 2000). This instability is conceptually similar to contingent self-esteem (Deci & Ryan, 1995). Exercise participants with low self-esteem are more likely to have a fragmented view of their self-concept that requires, but is unlikely to receive, the continual validation required to sustain high self-regard. The major applied interest of this study was determining whether autonomous motives prove useful in discriminating between exercise participants holding diverse perceptions of their physical self-worth. Support for this relationship would illustrate the importance of autonomous regulations as a potential mechanism for positive self-worth changes in the physical domain. Feldt (1961) contends that extreme group designs lend themselves well to the study of theoretical

relationships between variables when the goal is to demonstrate plausible mechanisms of change between two groups. Consequently, it was deemed suitable to employ an extreme groups design in this study, given the theoretical and applied considerations involved.

Results

Preliminary Analyses

Internal consistency estimates (Cronbach, 1951) were computed for all BREQ subscales and the physical self-concept subscale of the PSDQ. The results of these analyses (Table 1) indicated that all multiitem subscales used in this study met or exceeded conventionally acceptable criteria (DeVellis, 1991). Therefore, all variables were deemed suitable for inclusion in subsequent analyses. Descriptive statistics were calculated for all relevant study variables and are presented in Table 1. No particular areas of concern emerged in terms of the distributional properties of the BREQ and PSE variables; however, both age and BMI were somewhat kurtotic. Consistent with previous research in the exercise domain (Mullen & Markland, 1997; Mullen et al., 1997), the female exercise participants in this study reported more identified and intrinsic reasons for exercise participation than external and introjected reasons. PSE scores were slightly higher than those reported by Marsh et al. (1994) for female high school students. The high ($M = 5.76$, $SD = 0.22$) and low ($M = 2.94$, $SD = 0.48$) PSE groups were significantly different from one another in terms of their scale scores following the extreme group's split of the data, $t(40) = -23.990$, $p < .001$. Furthermore, the low PSE group reported mean scale scores that fell below the theoretical midpoint (<3.5) of the scale.

Relationships Among Demographics, BREQ Motives, and PSE

Pearson correlations were computed to examine the relationships among age, BMI, BREQ motives, and PSE. The results (Table 1) revealed several interesting patterns of relationships. Age was weakly associated with introjected regulation, whereas BMI was not significantly associated with either exercise regulations or PSE. Consistent with our first hypothesis, an ordered pattern of relationships emerged among the BREQ motive subscales, indicating that proximal constructs were more strongly and positively correlated with one another than were distal constructs. Finally, external regulation was negatively correlated with PSE, whereas identified and intrinsic regulations were positively correlated with PSE, thus rendering some support for our second hypothesis.

Discriminant Function Analysis

The main hypothesis regarding the relationship between autonomous motives and physical self-esteem was tested using a predictive discriminant function

Table 1
Descriptive Statistics and Relationships Among Study Variables (N = 114)

	<i>M</i>	<i>SD</i>	Skew-ness	Kur-tosis	1	2	3	4	5	6	7
1. Age	25.98	11.17	2.77	7.69	—						
2. BMI	22.71	2.89	1.54	3.12	.11	—					
3. External regulation	1.44	0.63	1.68	2.22	.04	-.03	(.82)				
4. Introjected regulation	2.64	0.89	0.16	-0.57	-.15*	.05	.24**	(.71)			
5. Identified regulation	4.26	0.76	-1.44	2.24	.09	-.09	-.20**	.39***	(.85)		
6. Intrinsic regulation	4.19	0.82	-1.24	1.65	.06	-.08	-.23**	.14	.78***	(.92)	
7. PSE	4.58	0.91	-0.87	0.43	.05	-.02	-.21**	-.10	.25**	.32***	(.96)

Note. BMI = Body mass index; PSE = Physical self-esteem. Reliability estimates (Cronbach's α) are placed along the principal diagonal for all multiitem scales.

* $p < .10$. ** $p < .05$. *** $p < .01$ (two-tailed).

(PDF) analysis. This analysis was used to predict membership in two PSE groups from four motivational variables assessed by the BREQ (external, introjected, identified, and intrinsic). Previous research suggests that PDF is a fairly robust analytical technique with various sample sizes (Duarte Silva & Starn, 1995). Huberty (1994) recommends a minimum sample size per group that is equivalent to $3(p)$, where p is the number of predictor variables employed in the analysis. The extreme group's split of the PSE data resulted in 20 participants being assigned to the high and low PSE groups, respectively. On the basis of Huberty's recommendations, the sample sizes in each group ($n = 20$) were adequate, given that there were four predictors used in the analysis (BREQ scales).

One significant discriminant function emerged from this analysis (canonical $r = .717$), Wilks's $\Lambda = .487$, $\chi^2(4) = 23.051$, $p < .001$. An examination of the standardized canonical discriminant function coefficients (Table 2) suggested that both identified and intrinsic regulation predicted PSE group membership, with introjected regulation approaching a value consistent with Pedhazur's (1997) criteria. Collectively, the discriminant function correctly specified 86.1% of the overall cases, accurately classifying 83.3% of the high PSE group and 88.9% of the low PSE group. Given that classification by chance alone typically renders 50% of the cases correctly (Huberty, 1994), it would seem that autonomous motives are useful in predicting membership in PSE groups.

Discussion

The purpose of this study was to apply the propositions put forth within SDT (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000) by examining the relationship between autonomous exercise motives and physical self-esteem in female exercise participants. Consistent with theoretical arguments, exercise regulations displayed an ordered pattern of relationships indicative of an underlying continuum of psychological need satisfaction. Furthermore, females who endorsed identified or intrinsic reasons for exercise were more likely to report higher perceptions of their physical self-worth, whereas participants relying predominantly on external regulations reported lower PSE. The results of the discriminant function analysis indicated that high and low PSE group membership was predicted by more autonomous (identified and intrinsic) exercise regulations. Collectively, these findings extend the application of SDT in the exercise domain by expanding the scope of motivational consequences associated with the regulatory continuum. These findings also provide preliminary support for the utility of SDT as a guiding theoretical framework highlighting plausible routes underpinning physical self-perception development and maintenance.

Consistent with our initial hypotheses, exercise motives as measured by the BREQ demonstrated an ordered pattern of relationships with one another that was indicative of an underlying continuum of psychological need satisfaction. An

Table 2
Descriptive Statistics and Structure Coefficients for Higher and Lower Physical Self-Esteem (PSE) Groups

	Low PSE ($n = 20$)		High PSE ($n = 20$)		Coefficients for canonical discriminant variables ^a	Correlation of predictor variables with discriminant function ^b	Univariate F values (1, 39)
	M	SD	M	SD			
External regulation	1.55	0.71	1.23	0.47	.049	-.092	2.904
Introjected regulation	2.76	0.90	2.60	0.77	-.370	-.260	0.366
Identified regulation	3.93	0.61	4.73	0.43	.643	.735	23.156****
Intrinsic regulation	3.82	0.62	4.73	0.36	.578	.874	32.786****

Note. High PSE = ($M + 1 SD$); Low PSE = ($M - 1 SD$).

^a Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions. ^b Standardized canonical discriminant function coefficients.

**** $p < .001$.

inspection of the pattern of correlations presented in Table 1 indicates that motives proximal to one another along SDT's regulatory continuum were more positively and strongly associated with each other than with distal motives. This finding is consistent with a larger body of research in other domains (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand, 1997), and it more generally supports arguments put forth by SDT regarding the influence of psychological need satisfaction on motivational development (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000).

The results of this study indicate a pattern of positive relationships between more autonomous exercise motives and higher PSE, whereas the discriminant function analysis supports our main hypothesis, given that females reporting high and low PSE were accurately classified according to the autonomous motives regulating their exercise involvement. Collectively, these data support SDT propositions (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000) and suggest that women who value the important health outcomes associated with being physically active (identified regulation) or find exercise itself pleasurable and self-rewarding (intrinsic regulation) are likely to report higher PSE. With reference to the exercise domain, these results suggest that autonomous exercise

motives can influence more than merely behavioral adherence and may play a role in the development of physical self-perceptions that have previously been linked with overall mental health (Sonstroem & Potts, 1996). Interestingly, the results indicated that introjected regulation approached a value typically considered meaningful in discriminant function analysis (Pedhazur, 1997). However, the direction of the standardized coefficients (Table 2) revealed that women reporting higher levels of PSE scored lower on this facet of exercise regulation, implying that regulations that are not wholly self-endorsed are unlikely to improve perceptions of one's physical self-worth.

Theoretical and Practical Implications

The results of this study provide empirical support for the contention that autonomous regulations are favorably associated with psychological consequences that contribute toward enhanced well-being (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000). In line with these theoretical arguments, both identified and intrinsic exercise regulations were positively associated with higher PSE, suggesting that positive consequences may ensue from autonomous regulations other than simply intrinsic motives (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand, 1999). From a theoretical standpoint, these results imply that self-perception models interested in elucidating the mechanisms responsible for physical self-worth promotion may wish to consider the influence of autonomous regulations within the self-system in particular and the role of perceived autonomy within the exercise domain more generally.

In conjunction with the theoretical relevance of this study, these findings suggest that people who feel compelled to exercise by conforming to social pressures or constraints are unlikely to develop motivational patterns that either sustain exercise involvement or promote overall physical self-worth. Consequently, health practitioners interested in promoting or sustaining positive self-perceptions through exercise would do well to consider the reasons regulating exercise participation when implementing interventions designed to improve physical self-worth. In this regard, Deci and Ryan (1985) presented a cogent argument suggesting that autonomy can be developed by altering facets of the social context such as perceived autonomy support, environmental structure, and involvement. Markland (1999) suggested that each dimension of the social milieu described by Deci and Ryan seems relevant and amenable to intervention in the exercise domain with the intent of enhancing perceptions of autonomy.

Limitations and Future Directions

Despite the promising theoretical and practical implications associated with the current findings, several limitations should be noted when interpreting the results and planning future research with SDT in the exercise domain. First,

the sample consisted predominantly of young females who were involved in supervised exercise classes conducted in a university setting. Consequently, the generalizability of this study is limited and future research may wish to examine the applicability of these findings to other exercise contexts (e.g., strength training, rehabilitation) and populations (e.g., males, older adults). Second, the correlational design of this study precludes causal inferences about the role of autonomous motives in PSE development. Future studies may wish to address this issue using experimental designs that examine both the influence of manipulating perceived autonomy support in exercise contexts on motivational development and the impact of altering motivational regulations in nurturing changes in PSE over time. Finally, recent theorizing within the context of SDT (Deci & Ryan, 1995; Kernis et al., 2000) has argued for a distinction between true and contingent sources of self-esteem; however, the current study only measured the overall level of PSE reported by women. Consequently, future research may wish to examine the influence of motivational regulations that vary in autonomy on both the type (true vs. contingent) and level (high vs. low) of self-esteem reported in the exercise domain.

In summary, this study provides preliminary support linking autonomous exercise regulations with higher perceptions of physical self-worth in physically active females. The evidence suggests that both identified and intrinsic exercise regulations were associated with higher perceptions of one's PSE, a finding that is meaningful in the context of SDT, which contends that positive behavioral and psychological consequences ensue from more autonomous regulations (Deci & Ryan, 1985, 1995; Ryan & Deci, 2000). Notwithstanding the limitations of this study, and given the importance of positive self-regard in the physical domain, it seems reasonable to suggest that future research interested in examining factors responsible for psychological well-being in the exercise domain may wish to consider the utility of SDT as a guiding theoretical framework.

References

- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*, 497-529.
- Craig, C. L., Russell, S. J., Cameron, C., & Beaulieu, A. (1999). *Foundation for joint action: Reducing physical inactivity*. Ottawa, ON, Canada: Canadian Fitness and Lifestyle Research Institute.
- Crocker, P., Chad, K., Hubert, L., & Graham, T. (1994). The effects of a 10-week jump rope program on physical self-perceptions of grade nine students. *Journal of Sport & Exercise Psychology, 16*, S44.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 2*, 135-138.

- deCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. New York, NY: Academic Press.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.
- Deci, E. L., & Ryan, R. M. (1995). Human agency: The basis for true self-esteem. In M. H. Kernis (Ed.), *Efficacy, agency, and self-esteem* (pp. 31-50). New York, NY: Plenum
- Devellis, R. F. (1991). *Scale development: Theory and applications*. Newbury Park, CA: Sage.
- Duarte Silva, A. P., & Stann, A. (1995). Discriminant analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 277-318). Washington, DC: American Psychological Association.
- Ebbbeck, V., & Weiss, M. R. (1998). Determinants of children's self-esteem: An examination of perceived competence and affect in sport. *Pediatric Exercise Science, 10*, 285-296.
- Eklund, R. C., Whitehead, J. R., & Welk, G. J. (1997). Validity of the children and youth Physical Self-Perception Profile: A confirmatory factor analysis. *Research Quarterly for Exercise & Sport, 68*, 249-256.
- Feldt, L. S. (1961). The use of extreme groups to test for the presence of a relationship. *Psychometrika, 26*, 307-316.
- Fox, K. R. (1997). *The physical self: From motivation to well-being*. Champaign, IL: Human Kinetics.
- Fox, K. R., & Corbin, C. B. (1989). The physical self-perception profile: Development and preliminary validation. *Journal of Sport & Exercise Psychology, 11*, 408-430.
- Huberty, C. J. (1994). *Applied discriminant analysis*. New York, NY: John Wiley & Sons.
- Kerny, W. (1995). *American College of Sports Medicine's guidelines for exercise testing and prescription*. Baltimore, MD: Williams & Wilkins.
- Kernis, M. H., Paradise, A. W., Whitaker, D. J., Wheatman, S. R., & Goldman, B. N. (2000). Master of one's psychological domain? Not likely if one's self-esteem is unstable. *Personality & Social Psychology Bulletin, 26*, 1297-1305.
- Markland, D. (1999). Self-determination moderates the effects of perceived competence on intrinsic motivation in an exercise setting. *Journal of Sport & Exercise Psychology, 21*, 351-361.
- Marsh, H. W. (1993). The multidimensional structure of physical fitness: Invariance over gender and age. *Research Quarterly for Exercise & Sport, 64*, 256-273.
- Marsh, H. W. (1996). Physical self-description questionnaire: Stability and discriminant validity. *Research Quarterly for Exercise & Sport, 67*, 249-262.
- Marsh, H. W., Richards, G. E., Johnson, S., Roche, L., & Tremayne, P. (1994). Physical self-description questionnaire: Psychometric properties and multitrait-multimethod analysis of relations to existing instruments. *Journal of Sport & Exercise Psychology, 16*, 270-305.
- McAuley, E., Blissmer, B., Katula, J., Duncan, T. E., & Mihalko, S. (2000). Physical activity, self-esteem, and self-efficacy relationships in older adults: A randomized controlled trial. *Annals of Behavioral Medicine, 22*, 131-139.
- Mullen, E., & Markland, D. (1997). Variations in self-determination across the stages of change for exercise in adults. *Motivation & Emotion, 21*, 349-362.
- Mullen, E., Markland, D., & Ingledeu, D. K. (1997). A graded conceptualization of self-determination in the regulation of exercise behavior: Development of a measure using confirmatory factor analysis procedures. *Personality & Individual Differences, 23*, 745-752.
- Page, A., Fox, K. R., MacManus, A., & Armstrong, N. (1994). Profiles of self-perception change following an 8-week aerobic training program. *Journal of Sport Sciences, 12*, 204.
- Pedhazur, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction*. Orlando, FL: Harcourt Brace.
- Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*, 397-428.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.
- Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology, 28*, 335-354.
- Sheldon, K. M., Elliot, A. J., Kim, Y., & Kassir, T. (2001). What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality & Social Psychology, 80*, 325-339.
- Sonstroem, R. J., & Potts, S. A. (1996). Life adjustment correlates of physical self-concepts. *Medicine & Science in Sport & Exercise, 28*, 619-625.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271-360). San Diego, CA: Academic Press.
- Vallerand, R. J. (1999). Intrinsic and extrinsic motivation in sport: Toward a hierarchical model. In R. Lidor & M. Bar-Eli (Eds.), *Sport psychology: Linking theory to practice* (pp. 191-212). Morgantown, WV: Fitness Information Technology.
- White, R. W. (1958). Motivation reconsidered: The concept of competence. *Psychological Review, 66*, 297-333.
- Whitehead, J. R., & Corbin, C. B. (1997). Self-esteem in children and youth: The role of sport and physical education. In K. R. Fox (Ed.), *The physical self: From motivation to well-being* (pp. 175-203). Champaign, IL: Human Kinetics.