

Original Research

The Role of High School Physical Activity Experience in College Students' Physical Activity Motivation

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ABSTRACT

International Journal of Exercise Science 7(2) : 98-109, 2014. This study tested the role of past physical activity mode in predicting physical activity motivation of first year college students. Consistent with self-determination theory, perceived competence and autonomy were expected to mediate the relationships of specific types of physical activity engaged in during high school to autonomous motivation for physical activity in college. College students ($N = 124$; $M_{age} = 18.42$, $SD = 0.51$) completed an online questionnaire that assessed frequency of engagement in different modes of physical activity during their final year of high school (i.e., competitive sport, recreational sport, aerobic exercise, resistance exercise, organized activities and recreational activities) and current perceptions of competence and autonomy and autonomous motivation for physical activity in college. Path analysis results showed that feelings of competence and autonomy mediated the relationships of past engagement in competitive sport and resistance exercise to current autonomous motivation for physical activity. Competitive sport involvement positively predicted both perceived competence and autonomy, whereas resistance exercise positively predicted perceived competence. Results supported self-determination theory and suggest that creating more opportunities for students to stay involved in competitive sport and engage in resistance exercise may be important for sustaining physical activity behaviours in college.

KEY WORDS: Physical activity mode, perceived competence, perceived autonomy, autonomous motivation, self-determination theory

INTRODUCTION

There are multiple developmental epochs across the lifespan during which physical activity patterns undergo significant change. Early adolescence is one of these and represents the first substantial decline in physical activity, particularly moderate to vigorous activity, for both boys and girls (e.g., 26, 27, 33). Another is when adolescents begin to enter young adulthood

(e.g., 27), and has been shown to be particularly marked for those students transitioning from high school to college (5). The cumulative effect of these declines means most college students do not engage in physical activity at a level sufficient to gain health benefits (e.g., 16). Understanding the factors that contribute to physical activity changes upon entering college are important for identifying

effective tools for health promotion in college aged men and women.

One such factor that is a well-known predictor of future physical activity behaviour is past physical activity behaviour (3). However, the relationship between past and current physical activity behaviours is modest at best (12, 21), suggesting that this relationship may depend on characteristics of individuals' past physical activity experiences. One characteristic of past physical activity behaviour that may help explain this relationship is the mode of physical activity in which youth participate. Many studies have documented the important role that youth sport participation plays in positively predicting adult sport participation (34) and physical activity levels more generally (33). For example, Telama and colleagues conducted a 21-year longitudinal study and demonstrated that not only regular sport participation, but also persistence at sport (i.e., 3 or 6 years of participation) and participation in high-level competitions were positive predictors of physical activity levels during adulthood, particularly so for males (32). Additionally, Vanruesal et al. found that recreational sport participation during adolescence was a stronger predictor of adult sport participation twenty years later than competitive sport participation in a sample of boys (34). Although past sport participation appears to play an important role in adult's physical activity patterns, research is limited in the examination of potential explanatory variables in this relationship or the role of other modes of physical activity during childhood or adolescence (e.g., exercise, recreational activities). It may be useful to utilize self-determination theory (SDT; 7, 29) as a motivational framework and

explanatory variable within which to examine the role of past physical activity experiences (i.e., competitive sport, recreational sport, aerobic exercise, resistance exercise, organized activities and recreational activities) in explaining current physical activity motivation in first year college students.

Self-determination theory suggests that autonomous reasons for participating in physical activity are more likely to lead to physical activity adherence (7, 29). These autonomous reasons include participating because physical activity is fun for the individual (i.e., intrinsic motivation), a core piece of the individual's identity (i.e., integrated regulation) or viewed as important to the individual (i.e., identified regulation). Physical activity research has clearly supported the positive relationships of autonomous forms of motivation to both physical activity intentions and behaviour (8, 38).

Furthermore, SDT states that in order for individuals to experience more autonomous motivation for physical activity, they must feel competent (i.e., effective in one's environment), autonomous (i.e., volitional), and socially connected or related (29). Feelings of competence and autonomy may be particularly relevant to understanding the link between past physical activity experiences and current physical activity motivation. For example, past activities that help individuals develop greater physical competence and that are engaged in for more autonomous reasons may help students feel more competent and autonomous with respect to physical activity in college and thus more likely to experience autonomous forms of

motivation. Since feelings of relatedness are highly dependent upon the specific social context in which physical activity occurs, it appears less relevant for predicting future autonomous motivation after the transition to a new social context (i.e., high school to college). In addition, perceived relatedness has generally shown to be a poor predictor of motivation-related outcomes in exercise contexts (37). Thus, we chose to focus on the roles of perceived competence and autonomy in explaining the relationships between different modes of physical activity and autonomous motivation in this study.

Activities that may be more likely to support perceptions of competence and thus autonomous motivation for physical activity include competitive sport participation where there is a focus on skill development. Youth sport research supports this contention by consistently showing positive relationships between youth sport participation and perceptions of competence or overall self-concept (9, 23, 24). For example, Findlay and Bowker showed that athletes report higher perceptions of physical competence, physical appearance, physical self-esteem and global self-esteem compared to non-athletes during adolescence (9). Similarly, individuals may feel more volitional or autonomous engaging in some activities relative to others. For example, research consistently shows that individuals choose to engage in sport for more self-determined or autonomous reasons compared to the reasons they choose to engage in exercise (11, 19, 30). Kilpatrick and colleagues showed that college students were more likely to participate in sport for intrinsic reasons such as enjoyment and more likely to participate in exercise for extrinsic

reasons such as changing one's physical appearance or gaining health benefits (19). Though specific SDT (29) constructs (e.g., perceived autonomy, autonomous motivation) were not directly assessed in this study, the results suggest that participation in sport may engender greater feelings of autonomy compared to participation in exercise.

Numerous physical activity studies have supported the positive relationships of perceived competence and autonomy to more autonomous motivation (e.g., 8, 25, 39). However, there is little evidence that studies have simultaneously considered the role of past physical activity modes from a SDT perspective. Utilizing variables from SDT (i.e., perceived competence and autonomy) may help identify which forms of physical activity are more likely to support and sustain autonomous forms of motivation across the transition to college. Therefore, the purpose of this study was to test the mediating roles of perceived competence and autonomy in explaining the relationship between mode of past high school physical activity participation (retrospectively) and autonomous physical activity motivation during students' first year in college. Six modes of physical activity were examined in this study including competitive sport, recreational sport, aerobic exercise, resistance exercise, organized activities and recreational activities. These modes were selected in order to represent all forms of physical activity and align with the literature regarding youth physical activity participation (e.g., 2, 10, 18, 28, 35).

It was hypothesized that greater participation in competitive sports would positively predict perceptions of

competence and autonomy and, in turn, greater autonomous motivation. It was also predicted that greater participation in aerobic and resistance exercise would negatively predict perceived autonomy and, in turn, less autonomous motivation since individuals tend to choose to exercise for more external reasons (19). Due to the lack of research on the other modes of physical activity relative to motivation variables, we took an exploratory approach to examining their relationships with motivation variables and no further activity-specific hypotheses were forwarded.

METHODS

Participants

After approval was granted from the Institutional Review Board and university officials, an email with a link to an online questionnaire was sent to all first year students living on campus at a mid-size university in the Midwest who agreed to be contacted to participate in research during the spring of their first year in college. The majority of first year students live on campus (97%) thus the survey was sent to approximately 3880 of the 4000 freshman students in the spring of 2011. As an incentive, students were told they could provide their email address to be entered into a drawing for a \$25.00 gift card upon completion of the survey. Students who chose to participate were directed to click on a link in the email that took them to the website where they could complete a 40-item questionnaire assessing all study variables. Participants indicated their consent by clicking on a box to proceed to the first set of questions. Participants were instructed to take the survey in a secluded area so confidentiality could be maximized

while simultaneously minimizing influence from others. Participants included 124 ($M_{age} = 18.42$, $SD = 0.51$) first year students from a variety of majors, 91 of whom were female. This reflected a 3% response rate. Survey responses with no individual identifiers were downloaded onto a password protected computer for analyses.

Protocol

Autonomous motivation was assessed using the Behavioural Regulation in Exercise Questionnaire-2 (22). Included are subscales for intrinsic motivation (4 items), identified regulation (3 items), introjected regulation (3 items), external regulation (4 items) and amotivation (4 items) reflecting the different reasons why individuals engage in physical activity. Students responded to the stem, "Why do you engage in physical activity?", on a 5-point scale ranging from "not true for me" (0) to "very true for me" (4). There is research evidence supporting the construct validity and internal consistency reliability of scale scores in adults (22). For data analyses, the mean of students' responses to the intrinsic motivation and identified regulation items was used to represent autonomous motivation.

Students perceptions of ability and freedom of choice were assessed using items from the Psychological Need Satisfaction in Exercise Scale (40). Only items from the subscales measuring perceived competence (6 items) and autonomy (6 items) were included on the survey. Students responded to items regarding how they currently felt while participating in physical activity on a 6-point scale from "false" (1) to "true" (5) with the average of the six items representing each variable. Research with physically active adults supports the

construct validity and internal consistency reliability of subscale scores (39, 40).

Prior physical activity was assessed with 6 items created for this study asking participants to report the number of hours spent per week in the following activities during students' senior year of high school (i.e., the previous year). The questions were worded as, "How many hours a week did you spend practicing or playing:" Competitive Sport (e.g., participation on school or club teams), Recreational Sport (e.g., participation on intramural teams), Aerobic Exercise (e.g., jogging, biking, swimming), Resistance Exercise (e.g., free weights, resistance bands), Organized Physical Activity (e.g., non-competitive martial arts or dance), and Recreational Physical Activity (e.g., skiing, rock climbing, hiking). More example activities were included on the actual survey and are not listed here for space considerations. The item responses to each type of activity included 0, 1-5, 6-10, 11-15, and 15 or more hours. These responses were then coded on a scale from 0 (0) to 4 (15 or more) for the main analyses.

Statistical Analysis

Descriptive statistics were generated using PASW Statistics 18 (IBM Corporation) and the data were tested to see if they met assumptions for multivariate analyses. Cronbach's alpha coefficients were calculated to assess the internal consistency reliability of the perceived competence, autonomy and motivation subscales. Values greater than .70 indicate acceptable scale reliability. In order to address the study purpose, path analysis using only observed variables in Lisrel 8.71 (Scientific Software International Inc., Chicago, IL) was used to conduct a test of mediation.

Path analysis is advantageous because it allows us to consider the roles of all modes of physical activity simultaneously (and control for the correlations among them) as well as test both direct and indirect relationships to autonomous motivation. Due to a relatively small sample size, only observed indicators (i.e., the mean of each variable) were used when testing each model to preserve power and maintain a reasonable ratio of sample size to parameter estimates (i.e., 10:1)(20). We followed the recommendations of James, Mulaik, and Brett for testing mediation using structural equation modeling by first testing a model of complete mediation (i.e., mediation model) with only indirect paths between physical activity mode and autonomous motivation (through perceived competence and autonomy) (17). In this model, the six physical activity modes directly predict perceived competence and autonomy which, in turn, both directly predict autonomous motivation. Figure 1 shows the relationships tested in the mediation model. Modes of physical activity that did not relate to at least one of the hypothesized mediators (i.e., perceived competence or autonomy) were dropped from subsequent models due to failing to meet a key criterion for mediation (and in order to maintain a reasonable number of estimable parameters).

We then tested a model that included both direct and indirect paths from remaining physical activity modes to autonomous motivation (i.e., partial mediation model). In this model, the different physical activity modes predict perceived competence and autonomy directly as well as have direct paths with autonomous motivation. We compared the fit of the two models (i.e., mediation and partial mediation) as well as

Table 1. Descriptive statistics for study variables (N = 124).

Variable	1	2	3	4	5	6	7	8	9
1 Competitive sport	---								
2 Recreational sport	.26**	---							
3 Aerobic exercise	-.11	.02	---						
4 Resistance exercise	.30**	.26**	.24**	---					
5 Organized activities	-.08	-.12	.15	.00	---				
6 Recreational activities	.13	.29**	-.05	.08	-.08	---			
7 Perceived competence	.43**	.22*	.00	.38**	-.06	.08	.93		
8 Perceived autonomy	.26**	-.06	.10	.19*	-.02	-.05	.53**	.91	
9 Autonomous motivation	.23*	.03	.04	.22*	-.08	.03	.55**	.43**	.93
Possible Range	0-4	0-4	0-4	0-4	0-4	0-4	1-6	1-6	0-4
M	1.98	0.84	1.00	0.73	0.44	0.50	4.58	5.35	2.92
SD	1.45	.073	0.64	0.70	0.67	0.70	1.12	0.76	0.86

the significance of the indirect path coefficients to determine whether the relationships were mediated, partially mediated, or not mediated. Model fit was evaluated by examining a number of indices (see 6, 15) including the root mean square error of approximation (RMSEA; values $\leq .08$), comparative fit index (CFI: values $\geq .95$) and the standardized root mean squared residual (SRMR: cut-off values close to .08). We also compared the fit of the two models by testing for significant differences in χ^2 .

RESULTS

Means, standard deviations, and internal consistency reliabilities are displayed in Table 1. There was no missing data on the surveys. Scale internal consistency reliabilities were good ($\alpha = .91 - .93$) and students reported that they participated in

competitive sport and aerobic exercise the most during their senior year of high school (i.e., $M = 1.98$ and 1.00 or 1-10 hours/week) and in organized and recreational activities the least ($M = .44$ and $.50$ or 0-1 hour/week). The following percentages of students reported no involvement in each physical activity mode: competitive sport (26.6%), recreational sport (30.6%), aerobic exercise (19.4%), resistance exercise (40.3%), organized physical activity (64.5%), and recreational physical activity (58.9%). Moderate positive significant ($p < .01$) correlations emerged among perceived competence, autonomy and autonomous motivation. Competitive sport, recreational sport and resistance exercise demonstrated significant positive relationships with perceptions of competence and autonomy (except recreational sport) and autonomous motivation (except recreational sport). None of the other modes of physical

activity related to any motivational variables.

Standardized scores for multivariate normality were examined and fell within an acceptable range (i.e., skewness = 10.33, $p < .00$; kurtosis = 5.23, $p < .00$) for testing models using maximum likelihood estimation (see 13). The fit statistics for the mediation model indicated a marginal fit to the data ($df = 7$, $\chi^2 = 37.66$, $p < .00$; RMSEA = 0.18; CFI = 0.84; SRMR = 0.07). Inspection of modification indices showed that the fit could be substantially improved by allowing the errors of perceived competence and autonomy to correlate. Since this is consistent with SDT and past research (e.g.,14), we modeled this correlation and saw an improved fit to the data ($df = 6$, $\chi^2 = 1.57$, $p = 0.95$; RMSEA = 0.00; CFI = 1.00; SRMR = 0.01). This model (see Figure 1) revealed significant positive paths from both perceived competence and autonomy to autonomous motivation. Competitive sport positively predicted ($p < .01$) perceived competence and autonomy whereas resistance exercise only positively predicted ($p < .01$) perceived competence. The indirect relationships of competitive sport and resistance exercise to autonomous motivation were both significant ($p < .01$).

Next, we tested the partial mediation model with the addition of direct relationships from competitive sport and resistance exercise to autonomous motivation. This model did not provide a significantly better fit to the data ($\Delta\chi^2 = 0.11$, $\Delta df = 2$, $p > .05$). In this model, the direct paths from physical activity modes to autonomous motivation were all nonsignificant, supporting full mediation. Taken together, results support a model where the relationships of

competitive sport and resistance exercise to autonomous motivation are fully mediated by perceptions of competence and autonomy (see Figure 1).

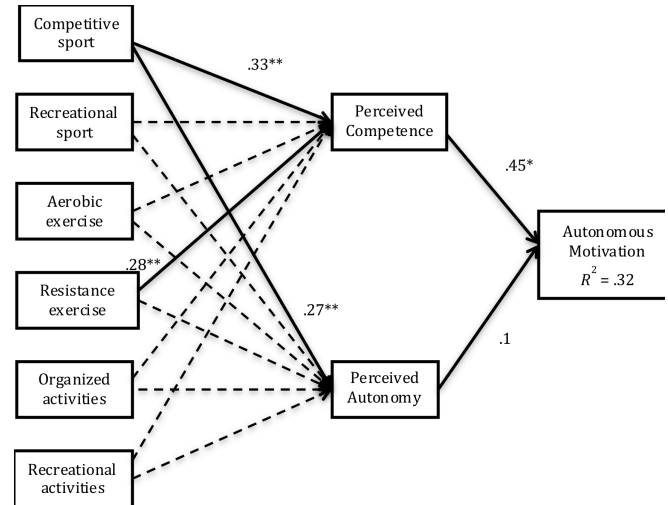


Figure 1. Standardized path coefficients and amount of variance explained in the mediation model. For simplicity, the path coefficients for the dashed lines are not shown and represent nonsignificant relationships. The standardized path coefficients for the indirect relationships of competitive sport and resistance exercise to autonomous motivation were .19 and .16 ($p < .01$), respectively. R^2 = amount of variance explained. * $p < .05$. ** $p < .01$.

DISCUSSION

This study aimed to extend past research on the relationship between prior physical activity and current motivation for physical activity (e.g., 21) by investigating the moderating role of physical activity mode within a self-determination theory (29) framework. That is, we hypothesized that certain modes of physical activity participation during one’s high school senior year would be more likely to facilitate autonomous motivation for physical activity during students’ first year at university due to differences in the degree to which they support feelings of competence and/or autonomy. Our

hypotheses were partially confirmed in that students who spent more time participating in competitive sport during their senior year in high school, felt more competent and autonomous with respect to physical activity pursuits during their first year of college and, thus, experienced more autonomous motivation. As hypothesized, feelings of competence and autonomy mediated the relationship between competitive sport participation and autonomous motivation. This supports past research demonstrating that sport participation is linked to perceptions of physical competence (e.g., 9) and that individuals experience more self-determined reasons for motivation towards sport (e.g., enjoyment and challenge) compared to exercise (e.g., 19).

Contrary to hypotheses, participation in aerobic and resistance forms of exercise did not negatively predict feelings of autonomy. This hypothesis was based on research showing that individuals generally report more external reasons for exercise such as weight loss and appearance change (e.g., 19) which represent more controlling (i.e., less autonomous) forms of motivation. However, this study clearly demonstrated that we need to pay attention to important differences between types of exercise (e.g., aerobic vs. resistance exercise). Research has shown that exercise that incorporates weight training can be effective in improving physical self-efficacy (i.e., situation-specific perceptions of competence)(36) and that it is more effective than aerobic exercise alone for improving physical self-perceptions (13) in college students. These studies support our findings in that resistance exercise can be more effective than aerobic exercise at supporting perceptions of physical

competence which can, in turn, support more autonomous motivation. No other modes of physical activity during high school senior year related to motivation-related constructs in the final model.

The results of this study offer important theoretical and practical implications. The results of the test of mediation clearly support SDT (29) in that greater feelings of competence and autonomy explained why certain modes of past physical activity participation were associated with more autonomous motivation. Though, theoretically, any form of physical activity could help build perceptions of competence, it is interesting to note some general trends from this study. Though we were not able to detect significant relationships from the other modes of physical activity to motivation variables, it may be the case that these modes do support perceptions of competence in specific subsamples of the population. These relationships may not have been detected in the current study due to a small sample size with limited power or perhaps due to the lower mean scores in these other forms of physical activity. It will be important in future studies to consider the specific mechanisms by which these forms of physical activity are likely to support feelings of competence or autonomy.

On a practical note, past physical activity choices or exposure appear to matter when it comes to understanding current motivation. There has been a significant movement towards promoting lifestyle physical activity such as various forms of aerobic exercise in physical education classes (e.g., 31). However, the results of this study suggest that involvement in competitive sport and resistance exercise

play an important role in helping students feel more competent and autonomous with respect to physical activity in general. Therefore, high school administrators may wish to consider ways in which they could offer sport opportunities to more of their students at levels of challenge that match students' diverse levels of ability (e.g., intramural teams) in order to support more autonomous motivation for physical activity. Similarly, physical educators may consider creative ways of integrating resistance exercise into their classes.

Though the results of this study provide new information about the role of past physical activity behaviours on current physical activity motivation, limitations need to be considered. The limitations of this study relate to methodological issues such as the study design, reliability and validity of measurement, sample size and generalizability to larger populations. First this study was cross-sectional with data collected at one point in time. Therefore, students were asked to recall the amount of time they spent in each of the different modes of physical activity during the previous school year which could certainly impact the accuracy of their estimates. The cross-sectional study design also precludes drawing any conclusions about past experiences impacting future physical activity behaviours. Another limitation, related to reliability and validity of measurement, involved the delineation of physical activity into the different modes (e.g., competitive sport, recreational sport, aerobic exercise, resistance exercise, organized activities and recreational activities) and lack of measurement testing of reliability and validity. These modes were determined from literature regarding youth participation in physical activity.

However, one can see these may not be mutually exclusive. For example, someone may consider participation in afterschool intramural basketball as recreational sport or as organized activity. This may have caused confusion in terms of which mode to choose, however, we did supply ample examples for each mode to minimize this possibility.

The sample size of this study was a limitation both in terms of power and generalizability. A greater sample size would have allowed more confidence in generalizing to other college populations and perhaps provided more power to detect relationships that appeared to be nonsignificant in this study. The generalizability of findings to a larger population could be difficult. Another limitation to generalizability relates to the majority of the sample being female. Females become less physically active especially in organized physical activity as they age (4, 41). In addition, females have a tendency to choose physical activity that is less competitive and more exercise based (1, 4). The relationships that emerged in this study could be biased because the majority of participants were female.

The results of this study clearly demonstrate the distinctive roles that different modes of past physical activity play in supporting more autonomous motivation through supporting feelings of competence or autonomy with respect to physical activity in general. Though recreational sports (e.g., intramurals), recreational activities (e.g., hiking), organized activities (e.g., dance) and aerobic exercise (e.g., running) clearly have the potential to help youth maintain a physically active lifestyle and reap the

associated health benefits, they may not be the best choices for maintaining physical activity levels across the transition into college. Our intention was to explore these since the information is limited. It appears that frequency of participation in competitive sport is superior at supporting both feelings of competence and autonomy, whereas resistance exercise helps students feel more competent with respect to physical activity. Therefore, developing strategies for more youth to stay involved in competitive sport for longer periods of time remains an important focus for helping youth develop physical activity patterns that will continue into young adulthood. Finally, providing more education on resistance exercise and opportunities to learn various weight training techniques appears a crucial supplement to aerobic forms of exercise whose value extends beyond the purely physical.

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