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Recommended Citation

Bice, M. R., Ball, J. W., Parry, T., & Adkins, M. (2016). Retrospective evaluation of high school primary physical activities and adulthood physical activity need satisfaction. *Sport Science Review*, 25(3-4), 183-198. doi: 10.1515/ssr-2016-0010. Retrieved from <https://neiu-dc.neiu.edu/hpera-pub/4/>.

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Retrospective evaluation of high school primary physical activities and adulthood physical activity need satisfaction

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Presumably, individuals are taught skills throughout their primary education that are required to live a healthy lifestyle throughout the lifespan. The primary purpose of this study was to assess adult psychological need satisfaction in relation to high school participation. Participation included university employees and students of two mid-sized universities and members of a state health organization. Participants ($n = 512$) completed the *Psychological Need Satisfaction in Exercise (PNSE)* and the *International Physical Activity Questionnaire (IPAQ)*. The current study found modest associations between measured motivation constructs on physical activity levels. Standardized coefficients report competence and autonomy had a significant effect on physical activity in predicting adult physical activity levels. Results of this study provide insight into the determinants underlying the development of physical activity tendencies in adults and suggest high school physical education and sport participation have an equal influence on adult physical activity levels.

Keywords: motivation, competence, autonomy, relatedness, and need satisfaction

Introduction

Physically active adults have been a decreased risk for many serious health conditions, demonstrating the long-term beneficial effects throughout the lifespan on all aspects of health (Flegal, Graubard, Williamson & Gail, 2005; Sherry, Blanck, Galuska, Pan, & Dietz, 2010). Physical inactivity is a national concern, with a high prevalence of overweight and obese adult Americans. However, even more concerning is the rapid increase of obesity among youth populations (USHHD 2008 Physical Activity Guidelines for Americans, 2014). Increases in the incidence of youth obesity could be tied to physical inactivity during adolescence, which in turn can lead to increased adult obesity. The benefits of a physically active lifestyle are noted; however, questions still exist concerning the contributing factors that lead to the maintenance of physical activity (PA) into adulthood (Flegal, Graubard, Williamson, & Gail, 2005; Van Stralen, De Vries, Mudde, Bolman, & Lechner, 2009).

Physical Activity

Research reports have indicated that total amount of PA decreases as a person ages (Haskell, et al., 2007). Over the past 20 years, American physical activity recommendations have altered suggesting Americans need to be more active, particularly as their everyday lifestyles become more sedentary (CDC, 2013; USHHD 2008 Physical Activity Guidelines for Americans, 2014). American adults should partake in a minimum of 30 minutes of moderate intensity PA, if possible every day of the week (CDC, 2010, 2013; Dana et al., 2008). Physical activities are unique and individuals gravitate to activities that are interesting and performed within inviting environments. Activity participation varies among individuals, suggesting that motivation for PA participation varies.

Theoretical framework

Motivation is explained as the direction and intention for individuals to engage in a certain behavior and described as a psychological force reinforcing action (Schacter, 2011). The self-determination theory (SDT) was developed by Deci and Ryan (1985) and explains how individual behavior is determined (Deci & Ryan, 2000). The SDT is widely used to examine PA motivation to determine what motivates individuals to participate (Frederick-Recascino, 2002). Deci and Ryan (1985; 2000) suggests optimal functioning is a product of the psychological needs of competence, relatedness, and autonomy serving as a psychological foundation for which motives develop. One important approach taken by the SDT is the concept that psychological needs are essential to nourish growth, integrity, and well-being (Deci & Ryan, 1985, 2002; Ryan, 1995). The effects of satisfying basic psychological needs are universal and environments that nourish these feelings promote well-being (Deci & Ryan, 2002; Ryan,

1995; Sheldon, Williams, & Joiner, 2003). It can be argued that participation in physical activities are associated with experiences of autonomy, competence, and relatedness and therefore will promote well-being.

Competence refers to the interaction of individuals and how they master challenging tasks and skills within environments (White, 1959). Autonomy refers to the free agency of behavior choice and that behavior is perceived to emanate from an internal locus of causality (DeCharms, 1968). Lastly, relatedness refers to the need to belong and making a meaningful connections within a social environment (Baumeister & Leary, 1995). The combination of competence, autonomy, and relatedness provide a framework to better understand motivation (need satisfaction). The universal interaction between psychological needs have been challenged; however, evidence highlights that the SDT constructs complement need-satisfying experiences and stem from need satisfaction.

Physical Activity Categorization

Physical activities have previously been categorized as rest, work, and leisure; however, leisure time activities can be further categorized as sport, exercise, and recreation activities (Montoye, 1975; Caspersen, Powell, & Christenson, 1985; Folsom et al., 1985). These subcategories suggest uniqueness among leisure time physical activities, further suggesting distinct differences exist among sport, exercise, and recreation participation. Because the concept of sport is not concise, sport is a difficult term to construe (McBride, 1975). For the purposes of this study, sport is an organized activity involving individuals competing against opposing participant(s) utilizing a sport specific set of physical skills (McBride, 1975). Exercise is often used interchangeably with physical activity; however, exercise is a category of leisure time physical activity (Taylor, 1983). Exercise is planned, structured, repetitive, and purposive with the goal of physical improvement (Montoye, 1975). Examples of exercise include, running, weight training, and aerobics, to name a few. The Park and Recreation Professional Handbook (Hurd & Anderson, 2011, p. 9) defines recreation as “an activity that people engage in during their free time, that people enjoy, and that people recognize socially redeeming values.” Recreation activities are performed for enjoyment, with little to no competition, and performed during leisure time. Example recreational activities include hiking or kayaking. As types of leisure time physical activities are distinctly different, how activity behaviors transition and influence adulthood continue to be an interest for health educators.

Physical Activity in Schools

The National Association of Sport Education (NASPE) recommends a minimum of 150 minutes of physical education instructional time per week for elementary aged students and 225 minutes for high school students (NASPE,

2010). It is a common practice for physical education programs to develop curriculum to meet the five Society of Health and Physical Educators (SHAPE) America standards for physical education. These standards are designed to develop physically literate individuals who can perform, understand, and value a broad range of health promoting physical activities including fundamental movement patterns, fitness, and sports. However, all schools do not meet these weekly recommendations, or are not required to, with many falling well below the suggested minutes of physical education instructional time. This begs the question, where do students acquire their recommended daily amount of PA?

Secondary physical education programs have evolved, providing a broad range of activities from competitive sport based classes to lifetime, leisurely activities (Spink et al., 2006). But if they do not provide the recommended amounts of instructional time, other sources of PA, such as varsity sports, must be considered to achieve daily recommendations. With over 55% of all students enrolled in high school participating in a variety of varsity and/or club level competitive sports, links between sport participation and PA are evident (Goodarz et al., 2009; Howard & Gillis, 2009). If a student does not feel they have the requisite skills for proficient participation, it is unlikely they will seek out future opportunities to participate. Seefeldt (1980) identified this as the *proficiency barrier*, suggesting children that do not develop basic skills would not be able to participate in activities that required the application of these skills to be successful. Therefore, motor skill competence can be considered a precursor that provides the foundation of future movement and PA opportunities. This ultimately allows individuals to successfully participate in sports, games, and lifetime physical activities that promote health related fitness (Stodden, True, Langendorfer & Gao, 2013).

It is interesting to speculate that persons whom possess low motor skill competence may have limited PA opportunities in adulthood due their lack of requisite skills to engage in a variety of activities. Previous research suggests that individuals who participate in high school sports, in addition to physical education, are more likely to participate in PA in adulthood (Ball, Bice & Parry, 2014). These findings establish an association between participation in high school sports and adulthood activity leading to speculation of specific contributing factors associated with adult PA levels. One potential theme behind the association may be motivation, specifically, need satisfaction. A foundational construct of need satisfaction is competence, which could contribute to PA self efficacy, resulting in an individual to be more confident and thus willing to engage in other types of PA in adulthood. SHAPE (2013) identifies that “physically literate individuals demonstrate competency in a variety of motor skills and movement patterns”. If sport participation, in addition to physical education, can enhance competence

and in turn positively influence the likelihood of continued PA, high school sports may be a positive factor determining adult PA.

Purpose

Ball, Bice, and Parry (2014) report varying PA motives between adults whose primary mode of PA was exercise, sport, and recreation activities. This study suggests participants who use exercise and recreation activities as their primary modes of activity are influenced by more extrinsic constructs than those who primarily participate in sports whom tend to be more intrinsically motivated. The current study assessed current adult motivation based on psychological need satisfaction as it relates to current physical activity based on high school participation of (a) physical education, (b) competitive sport, and/or (c) recreation activities. It is hypothesized that associations will be present between need satisfaction constructs and adult PA and motivation constructs will be revealed as predictors of adult PA.

Methods

Participants

A convenience sample was used for study participation and offered via email solicitation to university employees and students of two mid-sized universities and members of a state health organization ($n = 516$) (See Table 1). The universities used were similar in institution enrollment, faculty, and staff members. The research team was granted access through the Institutional Review Board (IRB) at both participating universities. Data were collected using an online questionnaire using Survey Monkey. Participants were emailed the research study cover letter, study purpose, and a link that contained the questionnaire. Participants were reminded participation was voluntary and they could withdraw at any time without any consequences. All procedures were approved by the appropriate university's IRBs prior to data collection.

Primary Physical Activity

Participants were asked to identify their primary PA while in high school and given the options of sport, physical education, or recreation activities. In addition to primary forms of activity, participants were asked if they participated in more than one mode during high school, such as participating in sports and recreational activities. Participants were provided all possible combinations of activity modes as well as instructed to list if additional activities per specific mode were undertaken. For example, a participant would indicate "2" if they participated in two sports. This approach allowed researchers to categorize participants for data analysis.

| Demographics | | | |
|---------------------------------|------------|----------|-----------|
| | N (%) | <i>M</i> | <i>SD</i> |
| Age | | 36.74 | 15.26 |
| Men | 147 (28.6) | | |
| Female | 369 (71.2) | | |
| Total Participants | 516 | | |
| Primary Physical Activity | | | |
| Competitive Sport | 110 (21.2) | | |
| Physical Education | 71 (13.7) | | |
| Leisure/Recreation activities | 19 (3.5) | | |
| Sport & PE | 75 (14.5) | | |
| Sport & Leisure/Recreation | 16 (3.1) | | |
| PE & Leisure/Recreation | 55 (10) | | |
| Sport, PE, & Leisure Recreation | 166 (32) | | |

Table 1

Measurement of Physical Activity Motivation

The *Psychological Need Satisfaction in Exercise (PNSE)* scale assesses psychological need satisfaction based on Deci and Ryan's (1985, 2002) SDT consisting of 18 items (competence, $n = 6$; autonomy, $n = 6$; relatedness, $n = 6$) (Wilson, Rogers, Rodgers, & Wild, 2006). A factor analysis reports the support of a 3-factor model and partial support among genders. The PNSE scale has an acceptable internal consistency estimates among the three PNSE scales (Cronbach $\alpha > 0.90$) (Wilson et al., 2006). The current study focused on the context of physical activity rather than exercise and yields the following Cronbach alpha values: competence ($\alpha = 0.95$), autonomy ($\alpha = 0.94$), and relatedness ($\alpha = 0.94$). Participants rated motivation questions based on their current motives to pursue PA opportunities as adults.

Measurement of Physical Activity

The International Physical Activity Questionnaire short form (IPAQ) was used to obtain data concerning adult physical activity levels. Concerns are present with data validity using self-report forms; however, the IPAQ is internationally

accepted tool that has been tested for reliability and validity (Maddison et al., 2007). The IPAQ short form is a 7-day PA recall including seven questions on vigorous and moderate PA, walking, and sitting time (Maddison et al., 2007). Participants were provided examples for each question to ensure recall accurately.

Data Analysis

Participants were asked whether they participated in sport(s), physical education, or recreational activities as their primary mode of PA while in high school based on the definitions and examples provided. Psychological need satisfaction data were categorized SDT constructs of competence, autonomy, and relatedness. Physical activity levels were categorized in terms of the number of days and minutes spent performing physical activities considered vigorous, moderate, walking and sitting time. Activity data were analyzed categorically (moderate, vigorous).

Pearson correlations were used to examine variable associations between PA (IPAQ) and psychological need satisfaction (PNSE) among adults' whose primary form of high school PA were sport, physical education, and recreation activities. Differences among high school activity participation (sport, physical education, or recreational activities) and psychological need satisfaction (competence, autonomy, and relatedness) were analyzed using a multiple regression analysis. These analyses allowed researchers to examine the effect of activity type on psychological need satisfaction. Data were analyzed using SPSS version 22 and results were deemed significant at $p < 0.05$.

Results

A total of 516 participants completed the surveys, 147 (28.6%) males and 369 (71.2%) females. A total of 377 (73.06%) participants competed in competitive high school sports and 139 (26.94%) reported to participate in physical education or recreation activities as their primary activity. Twenty-two percent ($n = 114$) of study participants reported to compete in 1 sport, 24% ($n = 124$) participated in 2 sports, 18% ($n = 94$) participated in 3 sports, 7% ($n = 37$) participated in 4 sports, and 3% ($n = 14$) participated in 5+ sports. In addition, high school participation was broken down into categories (See Table 1).

As shown in Table 2, this study found modest associations between the measured motivation constructs and PA levels among study participants. Varying correlations strengths were reported among high school activity participation (sport, physical education, and recreation activities). Ratings of competence and measures of adult vigorous PA (days and minutes) represent a statistically significant association among individuals who primarily participated sport (Vig

Days, $r = 0.682$; Vig Min, $r = 0.502$), physical education (Vig Days, $r = 0.479$; Vig Min, $r = 0.318$), and recreation activities (Vig Days, $r = 0.624$; Vig Min, $r = 0.707$) while in high school. A correlation matrix shows various associations between adult PA and motivation constructs (see Table 2).

| | | Competence | Autonomy | Relatedness |
|------------------------------------|------------------|------------|----------|-------------|
| Competitive sports | Vigorous Days | .682** | .222* | .427** |
| | Vigorous Minutes | .502** | 0.028 | .347** |
| | Moderate Days | .355** | 0.006 | 0.151 |
| | Moderate Minutes | .295** | 0.09 | 0.168 |
| | Walk Days | .295** | 0.084 | 0.169 |
| | Walk Minutes | 0.165 | 0.092 | 0.01 |
| | Sitting Time | -0.093 | .219* | 0.087 |
| Physical Education | Vigorous Days | .479** | 0.189 | -0.213 |
| | Vigorous Minutes | .318** | 0.02 | 0.004 |
| | Moderate Days | .317** | 0.202 | 0.079 |
| | Moderate Minutes | 0.077 | -0.106 | 0.178 |
| | Walk Days | -0.015 | -0.075 | -0.015 |
| | Walk Minutes | -0.019 | -0.08 | 0.05 |
| | Sitting Time | -0.022 | 0.05 | 0.173 |
| Leisure & Recreation Activities | Vigorous Days | .624** | .494* | .500* |
| | Vigorous Minutes | .707** | 0.463 | .574* |
| | Moderate Days | 0.067 | -0.012 | 0.032 |
| | Moderate Minutes | -0.18 | 0.033 | -0.004 |
| | Walk Days | 0.32 | 0.336 | .514* |
| | Walk Minutes | | -0.33 | 0.014 |

** denotes significance at 0.01

* denotes significance at 0.05

Table 2 - Correlation between theoretical constructs and Motivation constructs

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A regression analysis was conducted to measure the influence of the three measured motivation constructs (competence, autonomy, & relatedness) on PA levels among participants. The total regression model was significant, explaining 15.1% of the total variance, $F(3, 516) = 31.31, p < 0.001, R^2 = 0.151$. Standardized coefficients indicate that competence ($p < 0.01$) and autonomy ($p < 0.05$) have a statistically significant influence on adult PA levels among all participants (grouped) (see Table 3).

Constructs used in this study were found to be statistically influential among high school sport participants $F(3, 374) = 15.09, p < 0.01, R^2 = 0.301$. Standardized coefficients report competence ($\beta = 4.45, p = .001$) and autonomy ($\beta = -1.76, p = .008$) had a significant effect on PA in predicting adult PA levels that participated in high school competitive sports. Standardized coefficients report competence ($\beta = 3.45, p = .004$) and autonomy ($\beta = -3.76, p = .028$) have a statistically significant influence on adulthood PA of those who primarily participated in physical education while in high school with a variation of 13.3% (see Table 3).

| | Combined | Sports | Physical Education | Leisure/Recreation |
|----------------|-------------|-------------|--------------------|--------------------|
| Model | F = 31.31** | F = 15.09** | F = 3.36* | F = 0.904 |
| Competence | B = 3.34** | B = 4.34** | B = 3.45** | B = -2.16 |
| Autonomy | B = -1.39* | B = -1.76* | B = -3.76* | B = 4.42 |
| Relatedness | B = 0.84 | B = 1.14 | B = 0.32 | B = 3.04 |
| R ² | 0.151 | 0.301 | 0.133 | 0.173 |

** denotes significance at 0.01
 ** denotes significance at 0.05

Table 3 - Current Physical Activity, Retrospective Primary Activity, and Construct Influence

Discussion

Youth PA plays a profound role in reinforcing health enhancing PA behaviors into adulthood. However, because the opportunity for adults to engage in sport, physical education, and/or recreation activities may be limited, the importance of identifying contributing factors becomes a topic of interest. The current study sought to examine the link between need satisfaction and PA. Findings suggest adult need satisfaction (motivation) plays an important role in predicting adult PA levels. It can be speculated that participation in sport and physical education, while in high school, provide individuals an opportunity to engage in PA behaviors in a controlled environment with support through the

instruction of a teacher or coach. Continuous activity participation throughout the lifespan enhances a person's general physical literacy and skill competence in those activities (Whaley & Schrider, 2005). If an individual feels the learning environment is positive and can relate to the instructor (teacher/coach), peers, and content then they are more likely to participate in PA. Furthermore, if individuals feel they can regulate their behaviors and have a feeling of autonomy or choice they may engage in those physical activities.

The competence construct and adult vigorous PA represent a significant association among individuals who primarily participated in sport, physical education, and recreational activities. As it is not surprising that sport and physical education were mentioned, a pleasant surprise is the association with recreation activities. As many physical education classes incorporate recreation activities into their curriculum, these findings suggest recreation activities are as valuable as traditional school instruction of PA (sport and PE) as a determinant of adult PA. Physical education classes have broadened their scope to meet the interests of more students in a structured environment (Spink et al., 2006). The problem is that not all recreational activities are feasible to incorporate due to geographic location, climate, and funding. Certain recreation activities can be extremely beneficial and making additional recreational opportunities available in high school and could potentially be a valuable tool influencing adulthood PA levels.

Competitive high school sports provide a competitive setting based on sport specific skill performance. Performing PA skills in the environment afforded by high school sport may reinforce skills associated with continued engagement in PA as adults, such as perseverance. Furthermore, sports provide dynamic challenges associated with competition, that may enable the restart or maintenance of a physically active lifestyle as an adult, relating to behavior competence (Vallerand, 2001). It can be speculated that both physical education and sport participation provide individuals a foundation for increased individual self-efficacy outside of the physical education or sport environment. Competence refers to effective interaction within an environment while performing challenging tasks (White, 1959). The current study suggests that competence gained in youth transitions into adulthood and plays a vital role in encouraging adult PA participation.

The multiple regression analysis revealed large standardized coefficients for the motivation constructs of competence and autonomy. This is not uncommon with the use of 2 or more predicting variables that are correlated and supports the strong association between the two constructs (Deegan, 1978). In some cases, high school students are given the option to either participate in physical

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education or competitive sports suggesting activity competence prepares individuals with necessary skills to confidently choose various types of physical activities. Importantly, an individual's efficacy towards specific skills, prepares them to be more willing to participate in new activities that they may not already have competence in. Individuals are free to choose and are more confident in exploring new things as it pertains to meeting health goals aligned with physical health if they have competence in other areas (Edmunds, Stephenson, & Clow, 2013).

Although different, physical education teachers and sport coaches both teach skills that may be foundational toward adult PA behaviors. Skills and physical proficiencies associated with certain sports may provide the prerequisite competence for numerous recreation activities. For example, competitive swimming may allow adults to pursue kayaking as they have the underlying physical proficiency to be competent. Kayaking is typically not a high school sport or activity, so many adults may have limited experience. However, if skills and physical proficiencies are transferable between activities it would certainly increase the PA opportunities in adulthood. Physical education classes focus on the development of motor skills and coordination in a physically active environment. These types of physical skills are often the building blocks for various recreation and sporting activities enhancing the potential competence and autonomy needed to be motivated to participate in physical activities as adults.

Future Research

Future research efforts should examine the role and influence of intramural activities at colleges and universities. Intramural activities provide opportunities for students to participate in various sport, exercise, and recreation activities that can potentially serve as a bridge from high school to adulthood physical activity motives and behaviors. Furthermore, research needs to examine physical activity motivation in American Indian and Hawaiian populations. Both American Indians and Hawaiian populations present significant limitations due to geographic location and resources.

Conclusions

Results from this project are very applicable to the development of PA tendencies of adults and can help health education and promotion professionals in the development of school policies, school programming, program integration and implementation, and research interventions. Physical activity is important and needs to be a habitual concept included into individual's daily regimen. The current project presents data that suggest high school physical education

and sport participation both contribute to adult PA levels, advocating the importance of participation in these activities throughout their schooling. Study findings suggest that high school physical education and sport participation equally influence adult PA levels; however, how physical education and sport individually contribute to adult PA can only be speculated. Competitive sports are not for everyone and therefore cannot be identified as the blanket answer to increase adult PA. Furthermore, this study reveals that teaching the proper skills and providing physical activities for people at a young age could potentially give them the competence and autonomy needed to participate in physical activities as adults. Lastly, sport and physical education that involves significant PA are the most important determinants of adults' activity levels.

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