Importance of Motivation on Physical Activity Behavior and Knowledge about Benefits of Physical Activity

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ABSTRACT: Motives for participating in physical activity were assessed through a questionnaire (MPAM-R) and were used to measure motives to participate in physical activity (PA). Two groups of university students with the same major (kinesiology/healthy lifestyle) from two different countries took the questionnaire and a multivariate analysis of variance (MANOVA) revealed a significant difference between the two groups in their motives for participating in physical activity: Wilks’ λ = .78, F(5, 69) = 3.79, p = .004, partial η² = .22. Also, the group with the lower motivation to participate in PA were significantly younger (p < .01), had lower BMI (p = .02), had higher PA measured with pedometers (p < .01), and were more knowledgeable about benefits of PA (p < .001). The results suggested that higher motivation to participate in PA measured by MPAM-R not be enough to influence PA behavior positively. However, whether a student was from the Czech Republic or U.S. (Beta = -.51) the score on the Interest/Enjoyment intrinsic motivation factor (Beta = 3.5) was statistically significant predictor (p<.001 for both) and accounted for 35% of the total variance (r = .60) in knowledge score about the benefits of PA.

KEYWORDS - PA – any sport and/or exercise; motivation - the driving force behind action; behavior – a manner of acting.

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I. Introduction

Reliable research data show an increased incidence of corpulence and obesity among adult populations of developed and some developing countries and the alarming spread of the problem. For example, in 2012 one-third of adults were overweight in the United States (Ogden at al., 2013)and the World Health Organization estimates roughly 39% of adults worldwide aged 18 and over as overweight with the incidence of obesity doubling since 1980 (WHO, 2017). Causes of this growing epidemic are a well-known combination of improper diet and sedentary lifestyle. The most widely used indicator of obesity and overall health in individuals is the body mass index (BMI). Health-related quality of life (HRQL) and BMI have an inverse relationship, and individuals with a higher BMI tend to have a lower health-related quality of life (Lillis at al., 2011). It has also been reported that people with a BMI of 30 or higher that classified them as obese were more likely to have many psychosocial difficulties in addition to a poorer overall quality of life (Hackman and Mintah, 2010).

To understand what drives the primary behavior for people to be more physically active and to appreciate the benefits of PA could be a critical factor in changing the unwanted obesity trend that is connected to many health problems in addition to reduced mental performance (Kilpatrick at al., 2005; Hackman and Mintah, 2010). Reasons to be PA may vary for different cultures and different age groups. Ziegler (2000) and Duda and Hayashi (1998) in their studies expressed a need for more cross-cultural research and comparative studies to understand different cultures better. Also, Keating at al. (2005) stressed the need to study college students because PA for this age group is decreasing and that “virtually all college students are adults with multiple responsibilities and they are very likely to maintain physical activity patterns that they establish during their college years throughout adulthood” (p.117). Furthermore, in the fall of 2016, some 20.5 million students attended American colleges and universities; therefore, to be able to influence this large group would be very beneficial (U.S. Department of Education Institute of Education Sciences National Center for Education Statistics, 2016). In general, it has been understood that when people are motivated to do something, the results
of that task are much better when compared with those who are not motivated (Lazear, 2000; Kusurkar et al., 2013). Motivation has been described as the driving force behind the action (Deckers, 2010): A higher motivation to participate in PA should move people to action with a resulting change of their sedentary behavior and become interested in understanding the benefits of PA. It is hypothesized that this should happen to a higher degree for university students who major in kinesiology/healthy lifestyle.

1.1. History of Motivational Theories

Early motivational theories were often based on the work of behavioral psychologists such as Pavlov and Thorndike, and focused on the concept of maintaining homeostasis: Within these theories, all human behavior was seen as motivated by an innate need for balance. Hull’s (1943) Drive-Reduction Theory (DRT) was the first to create one central theory that could be used to explain and understand all aspects of human behavior. Hull’s theory was unique because it was the first “needs-based” theory meaning that behavior was thought to be a result of the fulfillment of biological drives. One problem with the DRT is that motivation could only be explained by behaviors that were directly related to survival. This theory could not account for reasons as to why individuals participate in behaviors that do not reduce biological drives such as eating when one is not hungry, social needs, or other standard practices.

The DRT was later modified by Abraham Maslow with his theory of Human Motivation by placing needs on a hierarchy as well as dividing these needs into “higher order needs” and “lower order needs” (Maslow, 1954). Lower order needs consist of biological drives such as thirst, hunger, and the need for shelter. Higher order needs were thought of as growth needs. These were the needs for social engagement, esteem needs, and self-actualization. Maslow proposed the idea that individuals are motivated to perform behaviors to fulfill each need starting with lower order and moving toward higher order. As one need was fulfilled, the next need in the hierarchy would then become the primary focus of motivation. Maslow also proposed that the motivation to fulfill these needs could be derived from both internal and external forces.

In 1957, Atkinson proposed the Theory of Achievement Motivation. In his theory, Atkinson states that individuals have a need for achievement that is shaped by childhood experiences in which an association between achievement and positive emotional states has been made. According to this theory, motivation is instigated when an individual knows that he is responsible for the outcome of some venture when he anticipates explicit knowledge of results that will define his success or failure, and when there is a degree of uncertainty as to the outcome of that venture (Atkinson, 1957). In this theory, individuals are motivated to act when the potential outcome is thought of as being higher than the perceived risk. The Theory of Achievement Motivation is the first theory to recognize that the level of motivation to perform specific tasks will vary between individuals because of differences in personalities (Atkinson, 1957).

In the 1990’s, Deci and Ryan developed a new theory named Self-determination Theory (SDT) from decades of research related to the topic. The theory is based on the idea that each individual has desires to attain self-fulfillment and to achieve personal growth. It is assumed that individuals are actively directed towards growth and self-fulfillment, and they seek out and perform activities that satisfy these needs. The theory is based on three innate psychological needs of every individual: competence, relatedness, and autonomy. The need for competence is the need to control and master a task. The need for relatedness is the need to interact and be connected with other people, and the need for autonomy is the need to gain control of one’s own actions but not necessarily to be independent of others. Deci and Ryan expanded on Maslow’s Human Motivation Theory that motivation could be derived from both internal and external forces and inferred that there are two types of motivation: intrinsic motivation and extrinsic motivation. According to the authors, intrinsic motivation refers to engaging in an activity solely for the pleasure derived from performing the activity. Extrinsic motivation refers to engaging in behaviors to elicit external rewards or other contingencies derived from performing the behavior itself. SDT has been one of the prominent theories of motivation for the last 30 years (Hagger and Chatzisarantis, 2008). It has been used to assess motivation in many different disciplines, including PA, and also in academic contexts to assess motivation to understand better what motivates an individual to an action.

1.2. PA and Motivation

Ryan and Deci (2000) described intrinsically motivated behaviors as not performed for any external reason but are instead only performed for the positive experiences associated with that behavior. In contrast, extrinsic motivation is a construct that pertains to whenever an activity is performed to solicit some attainable
task that is separate from the actual activity itself. Researchers have gained a better understanding of intrinsic and extrinsic motivation and how they impact individuals who wanted to begin participating in PA.

Frederick and Ryan (1993) surveyed 376 adults asking them what their primary choices of activity included. The authors classified these activities as either sports activities, such as tennis or football and exercise/fitness activities such as running, or aerobics. The researchers found intrinsic motives were higher for the participants who performed sports activities and that extrinsic motives were higher for participants who performed exercise/fitness activities. Also, the researchers developed a questionnaire intended to assess the strength of three motives for participating in physical activities (MPAM) within the contexts of SDT (intrinsic motivation and extrinsic motivation). The three motives were: (1) Competence motives which refer to being physically active because of the desire just to improve at an activity, to meet a challenge, and to acquire new skills; (2) Enjoyment motives which refer to being physically active just because it is fun, makes you happy, and is interesting, stimulating, and enjoyable; and (3) Body-related motives which refer to being physically active out of the desire to be physically healthy, strong, and energetic and to being physically active in order to become more physically attractive, to have defined muscles, to look better, and to achieve or maintain a desired weight. By using the MPAM, they found intrinsic motivators (competences and enjoyment) to be positively related to the length of someone’s workout, how often they participated in PA and greater satisfaction with the PA. Conversely, extrinsic (body related) motives were negatively associated with the length of workout and participation in PA (Frederick and Ryan, 1993).

Ryan et al. (1997) continued research with the MPAM, added a new motive called Social Motive to the three original motives in MPAM, and split the original body-related motive into Appearance and Fitness motives. The MPAM-Revised assessed the five motives factors of Interest/Enjoyment, Competence, Appearance, Fitness, and Social. Results of the Ryan et al. (1997) study involved college students and supported the findings of Frederick and Ryan (1993) that intrinsic motives (competence, social, enjoyment) are more effective for maintaining meaningful PA and extrinsic, body-related motives (appearance and fitness) are not sufficient to sustain regular exercise regimens. The 1997 study also found that extrinsic motivators are often the reason that people will start PA, but intrinsic motivators are better for maintenance of these activities. This finding suggests that if “one exercise for intrinsic reasons, one is more likely to feel energized, confident, and satisfied in one’s activity, whereas extrinsic, body-related reasons may not facilitate these results” (Ryan et al., 1997, p. 335-354).

Teixeira et al. (2012) conducted a systematic review of 66 studies and found that there was a positive relationship between intrinsic forms of motivation and PA. Their review of the research disagreed with the Ryan et al. (1997) study which indicated that extrinsic motivators are often the reason that people begin PA and came to the conclusion that intrinsically motivated individuals are not only more likely to participate to PA but also to begin PA (Teixeira et al., 2012). In the review of the literature, the authors also examined motivation in relation to the SDT innate psychological needs satisfaction (competence, relatedness, and autonomy) and found that a majority of studies reported a positive relationship between innate psychological needs satisfaction and PA. No studies were reported to have found a negative association between autonomy and PA and between relatedness and PA (Teixeira et al., 2012). However, the authors cautioned that although positive associations between different psychological needs and PE were found, correlation does not equal causality, and direct conclusions cannot be made. Perhaps more importantly, other studies indicate that intrinsic motivation alone was not strong enough for people to be physically active (Mullan et al., 1997; Edmunds et al., 2006). For example, Edmunds et al. (2006, p. 899) stated that maintaining a lifestyle of PA requires a high degree of effort in which repetitive tasks are performed and that “people are unlikely to maintain regular exercise behavior purely for the intrinsic reasons of fun and enjoyment.”

1.3. Academics and Motivation

Vansteenkiste et al. (2006) studied the SDT theory within academic contexts. They reported that “portraying activities as serving the attainment of an intrinsic rather than an extrinsic goal promotes deeper processing of the learning material, greater conceptual understanding of it, and both short-term and long-term persistence at relevant learning tasks” among different age groups, contexts, and types of learning activities (Vansteenkiste et al., 2006, p. 19-31). Also, authors suggested that students’ extrinsic motivation is also a
positive motivator, but it is much more efficient on short-term performance. To ensure a high-quality product, diagrams and lettering MUST be either computer-drafted or drawn using India ink.

In summary, prior theory and research have indicated strong relationships between motivation and PA. Studies have also linked motivation to academic success and health-related quality of life, although there is some debate as to whether culture is an important factor in motivation. For example, Deci and Ryan have argued that SDT components are fundamental psychological processes that are invariant to cultural context, but the cultural-relativists reason that needs vary by cultural context (Vlachopoulos et al., 2013). Therefore, to examine some of these issues, the first purpose of this study was to investigate motivation to participate in PA involving university students from two different countries that chose kinesiology/healthy lifestyle as their major subject of study. The second purpose was to determine whether possible differences in motivation to participate in PA between these two groups were related to the group’s PA behavior. Finally, we were interested to know whether the degree of motivation was correlated with knowledge about the benefits of PA. Three research questions guided the study: (1) Are there any differences in motivation to participate in PA between two groups of students with the same major (kinesiology/healthy lifestyle) in two universities in two countries?; (2) Do possible differences in motivation to participate in PA affect PA behavior as measured by BMI and level of PA?; and (3) Do possible differences in motivation to participate in PA affect the group’s knowledge about benefits of PA as measured by a self-reported questionnaire?

II. Material And Methods

2.1 Participants
A total of 76 American (n=46) and Czech (n=30) college students enrolled in their first major class kinesiology/healthy lifestyle participated in the study. Representative sampling technique was used to match the same students’ characteristic (first major class and same major of study). Because the study was directly connected to the participants’ major, the PA behavior and their knowledge about the benefits of PA were collected as a part of the class session in both countries. Before participating in the study, all participants provided their informed consent form where they agreed to participate, and the study was approved by the Institutional Review Boards in both countries.

2.2 Measures and Statistical Analysis
The study relied on self-reporting as well as self-monitoring assessment techniques. The first research question “Are there any differences in motivation to participate in PA between two groups of students with the same major in two different universities in two countries?” was assessed using the previously validated instrument MPAM-R (Ryan et al., 1997). This instrument was developed to assess the strength of both intrinsic motivation (competences, interest/enjoyment and social motives) and extrinsic motivation (appearance and fitness) for participating in physical activities. Questions such as reasons for engaging in PA “because it’s fun” or “because I want to obtain new skills” are scored on a Likert type scale from 1 “not at all true for me” to 7 “very true for me”.

The second question “Do possible differences in motivation to participate in PA affect PA behavior as measured by BMI and level of PA?” was assessed by measuring students’ BMI and by using a pedometer to count steps. The BMI is an important factor when considering PA because people who are obese are usually not physically active. Kruger at al. (2007) in their study on health-related quality of life (HRQL) and reported that HRQL is more commonly low among obese individuals when compared with people with a healthy weight. Jia and Lubetkin (2005, p. 160) found that “persons who were physically active not only had a lower risk of being obese but also had higher HRQL scores at all BMI levels.” The studies that report a relationship between BMI, HRQL and PA, support that if people live healthy lifestyles, they are more likely to have a higher quality of life. The use of pedometers to assess and predict PA levels has been a frequent practice for many years. Some studies suggested that to assess and predict PA, the adult participants could wear the pedometers less than one week (Sigmundova et al., 2013; Tudor-Locke et al., 2005). For our study, however, we chose to assess the number of steps taken during a full week period excluding time for sleep and personal hygiene. For measurement-accuracy, both groups of students used the same type of pedometers YAMAX SW 701 (Schneider et al., 2003; Simunek et al., 2016) and started recording their measurements on the same date (Monday-Sunday).
The third question “Do possible differences in motivation to participate in PA affect the groups’ knowledge about benefits of PA measured by a self-reported questionnaire?” was assessed using a previously validated instrument (Vasickova et al., 2011). The instrument has 32 PA knowledge questions that are divided into four areas, with eight questions per area. The areas are physical conditioning (all aspects of fitness), energy expenditure (energy expenditure of various PA), nutrition (basic nutritional recommendation and eating habits), and PA education (PA guidelines, practical PA recommendations, an example of good practices).

2.3 Procedures

All data were collected in English because the Czech university students have English as a second language and English is required and taught in primary school. Furthermore, the two questionnaires used simple English with familiar words especially for students who study the same major (kinesiology/healthy lifestyle). Some of the English words are commonly used in the Czech language, and many times are not translated in the professional literature. For example, the terms physical activity, physical fitness, muscles, BMI, carbohydrate, protein, fat, energy, heart rate, and calories, are used in both English and Czech academic texts and journals, so no translation of these was required.

III. Results

To examine research Question 1, a one-way multivariate analysis of variance (MANOVA) was conducted. The results revealed a significant difference between the two groups in their motives for participating in physical activity: Wilks’ $\lambda = .78, F(5, 69) = 3.79, p = .004$, partial $\eta^2 = .22$. Although the follow up analyses indicated higher composite scores for all five motivating factors (see Table 1), there were no statistically significant differences in the Interest/Enjoyment ($p = .73$), Competence ($p = .07$), or Social ($p = .92$) factors. The U.S. students did score statistically significantly higher for the Appearance ($p = .03$) and Fitness ($p = .008$) factors. The U.S. students mean scores were higher for almost all (29 of 32) of the motivation questions when compared with the Czech students. However, independent t-test analyses only found statistically significant higher scores for U.S. students with regard to external motivation for the Appearance factor, with the following items: “I want to look or maintain weight so I look better” ($t = 2.92, df 73, p = .005$), “I want to be attractive to others” ($t = 2.28, df 73, p = .026$), “I want to improve my appearance” ($t = 2.57, df 73, p = .012$), and “I want to improve my body shape” ($t = 2.3, df 73, p = .024$). Within the extrinsic Fitness factor, the following items were statistically significantly higher: “I want to have more energy” ($t = 3.0, df 73, p = .004$), “I want to improve my cardiovascular fitness” ($t = .369, df 73, p < .001$), and “I want to maintain my physical health and well-being” ($t = 2.3, df 73, p = .024$). The only other item that was statistically significantly different between the Czech and U.S. students was in the intrinsic Competence factor. The US students scored “I like activities which are physically challenging” higher than the Czech students ($t = 1.96, df = 73, p = .05$).

<table>
<thead>
<tr>
<th>Motivating factors</th>
<th>Czech students ($n = 30$)</th>
<th>US students ($n = 45$)</th>
<th>$p$-value</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
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<tr>
<td>Interest/Enjoyment (intr.)</td>
<td>5.29</td>
<td>1.33</td>
<td>5.41</td>
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<tr>
<td>Competence (intr.)</td>
<td>4.92</td>
<td>1.29</td>
<td>5.51</td>
</tr>
<tr>
<td>Appearance (extr.)</td>
<td>4.86</td>
<td>1.82</td>
<td>5.67</td>
</tr>
<tr>
<td>Fitness (extr.)</td>
<td>5.26</td>
<td>1.45</td>
<td>6.12</td>
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<tr>
<td>Social (intr.)</td>
<td>4.15</td>
<td>1.47</td>
<td>4.18</td>
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To address research Question 2, first, we were interested to see if student’s age, gender, and country were related to differences in BMI and PA levels using ANOVA and regression analyses. There were statistically significant differences in BMI and age when comparing the students from each country ($p < .05$). The US students had a statistically significantly higher BMI of 24.4 than the Czech students BMI of 21.5 ($p = .02$, $\eta^2 = .07$). The U.S. students also were statistically significantly older ($M = 21.4$, $SD = 2.1$) than the Czech students ($M = 20.2$, $SD = 1.5$) at the $p = .01$ level. Of note, the range for U.S. students was from 19 years old to 31 years old compared the range for Czech students from 18 years old to 26 years old. No effects were found for
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gender when looking at either the BMI. For this study, steps recorded on pedometers were used as a proxy for PA levels. The Czech Republic students reported an average of 20,251 more steps than students in the US. An independent t-test revealed this to be statistically significant ($t = 3.05, df = 65, p < .01$) with a moderate-to-large .75 Cohen’s $d$ effect size (Cohen, 1988).

A canonical correlation analysis explored any potential relationships between the healthy lifestyle variables of PA and BMI and any potential combination of the five motivation MPAM-R factors. There were moderate to high relationships between the MPAM-R variables (range from .46 to .85), but no significant relationship between pedometer steps and BMI ($r = .09$). There was no significant composite relationship between healthy lifestyle (composite of PA and BMI) and the five motivation factors ($p = .29$).

To address Research Question 3, we explored relationships between basic knowledge about kinesiology/healthy lifestyle and some variables. There was no bivariate correlation between age and knowledge on the test ($r = .02$). An ANOVA found no interaction between age and country or gender as the main effect. Czech students ($M = 19.4, SD = 3.9$) did score statistically significantly higher than the US students ($M = 15.4, SD = 4.3$) on the knowledge test ($p = .003, \eta^2 = .12$). The number of steps from the pedometer was regressed onto BMI and a student’s score on the knowledge test to see if PA knowledge and healthy lifestyle were related to how much PA a student engaged in during the week. There was no statistical relationship between the variables, though there were higher Beta scores for the Czech students (.13 for BMI and .12 for knowledge) than for the US students (.07 for BMI and .01 for knowledge).

Knowledge about the benefits of PA was regressed into stepwise regression model by country and the five MPAM-R variables. Whether a student was from the Czech Republic or U.S. (Beta = -.51) the score on the Interest/Enjoyment factor (Beta = 3.5) were statistically significant predictors ($p <.001$ for both) and accounted for 35% of the total variance ($r = .60$) in knowledge scores. As noted earlier, Czech Republic students had a higher score on knowledge of PA than U.S. students. Also, a person’s Interest/Enjoyment of PA added unique variance to the model with a part correlation = .34.

IV. Discussion

The Czech students were on average younger than the students from the U. S. The primary reason for this difference could be the differences in the university education systems. The Czech university system is a socialized based system that is supported by the government as compared to the U. S. based system that relies heavily on students’ tuition even among public universities. In Czech, to gain access to the university is more competitive (only a limited amount of spaces for certain degrees - free education), and most of the students enter the university immediately after the high school. In the U.S., some students come to the university later in their lives (nontraditional students).

The primary purpose of the study was to examine whether possible differences in motivation to participate in PA between these two groups would influence students’ PA behavior (as measured by their BMI and the number of steps recorded by pedometers) and their knowledge about the subject of study kinesiology/healthy lifestyle (as measured by the self-reported questionnaire). The collected data suggested that there were significant differences in motives to participate in PA between these two groups. College students from the southeastern United States were indicated that they were significantly more motivated to participate in PA than students from the southeastern Czech Republic. The college students from the southeastern United States reported higher motivation on almost all 30 questions with the exception of 3 questions. The only three questions where the Czech students scored higher involved intrinsically motivated questions and were not statistically significant. From the remaining 27 questions, the United States students scored higher. Eight of them were statistically significant; however, only one of the eight questions (question 14) was an intrinsically motivated question. All of the remaining seven questions were extrinsically motivated questions (Questions 5, 13, 16, 17, 20, 23, and 24).

When we examined the five MPAM-R factors, we found U.S. students to have higher composite scores for Fitness and Appearance. However, the main finding of the study was that significant differences in motivation to participate in PA between the two groups did not influence PA behavior and the students’ knowledge about their subject of study- kinesiology/healthy lifestyle. Although the U.S. students reported significantly higher motivation to participate in PA, their BMI was significantly higher ($p = .02$) with moderate effect size ($\eta^2 = .07$) than the BMI of the Czech students. Furthermore, the U.S. students reported significantly
lower steps measured by pedometers (p < .01) than the Czech students and significantly less knowledge about their subject of study – kinesiology/healthy lifestyle (p < .001) than the Czech students.

Prior research has suggested that when people are motivated to do something, the results of that task are much higher than when they are not motivated (Lazear, 2000; Kusurkar et al., 2013). In our study, Interest/Enjoyment was the only motivation factor that was significantly related to knowledge. As there was no significant difference between U.S. and Czech students for this one motivation factor, there was a positive relationship between Interest/Enjoyment and knowledge of PA for all students.

One possible explanation for the lack of relationship between motivation to participate in PA and the actual PA behavior could be that almost all questions (except question 14) that U.S. students answered statistically significantly higher than the Czech students were the extrinsically motivated questions (5, 13, 16, 17, 20, 23, and 24). Extrinsic motivation refers to engaging in behaviors to elicit external rewards or other contingencies derived from performing the behavior itself. Frederick and Ryan (1993) used an earlier version of the same instrument (MPAM) and found that extrinsic body-related motives “were negatively correlated with hours per week of participation and length of workouts” (p. 125-145.). Other studies corroborate the Frederick and Ryan (1993) findings and suggest that extrinsic, body-related motives (appearance and fitness) are not sufficient to sustain regular exercise regimens and that intrinsic motives are more effective for participating in PA (Ryan et al. 1997; Teixeira et al., 2012). Furthermore, the three questions the Czech students answered higher (but not statistically significantly higher) were all intrinsically motivated questions (6, 7 and 22). Findings from this study support earlier research and indicate extrinsic motivation has little to no relationship to participation in PA and knowledge about PA and healthy lifestyles. Other researchers (Edmunds et al., 2006) have disagreed with the importance of intrinsic motivation. They suggest extrinsic motivators to be the driving force behind behavior and suggest extrinsic factors may lead to greater PA participation compared to intrinsic motivators. Our study did not support this.

V. Summary

Although Deckers (2010) suggested that motivation is the driving force behind the action, this study suggests that higher motivation by itself (measured by MPAM-R) is not related to higher levels of PA behavior. Intrinsic motives for physical activity, precisely as the motives relate to interest and enjoyment actors were related to knowledge about healthy lifestyles for college students in the U.S. and Czech Republic. More research is needed to understand how motivation and specifically internal and external motivational forces may or may not influence behavioral changes that relate to higher participation in PA.

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